

NPTEL Phase IV Proposal

-November 23rd 2015

-Domain Experts Committee(DEC) meeting

- Building on the accomplishments of Phases I, II, and III
- Increasing the access and utility of NPTEL content

NPTEL phase IV online course delivery

93 Crores;

Control Number: AEC 3012201413260

Submission date: November, 2015

Translation and Subtitling of NPTEL video lectures in Indian Languages

Rs 39.91 Crore;

Control Number: PEC2602201513271

Submission Date: February, 2015

NPTEL

Accomplishments:

- 933 Live courses (512 Video courses of 40 hours duration, 421 Web)
- Over 350 million views (80% Indian)
- World's most accessed educational channel on YouTube

Present Status:

- Successful rollout of MOOCs based education (2.5 Lakh users, 3.7 Lakh enrolments)
- 93 MOOCs courses – **New (47)/repurposed (46) and delivered in MOOC format**
- Unique features such as online programming exams, successfully deployed for MOOC offering
- Multiple course durations (10 hour, 20 hour, and 40 hour) successfully completed
- Successfully opened Local Chapters in colleges to directly engage MOOC participants. 97 Colleges across 15 states so far.

Future directions:

- Creation of **300 courses** in MOOCs format in 2016 (***effort already on going***)
- 'Shiksha' – internally developed portal for MOOC delivery (***alpha testing stage***)
- Translation and subtitling NPTEL content in more than 15 Indian Languages (***trials completed***)

NPTEL Phase IV Proposal Summary

Name of the Institution: IIT Madras (Coordinating Institute)

Title of the Project: NPTEL Phase IV for the period 2016-2018

Cost of the Project: Rs. 93 crores

Name of the Principal Investigator responsible for implementation of the Project:

Dr. Andrew Thangaraj, IIT Madras (Coordinating Institute)

Dr. Prathap Haridoss, IIT Madras (Coordinating Institute)

Dr. Kushal Sen, IIT Delhi

Dr. Satyaki Roy, IIT Kanpur

NPTEL Summary

Overall Course summary over all phases

	Web course	Video Course	Total
Phase 1	125	138	263
Phases 2/3 (current)	296	374	670
Total	421	512	933

The current numbers of 670 courses delivered during Phase 2 /3 far exceeds the proposed (includes 47 Open Online Courses)

Current phase II/III courses – Institute-wise

Course Type	IISc	IITB	IITD	IITG	IITK	IITKGP	IITM	IITR	Total
Live Courses	61	57	44	77	120	91	141	32	623
Work In Progress (live by Dec 31)	2	15	25	20	12	16	63	6	159
Total	63	72	69	97	132	107	204	38	782

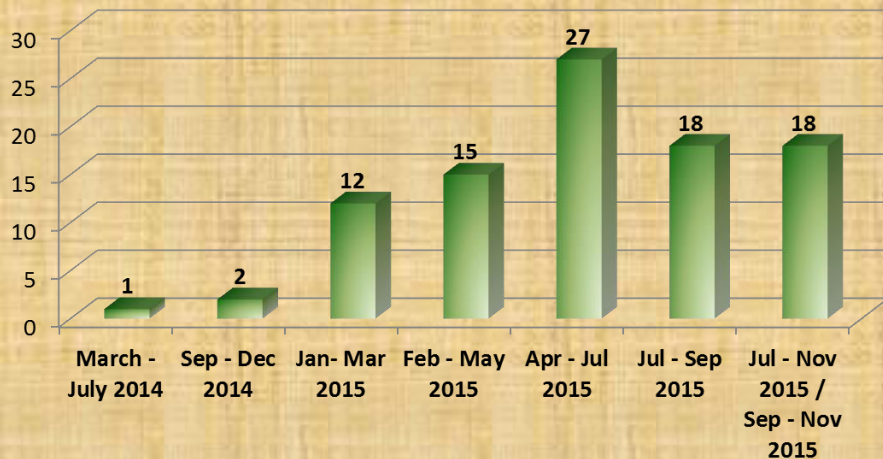
NPTEL Online Courses Delivery Summary

From March 2014 till now

- 7 Course-runs in 2 years
- 93 Courses completed

	40 hour courses	20 hour courses	10 hour courses
Semester	Full Semester	Half Semester	1 credit equivalent
Duration	12 weeks	8 weeks	4-5 weeks
Lectures per week	3-4 hours of lecture per week	2.5 hours of lecture per week	2-2.5 hrs of lecture per week
Workload	Two quizzes or practice exams	Weekly assignments	
Course Material	Mostly use existing NPTEL course material for self-study	Newly created videos	Newly created videos
Total courses conducted so far	44	39	10

Courses



<https://onlinecourses.nptel.ac.in>

The screenshot shows the NPTEL website interface. At the top, there's a red header with the NPTEL logo and a 'Login' link. Below the header, there's a section titled 'Explore Courses' with logos of various Indian Institutes of Technology (IITs). A video player is embedded, showing 'Online Certification Courses' with the NPTEL logo. Below the video, there's a red banner for 'UPCOMING - 10 hr courses - Starting 14 September 2015'. The main content area displays four course cards, each with a title, professor name, department, and a 'Join' button.

UPCOMING - 10 hr courses - Starting 14 September 2015

- Manufacturing systems technology part II**
Prof. Shantanu Bhattacharya
Department of Mechanical Engineering
IIT Kanpur
Course Duration: September 14 2015 - October 23 2015
Short term course - 10 hrs
- Issues in Bioethics**
Prof. SreeKumar Nellickappilly
Department of Humanities & Social Sciences
IIT Madras
Course Duration: September 14 2015 - October 23 2015
Short term course - 10 hrs
- Language and society**
Prof. Rajesh kumar
Department of Humanities & Social Sciences
IIT Madras
Course Duration: September 14 2015 - October 23 2015
Short term course - 10 hrs
- Introduction to Nonlinear Dynamics**
Prof. Gaurav Raina
Department of Electrical Engineering
IIT Madras
Course Duration: September 14 2015 - October 23 2015
Short term course - 10 hrs

Other visible course titles at the bottom: Mass spectrometry based proteomics, Proteins and Gel-Based Proteomics, Principles of Downstream techniques in Bioprocess.

NPTEL Phase IV Proposal – Objectives

- Creation of Open Online Courses
- Repurposing Courses for Online Delivery
- Rerun of Open Online Courses
- Lecture Series on Special Topics
- NPTEL workshops and International Conferences

Creation of Open Online Courses

- Offer free 10-hour, 20-hour, 40-hour online courses
- Basic core courses in sciences and humanities with relevant exposure to tools and technologies
- 2-4 hours of lecture every week
 - The lectures are broken up into short modules
 - Every module
 - Description of contents
 - Expected learning outcomes
- Weekly submission of assignments
- Programming or other assignments every week
- Active interaction through a discussion forum
- NPTEL offices coordinate from sign up to completion of course
- **Proposed: Create 300 Open Online Courses during the period 2016-18**

Repurposing Courses for Online Delivery

- Lecture videos to be annotated or resized into smaller modules.
- Define tangible learning outcomes
- Additional content to be created (if required)
- Plan weekly schedule of lessons
- Weekly assignments to be created
- Content to be moved to online course delivery portal
- Course delivered as per schedule – start date/ end date
- Forums to be manned by TAs
- **Proposed: Repurpose 300 courses during the period 2016-18**

Rerun of Open Online Courses

- A successful course can be offered again either by same SME or a new SME
- Need to alter / create new assignments
- Manage content of the portal
- Respond to questions on the forum
- Based on feedback from the previous run, new content may be created, if necessary.
- Rerun involves little effort in lecture content creation
- But the effort and methodology of running the course is same as before.
- **Proposed: Rerun 200 successful Open Online Courses during the period 2016-18**

Lecture Series on Special Topics

- Highlight excellent contributions on learning native to India
- Get the best exponents of every area for a series of lectures
- Bring India's own traditional knowledge to the fore in a scientific and rigorous manner.
- **Proposed: Create 100 special topics lecture series during the period 2016-18**

NPTEL workshops and International Conferences

- Workshops throughout the country
- Creation of Local Chapters in colleges
- Inform teachers and students , leaders of the industry and general public
- Inform on availability and curriculum adoption of course contents
- Encourage students to participate and obtain knowledge
- Invite faculty members to participate as collaborators
- Support educational institutions that offer NPTEL courses for their students
- Establish online mentoring principles
- Research conferences will be partially supported to provide inputs on
 - Pedagogy, development and implementation
 - ICT tools in NPTEL and NMEICT
- NPTEL has helped previously on Technology Enhanced Learning known as T4E (Technology for Education).

Deliverables of the proposal (year wise)

S.No	Proposed item	2016	2017	2018	Total (deliverables / Courses)
1	Creation of Open Online Courses	100	100	100	300
2	Repurposing Courses for Online Delivery	100	100	100	300
3	Rerun of Open Online Courses	30	70	100	200
4	Lecture Series on Special Topics	25	40	35	100
5	Workshops and research conferences	80	60	60	200

Budget of the Proposal

	Topic	Content	Unit Cost (in Lakhs)	Number	Total Cost (in lakhs)
1	Creation of Open Online Courses	Online course	12.0	300	3600
2	Repurposing Courses for Online Delivery	Course supplements	6.0	300	1800
3	Reruns of Open Online Courses	Course delivery	5.0	200	1000
4	Lecture Series on Special Topics	Lecture Series	6.0	100	600
5	Workshops and Conferences (National and International)	Training and research	5.0	200	1000
6	Travel for Coordinators of various institutes for three years along with coordinator Honoraria and office expenditure for managing NPTEL offices centrally at least in three locations IIT Madras, IIT Kanpur and IIT Delhi	-----	-----	-----	1300
	Overall Total Cost				9300

Budget with item-wise breakup

S. No	Proposed item	Cost (in INR, lakhs) per course					Unit cost	Number	Total
		Human resource support	Web studio hardware/software and infrastructure support	Honoraria to faculty	Student/teacher assistant/mentor online technical support	English text Transcription indexing and assessment material for certification			
1	Creation of Open Online Courses	3.5	1.5	3.5	2	1.5	12	300	3600
2	Repurposing Courses for Online Delivery	2	0.5	1.5	1	1	6	300	1800
3	Reruns of Open Online Courses	2	0.5	1.5	1	-	5	200	1000
4	Lecture Series on Special Topics	2	1	2	-	1	6	100	600

Office, Honoraria and Travel Budget

	Years			In lakhs
	2016	2017	2018	
IIT Madras NPTEL Office	16.5	16.5	17	50
TEL coordinator Honoraria (IIT Madras: Rs. 40 lakhs, 7 other institutes: Rs. 30 lakhs each per Institute. This includes honoraria payment to support staff of the institute for providing all administrative and infrastructure support.) TEL coordinator honorarium will be fixed at Rs. 2.5 lakhs per coordinator per Institute per year				250
Travel expenses for meetings, publicity, coordinators and faculty deliberations on project related matters (Rs. 3.0 crores for coordinating Institute and Rs. 1.0 crore each for seven partner Institutes)				1000
Total				1300

Translation and Subtitling of NPTEL Video Lectures in Indian languages

Proposal aims to increase the reach of NPTEL content **(including online courses)** to students who are more comfortable with instruction in Indian languages, while simultaneously helping them improve their English skills.

Accomplished by subtitling NPTEL video lectures in Indian Languages

*Hindi, Bengali, Telugu, Marathi, Tamil,
Kannada, Gujarati, and Malayalam*

*Urdu, Oriya, Punjabi, Assamese, Santhali,
Kashmiri, Manipuri, and Sanskrit*

The process addresses cognitive skills which might be native to the learner and to help him or her with enhancement of communication skills through constant and persistent training by listening to spoken English.

Grammar structure of Indian languages is different from that of English, automated software cannot be used for generating the subtitles.

In addition, a large amounts of metadata can be created in Indian languages that can be used to search content.

Proposal Summary

Name of the Institution: **IIT Madras (Coordinating Institute)**

Title of the Project: **Translation and subtitling of Higher Education Video Lectures in Indian languages**

Cost of the Project: **Rs. 39 crores**

Name of the Principal Investigator responsible for implementation of the Project:

Dr. Prathap Haridoss, IIT Madras

Dr. Andrew Thangaraj, IIT Madras

Dr. Rajesh Kumar, IIT Madras

Dr. Abhijit P. Deshpande, IIT Madras

Work done – initial efforts

English

Lec-10 Goal Programming Solutions Complexity of Simplex Algorithm

Lec-10 Goal Programming Solutions Complexity of Simplex Algorithm

Example

Minimize $[(\eta_1, \eta_2 + \rho_3), \rho_4, \eta_5]$

$X_1 + Y_1 + \eta_1 - \rho_1 = 20$

$X_2 + Y_2 + \eta_2 - \rho_2 = 20$

$4X_1 + 3X_2 + \eta_3 - \rho_3 = 90$

$4Y_1 + 3Y_2 + \eta_4 - \rho_4 = 20$

$7X_1 + 8X_2 + \eta_5 - \rho_5 = -200$

all these variables from now on. So you can eliminate eta1, eta2, eta3, rho1, rho2, rho3;

11:16 / 49:11

Hindi

Lec-10 Goal Programming Solutions Complexity of Simplex Algorithm

Lec-10 Goal Programming Solutions Complexity of Simplex Algorithm

Example

Minimize $[(\eta_1, \eta_2 + \rho_3), \rho_4, \eta_5]$

$X_1 + Y_1 + \eta_1 - \rho_1 = 20$

$X_2 + Y_2 + \eta_2 - \rho_2 = 20$

$4X_1 + 3X_2 + \eta_3 - \rho_3 = 90$

$4Y_1 + 3Y_2 + \eta_4 - \rho_4 = 20$

$7X_1 + 8X_2 + \eta_5 - \rho_5 = -200$

शुरूआत में हम उद्देश्य फलन के इस भाग को और केवल कठोर बाधाओं पर विचार करते हुए सिंप्लेक्स एल्गोरिथ्म को शुरू करेंगे.

1:16 / 49:11

Gujarati

Lec-10 Goal Programming Solutions Complexity of Simplex Algorithm

Lec-10 Goal Programming Solutions Complexity of Simplex Algorithm

Example

Minimize $[(\eta_1, \eta_2 + \rho_3), \rho_4, \eta_5]$

$X_1 + Y_1 + \eta_1 - \rho_1 = 20$

$X_2 + Y_2 + \eta_2 - \rho_2 = 20$

$4X_1 + 3X_2 + \eta_3 - \rho_3 = 90$

$4Y_1 + 3Y_2 + \eta_4 - \rho_4 = 20$

$7X_1 + 8X_2 + \eta_5 - \rho_5 = -200$

તેથી તમે eta1, eta2, eta3, rho1, rho2, rho3 દૂર કરી શકો છો;

11:19 / 49:11

Telugu

Lec-10 Goal Programming Solutions Complexity of Simplex Algorithm

Lec-10 Goal Programming Solutions Complexity of Simplex Algorithm

Example

Minimize $[(\eta_1, \eta_2 + \rho_3), \rho_4, \eta_5]$

$X_1 + Y_1 + \eta_1 - \rho_1 = 20$

$X_2 + Y_2 + \eta_2 - \rho_2 = 20$

$4X_1 + 3X_2 + \eta_3 - \rho_3 = 90$

$4Y_1 + 3Y_2 + \eta_4 - \rho_4 = 20$

$7X_1 + 8X_2 + \eta_5 - \rho_5 = -200$

eta1, eta2, eta3, rho1, rho2, rho3, వీటిలో ఉండవు, అవి అన్ని అప్రధాన మైనవి, మరియు అవి కనిపించవు; అవి 0 వద్ద ఉన్నాయి.

11:59 / 49:11

Marathi

Lec-10 Goal Programming Solutions Complexity of Simplex Algorithm

Example
Minimize $[(\eta_1 + \eta_2 + \rho_3), \rho_4, \eta_5]$
 $X_1 + Y_1 + \eta_1 - \rho_1 = 20$
 $X_2 + Y_2 + \eta_2 - \rho_2 = 20$
 $4X_1 + 3X_2 + \eta_3 - \rho_3 = 90$
 $4Y_1 + 3Y_2 + \eta_4 - \rho_4 = 20$
 $7X_1 + 8X_2 + 6Y_1 + 7Y_2 + \eta_5 - \rho_5 = 200$

शुद्धता; $\rho_1, \rho_2, \rho_3, \rho_4, \rho_5$ काढून टाकू

Oriya

Lec-10 Goal Programming Solutions Complexity of Simplex Algorithm

Example
Minimize $[(\eta_1 + \eta_2 + \rho_3), \rho_4, \eta_5]$
 $X_1 + Y_1 + \eta_1 - \rho_1 = 20$
 $X_2 + Y_2 + \eta_2 - \rho_2 = 20$
 $4X_1 + 3X_2 + \eta_3 - \rho_3 = 90$
 $4Y_1 + 3Y_2 + \eta_4 - \rho_4 = 20$
 $7X_1 + 8X_2 + 6Y_1 + 7Y_2 + \eta_5 - \rho_5 = 200$

ଭଗା଼, ଭଗା଼, ଭଗା଼, ଭଗା଼, ଭଗା଼, ଭଗା଼, ଭଗା଼, ଭଗା଼ ଭଗା଼ ଭଗା଼ ଭଗା଼ ଭଗା଼
(କ଼େ଼ କ଼େ଼)

Tamil

Lecture-19-Design of Members for Flexure (Type1&Type3)

'C' என்பது T-யிலிருந்து e2 விற்கு சமமான தூரத்திற்கு மேலே நகர்கிறது.

Organisation of work elements

- 1) Reviewing the correctness of all of the existing English transcripts by Subject matter experts.
- 2) Generating a sentence by sentence translation in Indian Languages, with suitably developed guidelines for translation and transliteration in a uniform manner.
- 3) Reviewing the correctness of the translation in Indian Languages, from a language perspective
- 4) Reviewing the correctness of the translation in Indian Languages, from a technical perspective
- 5) Updating the NPTEL videos to support the subtitles in Indian Languages.

Generating documentation towards establishing standards for technical translation and transliteration in Indian Languages, will also be examined.

S.No	Proposed Item	First Year	Second year
1	Reviewing the correctness of the existing English transcripts by Subject matter experts.	40 courses	
2	Generating a sentence by sentence translation in Indian Languages	10 courses in 8 languages + 2	30 courses in 8 languages
3	Reviewing the correctness of the translation in Indian Languages, from a language perspective	course in an additional 8 languages	+ 6 courses in an additional 8 languages
4	Reviewing the correctness of the translation in Indian Languages, from a technical perspective		
5	Updating the NPTEL videos to support the subtitles in Indian Languages.		
6	Conducting awareness workshops		2 workshops on average per

Budget:		1st Year	2nd Year	Total
Item	Details			
Office team 2 senior project officers 12-15 project associates	Rs. 5,00,000	Rs. 60,00,000	With 15 percent enhancements Rs. 70,00,000	Rs.1,30,00,000
Outsourcing translation of 40 courses in 8 languages	Rs. 8,00,000 per language per course	Rs. 6,40,00,000	Rs. 19,20,00,000	Rs.25,60,00,000 (40 courses, 8 languages)
Outsourcing translation of 8 courses in 8 additional languages;	Rs. 8,00,000 per language per course	Rs. 1,28,00,000	Rs. 3,84,00,000	Rs.5,12,00,000 (8 languages, 8 courses)
Honorarium for language coordinators and project coordinators. 2 coordinators per language and 4 overall project coordinators	Rs 1,00,000 per year per language coordinator. Rs. 2.5 lakh per year to project coordinators	Rs. 42,00,000	Rs.42,00,000	Rs. 84,00,000

Workshops and related expenses	Two Workshops on average, in each language. Rs 10000 Per participant, for 200 participants each in 16 Languages	Rs. 1,95,00,000	Rs. 2,95,00,000	Rs. 4,90,00,000
Travel		Rs. 30,00,000	Rs. 30,00,000	Rs. 60,00,000
Equipment		Rs. 1,20,00,000	Rs, 10,00,000	Rs. 1,30,00,000
Consumables		Rs. 10,00,000	Rs. 15,00,000	Rs. 25,00,000
Total				Rs. 39,91,00,000

Thank you

Backup slides

NPTEL Financial Summary – actuals from UCs received

Institute Name	Allocation	Utilized	Balance
IIT Madras (30-Sep-15)	96,00,00,000	92,67,98,510	5,29,51,490
IISc Bangalore (13-Oct-15)	6,05,16,979	5,33,04,212	72,12,767
IIT Guwahati (14-Oct-15)	6,80,65,963	6,30,84,060	49,81,903
IIT Kanpur (5-Oct-15)	14,74,12,600	13,64,87,907	1,09,24,693
IIT Kharagpur (16-Oct-15)	10,69,76,600	11,13,30,656	-43,54,056
IIT Roorkee (19-Oct-15)	3,30,62,033	3,23,19,001	7,43,032
IIT Delhi (20-Nov-14)	7,61,48,551	4,89,03,210	2,72,45,341
IIT Bombay (26-Oct-15)	6,73,70,600	5,85,76,058	87,94,542

The remaining balance in NPTEL funds is 10,84,99,712

Response to Comments on NPTEL Phase IV Proposal

In the first meeting of the Domain Experts Committee held on July 14, 2015, the initial version of the NPTEL Phase IV proposal was presented. The NPTEL team thanks the committee for its careful review of the proposal and various comments for improvement. After the meeting, the proposal for Phase IV has been significantly revised in response to the comments of the committee.

Our responses to the specific queries raised are given below:

Comment 1: *Relevance of various deliverables proposed as many of them are being considered by various other stakeholders.*

Response: In the original proposal, there were more than 10 items with several different deliverables. Following the various queries raised in the meeting, in the revised proposal, the only deliverable is online course content. The other items may possibly be submitted as a separate proposal in the future.

Comment 2: *The financial status of the phase-II/ III project on the sanctioned budget versus expenditure thereon along with UCs, along with the work done and pending status.*

Response: All the commitments under Phases II and III are now complete, and all courses are live on our portal <http://nptel.ac.in>. The necessary UCs are enclosed as separate documents.

Comment 3: *Justifications of the costs proposed for various components of the project - including the justification for inclusion of infrastructure costs, when the unit rate for each course is being proposed.*

Response: The cost per course is in accordance with that proposed by the costing committee for MOOCs. The basic infrastructure needed to support recording of videos including studio equipment, computing hardware and software requirements fall under the category of infrastructure costs. In keeping with previous phases of NPTEL, the infrastructure cost is included with the course unit cost. The same has been recommended by the costing committee for MOOCs.

Comment 3: *Clarification on certification and its format being awarded.*

Response: This proposal is only concerned with the creation of online course content. The certification part is fully independent of this proposal, and may be carried out by the organizing institute, if the institute deems it to be fit. The only connection is that the course content created under this proposal will be such that it is suitable for certification purposes. No funds from this proposal are for the purposes of covering the costs of certification.

From March 2014, as a pilot, NPTEL has been creating open online courses and delivering them through the portal <https://onlinecourses.nptel.ac.in>. Courses in this portal are completely free. However, students who did these courses have the option of registering for a proctored exam, which is conducted in several cities through an exam partner, and obtain a certificate from the Centres for Continuing Education (CCE) of the institute that ran the course. The costs of certification are independent of the course creation. The certificate is given by the CCE of the organizing institute and also has the NPTEL logo on it along with other partners.

We have seen that students and colleges see value in the online delivery of courses and certification. We encourage the participating institutes that create the courses to continue offering certification for value addition to the student community.

Comment 4: *The need and provision of improved Interactive and doubt clearance sessions, in the certification courses.*

Response: The online course portal <https://onlinecourses.nptel.ac.in> has a discussion forum as an integral part of it. Students who have doubts post questions on the forum. The questions on the forum are answered actively by the faculty and the teaching assistants. In addition, periodic announcements are made to all registered students. We present below sample data from a few representative courses:

Name of course	Course duration	Topics in forum	Posts	Number of views	Announcements
Digital Circuits and Systems	Jan-Mar 2015	455	2218	42060	33
Basic Electrical Circuits	Sep-Nov 2014	664	2496	35716	19
Introduction to Programming in C	July-Sep 2015	1244	4662	66006	23
Language and Mind	Jan-Mar 2015	109	199	2179	27
Networks and Systems	July-Nov 2015	236	1182	8394	34

Comment 5: *As some of the deliverables proposed (particularly deliverable mentioned at No.1 above) of Phase IV proposal are related to development and delivery of MOOCs, a clarification is required from MHRD on whether these components of the proposal have to be referred to the MHRD constituted "Implementation and Monitoring Committee on MOOCs Content", chaired by Prof. Bhaskar Ramamurthi, Director, IIT Madras.*

Response: We will be happy to present the proposal to the mentioned committee, if necessary.

Final comments: *After discussions, it was decided that an exclusive one full day session on NPTEL proposal is needed to seek clarifications and answers from PI on questions asked by various members, including above. The PI would also give information about different domain being taken up, Virtual Labs justification and lab kits, etc.*

Response: We hope the above responses have answered the queries raised and provided the necessary clarification. The proposal has undergone a significant revision with much more focus on the topic of online course content creation. We will be happy to present the revised proposal to the Domain Expert Committee on a convenient date.

In summary, we thank the committee members, once again, for their many comments. Our proposal has benefited immensely from hearing the committee members' views on the various topics we had included in the original proposal. The revised version of the proposal has incorporated all the comments, and we are eager to present the revised version to the committee and seek its inputs.

NMEICT

National Mission on Education Through ICT MHRD, Govt. of India

Control Number: AEC3012201413260

Submission Date: Nov 16, 2015

PART I - Personal Details

	PI - 1	PI - 2	PI - 3	PI - 4
Name	Dr. Andrew Thangaraj	Dr. Prathap Haridoss	Dr. Kushal Sen	Dr. Satyaki Roy
Designation	Professor	Professor	Professor	Associate Professor
Organisation	IIT Madras	IIT Madras	IIT Delhi	IIT Kanpur
Postal Address	Web Studio, 3 rd floor, ICSR building, IIT Madras, Chennai 600036	Web Studio, 3 rd floor, ICSR building, IIT Madras, Chennai 600036	Educational Technology Services Centre, IIT Delhi, New Delhi 110016	Media Technology Centre, IIT Kanpur-208016
City	Chennai	Chennai	Delhi	Kanpur
State	Tamil Nadu	Tamil Nadu	Delhi	Uttar Pradesh
Fax	044-22570545	044-22570545	-	-
Email	andrew@iitm.ac.in	prathap@iitm.ac.in	kushal@textile. iitd.ac.in	satyaki@iitk.ac.in
Mobile	9940489032	9444468235	9810602231	9793000770
Project Category	Content Creation and Online Certification	-----	-----	-----

PART II - Information relating to Department/Institute

1. Name of Institute with complete address:

Indian Institute of Technology Madras, Chennai 600036 (Coordinating Institute)

2. Title of the Research Project

NPTEL Phase IV for the period 2016-2018

3. Department/ Broad Area - Not Applicable

4. Major areas of research in the Department - Not Applicable

5. Names & Designation of Principal Researchers in the major areas and list of publications during last 5 years based on work done in the Department:

Dr. Andrew Thangaraj (Professor, IIT Madras), Dr. Prathap Haridoss (Professor, IIT Madras), Dr. Kushal Sen (Professor, IIT Delhi) and Dr. Satyaki Roy (Associate Professor, IIT Kanpur); The CV of the Principal Investigators is attached at the end of this document.

6. **Is it Interdisciplinary Project?** Yes

7. **Is it Inter Institutional Project?** Yes

8. **Is any Industry/User agency participating?** No

9. **Brief of completed and or ongoing research projects supported by MHRD/ AICTE in the Department during last 5 years.**

Please refer Part IV- section 15(a) for details

PART III - Information relating to Department/Institute

10(a) Principal Investigator Details:

1. **Dr. Andrew Thangaraj** is a Professor in the Department of Electrical Engineering at the Indian Institute of Technology, Madras, where he has been since 2004. His areas of research interest are Coding Theory, Information-theoretic Security and Information Theory. For the past five years he has been interested in online and distance education pedagogies and paradigms, and has been an active coordinator of NPTEL Phases II and III for the past three years. He has been heading the NPTEL Massive Open Online Courses (NPTEL MOOC) for the past one year. He is also a content creator for NPTEL Phases II and III. More details are in the CV attached.

2. **Dr. Prathap Haridoss** is a Professor in the Department of Metallurgical and Materials Engineering, Indian Institute of Technology Madras, where he has been since 2003. His areas of interests are Carbon Nanotubes, Fuel Cells, Semiconducting Nanomaterials and Recycling Printed Circuit Boards. For the past five years he has been developing online and distance education pedagogies and coursework and paradigms, and has been an active coordinator of NPTEL Phases II and III for the past two years. He is also a content creator for NPTEL Phases II and III. More details are in the CV attached.

3. **Dr. Kushal Sen** is a Professor in the Department of Textile Engineering in IIT Delhi, where he has been since 1981. His areas of specialization are Dyeing, printing, finishing of natural and manufactured fibers, which come under the area of Textile Chemical Processing. He is a Founder and National Coordinator of Video Courses of the NPTEL Project from the first phase of NPTEL launched in 2003 and has been championing the programme of Eklavya, a Gyan Darshan TV Channel from 2004 and is well versed with

all aspects of NPTEL for the past eleven years. In addition he is a contributor to NPTEL content. More details are in the CV attached.

4. **Dr. Satyaki Roy** is an Associate Professor jointly with the Department of Humanities and Social Sciences at Indian Institute of Technology, Kanpur and the Design Programme. He has been the IIT Kanpur NPTEL coordinator since the year 2005 and has been responsible for the promotion of NPTEL MOOCs in IIT Kanpur and for NPTEL's presence in all the Northern and Eastern States of India. His areas of interest include Graphics, Media and Design. More details are in the CV attached.

Detailed CVs of the PIs are in **Annexure I - CVs of Principal Investigators:**

10(b) Co-Principal Investigator Details:

Not Applicable

11. In case it is a joint project with other Institution, research labs and industries, names(s) of

Participating investigators:

NPTEL is a joint project of the 7 IITs (IIT Madras, IIT Bombay, IIT Delhi, IIT Kanpur, IIT Kharagpur, IIT Kanpur, IIT Roorkee, IIT Guwahati) and IISc Bangalore. NPTEL is administered through a national committee known as the NPTEL Programme Implementation Committee whose members are from each of the Institutes above. In addition there are other national and international experts who are invited from time to time to provide valuable inputs. The list of current NPTEL PIC Members is enclosed as Annexure III to this proposal.

12. In case industry/user agency is participating, whether a MOU has been signed or letter of intent given.

Several industries are partners to NPTEL and a number of MOUs have been signed with them. They are all non-exclusive to the partner industries. In addition NPTEL has signed MOUs and license agreements with national and international agencies to ensure promotion of the educational content and the NMEICT programme without compromising the fundamental integrity of the National effort. These details can be provided on request.

13a) Present commitments of the Principal Investigators:

No major commitments apart from regular departmental and institute duties. All the PIs are active TEL coordinators of NPTEL Phases II and III, which is about to be concluded.

13(b) Present commitments of the Co-Principal Investigators

Not Applicable

14. Other members of the Research Group to work on proposed Projects:

Not Applicable

PART IV - About Research Project

15 (a) Summary of the project (brief):

Over the past ten years, the National Programme on Technology Enabled Learning (NPTEL) has been successful in creating the largest online repository in the world of courses in engineering, basic sciences and selected humanities and social sciences subjects and maintaining the popular online web portal <http://nptel.ac.in>. More than 16000 video hours have been uploaded in NPTEL and NPTEL's YouTube channel, and the portal constitutes the most accessed library of peer-reviewed educational content in the world. Cognizant of the rapid advances and changes in the area of online and distance education with tremendous transformations in efficacy, acceptance and quality of delivery, NPTEL has proposed new activities in the current proposal. Globally, popular online education portals have been witnessing rapid growth. In India, which has the largest growing population of youth in the world, the need for scalable, certifiable education for a large number of students is vital for the future growth of the country, and this need is addressed in this proposal as a key initiative. The main items in this proposal are the following:

- Creation of Open Online Courses
- Repurposing Courses for Online Delivery
- Courses in New Disciplines
- Lecture Series on Special Topics

(b) Justification, importance of projects:

Given its expertise, use and success in the Indian online education context, NPTEL is uniquely placed to be an important player in the country's effort towards affordable, high-quality, online education for all in every area of higher education. To work towards this larger objective, this document presents NPTEL's plans and proposals for the next three years 2016-18. All aspects of current and previous NPTEL proposals have been incorporated in the Mission Document that MHRD created and obtained approval from the Cabinet of Government of India in the year 2009 for launching the National Mission on Education through Information and Communication Technology (NMEICT). NPTEL has continued to

create new vistas in online education and online certification with uniform policy for copyrights and distribution/access of materials throughout the world and provides full support for present and future NMEICT initiatives while creating a credible online programme and a model for the whole nation.

(c) Details of the work already done by Principal Investigator in this area

Introduction and Motivation (along with a summary of the past phases)

The National Programme on Technology Enhanced Learning (NPTEL) was initiated by five Indian Institutes of Technology (Bombay, Delhi, Kanpur, Kharagpur and Madras) and four Indian Institutes of Management (Ahmedabad, Bangalore, Lucknow, and Calcutta (Kolkata now)) in the year 1999. In 1998 some of the Directors visited several Academic Institutions in the United States to explore active learning by students and teaching by faculty using the Internet and Technology Enhanced Learning (TEL). Professor Paul Goodman, Director, Center for Strategic Learning in Carnegie Mellon University (CMU) in Pittsburgh followed the visits with active support for TEL. He was the Director of the Center for Strategic Learning which had been helping CMU faculty create interactive and cognitive learning support using technology. He had also helped establish a highly successful Virtual University in Mexico earlier. Prof. Goodman arranged for a workshop in IIT Madras with funds from Ford Foundation (USA) in 1999. Industry, Government and academics from India and United States participated in the three day workshop conducted by IIT Madras in May 1999 and drafted a proposal a TEL framework for four activities, namely,

1. Creation of electronic and web based content for core engineering, management and basic science curriculum by the IITs and IIMs (about 100 courses)
2. Creation of digital library archives in India following CMU's pioneering effort in that direction,
3. Creation of online guidance for IIM Doctoral students by faculty who would be in other IIMs and
4. Creation of a Virtual Technical University (VTU) once the core content creation process had been standardized with about 500-600 complete one-semester courses.

IITs felt that a number of components such as core content creation and establishing a VTU (or a virtual IIT as the case may be with approval from IIT Council and with active partnership from all IITs and NITs) were vital to online science and engineering education in India as a whole and also the drivers for innovation in design and manufacturing to make the nation competitive in the twenty first century, and needed Government support. With a large number of private institutions in India created already due to liberalization of economy in the nineties and without adequate support of quality faculty the quality of students had started declining; the latter was already beginning to have its effects in the intake quality of M. Tech and M. S students to IITs. Large-scale teacher training and quality monitoring of engineering

students were urgently needed before the situation got out of control. This prompted Prof. M. S. Ananth, Director of IIT Madras, who had earlier written a proposal based on the TEL workshop, to champion the TEL programme to the Government from 1999 onwards for providing high quality, peer-reviewed educational contents freely, as a priority from those four activities listed above; he succeeded in convincing the Ministry and in 2003, funds to the tune of Rs. 15 crores (Rs. 150 million, or equivalently, 3.5 million US Dollars then) were sanctioned for creating a National Programme on Technology Enhanced Learning (NPTEL) that would be coordinated by IIT Madras with six other IITs and IISc Bangalore. Five core disciplines were identified, namely, civil engineering, computer science and engineering, electrical engineering, electronics and communication engineering and mechanical engineering; in addition core science, language and management courses that all engineering students needed would be developed as the sixth discipline. Undergraduate courses covering the syllabi provided by the model curricula of All India Council of Technical Education would be the focus along with relevant components of three large affiliating engineering Universities in India at that time, Anna University (Tamil Nadu), Jawaharlal Nehru Technological University (Hyderabad) and Visvesvaraya Technological University (Karnataka). The courses would be modularized so that there is flexibility in their use by Universities and colleges. Between six to twelve modules containing three to four lectures each would be developed with sixty to eighty percent of the course covering core syllabus materials.

The Minister for the Human Resource Development, Dr. Murli Manohar Joshi, requested the project coordinators in 2003, soon after sanctioning funds, to restructure the proposal for 200 web based courses to about 100 full broadcast quality, video recorded courses and 100 online web based educational material. He argued that television had the last mile reach in India (which is a fact even today after eleven years of various interventions with Internet!) with more than forty percent of colleges in rural and semi-urban locations; internet had not penetrated even in the cities and reaching out to teachers and students had to be done fast with the steady increase in the opening up of new institutions and requirements for a large number of engineering students in the IT industry. The presence of a teacher, through the medium, could be quite influential to the students and other learners for the learning process. He created a new GyanDarshan T. V. Channel and named it as Ekalvyas, which began hosting NPTEL content from 2005 until June of this year.

The first phase of the programme was completed in 2007 with about 130 video courses each containing approximately forty one-hour lectures recorded with high quality broadcast studios in seven IITs

(including Roorkee and Guwahati which had been formed already) and the Indian Institute of Science. Another 130 courses were created as web based lecture materials with animations and other completely in-house contents. The requirement for adherence to copyrights was impressed upon faculty early-on and in return, the Government had agreed for a one-time honorarium to the faculty who contributed to the teaching-learning process through their intellectual property. In order to facilitate content development in both the video and the web format, studios were created with state-of-the-art recording facility and computer-software-human technical support infrastructure in each of the eight institutes. An additional 5.5 crores of Indian Rupees was released towards the end the first phase to cover the costs of more than 60 courses that were added over and above the sanctioned number of 200 courses. **Recording from other books, scanned pictures and use of one's own text books in both web and video lectures were forbidden and this practice enabled NPTEL later to adopt Creative Commons copyright license to the NPTEL project.**

NPTEL activities summary for Phases II and III during 2009-2014

The video lectures from the first phase needed to be converted from the high-resolution broadcast format to low-resolution Internet streaming format in order to enable any-time, any-place access by any one. Google Inc. came forward with the option of providing a free Indian educational channel in YouTube similar to their offer to MIT, Stanford and University of California system in 2006. Dr. Ramanathan Guha, an Alumnus of IIT Madras and a senior Vice-President in Google spearheaded the effort inside his organization. The channels would be free of commercials and would be administered by the NPTEL academic team. In addition Google would provide data on analytics of usage. After considerable discussions among the Directors of IITs and IISc (who were the custodians of intellectual property created by their faculty) , approval was given to the NPTEL Project Implementation Committee to compress the videos and upload them in the YouTube. The programme was launched on Nov 5, 2007 and has registered more than 120 million channel views until Sep 2015. It is the single, largest, free academic channel in the world hosting more than 15000 curriculum based lectures videos (all in English) recorded by faculty in IITs and IISc and is growing everyday with uploads of new lectures. Every country in the world has viewers on that channel. Some of the videos have crossed the million-viewer mark. The largest number of YouTube users (75-80 percent) is from India. Corporates and academic institutions in India and abroad use the contents freely. In an Appendix to this document data on usage of some of the courses is provided.

The main goal of Phase II (2009-14) was to build on the engineering and core science courses launched previously in NPTEL Phase I by the Ministry for Human Resource Development, Government of India on

September 03, 2006 and create online course contents and interactions between faculty members in science and engineering using the best academics in India. The main deliverables in Phase II were the following:

1. Conversion of NPTEL phase I video courses in streaming video lecture format and setting up eight distributed national video servers for delivering lectures on demand in each of the eight partner institutions.
2. Creation of additional 600 web and video courses in all major branches of engineering, physical sciences at the undergraduate and postgraduate levels and management courses at the postgraduate level.
3. Integration of College curricula in engineering education with NPTEL contents through a large number of course specific workshops and interaction with Colleges in India for improving TEL infrastructure.
4. Creation of discussion forum for each course created under the NPTEL using a grid of computer servers and setting up FAQ's for each course.
5. Indexing of all video and web courses and setting up powerful search engines to enable content and keyword search on all topics in science and engineering developed under NPTEL.

Setting up internal infrastructure in each IIT for implementing virtual online certification programmes in science and engineering.

16 .Total amount required for Phase IV (2016-18): Rs. 93 crores

	Topic	Content	Unit Cost (in Lakhs)	Number	Total Cost (in lakhs)
1	Creation of Open Online Courses	Online course	12.0	300	3600
2	Repurposing Courses for Online Delivery	Course supplements	6.0	300	1800
3	Reruns of Open Online Courses	Course delivery	5.0	200	1000
4	Lecture Series on Special Topics	Lecture Series	6.0	100	600
5	Workshops and Conferences (National and International)	Training and research	5.0	200	1000

6	Travel for Coordinators of various institutes for three years along with coordinator Honoraria and office expenditure for managing NPTEL offices centrally at least in three locations IIT Madras, IIT Kanpur and IIT Delhi	-----	-----	-----	1300
Overall Total Cost					9300

17(a) Recurring budget of the proposal along with item-wise breakup (Manpower, Contingency, Consumable, Travel, Miscellaneous year wise breakup).

S. No	Proposed item	Cost (in INR, lakhs) per course					Total cost (per course) in INR, lakhs	Number of courses	Total (INR in lakhs)
		Human resource support#	Web studio hardware/ software and infrastructure support	Honoraria to faculty	Student/ teacher assistant/ mentor online technical support	English text Transcription, indexing and assessment material for certification			
1	Creation of Open Online Courses	3.5	1.5	3.5	2	1.5	12	300	3600
2	Repurposing Courses for Online Delivery	2	0.5	1.5	1	1	6	300	1800
3	Reruns of Open Online Courses	2	0.5	1.5	1	-	5	200	1000
4	Lecture Series on Special Topics	2	1	2	-	1	6	100	600

#Human resource support includes 30% House Rent Allowance (HRA)

Item 6. Travel for Coordinators of various institutes for three years along with coordinator Honoraria and office expenditure for managing NPTEL offices centrally at least in three locations IIT Madras, IIT Kanpur and IIT Delhi

	Years			In lakhs
	2016	2017	2018	
IIT Madras NPTEL Office	16.5	16.5	17	50
TEL coordinator Honoraria (IIT Madras: Rs. 40 lakhs, 7 other institutes: Rs. 30 lakhs each per Institute. This includes honoraria payment to support staff of the institute for providing all administrative and infrastructure support.) TEL coordinator honorarium will be fixed at Rs. 2.5 lakhs per coordinator per Institute per year				250
Travel expenses for meetings, publicity, coordinators and faculty deliberations on project related matters (Rs. 3.0 crores for coordinating Institute and Rs. 1.0 crore each for seven partner Institutes)				1000
Total				1300

18. SUMMARY SHEET:

1. Name of the Institution: IIT Madras (Coordinating Institute)

2. Title of the Project:

NPTEL Phase IV for the period 2016-2018

3. Name of the Department: Not Applicable

4. Cost of the Project: Rs. 93 crores

5. Amount released earlier if any: None

6. Utilization position in respect of grants released earlier (upto 2001) for various projects (Details to have given project wise)

a. Fully spent: Not Applicable

b. Unspent, proposal to utilize it: Not Applicable

7. Reasons for unspent balance: Not Applicable

8. Name of the Principal Investigator responsible for implementation of the Project:

Dr. Andrew Thangaraj, IIT Madras (Coordinating Institute)

Dr. Prathap Haridoss, IIT Madras (Coordinating Institute)

Dr. Kushal Sen, IIT Delhi

Dr. Satyaki Roy, IIT Kanpur

PART V - Detailed Project Report (DPR)

1. Objective:

The main aspects of the proposal are the following:

1) Creation of Open Online Courses

Through an online portal, it is proposed to offer free 4-, 8- or 12- week or full-semester online courses typically on topics relevant to students, preferably in their final years of higher education along with basic core courses in sciences and humanities and relevant exposure to tools and technologies. The portal includes support for weekly submission of assignments by students and active interaction through a discussion forum. These courses are suitable for possible certification by any participating organization. As a pilot, since March 2014, online courses are being run by NPTEL. A total of 45 courses have already been newly created as open online courses. We propose to create 300 new courses in Phase IV.

2) Repurposing Courses for Online Delivery

Existing NPTEL courses were created without an explicit online course delivery model. In online delivery of courses, the videos have to be annotated and, if needed, broken up into smaller pieces. Also, weekly assignments have to be added, and the entire content needs to be moved to an online course delivery portal. In the pilot phase, since March 2014, a total of 9 courses have been repurposed for online delivery. We propose to repurpose 300 existing courses in Phase IV.

3) Reruns of Open Online Courses

An open online course, once created and run, can be offered again at a future time. However, during a rerun, the assignments are typically changed and questions in the discussion forum will have to be answered. If needed, new content is created based on feedback from previous course runs. In the pilot phase, since March 2014, 4 courses were rerun. We propose to rerun 200 courses in Phase IV.

4) Lecture Series on Special Topics

To highlight excellent contributions on learning native to India and invigorate its younger citizens, it is proposed to bring the best exponents of every area in higher learning for delivering a series of lectures. Four such lecture series have been created in 2013-14. They are in the areas of Ayurveda, siddha medicinal practices, Indian contribution to mathematics from First Century AD and Psychology. The science behind professional practices of ancient India and its arts and culture are some of the areas actively being promoted. It is proposed to create at least 100 such special topics lecture series during the period 2016-18 to bring the learning from our past to the present and the future generations using ICT.

5) NPTEL workshops and International Conferences

Workshops will be conducted throughout the country for fostering and promoting NPTEL and NMEICT. Research Conferences will be partially supported to provide inputs to pedagogy, development and implementation of ICT tools in NPTEL and NMEICT and to create rigorous peer-review mechanisms for ICT in education. The conferences will also have other sources of funding through registration and sponsorship outside of NPTEL funding. NPTEL has helped in the creation and organization of the research conference series in India on Technology enhanced learning known as T4E.

2. Methodology:

The exact methodologies to be followed for achieving the objectives are detailed in this section.

1) Creation of Open Online Courses

Online courses are to be offered along the lines of Massive Open Online Courses (MOOCs). A typical online course contains the following:

1. Clear assumptions about prerequisites for a learner
2. Clear learning outcomes
3. 8-12 weeks in duration or full semester courses
4. 2-4 hours of lecture every week
 - The lectures are broken up into short modules
 - Every module has a clear description of its contents and expected learning outcomes
5. Objective-type assessments every week (to be auto-graded)
6. Programming or other assignments every week (to be auto-graded or peer-graded)

Subject Matter Experts

Subject Matter Experts (SMEs) will be invited from all over India to create the video lectures and other content adhering to a curriculum. If the SMEs already have a course in NPTEL, that course may be modified to meet the requirements of an online course. However, all the important pedagogical aspects of the online course will be met – prerequisites, learning outcomes, splitting into weeks and short modules, weekly assessments and assignments will be provided.

The content of the online course will be peer-reviewed to see if it meets all the requirements. Even if the online course is created from an existing NPTEL course, a second round of peer review will be carried out to confirm that the newly created online course is suitable for open offering.

The effort of the SMEs for content creation and that of the reviewers will be funded adequately and according to norms approved by the Standing Committee and the PAB of NMEICT from time to time. The role of the SMEs will not end with content creation. The SME team (assuming there are more than one for a particular course; the team could have a single SME as well) will play a crucial role in the conduct of the course on the portal. The SME team will be assisted by a group of Teaching Assistants (TAs) provided by the SME team's department at their institute.

Course announcement

Once a course is ready, it will be announced on the portal for students to sign up for the course. The announcement will include the following:

- Date when sign-ups are opened
- Date when sign-ups will be closed
- Start date for the course
- End date for the course

Sign-up

Sign-up will be kept open typically for a month or two. Anyone who signs up will get a welcome email and get added to email lists for course announcements and course discussion. The welcome email for these lists will be drafted by the SME team. This will be done on the portal. The SME team and TAs will have course admin logins in the portal, and this will allow them to manage the content and the email lists.

Uploading content

The course will open on the announced start date. Content will be released every week: Week 1 to Week 8 or 12, or the entire semester. Content includes video lectures, lecture slides, additional material, assessments and assignments. The SME team and TAs will be responsible for uploading the content on the portal, formatting it suitably, making it public and posting an announcement in the announcement email list about the content being available.

A suggested practice is to upload all content by Wednesday of the previous week, check the content for a couple of days and then make it public on Sunday night or Monday morning. The SME team and TAs will function as a well-knit group that would meet often and discuss the modalities of running the course.

Solutions for the assessments and assignments will be created and uploaded on the portal. Whenever possible, suitable videos will be created for explaining the solutions.

Forum

An important duty for the SME team and TAs during the running of the course is monitoring the forum. The discussion forum on the portal tends to be very active and numerous questions are posted in it on a daily basis. The SME team and TAs will respond to the questions every day.

Multiple runs

The same course may be run multiple times depending on the availability of the SMEs and the necessity as recognized by requests from institutions. The rerun may also be done by a different team of SMEs, who will create/manage the content and the running of the course on the portal. The efforts of the SME team and TAs in running the course on the portal will be remunerated at applicable and suggested rates provided in the budget details in a later section.

Pilot courses and portal (data ownership and integrity)

For the pilot courses, NPTEL has a partnership with Google for maintaining the portal. This is through a Google App Engine agreement, which many businesses use today. Through this, NPTEL and NMEICT will continue to own all the data on the portal and also access it. Developers and designers from Google have contributed significantly to the coding and the look-and-feel of the portal. They have extended full support for some time at least, through a personal oral and written assurance by the Google's software Head to the Secretary and the Mission Director. Google also released a white paper on how its

processes and support will be made available to NPTEL without any cost for its involvement. All of this is also due to a relationship that NPTEL has developed with the best search engine team in the world for helping with NPTEL analytics so far from 2007 when it launched the video channel with YouTube. The popularity of the YouTube IIT channel has belied everyone's expectations including Google. However, NPTEL will initiate efforts from the date of sanction of the project to migrate open source codes from Google cloud to a cloud identified by the NMEICT and integration effort will be carried out. The fully open coursebuilder codebase has been built on it significantly, and the entire codebase is in a git repository owned by NPTEL.

An important development effort from engineers in Google India is the support for programming assignments through an installation of a Mooshak instance and its connection to the portal. The Mooshak instance is being run on a Google Compute Engine instance, which, once again, through a suitable agreement, is owned by NPTEL. Google has donated all the development time and server space for the portal.

2) Repurposing Courses for Online Delivery

SMEs who already have an NPTEL course will work with the recorded video lectures and content from the other quadrant to repurpose their existing course into an open online course suitable for online delivery through the portal. The methodology involves porting the content to the online course portal in a suitable format. Typical tasks include adding annotations for video lectures to describe the content, uploading the content onto the portal and adding weekly assignments.

The running of the course is similar to that of a newly created course. The effort of the SME is lesser for repurposing because new video lectures are not being created. However, the effort of running the course – managing the content on the portal and responding to forum posts – are same as that of a newly created course.

3) Rerun of Open Online Courses

Once a course has been uploaded onto the portal and successfully run once, it can be offered again at a future time. At this time, either the same SME or a new SME, will be expected to alter the assignments suitably, manage the content of the portal, and respond to questions on the forum. Based on feedback from the previous run, new content may be created, if necessary.

A rerun involves little effort in lecture content creation, but the effort and methodology of running the course is same as before.

4) Lecture Series on Special Topics

To highlight excellent contributions on learning native to India and invigorate its younger citizens, it is proposed to bring the best exponents of every area in higher learning for delivering a series of lectures that will bring India's own traditional knowledge to the fore in a scientific and rigorous manner. Four such lecture series have been created in 2013-14 on a trial basis. It is proposed to create 100 such special topics lecture series during the period 2016-18.

NPTEL would launch, in addition to creating courses in more areas such as humanities, arts and sciences, performing arts such as music, motion picture, theatre and drama, special lecture programmes comprising of fewer but more focused lectures by experts in various fields in India. Strengthening the core humanities and social science programme online is envisaged as a fundamental need of the hour to engage students meaningfully and to bring out the best of culture and tradition as an embodiment of scientific knowledge. A large number of these lectures can be elective/special topics for students in higher education. Already, the following four programmes have been created:

- a. Lectures on Ayurvedic Tradition of India by Padma Vibhushan Prof. M. S. Valiathan of Manipal University,
- b. Lectures on Mathematics in Ancient and Modern India by Prof. M. D. Srinivas, Prof. Sriram (both from Madras University) and Prof. Ramasubramanian (IIT Bombay) who are international experts on the history and contribution of Indian Mathematicians to modern mathematical thought,
- c. Lectures on Creativity in Indian Art and Culture and Temple inscriptions, in the Chola period of Tamil Kingdoms by the renowned archeologist Dr. Nagaswamy (Chennai), and
- d. Lectures on Selected Topics in Psychology, by renowned people in the areas of Psychology and Psychiatry. The contributors are experts from IIM Bangalore, NIMHANS, Delhi University, Allahabad University, DRDO and ASSERT along with other experts in Neuro Radiology as well as R&D establishment. The series was coordinated by Prof. Braj Bhushan, Department of Humanities and Social Sciences, IIT Kanpur.

The objective is to recreate excellent contributions on learning native to India, to its younger citizens as formal education content. Hundreds of such topics are envisaged in the coming years and NPTEL will continue to bring the best exponents of every area in higher learning and India's own traditional

knowledge to the fore. While humanities and social sciences subjects cannot be separated from the convictions and opinions of individual exponents, a scientific process of enumerating counter and contrary thoughts processes of others by the same individual expert offering the course as a part of his or her lectures is being made a requirement to let the learner learn the topics more objectively. A total of 100 titles are proposed with 20 or fewer lectures in each title (not less than 10 per topic to ensure reasonable depth and to form a part of elective for students).

5) NPTEL workshops and International conferences

Workshops will be conducted throughout the country with the following objectives:

1. Inform teachers and students throughout the country as well as leaders of the industry and general public in the region about the availability and curriculum adoption of course contents developed by NPTEL. Encourage students to participate and obtain professional and competent certificates.
2. Invite faculty members to directly participate in NPTEL and NMEICT programmes as collaborators with adherence to the quality and content standards and procedures already in place and to evolve them with more participation by Universities, scientists in the national and private research labs and industry experts.
3. Evolve suitable mechanisms and support for educational institutions that offer NPTEL courses for their students and to establish online mentoring principles.

Research Conferences will be partially supported to provide inputs to pedagogy, development and implementation of ICT tools in NPTEL and NMEICT and to create a rigorous peer-review mechanism for ICT in education. The Conferences will have other sources of funding through registration and sponsorship outside of NPTEL funding. NPTEL has helped in the creation and organization of the research conference series in India on Technology Enhanced Learning known as T4E (Technology for Education). It is fully sponsored by the IEEE (USA) Society under the Computer Society's division on Learning Technologies. Its chairs have been Prof. Demetrio Sampson (University of Greece, Greece) and Prof. Kinshuk (Athabasca University, Canada). Prof. Mangala Sunder who was the National Coordinator of NPTEL Web Courses for the period 2003-2014 has also been the Chair of the Steering committee of T4E approved by the IEEE till December 20, 2014. Steering Committee on T4E is the Apex body for selecting and approving proposals to hold research conferences in this area in India with the sponsorship of IEEE. Proceedings are published as peer-reviewed papers by IEEE fostering research and

tools in online education and pedagogy research, which are also listed as goals of the NMEICT Mission.

Four fully sponsored T4E have been conducted in the past. They are

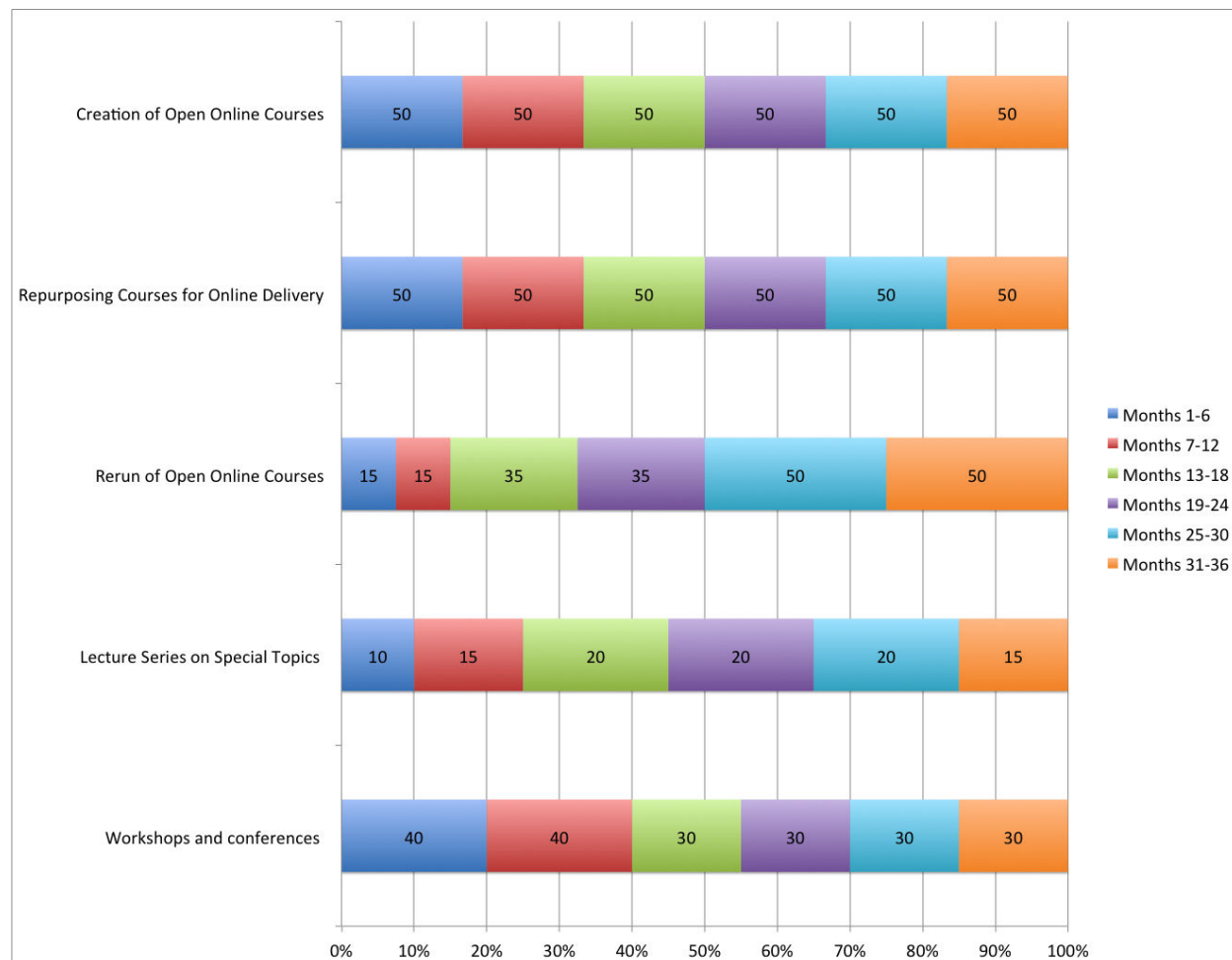
1. T4E 2011, IIT Madras
2. T4E 2012, IIIT Hyderabad
3. T4E 2013, IIT Kharagpur
4. T4E 2014, Amrita University, Kollam Campus
5. T4E 2015, NIT Warangal (Scheduled)

Two co-sponsored T4Es were held in the years 2009 (IIIT Bangalore) and 2010 (IIT Bombay) before IEEE upgraded the Conference to a fully sponsored event. Many International experts in educational technologies and pedagogies in online education have already participated and have been apprised of NMEICT and NPTEL. Panel discussions in these conferences devote adequate time to inform national and international educationists and researchers in the field of educational technology about Government of India's active role in promoting quality higher education and invite them to participate and contribute to the resource creation. The full proceedings have been published in several websites under T4E and will be archived for public access in the immediate future.

3. Deliverables year wise and its possible contribution to major objectives of mission.

S.No	Proposed item	2016	2017	2018	Total (deliverables / Courses)
1	Creation of Open Online Courses	100	100	100	300
2	Repurposing Courses for Online Delivery	100	100	100	300
3	Rerun of Open Online Courses	30	70	100	200
4	Lecture Series on Special Topics	25	40	35	100
5	Workshops and research conferences	80	60	60	200

4. Time schedule (half yearly):



The above graphic shows how the item-wise deliverables are spread out over the 3-year duration of the project.

5. Details of permanent assets to be procured from the project with estimated cost.

The total budget allocated for Webstudio hardware/ software and infrastructure support is Rs. 8 crores.

This total amount is to be split as follows into equipment and consumables.

Proposed:

Details	Amount (in crores)
Equipment	6
Consumables	2
Total	8

Equipment Details:

The total budget of Rs. 6 crores for equipment is to be split as follows. The split is based on similar expenditure in previous NPTEL phases.

Item Details	Amount in Crores
COMPUTER SYSTEMS BOUGHT FOR VIDEO PROCESSING AND FOR THE WEB STUDIO	1.2
EQUIPMENT RELATED TO STUDIO	3.2
SERVER RELATED	0.6
SOFTWARE	0.8
MISC.	0.2
Total	6

More details about the exact equipment proposed to be purchased are presented in Annexure II of the proposal.

6. Details of financial outlay in year wise for recurring and nonrecurring fund

Item	Year 1	Year 2	Year 3	Total
Equipment	4	2	0	6
Consumables	1	0.5	0.5	2
Staff salary	7.5	7.5	7.5	22.5
Total	12.5	10	8	30.5

(All costs are in crores)

Consumables include filing cabinets/ stationery/ Labour/ furniture/ refreshment/ flooring/ repairs/ books/ fans / Video Tapes.

Annexure II provides sample expenditure of IIT Madras – NPTEL project for the previous phases.

7. Management of Deliverables & IPR etc.

All learning materials developed on this project will be released as Open Education Resource (OER) Creative Commons By Attribution ShareAlike (CC BY SA 4.0 India), which is consistent with NMEICT guidelines. All software developed will be licensed through an appropriate open source license.

8. Justification of the projection with clear cut statement about outcomes if the project contributing to mission objective.

The Mission objectives are fully met by this proposal in the area of content creation, pedagogical and instructional design, online ICT tools and development of platforms. The outcomes of the past NPTEL activities have been coherent and were released as unanimously approved by the partner institutions. At every stage NPTEL proposal has provided the Mission document and founders of the Mission with the necessary clarity on the proposed objectives of the Mission in 2009 with its experience preceding the Mission for six years (2003 – 2009).

PART VI: Uploaded CV and DPR

Uploaded CV: Yes

Uploaded DPR: Yes

Part VII - DPR Summary

1. Objective :

This project proposes to deploy the power and advantages of technology enhanced learning (TEL) using ICT to build capabilities of professionals and students (UG level and above)

2. Deliverables :

S.No	Proposed item	2016	2017	2018	Total (deliverables / Courses)
1	Creation of Open Online Courses	100	100	100	300
2	Repurposing Courses for Online Delivery	100	100	100	300
3	Rerun of Open Online Courses	30	70	100	200
4	Lecture Series on Special Topics	25	40	35	100
5	Workshops and research conferences	80	60	60	200

Milestones and Payments:

Timeline	Percentage of payment	Payment (crores)	Milestone
Start of project	26.88%	25	-
End of Year 1	26.88%	25	Progress towards deliverables for Year 1
End of Year 2	26.88%	25	Progress towards deliverables for Year 2
Mid of Year 3	19.35%	18	Progress towards deliverables for Year 3

The milestones will be assessed and monitored through regular meetings of the NPTEL Programme Implementation Committee.

Arrangements for quality control: Platform quality control is exercised through a review by a committee of users and technical experts. Content quality control is exercised through faculty selection and content review; process quality control is patterned after globally emerging practices for online certification with special reference to NPTEL.

Accuracy: Platform accuracy is verified through standard software engineering practices. Content accuracy will result from the quality control exercises.

Coverage: Nationally Open for participation in certification; content is science-based and contextually national; the portal is globally open for browsing and for certification in limited places.

Updating Mechanism: Platform will be continually updated throughout the project phase, with feedback from each course offering. Subsequently, the platform will be put in an appropriate Open Source license. Content will be updated as appropriate based on inputs and suggestions from peers and from online communities in the MOOCs. Further, content will be released under NPTEL content licensing scheme (Creative Commons CC BY SA 4.0 India). The idea of using Creative Commons for all NPTEL content was first initiated by the NPTEL coordinator Prof. K. Mangala Sunder in the year 2011 to the NMEICT and has now been adopted as the Universal model for all contents released under NMEICT. The document which enabled this change has been uploaded in the NPTEL website and is free for everyone to view.

Testing by Users: Both content and services are provided in a “permanently beta” mode, open to continuous evaluation and subject to continual improvement.

Testing by Peer Group: Please see above comment.

4. Scaling up

NPTEL online courses model is designed in a scalable manner to reach a large number of students and learners. Through online courses, we plan to offer certification to interested students spread across the country and even internationally.

All NPTEL content is hosted on web servers and on YouTube and a National server that is being mirrored at multiple locations. This enables scalable distribution of content across the globe.

5. Popularizing and extension activities and plans

NPTEL activities and efforts will be popularized through workshops conducted in colleges all over the country. A total of 700 plus workshops have been conducted in the past five years. It is proposed to

popularize NPTEL through similar workshops for the next three years. In addition, it is proposed to use online advertisement methods and popularization through facebook/twitter and other similar social network portals.

6. Review Mechanism

All NPTEL content is peer-reviewed. Reviewers from a list approved by the coordinator are contacted for comments. The comments are provided to the content creator for incorporation and editing. The content creation process is deemed to be complete only after the peer review is complete.

For project review, it is proposed to continue with the same committee chaired by Prof. Arun Nigavekar (Former UGC Chairman) and ten to twelve members who reviewed the NPTEL Phases II and III in September 2014. The list of committee members with their affiliations as of Sep 2014 is given below.

- 1) Prof. Arun Nigavekar, Former UGC Chairman, Pune
- 2) Prof. P. Rama Rao, Chairman Governing Council, International Advanced Research Centre for Powder Metallurgy & New Materials (ARCI), Balapur PO, Hyderabad
- 3) Prof. Bandhopadhyay, former VC, Indraprastha University
- 4) Prof. Sunil Sarangi, Director, NIT Rourkela
- 5) Prof. Sandip Sancheti, Vice Chancellor, Manipal University, Jaipur
- 6) Prof. V. Ramachandran, Director, NIT Nagaland
- 7) Prof. M. K. Surappa, IIT Ropar
- 8) Shri. Kris Gopalakrishnan, Infosys
- 9) Prof. Ashok Mishra, Chairman, BOG, IIT Roorkee
- 10) Shri. Ravi Shankar, I. A.S. Additional Secretary, Dept. of Electronics and Communication Technology, New Delhi
- 11) Shri. N. K. Sinha, I. A. S. Principal Secretary, IT, Government of Bihar
- 12) Prof. S. Ramani, formerly Founder NCST and Director, HPLabs, Bengaluru
- 13) Prof. Ramakrishna Ramaswamy, Vice Chancellor, Central University of Hyderabad.

7. Budget

Overall Total Cost	Rs. 93 Crores
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	Human resource support	Webstudio hardware/ software and infrastructure support	Honoraria to faculty	Student/ teacher assistant/ mentor online technical support	English text Transcription, indexing and assessment material for certification	Other heads	Total
Creation of Open Online Courses	10.5	4.5	10.5	6	4.5	-	36
Repurposing Courses for Online Delivery	6	1.5	4.5	3	3	-	18
Rerun of Open Online Courses	4	1	3	2	-	-	10
Lecture Series on Special Topics	2	1	2	-	1	-	6
Travel / Honoraria / NPTEL Offices*			2.5			10.5	13
Workshops and research Conferences #			0.5			9.5	10
Total	22.5	8	23	11	8.5	20	93

(All costs are in crores)

*Travel expenses have been adjusted for inflation and increased fares and are otherwise based on the NPTEL proposal submitted to the Cabinet and to the NMEICT Mission in 2009. A copy of that will also be uploaded as support document for this proposal once a provision has been made.

#Workshop and research conferences will be supported in the same form as has been done till now. The budget for the NPTEL workshop for a typical 2-3 day workshop was approved earlier in 2009 by NMEICT for a sum of Rs. 4.0 lakhs and has been revised to Rs. 5 lakhs after adjusting for increased travel costs. Otherwise the unit cost is unaltered from the previous budget.

Focused comments on:

Total honorarium to be paid in the project:

Item No	Item Description	Honorarium per unit (in crores)	No. of Units	Rs. Total (in crores)
1	Creation of Open Online	0 .035	300	10.5

	Courses			
2	Repurposing Courses for Online Delivery	0.015	300	4.5
3	Rerun of Open Online Courses	0.015	200	3.0
5	Lecture Series	0.02	100	2.0
5	Workshops	0.0025	200	0.5
6	PI and Support staff	-----	-----	2.5
	Total			23

Individual costs have all been identified under every category. Apart from technology tools, this is also a human intensive project in content creation of the best kind in the whole world and faculty, students and other contributors have been provided with honoraria at the rates approved by NMEICT earlier for many of its other projects as well. Therefore, the justification for this process has been amply given for the total amount of honorarium that includes all payments to all content generators and to the support groups involving teachers, students and other employees for three years.

8. Cost benefit analysis including cost effectiveness approach viz-a-viz other alternatives:

The cost effectiveness of online course delivery and certification has been proven by our pilot courses run so far. The cost per student for certification is around Rs. 1000, which is affordable to most students. The cost of content creation is a one-time cost and the benefits accumulate over a long period of usage by students. Compared to other alternatives, the proposed NPTEL Online Courses model provides high quality content to all students in a scalable manner. Content creation through NPTEL is done predominantly using NPTEL studios maintained at all the institutions. So, the content creation process is cost-effective for those who certify through special MOOCs and NOCs.

The cost effectiveness is calculated with the total number of participatory learners to the whole programme and is arrived approximately as follows. From NPTEL Phases I, II and III the website has recorded more than 220 million visits till now and represent between forty to sixty percent of all viewers. More than 90 percent of these visits are due to NPTEL Phase II/III during the period 2009 – 2014. The scaling down to 40 percent is appropriate since more than 900 educational institutions and several university campuses have been provided local repository of the entire content and their students’ views are not included in the Internet capture by Google. Thus assuming that more than 400

million views have been recorded altogether, and about ten percent of these is due to dedicated visits by the same learner we can assume that about 40 million dedicated viewers. With increasing richness and variety of contents in the coming years, and using this as a base figure, Rs. 93 crores divided by 4 crores of visitors at the current level (10 percent of total views) for the next three years amounts to Rs. 23.25 per viewer for the whole of three years, or Rs. 2.4 per visit to the web site! With more numbers visiting in the coming years, this is likely to be a lot less. The cost-benefit ratio to a learner by a Government funded academic initiative to provide the highest quality learning educational materials freely and with no prejudice to anyone, is yet to be lowered by any country in the world and is a record low among all OER contributors, including the UNESCO.

9. Social Impact:

Significant increases in human capability and skills to harness technology infused methods to enhance national skill levels. The MOOC, as a social good, for developing and enhancing skill sets in the various domains of technology, engineering and sciences to empower students and professionals. The courses and the special topics foster a whole new generation of young learners to a value system developed in this country over centuries and Millennia. The impact is likely to be phenomenal and can result in the transformation of education in the country.

10. Outcome Extent to which the project will realize the objectives of the Mission may be given explicitly:

NPTEL is a major initiative and continues to act as the source for the whole content programme under NMEICT. Certification is the logical next step and an important new initiative for the mission. The final goal of creating a virtual IIT is in line with the mission and with the original goal of the workshop held in 1999 in IIT Madras.

Annexure I - CVs of Principal Investigators:

Curriculum Vitae – Andrew Thangaraj

Andrew Thangaraj

ESB212A, Electrical Engineering, IIT Madras, Chennai, Tamil Nadu 600036

Phone: 044 22576424 E-Mail: andrew@ee.iitm.ac.in

Professional Experience

Professor, Department of Electrical Engineering, IIT Madras	Sep 2015-
▪ Research Area: Coding and Information Theory	
Associate Professor, Department of Electrical Engineering, IIT Madras	Apr 2009-Sep 2015
Assistant Professor, Department of Electrical Engineering, IIT Madras	Jun 2004-Mar 2009
Post-doctoral Researcher, Georgia Tech Lorraine, France	Aug 2003-May 2004

Education

Doctoral Student, Georgia Institute of Technology, Atlanta, USA	Sep 1998-July 2003
▪ Research in iterative error control codes and quantum codes.	
Undergraduate Student, Department of Electrical Engineering, IIT Madras	Aug 1994-May 1998

Publications

Journal Papers

- 1) A. K. Pradhan, A. Thangaraj and A. Subramanian, "Construction of Near-Capacity Protograph LDPC Code Sequences with Block-Error Thresholds," to appear in *IEEE Transactions on Communications*.
- 2) K. Thekumparampil, A. Thangaraj and R. Vaze, "Combinatorial Resource Allocation Using Submodularity of Waterfilling," to appear in *IEEE Transactions on Wireless Communications*.
- 3) M. Bloch, M. Hayashi and A. Thangaraj, "Error-control Coding for Physical-layer Secrecy," Proceedings of the IEEE, vol. 103, no. 10, pp. 1725-1746, September 2015.
- 4) K. Ravindran, A. Thangaraj and S. Bhashyam, "LDPC Codes for Network-coded Bidirectional Relaying with Higher Order Modulation," *IEEE Transactions on Communications*, vol.63, no.6, pp.1975-1987, June 2015.
- 5) S. Vatedka, N. Kashyap and A. Thangaraj, "Secure Compute-and-Forward in a Bidirectional Relay," *IEEE Transactions on Information Theory*, vol.61, no.5, pp.2531-2556, May 2015.

- 6) A. Thangaraj and R. Vaze, "Online Algorithms for Basestation Allocation," IEEE Transactions on Wireless Communications, vol. 13, no.5, pp. 2966-2975, May 2014.
- 7) R. Vaidyanathaswami and A. Thangaraj, "Robustness of Physical Layer Security Primitives Against Attacks on Pseudorandom Generators," IEEE Transactions on Communications, vol. 62, no. 3, pp. 1070-1079, March 2014.
- 8) N. Kashyap and A. Thangaraj, "The Treewidth of MDS and Reed-Muller Codes," IEEE Transactions on Information Theory, vol. 58, no. 7, pp. 4837-4847, July 2012.
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- 11) M. Bama, S. Bhashyam and A. Thangaraj, "A Decode and Forward Protocol for Two-stage Gaussian Relay Networks", IEEE Transactions on Communications, vol. 60, no. 1, pp. 68-73, January 2012.
- 12) Arunkumar Subramanian, A. Thangaraj, M. Bloch and S. W. McLaughlin, "Strong Secrecy on the Binary Erasure Wiretap Channel Using Large-Girth LDPC Codes," IEEE Transactions on Information Forensics and Security, vol.6, no.3, pp.585-594, Sept. 2011.
- 13) Abhay Subramanian and A. Thangaraj, "Path Gain Algebraic Formulation for the Scalar Linear Network Coding Problem," IEEE Transactions on Information Theory, vol.56, no.9, pp.4520-4531, Sep 2010.
- 14) A. Thangaraj, S. Dihidar, A. R. Calderbank, S.W. McLaughlin, and J.-M. Merolla, "Applications of LDPC Codes to the Wiretap Channel," IEEE Transactions on Information Theory, Vol. 53, No. 8, Aug. 2007, pp. 2933-2945.
- 15) Sundeep B and A. Thangaraj, "Self-orthogonality of q -ary Images of q^m -ary Codes and Quantum Code Construction," IEEE Transactions on Information Theory, Vol. 52, No. 7, Jul 2007, pp. 2480-2489.
- 16) S. Donnet, A. Thangaraj, M. Bloch, J. Cussey, J.-M. Merolla and L. Larger, "Security of Y-00 under heterodyne measurement and fast correlation attack ", Physics Letters A, Vol. 356, No. 6, August 2006, pp. 406-410.
- 17) A. Thangaraj, "Rate Compatible LDPC Codes for Wireless Applications", IETE Technical Review, Vol. 21, No. 5, Sep.-Oct. 2004, pp. 325-333.
- 18) A. Thangaraj and S. W. McLaughlin, "Quantum codes from cyclic codes over $GF(4^m)$," IEEE Transactions on Information Theory, Vol. 47, No. 3, Mar. 2001, pp. 1176 – 1178.
- 19) A. Thangaraj and S. W. McLaughlin, "Thresholds and scheduling for LDPC codes over partial response channels," IEEE Transactions on Magnetics, Vol. 38, No. 5, Sep. 2002, pp. 2307-2309.

International Conferences (peer-reviewed)

- 1) S. Harikumar, J. Ramesh, M. Srinivasan and A. Thangaraj, "Threshold Upper Bounds and Optimized Design of Protograph LDPC Codes for the Binary Erasure Channel", 7th International Workshop on Signal Design and its Applications in Communications (IWSDA), Bangalore, India, Sep 2015.
- 2) A. Thangaraj, G. Kramer and G. Boecherer, "Capacity Bounds For Amplitude-Constrained Additive White Gaussian Noise Channels," IEEE International Symposium on Information Theory 2015, Hong Kong, Jun 2015.

- 3) R. Ganti, A. Thangaraj and A. Mondal, "Approximation of Capacity for ISI Channels with One-bit Output Quantization," IEEE International Symposium on Information Theory 2015, Hong Kong, Jun 2015.
- 4) A. Thangaraj, "Coding for wiretap channels: Channel resolvability and semantic security," 2014 IEEE Information Theory Workshop (ITW), Nov. 2014.
- 5) A. Pradhan, A. Subramanian and A. Thangaraj, "Deterministic Constructions for Large Girth Protograph LDPC Codes," IEEE International Symposium on Information Theory 2013, Istanbul, Turkey, Jul 2013.
- 6) Vignesh G and A. Thangaraj, "Quasi-Cyclic Regenerating Codes for Distributed Storage: Existence and Near-MSR Examples," IEEE International Symposium on Information Theory 2013, Istanbul, Turkey, Jul 2013.
- 7) N. Kashyap, V. Shashank and A. Thangaraj, "Secure Computation in a Bidirectional Relay," IEEE International Symposium on Information Theory 2012, Boston, USA, Jul 2012.
- 8) Rajaraman V and A. Thangaraj, "Known-plaintext Attack on the Binary Symmetric Wiretap Channel," IEEE Globecom Physical Layer Security (PLS) Workshop, Dec 9, 2011.
- 9) A. Thangaraj and C. Sankar, "Quasicyclic MDS Codes for Distributed Storage with Efficient Exact Repair", IEEE Information Theory Workshop 2011, Paraty, Brazil, Oct 16-20, 2011.
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- 11) Arunkumar Subramanian, Ananda Theertha Suresh, Safitha Raj, A. Thangaraj, M. Bloch and S. W. McLaughlin, "Strong and Weak Secrecy in Wiretap Channels", Invited paper at the Turbo Coding Conference (ISTC 2010), Brest, France, Sep 2010.
- 12) Ananda Theertha Suresh, Arunkumar Subramanian, A. Thangaraj, M. Bloch and S. W. McLaughlin, "Strong Secrecy for Erasure Wiretap Channels", IEEE Information Theory Workshop Dublin, Ireland, Aug 2010.
- 13) Mukundan Madhavan, Y. Sankarasubramanian, K. Viswanathan and A. Thangaraj, "NLHB: A Non-linear Hopper Blum Protocol", IEEE ISIT 2010, Austin, USA, June 2010.
- 14) Shilpa Gadiraju, A. Thangaraj and S. Bhashyam, "Dirty Paper Coding Using Sign Bit Shaping and LDPC Codes," IEEE ISIT 2010, Austin, USA, June 2010.
- 15) Y. Sankarasubramanian, A. Thangaraj and K. Viswanathan, "Finite State Wiretap Channels: Secrecy Under Memory Constraints," IEEE ITW Taormina, Oct 2009.
- 16) M. Bama, S. Bhashyam, A. Thangaraj, "Receiver Selection Scheduling in Wireless Networks," Proceedings of the Wireless Personal Multimedia Communications (WPMC), Sendai, Japan, September 2009.
- 17) Dinesh Kumar K. R. and A. Thangaraj, "Algebraic Network Coding: A New Perspective," to be presented in IEEE International Symposium on Information Theory 2009, Jun 28 – Jul 3 2009, Seoul.
- 18) S. Srimathy and A. Thangaraj, "Codes that have Tanner graphs with non-overlapping cycles," 5th International Symposium on Turbo Codes and Related Topics, Sep. 2008, pp. 299 – 304.
- 19) A. Subramanian and A. Thangaraj, "A Simple Algebraic Formulation for the Scalar Linear Network Coding Problem," Forty-Sixth Annual Allerton Conference on Communication, Control, and Computing, Sep. 2008, University of Illinois at Urbana-Champaign, IL, USA.
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- 21) G. Sridharan, A. Kumarasubramanian, A. Thangaraj, S. Bhashyam, "Optimizing burst erasure correction of LDPC codes by interleaving," IEEE International Symposium on Information Theory 2008, Jul. 2008, pp. 1143 – 1147.
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- 32) H. Tiwari and A. Thangaraj, "Run-length Limited Codes with Free Distance Properties: Construction and Soft-Decision Decoding," IEEE International Magnetics Conference 2006, May 2006, pp. 789.
- 33) S. Dihidar, A. Thangaraj, S. McLaughlin and R. Calderbank, "Linear-time Decodable Secrecy Codes for Binary Erasure Wiretap Channels", 43rd Annual Allerton Conference on Communication, Control, and Computing, Sep. 2005, University of Illinois at Urbana-Champaign, IL, USA.
- 34) A. Thangaraj, S. Dihidar, R. Calderbank and S. McLaughlin, "Coding for Reliability and Security over Wire Tap Channel Systems", 26th Symposium on Information Theory in the Benelux 2005, Brussels, May 2005.
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- 36) Fijo Therattil and A. Thangaraj, "A Low-complexity Soft-decision Decoder for Extended BCH and RS-like codes," IEEE International Symposium on Information Theory 2005, Sep. 2005, pp. 1320 – 1324.
- 37) A. Prabhakar, A. Thangaraj, M. Manickam, and E. Louis, "Effects of reader distortion on nonlinear transition shift measurements", IEEE International Magnetism Conference 2005, Apr. 2005, pp. 1343 – 1344.
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- 39) A. Thangaraj, A. R. Calderbank, S. McLaughlin and J.-M. Merolla, "Codes on graphs over the wire tap channel," IEEE International Symposium on Information Theory and Applications, Parma, October 2004.
- 40) J.-M. Merolla, O. Guerreau, A. Thangaraj, S. W. McLaughlin, and F. J. Malassenet, "Practical quantum cryptography system using single sideband scheme and WDM compensation technique," The International Conference on Solid State Quantum Information processing, SSQIP 03, Amsterdam (Netherlands), p. 167, Dec. 2003.
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National Conferences (peer-reviewed)

- 1) K. Dheeraj, R. Ganti, A. Thangaraj, "Equalization in Amplify-Forward Full-Duplex Relay with Direct Link," National Conference on Communications (NCC) 2015, IIT Bombay, Feb. 27 – Mar. 1 2014.
- 2) K. Ravindran, V. P. Boda, A. Thangaraj, S. Bhashyam, B. Joshi, W. Li, "Optimized codes for bidirectional relaying," National Conference on Communications (NCC) 2014, IIT Kanpur, Feb. 28 – Mar. 2 2014.
- 3) S. Subramanian, A. K. Pradhan, A. Thangaraj, "Node-splitting constructions for large girth irregular and protograph LDPC codes," National Conference on Communications (NCC) 2014, IIT Kanpur, Feb. 28 – Mar. 2 2014.
- 4) B. Joshi and A. Thangaraj, "EXIT Chart Based Design of LDPC Codes for Higher Order Constellations," Proc. National Conference on Communications (NCC) 2013, IIT Delhi, India, 15-17 Feb. 2013.
- 5) K. V. Sreenath and A. Thangaraj, "Implementation of Physical Layer Key Sharing Schemes Using Software Defined Radios," Proc. National Conference on Communications (NCC) 2013, IIT Delhi, India, 15-17 Feb. 2013.
- 6) A. Alapati, A. Krishnakumar, A. Thangaraj, "Public-private separation in linear network-coded simultaneous multicast and unicast," Proc. National Conference on Communications (NCC) 2012, IIT Kharagpur, India, 3-5 Feb. 2012.
- 7) Balakrishna S., S. Bhashyam, A. Thangaraj, "A dirty paper coding scheme for the Multiple Input Multiple Output Broadcast Channel," Proc. National Conference on Communications (NCC) 2012, IIT Kharagpur, India, 3-5 Feb. 2012.
- 8) N. Kashyap, Y. Sankarasubramaniam, A. Thangaraj, "Jamming to foil an eavesdropper," Proc. National Conference on Communications (NCC) 2012, IIT Kharagpur, India, 3-5 Feb. 2012.

- 9) Rajaraman V and A. Thangaraj, "EG-LDPC Codes for the Erasure Wiretap Channel," National Conference on Communications (NCC) 2010, IIT Madras, Jan 2010.
- 10) Gautham T. S. V., A. Thangaraj and D. Jalihal, "Common Architecture for Decoding Turbo and LDPC Codes," National Conference on Communications (NCC) 2010, IIT Madras, Jan 2010.
- 11) M. Bama, S. Bhashyam, A. Thangaraj, "Throughput of Wireless Relay Networks with Interference Processing," National Conference on Communications 2009, Jan. 2009, IIT Guwahati.
- 12) M. K. Dileep, S. Bhashyam, A. Thangaraj, "Low Density Parity Check Codes in OFDM Systems," National Conference on Communications 2009, Jan. 2009, IIT Guwahati.
- 13) R. Upadrashta, A. Thangaraj, "Key Reconciliation Using Nested LDPC Codes", National Conference on Communications 2008, Jan. 2008, IIT Bombay.
- 14) M. Bama, S. Bhashyam, A. Thangaraj, "Capacity of Network-Coded Wireless Multicast using Node-Based Scheduling", National Conference on Communications 2008, Jan. 2008, IIT Bombay.
- 15) P. Sankar, Arun Kumar Sharma, D. Jalihal, A. Thangaraj, "Turbo Product Codes for a Satellite Modem", National Conference on Communications 2008, Jan. 2008, IIT Bombay.
- 16) K. Chaitanya, A. Thangaraj, "Luby Transform Codes with Priority Encoding", National Conference on Communications 2008, Jan. 2008, IIT Bombay.
- 17) M. Madhavan, A. Thangaraj, "An Implementation Of A Soft-Input Stack Decoder For Tailbiting Convolutional Codes", National Conference on Communications 2007, Jan. 2007, IIT Kanpur.
- 18) S. Kaimalettu, A. Thangaraj, S. W. McLaughlin, "Constellation Shaping using Codes with a Tree Tanner Graph," National Conference on Communications 2007, Jan. 2007, IIT Kanpur.
- 19) A. S. Mohan Vamsi, A. Thangaraj, B. Ramamurthi, "HARQ Schemes using LDPC codes with Diversity-Combining", National Conference on Communications 2007, Jan. 2007, IIT Kanpur.

Patents

- 1) Advanced forward error correction, Granted Patent, United States Patent 6842873, Filed in 2005.
- 2) Methods and apparatus for improving error indication performance in systems with low-density parity check codes, Patent Application US20080155372, Filed in 2006.

Student Guidance

Graduated Doctoral Students (PhD)

- 1) M. Bama (jointly with Prof. Srikrishna Bhashyam): Graduated 2012
Thesis topic: Enhancing Information Flow in Wireless Networks using Interference Processing
- 2) A. Ayyar (jointly with Prof. K. Giridhar): Graduated 2013
Thesis topic: Interference Canceling Block Modulation
- 3) V. Rajaraman: Graduated 2015
Thesis topic: Correlation Attacks on Physical Layer Security Protocols

Graduated Masters Students (MS by research)

- 1) A. S. Mohan Vamsi (jointly with Prof. Bhaskar Ramamurthi): Graduated 2007

- **Thesis topic:** Low Density Parity Check Codes with Feedback
- 2) Sunil Kaimalettu: Graduated 2008
 - **Thesis topic:** Constellation Shaping using LDPC Tree Codes
- 3) P. Sankar (jointly with Prof. Devendra Jalihal): Graduated 2008
 - **Thesis topic:** Implementation of Turbo-Product Codes
- 4) Raviteja Upadrashta: Graduated 2009
 - **Thesis topic:** Nested LDPC codes for Key Reconciliation
- 5) Krishna Chaitanya: Graduated 2009
 - **Thesis topic:** Time-sharing and Priority Encoding for Raptor Codes
- 6) S. Srimathy: Graduated 2009
 - **Thesis topic:** Codes on Planar Graphs
- 7) Mukundan Madhavan: Graduated 2010
 - **Thesis topic:** Hopper-Blum lightweight authentication protocol
- 8) T. S. V. Gautham: Graduated 2010
 - **Thesis topic:** Implementation of turbo decoders
- 9) Amaranath Alapati: Graduated 2013
 - **Thesis topic:** Network coding
- 10) K Venkata Sreenath: Submitted 2015
 - **Thesis topic:** Implementation of physical-layer key distribution
- 11) Karra Chinmay Dheeraj (jointly with Radhakrishna Ganti): Submitted 2015
 - **Thesis topic:** Equalization of self-interference in full-duplex relays

Current Students

Doctoral Students : 5

Masters Students : 1

Professional Memberships and Service

- Editor, IEEE Transactions on Communications, 2012-
- Senior Member, IEEE
 - Societies: Information Theory, Communications, Signal Processing
- Member of Memberships and Chapters Committee of Information Theory Society
- Technical Program Committee Member
 - IEEE WCNC 2008, 2009, 2010, 2011, 2012
 - VTC 2009, 2011
 - ICC 2011, 2015
 - IEEE ITW 2011
 - SPCOM 2010, 2012
 - GLOBECOM 2008, 2013; GLOBECOM Workshop 2011
 - PIMRC 2012
 - NCC 2009-2013
- Technical Program Committee Chair

- SPCOM 2014

Research Grants and Projects

1. **Codes for Bidirectional Relaying (2010-13):** funded by Renesas Corporation
2. **Physical Layer Security Primitives for Wireless Communications (2009-12):** funded by the Reliance Telecom Centre for Excellence
3. **Software/Hardware Implementations of LDPC Codecs:** funded by ORB Analytics, USA; DEAL (DRDO), Dehradun
4. **SENECOM: Secure Network Communications (2006-2009):** funded jointly by the international cooperation wings of DST, India and the Science Foundation of Portugal
5. **Quantum Key Distribution (2005-07):** funded by DST, India; Indo-French Centre for Promotion of Advanced Research (IFCPAR/CEFIPRA)
6. **National Program on Technology Enhanced Learning (NPTEL):** Institute coordinator, IIT Madras, <http://nptel.ac.in>

Awards and Honors

- IIT Madras Young Faculty Recognition Award 2012
- Indian National Academy of Engineering Young Engineer Award 2011
- IETE JC Bose Memorial Award 2006 for the Best Engineering Oriented Paper
- Col. Oscar P. Cleaver Award 1998 for Outstanding Graduate Students in Electrical Engineering at Georgia Institute of Technology

Curriculum Vitae – Prathap Haridoss

Name: Prathap Haridoss

Education: B.Tech. in Metallurgical Engineering, IIT Madras, 1992
PhD in Materials Science, University of Wisconsin-Madison,
USA, 1999

Current Appointment: Professor (2013-), Dept. of Metallurgical and Materials Engineering, IIT
Madras, Chennai 600036, India

Previous Appointments: Associate Professor (2009-2013), Dept. of Metallurgical and Materials
Engineering, IIT Madras, Chennai 600036, India

(2003-2009), Assistant Professor, Dept. of Metallurgical and Materials
Engineering, IIT Madras, Chennai 600036, India

(2001-2003) Visiting faculty, IITM
(1999-2001) Senior Scientist, Plug Power Inc., Latham, New York
(1994-1999) Graduate Research Assistant, Los Alamos National
Laboratory, Los Alamos, New Mexico, USA

Summary of Accomplishments:

Patents: 3 US patents Issued, in the area of PEM fuel cells

International Journal Publications: 25

Conference Publications: 7

NPTEL courses: Video and Web courses, titled “Physics of
Materials”

Research Guidance:

	PhD	MS	M.Tech
Completed	3	6	14
Ongoing	7	1	2

Research Projects: Have participated either as Principal Investigator or, Co-Principal Investigator in 9 projects funded by external agencies for a total of 950 Lakh rupees. Areas of research include PEM fuel cells, Carbon nanomaterials, developing devices for assisting the differently abled, and recycling of electronic waste.

Conferences conducted: Served as **Convener**, for the International Symposium for Research Scholars, ISRS 2008

Service in Institute Positions:

- 1) **NPTEL Coordinator**, IIT Madras, 2013 onwards.
- 2) **Advisor Co-curricular** activities for the Institute 2010-2012
- 3) Served as Member of the IIT Madras Research Park Council
- 4) Served as Member of the Board of IC & SR

List of Patents and Publications

US PATENTS GRANTED:

- 1) **US Patent # 6,821,661:** Hydrophilic Anode Gas Diffusion Layer: P. Haridoss, C. Karuppaiah, and J. McElroy; Plug Power; **Granted:** November 2004
- 2) **US Patent # 6,774,637:** Method of Qualifying At Least a Portion of a Fuel Cell System and an Apparatus Employing the Same; R. Hallum, C. Comi, Y. Wu, P. Haridoss, and C. Karuppaiah; Plug Power; **Granted:** August 2004
- 3) **US Patent # 6,696,190:** Fuel Cell System & Method: P. Haridoss; Plug Power; **Granted:** February 2004

Publications in Refereed International Journals:

- 1) Jagannatham M., Sankaran S., Haridoss Prathap
"Electroless nickel plating of arc discharge synthesized carbon nanotubes for metal matrix composites" Applied Surface Science, Volume 324, 1 January 2015, Pages 475-481
- 2) A. Joseph Berkman, M. Jagannatham, S. Priyanka, Prathap Haridoss
"Synthesis of branched, nano channeled, ultrafine and nano carbon tubes from PET wastes using the arc discharge method" Waste Management, Volume 34, Issue 11, November 2014, Pages 2139-2145
- 3) Joseph Berkman, A., Ramakrishnan, S., Jain, G., Haridoss, P.;
"Aligning carbon nanotubes, synthesized using the arc discharge technique, during and after synthesis", 2013, Carbon, 55, Pages 185-195.
- 4) Wasekar, N.P., Haridoss, P., Seshadri, S.K., Sundararajan, G.;

- “Sliding wear behavior of nanocrystalline nickel coatings: Influence of grain size”, 2012, *Wear*, 296, Pages 536-546.
- 5) John Felix Kumar, R., Radhakrishnan, V., Haridoss, P.;
“Enhanced mechanical and electrochemical durability of multistage PTFE treated gas diffusion layers for proton exchange membrane fuel cells”, 2012, *International Journal of Hydrogen Energy*, 37 (14), Pages 10830-10835.
 - 6) Radhakrishnan, V., Haridoss, P.;
“Effect of GDL compression on pressure drop and pressure distribution in PEMFC flow field”, 2011, *International Journal of Hydrogen Energy*, 36 (22), Pages 14823-14828.
 - 7) John Felix Kumar, R., Radhakrishnan, V., Haridoss, P.;
Effect of electrochemical aging on the interaction between gas diffusion layers and the flow field in a proton exchange membrane fuel cell”, 2011, *International Journal of Hydrogen Energy*, 36 (12), Pages 7207-7211.
 - 8) Suresh, P.V., Jayanti, S., Deshpande, A.P., Haridoss, P.;
“An improved serpentine flow field with enhanced cross-flow for fuel cell applications”, 2011, *International Journal of Hydrogen Energy*, 36 (10), Pages 6067-6072.
 - 9) Berkman, A.J., Haridoss, P.;
“High yield formation of carbon nanotubes using arc discharge assisted with a nitrogen jet”, 2011, *Transactions of the Indian Institute of Metals*, 64 (1-2), Pages 137-142.
 - 10) Vijay, R., Seshadri, S.K., Haridoss, P.;
“Gas diffusion layer with PTFE gradients for effective water management in PEM fuel cells”, 2011, *Transactions of the Indian Institute of Metals*, 64 (1-2), Pages 175-179.
 - 11) Radhakrishnan, V., Haridoss, P.;
“Differences in structure and property of carbon paper and carbon cloth diffusion media and their impact on proton exchange membrane fuel cell flow field design”, 2011, *Materials and Design*, 32 (2), Pages 861-868.
 - 12) Radhakrishnan, V., Haridoss, P.;
“Effect of cyclic compression on structure and properties of a Gas Diffusion Layer used in PEM fuel cells”, 2010, *International Journal of Hydrogen Energy*, 35 (20), Pages 11107-11118.
 - 13) Joshi, R., Engstler, J., Haridoss, P., Schneider, J.J.;
“Formation of carbon nanotubes from a silicon carbide/carbon composite”, 2009, *Solid State Sciences*, 11 (2), Pages. 422-427.
 - 14) Ravi Joshi, Jorg Engstler, P. Kesavan Nair, Prathap Haridoss, Jorg J. Schneider;
“High yield formation of Carbon Nanotubes using a rotating cathode in open air”;
Diamond and Related Materials, 17 (2008) Pages 913 – 919
 - 15) Ravi Joshi, Roland Schierholz, Jorg J. Schneider, Prathap Haridoss; “Catalytic Induced Thermal Conversion Amorphous Carbon to Single Walled Carbon Nanotubes”; *J. Anorg. Allg. Chem.*, 2008, 634, Pages 911-915
 - 16) T.S. Vaishnavi, Prathap Haridoss, C. Vijayan;
“Optical properties of Zinc Oxide nanocrystals embedded in Mesoporous silica”, 2008, *Materials Letters*, 62 (10-11), Pages 1649-1651
 - 17) K. Suresh Kumar, Prathap Haridoss, and S. K. Seshadri;
"Synthesis and Characterization of Electrodeposited Ni-Pd Alloy Electrodes for Methanol Oxidation", 2008, *Surface and Coatings Technology*, 202 (9), Pages 1764-1770.
 - 18) R. Vetri Murugan, S. Bharat, Abhijit P. Deshpande, Susy Varughese, and Prathap Haridoss;

- "Milling and separation of the multi-component printed circuit board materials and the analysis of elutriation based on a single particle model", (2008) Powder Technology, 183 (2), Pages 169-176.
- 19) K. Suresh Babu, C. Vijayan and Prathap Haridoss;
"The influence of Parameters of Chemical Synthesis on the Optical properties of CdS nanocrystals", Materials Research Bulletin, Volume 42, Issue 7, July 2007, Pages 1251-1261.
 - 20) K. Suresh Babu, C. Vijayan and Prathap Haridoss;
"Properties of size-tuned PbS nanocrystals stabilized in a polymer template", Materials Research Bulletin, Volume 42, Issue 6, June 2007, Pages 996-1003
 - 21) K. Suresh Babu, C. Vijayan and Prathap Haridoss;
"Effect of PbS nanocrystal concentration on the physical properties of a polymer-nanocrystal composite", Materials Science and Engineering: C, Volume 27, Issue 4, May 2007, Pages 922-927
 - 22) K. Suresh Babu, C. Vijayan and Prathap Haridoss;
"Synthesis of Size Tunable and Stable CdS nanocrystals in DMF", Materials Letters, Volume 60, Issue 1, January 2006, Pages 124-128
 - 23) K. Suresh Babu, T. Ranjith Kumar, Prathap Haridoss and C. Vijayan; "Effect of the organic solvent on the formation and stabilization of CdS and PbS semiconductor nanoclusters", Talanta, 66, 2005, Pages 160-165
 - 24) Mohan Chand Paladugu, K. Maneesh, P. Kesavan Nair, Prathap Haridoss; "Synthesis of Carbon Nanotubes by Arc Discharge in Open Air", Journal of Nanoscience and Nanotechnology, May 2005, Pages 747 - 752
 - 25) P. Haridoss, F. A. Uribe, F. H. Garzon, T. A. Zawodzinski, Jr.;
"Structural Modifications of Disordered Mesocarbon Microbeads with Lower Temperatures of Heat Treatment." Journal of Materials Research, Vol 13, #7, July 1998, Pages 2015-2022

International Conferences Proceedings:

- 1) Cheryl Maria Tellis, Prathap Haridoss, S.S. Bhattacharya, R. Natarajan; "Tribological properties of carbon nanotubes and their effectiveness as lubricant additive" Proceedings of International Symposium for Research Scholars on Metallurgy, Materials Science and Engineering (ISRS 2010), IIT Madras. **Pages 102-105**
- 2) R. John Felix Kumar, Prathap Haridoss; "Effect of cyclic changes in relative humidity on mechanical durability of SPEEK and SPEEK blended membranes in a simulated PEMFC environment", Proceedings of International Symposium for Research Scholars on Metallurgy, Materials Science and Engineering (ISRS 2010), IIT Madras. **Pages 110-115**
- 3) S Ramakrishnan, Prathap Haridoss; "Purification of carbon nanotubes using liquid Bromine", Proceedings of International Symposium for Research Scholars on Metallurgy, Materials Science and Engineering (ISRS 2010), IIT Madras. **Pages 128-132**
- 4) Krishnan, Kalyana R; SusyVarughese; PrathapHaridoss; "Concepts in Engineering Design — An Introductory Course in Design Offered in Undergraduate Engineering Curriculum" ICORD 09: Proceedings of the 2nd International Conference on Research into Design, Bangalore, India 07.-09.01.2009, **pages 587-594**

- 5) R. Vijay, Prathap Haridoss; "Determination of Sag in Gas Diffusion Layer Used in PEM Fuel Cell"
Proceedings of International Symposium for Research Scholars on Metallurgy, Materials Science and Engineering (ISRS 2008), IIT Madras, **pages 118-122**
- 6) Vetrimerugan, R., A. P. Deshpande, S. Sankara Narayanan, Susy Varughese and Prathap Haridoss;
"Studies on size reduction and air classification of printed circuit boards for material recycling",
International Seminar on Mineral Processing Technology (MPT 2005), **pages 113-122**, Dhanbad,
(2005)
- 7) Vetri Murugan R. A., A. P. Deshpande, S. Varughese, P. Haridoss, "Recycling of printed circuit boards",
International Seminar on Advances in Polymer Technology, **pages 334-341**, Kochi, (2004).

Curriculum Vitae – Kushal Sen

Prof. Kushal Sen

Department of Textile Technology
Indian Institute of Technology Delhi
New Delhi-110016
India
kushal@textile.iitd.ernet.in

Prof. Kushal Sen obtained his B. Tech. Degree in Textile Chemistry in 1977 and Ph. D.

Degree in 1981- both from IIT Delhi. He joined the Department of Textile Technology, IIT Delhi as a faculty in 1981 and is currently a professor in the same Department. His areas of specialization include textile chemical processing, texturing, structure property analysis, and geo-technical textiles. His current areas of research include microencapsulation and electrically conductive textiles. He has keen interest in Educational Technology. Has made several films on textile chemical processing for handloom workers and has produced video courses for the undergraduate and postgraduates textile courses. He initiated the educational transmission of video programmes from IIT Delhi in 2001, which resulted in a full fledged 24-hour Educational channel- **Eklavya**. Since 2004, he is also the IIT Delhi coordinator of **NPTEL**-a project. On the administration front at IIT Delhi, he has been the Dean, Alumni Affairs and International Programmes Head, Department of Textile Technology and Head, and Educational Technology Services Centre. Has been member Board of Governors, IIT Delhi. Currently, he is Dean (Faculty), at IIT Delhi.

Curriculum Vitae – Satyaki Roy

Prof.Satyaki Roy

Head, Design Programme
Coordinator, Media Technology Centre
Humanities and Social Sciences
Indian Institute of Technology Kanpur
Pin: 208016, Uttar Pradesh, India

Phone +91 512 259 6617, 4060

E-mail satyaki@iitk.ac.in

Brief Summary

Dr.Satyaki Roy is jointly associated with the Department of Humanities and Social Sciences and Design Programme with research interest in Design Thinking, Creativity, Visual Communication, Folk Art & Craft, Film Studies, Education and E-Learning and User Experience Design. He has developed and taught several courses over the years and guided many students for their M.Des thesis. He established the Media Technology Centre at IIT Kanpur in 2004 which is fully equipped with state of the art infrastructure for video production and web based design research. He has been the Institute Coordinator and a member of PIC for NPTEL (National Programme on Technology Enabled Learning) project, sponsored by the Ministry of Human Resource and Development, Govt. of India and has been involved with several other projects in e-learning, video project and design of products. In 2010 he started a community radio station (90.4FM) that broadcasts programmes for 8 hours every day catering to the information needs of the community within and out side the IIT Kanpur premises. He has served as a Member of the Board for National Institute of Fashion Technology and USID Foundation of India. He has been a mentor to several design companies under the students entrepreneurship programme initiated by SIIC SIDBI and very recently started a private limited company called Gestures Design and Media Solutions.

Current Research Design Thinking, Creativity, Visual Communication, Folk Art & Craft, Film Studies, Education, User Experience Design

Academic Record

Degree	Institution	Year
Bachelor of Fine Arts	Visva Bharati University, Santiniketan	1997
Master of Fine Arts	Visva Bharati University, Santiniketan	1999
Ph.D	Visva Bharati, University, Santiniketan	2007

Teaching Experience

Duration	Organization
October 2001-Till Date (13 Years)	Indian Institute of Technology Kanpur
2001 April – October	New Era High School, Panchgani
1999 June – 3 March	Sahyadri School, Krishnamurti Foundation of India, Pune

Courses Taught

Course No. & Title	Level	Developed
Art101 Indian Art and Civilization	UG	No
Art103 Introduction to Western Art	UG	Yes
Art402 Modern Art	UG	No
Art410 Video Production Theory & Practice	UG	Yes
Art105 Introduction to the Art of Video Making	UG	Yes
Des620 Design Theory	PG	No
Des621 Creative Visualization	PG	Yes
Des622 2D and 3D Visual Design	PG	Yes
Des623 Topics in Motion Pictures	PG	Yes
Des626 Interaction Design	PG	Yes
Des681 Design Project I	PG	No
Des682 Design Project II	PG	No
Des628 Design Culture & Society	PG	Yes
Des698 Special Topics in Design	PG	Yes

Scholar in Residence at IIT Gandhinagar, May-June 2014. Taught a course on Film Making and Appreciation

A short term course, *Effective Ways for Video Making*, Design Factory, Aalto University, Finland, 2009

A short term course, *Film Theory and Practice*, PDPMIITDM Jabalpur, 2010

A short module, *Design and Creativity*, VLFM Product Design Course, Department of Industrial Management and Engineering, IIT Kanpur, 2009 – 2011

Thesis (M.Des) Supervision

Name	Year	Title of Thesis
<i>Pillai, S Jayesh</i>	2008	<i>3D CHILD Virtual Platform for Evaluation of Products for Children</i>
<i>Kumar, Senthil</i>	2009	<i>Application UI Design for a Collaborative Network Portal</i>
<i>Bathla, Siddharth</i>	2011	<i>Applying user centric design to architecture</i>
<i>Singh, Neha Kiran</i>	2010	<i>An Awareness through Print Media</i>
Ghosh, Mainak	2006	<i>A conceptual Model of Information Architecture</i>
Karnika	2009	<i>Board Game for Indian Family</i>
Dutta, Sourav	2007	<i>Building an Interactive Visual Archive of Indian Heritage – An Information Portal</i>
<i>Chowdhury, Payal</i>	2009	<i>Co-designing a learning device for children with emphasis on product semantics</i>
Rangnekar, Parul	2007	<i>Communication Design and Media Services for Children with Special Needs</i>
Siddhartha, Partha	2005	<i>Design and Development of Graphic User Interface Brihaspati – The Virtual Classroom</i>
Khera, Richa	2011	<i>Creativity Intercrossed</i>

Chaudhary, Shibika	2006	<i>Design Cell: A User Centered Design Toolkit</i>
Yadav, Alok	2009	<i>Design & Development of Products for Promotional Marketing of Higher Education</i>
Sharma, Shanu	2011	<i>"Design for barriers"-Stairs climbing Manual Wheel Chair</i>
Banerjee, Prantik	2009	Designing a Mobile School Communicator Device with Special Emphasis on Developing a Collaborative GUI
Shah, M M	2004	Design of an Effortless Vertical Upright Hard Baggage – Internal Space Organization
Subramanya, T N	2007	<i>Design of a web portal for Campus Relations, Oracle</i>
Roy, Adita	2009	<i>Design of classroom chair for student with Cerebral Palsy</i>
Shah, Alap Harshad	2010	Design of Future Magazine (SENSE Service) and User Experience and User Interface Design of Interactive Magazine(MAG X)
Abbas, Butool	2009	<i>Design of Signage and way finding system of Kanpur zoological park</i>
Solanki, Mona	2006	Design Principles for Print – A Contextual Model as Cookbook
Sekar, Sathish	2011	<i>"Drift" - Three Wheeler for a Green Ride</i>
Rajamanohar, K S	2004	<i>Edutainment - Multimedia Education Content Development for School Children</i>
Ahuja, Simarjeet Singh	2007	<i>Games as Interactive Systems</i>
Jain, Prachi	2005	Golden Section - A Notation of Aesthetics
Dasgupta, kaustav	2009	<i>Graphic Adaptation of "The Conqueror Worm" by Edgar Allan Poe</i>
Mallya, Prabha	2008	Illustration as Visual Essay
Sawant, Nutan	2011	<i>Impact of Social Media on Design</i>
Manjiri, Arvind Joglekar	2005	Instructional Aids for Special Education
Verma, Kratika	2011	<i>iServe: A Smart Phone Application</i>
Kumar, Ankit	2011	<i>Mobile Applications in the Realm of Location Based Services</i>
Verma, Paridhi	2005	Saksham – A Documentary Film About Spastic Children
Desai, Niral Ajaybhai	2010	<i>Study of 3D Technology and Application in Visualization and Tele-immersion</i>
Singh, Akansha	2009	<i>U.P. Handloom: A Neo-Retail Experience</i>
Rathor Pragam	2011	<i>Urban housing eco-system of low income groups: A human centric exploration</i>
Banerjee, Bidisha	2012	<i>GUI, UX Reconstruction of IITK Website</i>
Yaramilli, Praveen	2012	<i>Product Innovation in Indian Craft Clusters: Tribal Art and Craft from Phad, Rajasthan</i>
Chopra, Vikas	2012	<i>Touch Pad Based Gaming Application</i>
Kumar, Prasoon	2012	<i>Interactive textbooks for school children</i>
Mondal, Chirapriya	2012	<i>Impact of Social Media on Brand Building</i>
Siddhartha	2012	Iron Wielding Practices in India – video ethnography and Ux design project
Hangshing, Mangkhankhual	2014	Research on Public Perception Towards Mental Disorder - Designing to Mend the GAP
Kumar, Mritunjay	2014	The Possible Impact of Wearable Computing on productivity: Design proposition with experiments
Vivek Anand, Polasapalli	2013	REASSIGNMENT OF E-WASTE: EXPLORING CONSTRUCTIVE DESIGN RESEARCH
Jacob, Thomas	2013	Future of Travel - User Experience in the Air Travel Industry
Shukla, Parth	2014	Study of Dhokra Art & Craft clusters of Chhattisgarh and West Bengal
Singh, Yogendra	2014	User Centered Approach To Architecture
Agarwal, Charul	2014	Active Ageing: Life and Wellness in Later Years

Shankar, Vivek	2014	Understanding And Supporting Desktop Management For Multiple Monitor Users
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Sponsored Projects

Period	Sponsoring Organization	Title of Project
2003-07	Ministry of Human Resource & Development	National Program on Technology Enhanced Learning (NPTEL Phase I) IIT Kanpur
2008-14	Ministry of Human Resource & Development	National Program on Technology Enhanced Learning (NPTEL Phase II) IIT Kanpur
2005-07	Ministry of Information Technology	Digital Ecosystem for Agriculture and Rural Livelihood (Digital Mandi Phase II)
2008-09	European Commission	OPAALS – Social Sciences
2007-10	Ministry of Textiles	Design Center in Leather Handicrafts Products for Development of Kanpur Cluster
2013-14	Alumni Association, IIT Kanpur	Creating Health Awareness Among Community – In and Around IITK (Focus on Laborers and School Children)

Consultancy

Period	Organization	Nature of Work
2003-04	CHIPS, State Government of Chattisgarh	Design of Electronic Class Rooms at Raipur and Bilaspur University for <i>IT enabled distant learning</i>
2011	Nokia Research Center	Bhasha: Encouraging Use of Indian Languages Through Mobile Phone Developing concepts to promote use of vernacular language and empowering the rural segment

Video Projects & Documentaries

Celiac, A documentary film sponsored by Grow India Foundation, 2014
60 short videos for a project related to armed forces , DRDO, 2013
A promotional film for Kanpur Plastipacks Ltd, 2013
A short film on research initiatives of the Engineering Research Lab, IIT Kanpur, 2013
A short video supporting the functioning of International Relations office, IIT Kanpur, 2013
A short film on research and development initiatives and facilities at Indian Institute of Technology Kanpur, Doordarshan 2012-2014
<i>Giving back</i> , A film on liquid and solid waste management, 2012
<i>Digital Ecosystem for Knowledge and Learning: Indian agriculture Extension Service</i> screened at the 3rd International OPAALS (Open Philosophies for Associative Autopoietic Digital Ecosystems) Conference on Digital Ecosystems, Aracaju – SE- Brazil, 2010
<i>Digital Ecosystem for Knowledge around KVK in North India</i> screened at the London School of Economics, London, UK, 2009
A film on <i>IITK</i> - An informative documentary focusing on the varied aspects of research, education and life at Indian Institute of Technology Kanpur, screened at the FinIndia Conference, Design Factory, Helsinki, Finland, 2008

<i>Saksham</i> – A short video on the children suffering with cerebral palsy screened at the 'WE CARE Film Festival', New Delhi 2006
<i>Digital Proudयोगiki Aur Samajik Nirman</i> – A documentary film on the research initiatives of Media Lab Asia, IITK hub, 2003
A promotional advertisement campaign (Video) for <i>Weather Risk Management Services Pvt. Ltd. (WRMSPL)</i> on company's schemes for weather insurance and the financial risk management for weather based risks. Originally created in Hindi and then dubbed in multiple languages and distributed across 5 states in India. 2007
A corporate video and multimedia presentation for Lohia Starlingers, 2005
<i>Mandu</i> – a promotional video on Mandavgarh (Mandu), for MP Tourism, 2003-2004
<i>SAMTEL</i> – an instructional video on the manufacturing and fabrication facility of SAMTEL Research Center, 2007
<i>BSBE</i> –a promotional video on the Department of Bio-Sciences and Bioengineering, IIT Kanpur, 2003

Administrative Experience

Department of HSS and Design Programme			
2005-2009	IIT Kanpur	Department Post Graduate Committee	Convener M.Des
2004-2005	IIT Kanpur	Department Under Graduate Committee	Convener HSS
2003-2004	IIT Kanpur	Department Library Committee	Convener HSS
2005-2006	IIT Kanpur	Department Seminar Committee	Convener HSS
2008-2010, 2011-2012	IIT Kanpur	Department Placement Committee	Convener M.Des
2011-2012	IIT Kanpur	Department Computer's Committee	Convener HSS
2010-2011	IIT Kanpur	Department Web Committee	Convener HSS
2007-2008	IIT Kanpur	Department Space Committee	Convener HSS
Institute			
Since 2005	IIT Kanpur	Media Technology Center	Coordinator
Since 2010	IIT Kanpur	Management and Creative Head of the 90.4 FM, IIT Kanpur Community Radio Station	Coordinator
2002-2005 2012-2014	IIT Kanpur	Hall of Residence II Hall of Residence XI	Warden Warden Incharge
2009-2011	IIT Kanpur	Golden Jubilee Organizing Committee	Co Coordinator
Since 2013	IIT Kanpur	Design Programme	Head
Others			
Member of the Board, Universal Sustainable Innovative Design Foundation, Hyderabad, India, 2011-12			
Served as a Member of the Board, NIFT, Rae Bareilly, India, 2009-10			
Served as a Member of PIC, NPTEL (National Programme for Technology Enhanced Learning) since 2004			
Invited as a faculty reviewer in the Product Design Gala 2011, as part of the Product Development Project course with industry partners organized by Design Factory, Aalto University, Finland			
Member of Review Committee for Design Projects under NMEICT, MHRD			

Patents

Title	Indian Patent No.	Dated
"The Drift-Battery Operated Campus Vehicle"	Indian Patent No: 234987	07/03/11

"Stair Climbing Wheel Chair"	Indian Patent No: 238758	09/11/11
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Workshops Organized & Conducted

<i>Break out session Day 1: 'IDI 75', Design for Social Innovation & Sustainable Development, 5th India International Design Innovation & UX Conference, Auroville, Tamil Nadu, Jointly conducted by Satyaki Roy, Atul Tiwari, Jayanta Chatterjee, 2011</i>
<i>Break out session Day 2: 'Innovation Think - Work', Design for Social Innovation & Sustainable Development, 5th India International Design Innovation & UX Conference, Auroville, Tamil Nadu, Jointly conducted by Satyaki Roy and Jayanta Chatterjee, 2011</i>
<i>Opportunity Translation to Marketable Innovation: IDI 3, Organized by TYE for secondary school students, Jointly conducted by Satyaki Roy and Jayanta Chatterjee, 2011</i>
<i>PD6 workshop during the VLFM Course in the Department of Industrial Management and Engineering, IIT Kanpur, Jointly Conducted by Satyaki Roy and Kalevi Ekman, 2011</i>
A short module (3 Hours), Design Innovation, Prabandhan'11, the annual management conclave in the Department of Industrial Management and Engineering, IIT Kanpur, Jointly conducted by Satyaki Roy and Jayanta Chatterjee, 2011
A short module (3 Hours), <i>Design and Creativity</i> , Tata Motors, Lucknow, 2010
A short module (12 Hours), <i>Principles and Elements of Motion Pictures</i> , Organized by Parivartan Forum for secondary school students, Merchant Chamber, Kanpur, 2010
A short module (6 Hours), <i>Design and Emotion</i> , Department of Design, IIT Guwahati, 2010
A workshop (6 hours) for students and industry participants on India Centric Design Problem Identification and Problem Solving at the Design Factory, Aalto University, Finland, during FinIndia Conference, 2008
USID Gurukul 2011, International Design Workshop, IIT Kanpur, 2010, 2011, 2013
National Workshop (NPTEL Phase II) on 'Deployment and Use of NPTEL Courses for Civil Engineering, Core Sciences (including Physics, Chemistry and Mathematics)', IIT Kanpur, August 2011
National Workshop (NPTEL Phase II) on 'Deployment and Use of NPTEL Courses for Electrical & Electronics Engineering, Computer Sciences and Engineering, Mechanical Engineering, JSS Noida, October 2010
National Workshop (NPTEL Phase II) on 'Deployment and Use of NPTEL Courses'f or Electrical Engineering, Computer Sciences and Engineering, Mechanical Engineering, IIT Kanpur, July 2010
National Design Challenge, "Tractors for 2020" in collaboration with ESCORTS Pvt. Ltd, IIT Kanpur, as part of ADEX 2010
National Design Challenge, "Inter City Bus Exterior Styling" in collaboration with JCBL, IIT Kanpur, as part of ADEX 2009
National Workshop (NPTEL Phase I) on 'Deployment and Use of NPTEL Courses'f or Electrical Engineering, Computer Sciences and Engineering, Mechanical Engineering, Civil Engineering, and Core Sciences, IIT Kanpur, March 2007

Exhibition of Prints and Pantings

Exhibition Organized by Saga Art Collage, Japan, 2000
Avantika National Exhibition, New Delhi and Jaipur, 2000
Annual exhibition of Birla Academy of Fine Arts & Culture, Kolkata, 1997-1999

Annual exhibition of Prints, All India Fine Arts and Craft Society (AIFACS), New Delhi, 1998
An Exhibition organized by Lalit Kala Academy, Calcutta Information Center, 1998
An Exhibition organized by Lalit Kala Academy, Nandan, Shantiniketan, 1998
A group Show at Birla Academy of Fine Arts & Culture, Kolkata, 1997
Exhibition organized by the Oriental Association of India, Birla Academy of Fine Arts & Culture, Kolkata, 1996
A group Show at Academy of Fine Arts, Kolkata, 1995
Eastern Zonal Biennial of prints, Lalit Kala Academy, 1996
Printmaking workshop, Bharat Bhavana, Bhopal 1997
Artists Camp and Exhibition, Birbhum Jila Chatra Yuva Utsav, Bolpur, 1997
Camlin Art Material Awareness Camp and Exhibition, Shantiniketan, 1998

Annexure - II

The table given below is a sample of the permanent assets acquired during NPTEL phases II and III. It is not exhaustive but gives an idea of the nature of assets that will be acquired this time too.

CATEGORY BELONGING TO	ITEM DESCRIPTION	VALUE
COMPUTER SYSTEMS BOUGHT FOR VIDEO PROCESSING AND FOR THE WEB STUDIO (Includes Apple Mac for Video editing and conversions, Desktops, Players, Spare Parts, Computers, Taptops)	APPLE IMAC 2.93 GHZ	873600
	MAC PRO 2.26 GHZ+--	1200603
	APPLE MAC PRO	6517794
	TOW PUR OF NOTE BOOK	112000
	APPLE MAC PRO	367342
	APPLE MAC PRO	2188243
	APPLE MAC	3117221
	APPLE MAC PRO	2290716
	APPLE MAC PRO	717432
	TOW HP ELITE BOOK 87	140000
	TOW APPLE MACPRO& AP	925600
	NOTEBOOK COMPUTER	116970
	COMPUTER SYSTEM WITH	259858
	DESKTOP	250000
	SONY DVD 100'S PACK	132000
	L3CFB (200MTR)	265211
	FUJIFILM DV171HD 276	104000
	APPLE MAC PRO WITH S	2895916
	PUR OF DELL INSPIRON	481140
	SPARE PARTS	530422
	LENOVO DESKTOP	172200
	SPARE PARTS	265211
	LENOVO DESKTOP	172200
	APPLE IMAC 27	701456
	DELL LATITUDE XT3	444000
	SPARE PARTS	265211
	TOW CD-325	206600
	DELL PRECISION WORKS	124500
	DAC -70 CROSS CONVER	109920
	SUPPLY OF COMPUTER C	186635
SONY LAPTOP	141980	
FUJI VIDEOCASSETTE	114000	
TOSHIBA LAPTOP	126000	
EQUIPMENT RELATED TO STUDIO	VIDEO RECORING EQUIP	39651437
	VIDEO RECORDING EQUI	2748254

	TOW HIGH DEFINITION	3856723
	TOW PUR OF HD LCD TV	4131250
	TOW HD LCD TV MONIT	197820
	TOW PUR OF HDV RECORDER	487125
	TOW PUR OF INTEL SYSTEM	232000
	TOW HD LCD TV MONITO	110460
	TOW HIGH DEFINITION	1285065
	TOW HD LCD TV MONITO	197820
	TOW HD VIDEO CAMERA	230011
	TOW HVR DIGITAL HD V	676695
	TOW PUR OF DIGITAL CAMERA	156800
	TOW HIGH DEFINITION	1282481
	TOW HD LCD TV MONITO	282600
	TOW HD LCD TV MONITO	669060
	TOW HD LCD TV MONITO	298143
	PROJECTOR	125950
	VIDEO RECORDING EQUI	6789091
	TOSHIBA EXTERNAL HAR	192500
	WACOM INTERACTIVE PE	155000
	LENS KIT	211825
	ACOUSTIC PARTITION &	163437
	AUDIO EQUIPMENT FOR	1000000
SERVER RELATED	M5000 SERVER	1059119
	M5000 SERVER	2987612
	ADDITIONAL EXTERNAL STORAGE	1213928
	TOW HP WORKSTATION Z	148995
	SPARE PARTS	265211
	SPARE PARTS	265211
MISCELLANEOUS	PROVISION OF AC FACI	585294
	TOW CUSSTOM DUTY	2955793
SOFTWARE	CAMTASIA STUDIO SOFT	110668
	ACROBOT PROFESSIONAL	13490240
	PROFESSIONAL VIDE CA	1796047
	CHEMBIO DRAW ULTRA P	1102530
	NPTEL MEDIA AND APPL	2279550

The table given below is a sample of the recurring expenses during NPTEL phases II and III. It is not exhaustive but gives an idea of the expenditure that will be required. D

Consumables cost - sample expenditure from IIT Madras

NPTEL project

Consumables include filing cabinets/ stationery/ software licenses/ Labour/furniture/ refreshment/ flooring/ repairs/ books/ fans / Video Tapes

	Amount in Rs
2009 Sub-Total	2933017
2010 Sub-Total	6140804
2011 Sub-Total	831892
2012 Sub-Total	1108505
2013 Sub-Total	1871254
2014 (partial) Sub-Total	943061
Total	13828533

Staff salary cost - sample expenditure from IIT Madras

NPTEL project

Staff Salaries include salaries paid to administrative / accounts/ designers/ coders/ server maintenance personnel

	Amount in Rs
2009 Sub-Total	3984054
2010 Sub-Total	7536713
2011 Sub-Total	9145656
2012 Sub-Total	7973171
2013 Sub-Total	8444998
2014 (partial) Sub-Total	4656883
Total	41741475

Travel cost - sample expenditure from IIT Madras NPTEL project

Travel includes travel by PIs, NPTEL coordinators, partner institution faculty, SMEs, PIC members.

	Amount in Rs
2009 Sub-Total	607941
2010 Sub-Total	923737
2011 Sub-Total	1720184.75
2012 Sub-Total	2645889
2013 Sub-Total	2077612

2014 (partial) Sub-Total	1828029
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Total	9803392.75
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Other cost - sample expenditure from IIT Madras NPTEL project

Other includes payment made to vendors for services and miscellaneous payments.

	Amount in Rs
2009 Sub-Total	80511322
2010 Sub-Total	160444200
2011 Sub-Total	92555350
2012 Sub-Total	220838610
2013 Sub-Total	49028992
2014 (partial) Sub-Total	20820605
Total	624199079

Annexure – III: List of NPTEL Programme Implementation Committee Members

Prof. Bhaskar Ramamurthi - Chairman, NPTEL PIC & Director, IIT Madras

Prof. R. K. Shevgaonkar - Co-Chairman, NPTEL PIC & Director, IIT Delhi

Prof. M. S. Ananth, Professor Emeritus, Indian Institute of Science, Bangalore

Prof. Kushal Sen - National Video Coordinator and TEL coordinator, IIT Delhi

Prof. K. Mangala Sunder - National Web Course Coordinator and NPTEL Coordinator, IIT Madras

Prof. K. R. Srivathsan - Director, Chinmaya Institute of Technology, Kannur, Kerala (Special invitee)

Prof. Andrew Thangaraj - NPTEL Coordinator, IIT Madras

Prof. Prathap Haridoss - NPTEL Coordinator, IIT Madras

Prof. K.Gopakumar – NPTEL Coordinator, IISc Bangalore

Prof. Bani Bhattacharya - NPTEL Coordinator, IIT Kharagpur

Prof. Shyamal Kumar Das Mandal - CET, IIT Kharagpur

Prof. Bikash Mohanty - NPTEL Coordinator, IIT Roorkee

Prof. A.N. Chandorkar - NPTEL Coordinator, IIT Bombay

Prof. Satyaki Roy - NPTEL Coordinator, IIT Kanpur

Prof. Pradeep Yammiyavar, NPTEL Coordinator, IIT Guwahati

Dr. Kandasamy - NPTEL Coordinator, NIT K Surathkal

Dr. S. Vaidhyasubramaniam- NPTEL Coordinator, SASTRA University

Prof. K. S. Rajan - NPTEL Coordinator, SASTRA University, Thanjavur

Prof. Neelakrishnan - NPTEL Coordinator, PSG College of Tech, Coimbatore

E-content Development & Development and Delivery of MOOCs

Consortium for Educational Communication

**An Inter University Acceleration Centre
IUAC Campus, Aruna Asaf Ali Marg,
New Delhi – 110067**

website: www.cec.nic.in

E-content Development in 87 UG subjects under NME-ICT Project

- **The MHRD vide its communication dated 31st March, 2009 approved a Project Proposal for e-content development to CEC in 87 Under Graduate(UG) subjects.**
- **After receiving the initial funds in March, 2011, CEC Media Centres started producing the e-content courseware in allotted subjects.**
- **CEC developed the e-Content Template in **Four Quadrant** following instructional design methodology.**

The Scope of Work under the project

- **Phase –I**

- No. of subjects: **29 UG Subjects**

- Proposed no. of modules to be developed: **8341**

- **Phase -II**

- No. of subjects: **58 UG Subjects**

- Proposed no. of modules to be developed: **16353**

Development Approach

- **CEC adopted template based approach for development of the content where all the content elements are bundled within the template.**
- **The content can be made available online. This enables CEC to upload the content on CEC – LMS, presently hosted on NIC Servers.**
- **For the benefit of the students who are not connected with internet, the content can be taken on a memory device such as USB drive, DVD etc. and student can study at his own pace and time.**

Development Process -Subject Mapping

Process and steps involve in development of e-content module by CEC and Media Centres.

- I) Allotment of Subject to Media Centres
- II) Appointment of Subject Coordinator
- III) Adopting UGC model curriculum for 3 years UG course.
 - Identification of Subject Experts
 - Subject overview and extent of subject coverage (18-24 papers)
 - Topic selection for e-content modules (average 300 modules)

Development of Academic Script

- **Following Instructional design and strategies.**
- **Research and Academic script development along with Illustration, Summary, Text, Case Studies, FAQ's, Assignments , Quiz, Tutorial, References, Glossary, Links ,Download and other elements of e-template.**
- **Vetting of the Academic script by Subject Coordinator.**

Pre Production Arrangements

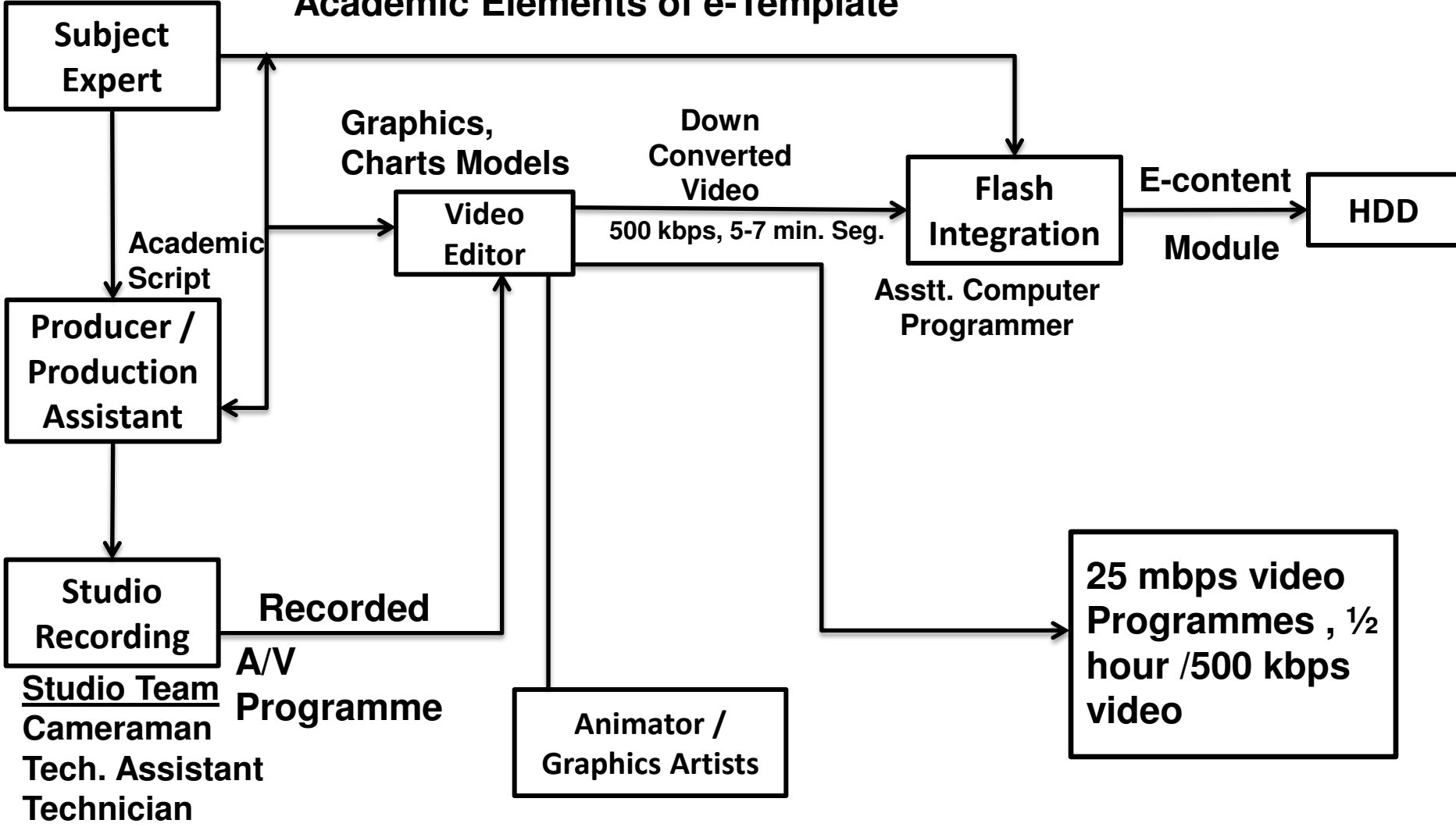
- **Adopting final Academic script for Audio/Visual production.**
- **Developing story board.**
- **Collection of All Multimedia Resources such as samples, illustration, models, graphs, etc.**

Production of e-content modules

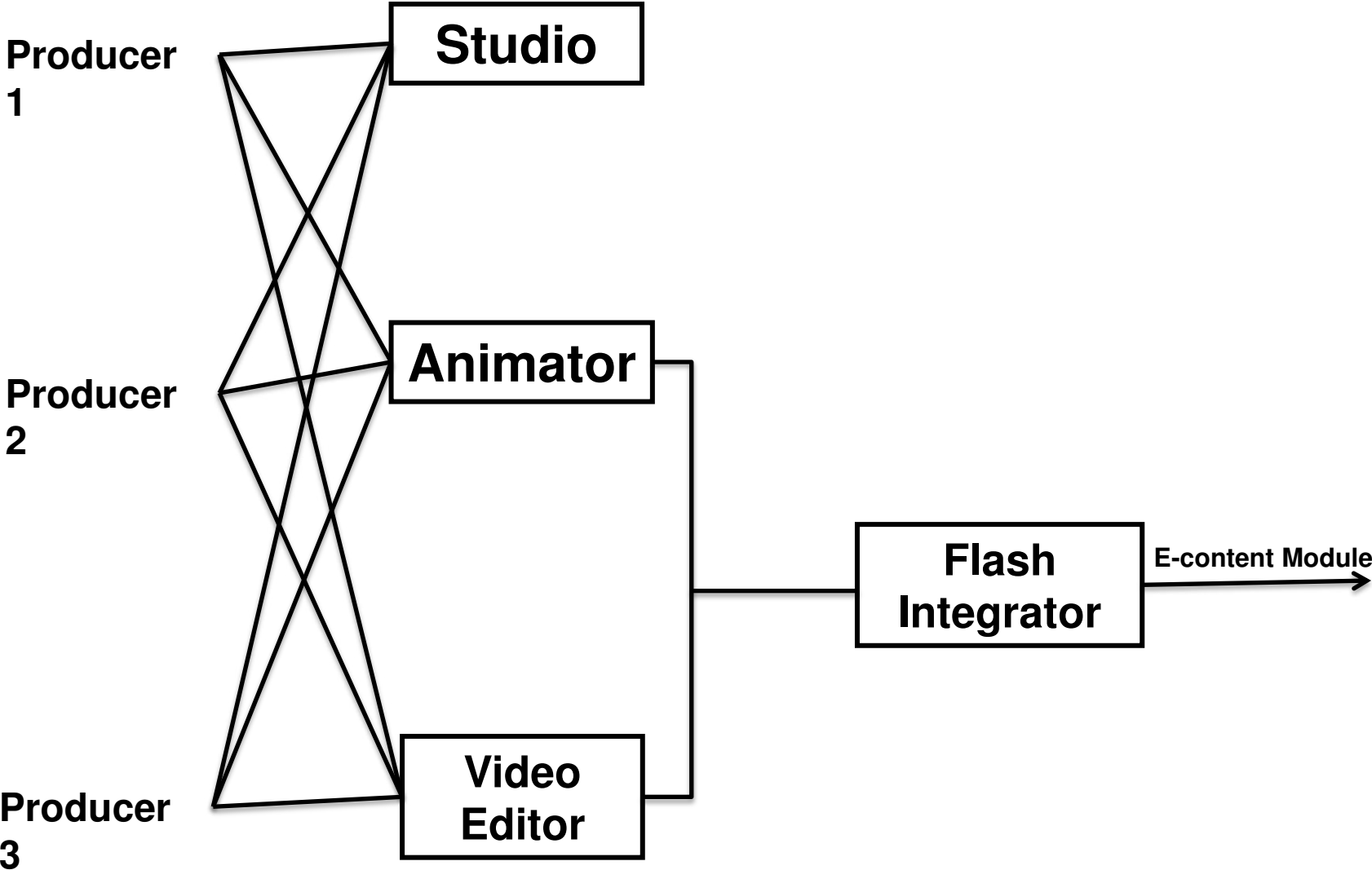
- **Video / audio recording.**
- **Editing**
- **Development of e-content elements**
- **Integration of elements in the e-content templates**
- **Preview of module by outside Subject Experts in presence of Ssubject Expert/Coordinator**
- **Modification if required**

Using Production Assembly Lines for optimum resource utilization

Academic Elements of e-Template



Matrix Operation for increasing production



CEC e-Content Template



Consortium for Educational Communication, India



सत्यमेव जयते



HOME



CONTACT

NME-ICT, MHRD
National Mission on Education through ICT

OBJECTIVES | SUMMARY | VIDEO / AUDIO

SEARCH

TEXT | ASSIGNMENT | REFERENCE | DOWNLOAD | BLOG

FAQs

CASE STUDY



BOTANY
Ist Year

Course Name :
Botany

Paper No. & Title:
Paper-II
Cell Biology and Genetics

Topic No. & Title:
Unit-III
DNA: The Genetic Material

Empowering through e-Education

© CEC - UGC

Credits

Four Quadrant Approach

1st Quad Text Resources

Textual Document, PDF / e-Books / illustration

2nd Quad Visual Resources

Video and Audio Content in an organized form, Animation

3rd Quad Web Resources

Related Links, Case Studies, Historical development of the subject, Articles , Web-links

4th Quad Self Assessment

MCQs, Quizzes, Assignments, FAQs

Unique Features of CEC e-content module

- **Maintaining highest Audio/Video quality**
- **Production of e-content in complete 4 Quadrants**
- **Creating Transcription (Text) out of the video spoken by the Teacher and making the text available to the students in e-content modules**
- **Creating e-book out of each e-content module is developed & incorporated in Template under Downloads & Academic Script, besides introducing Glossary, Frequently Asked Questions and their replies, Quiz, Assignment, case studies, Tutorials etc.**

Time required for developing One E-content Module

A. Preproduction Stage:-

- Orientation of subject expert by organising workshops at CEC/Media Centres.

(24 Hrs/3 Days)

- Providing module wise Academic Script alongwith other elements of the e-template like Module Mapping, Objectives, Summary, Downloadable Text, Case studies, FAQ's, Assignments, Quiz, Tutorial, References, Glossary, Web References etc.

(16 Hrs)

- Assuming that the Resource Persons will devote at least 4 hours each day, besides his/her normal academic work.

B. Production Stage:-

(Assuming that each module is of 25-30 minutes duration)

<u>Item</u>	<u>Days</u>	<u>Hours</u>
• Basic briefing of the Subject Expert regarding Orientation for e-content development	½	4
• Studio set-up & Audio/Video Recording	½	4
• Preparation of animation/graphic/Digitisation	2	16
• Post-production-video Programme***	2	16
• Preview, correction & certification of Video programme	¼	2
• Recording video programme on Final Media	¼	2
• Down converting and Chunking	½	4
• E-content integration in template and Platform validation	2	16
• Preview, correction & certification of e-content	½	4
TOTAL	8 ½	68

Content Certification and Validation

- CEC ensures Rigorous Quality Assurance during development of e-content at two stages:-

Stage-I : At Media Centres, Outside Experts Preview the e-content in presence of Subject Expert and Production Staff.

Stage-II : At CEC by Academic Experts. Suggestion for correction and modifications are send to Media Centres.

- Only accepted and certified e-content modules are uploaded and released in public domain.

E-Content Development Project Status

E-content development in 29 UG subjects under Phase – I

•Project Approval Board (PAB), MHRD approved a sanction of Rs. 18.5 Crores to this project in its 18th meeting, held on 24th Jan, 2011. Ministry of Human Resources Development under the project NME-ICT sanctioned an amount of Rs. 18.50 Crores vide letter no.: F.16-38/2009-DL dated 28th February, 2014 as grant-in-aid for production of e-content of courseware by CEC and Media Centres.

•Till date Rs. 15.92 Crores out of the total Rs. 18.50 Crores sanctioned has been released by Ministry. As resolved in the Standing Committee Meeting held on 6th December, 2013 the remaining amount of Rs. 2.08 Crores shall be released after closer of the Phase – I.

CEC has completed e-content under Phase-I (29 subjects)

Sr. No.	Subject Allotted	Media Centres	E-content Module proposed as per subject mapping by Centre	E-content Developed
1	B. A. History	Kolkata	356	356
2	B.A. Botany	Srinagar	279	280
3	B.A. / B.Sc. English Language	Hyderabad EFLU	131	131
4	B.A. / B.Sc. Environmental Science	Indore	76	75
5	B.A. Anthropology	Manipur	193	199
6	B.A. (Hons.) Mathematics	Calicut	379	378
7	B.A. / B. Sc. Hindi Language	Indore	147	147
8	B.A. Vocational Studies (Photography)	Indore	27	27

9	B.A. Communication & Journalism	MCRC Jamia	312	326
10	B. Sc. Computer Science	Chennai	350	405
11	B.A. Performing Arts	Patiala	290	329
12	B.A. (Hons.) English Literature	Hyderabad EFLU	399	399
13	B.A. Hindi Literature	Indore	325	329
14	B.A. Sociology	Madurai	390	390
15	B.A. Psychology	Hyderabad EFLU	305	285
16	B.Sc. Applied Physical Sciences (Computer Science)	Patiala	230	225
17	B.Ed.	Calicut	300	341
18	B.A. Geography	Mysore	340	427
19	B. Sc. Zoology	Ahmedabad	300	309
20	B.Sc. (Hons.) Microbiology	Kolkata	350	363

21	B.Sc. Applied Physical Sciences (Electronics)	Chennai	350	377
22	B. A. Human Rights	Imphal	210	198
23	B.Sc. Geology	Sagar	281	276
24	B.Sc. (Hons.) Statistics	Mysore	300	269
25	B.A. Business Management	Pune	316	316
26	B.Com Commerce	Jodhpur	355	782
27	B.A. Economics	Hyderabad Osmania	350	321
28	B.Sc. Chemistry	Roorkee	350	361
29	B.Sc. Applied Life Science (Sericulture)	Mysore	350	351
	TOTAL			8948

E-content development in 58 UG subjects under Phase – II

- The Ministry sanctioned an amount of Rs. 63.8290 Crores under centrally sponsored scheme of e-content courseware development Phase – II in 58 subjects under NME-ICT project vide letter no.: F.16-38/2009-DL dated 19th May, 2014.**
- MHRD released an amount of Rs. 17.80 Crores out of the total sanction of Rs. 63.8290 Crores. The Media Centres are already at various stages of production under Phase – II. The e-content for phase – II is scheduled to be completed by December, 2016.**

Production of e-content courseware in 58 UG subjects under Phase – II

Sr. No	Subject Allotted	Media Centres	E-content Module proposed as per subject mapping by Centre	E-content Developed till September, 2015
1	B.A. (Hons) Urdu (1 st Year)		140	59
	B.A. (Hons) Urdu (2 nd Year)	EFLU	100	
	B.A. (Hons) Urdu (3 rd Year)	MCRC, Jamia	100	48
2	B.A. (Hons) Music (Ravindra Sangeet) (The primary language may be Bengali with English subtitle)	Kolkata	85	
3	B.A. (Hons) Political Science	Kolkata	350	07
4	B.A. (Hons) Hindi Journalism	MCRC, Jamia	300	33
5	B.A. (Hons) Philosophy (3 year)		279	121
6	B.A. (Hons) Business Economics	Ahmedabad	350	07
7	B.A. (Hons) Sanskrit (1 st and 2 nd Year) (52+110)	Roorkee	162	16
	B.A. (Hons) Sanskrit (3 rd & 4 th Year)	Chennai	200	33
8	B.A. (Hons) Music (Karnataki Sangeet) 3 year		210	12
9	B.A. (Hons) Music (Hindustani Classical)	Pune	375	34

10	B.A. (Hons) Social Work	Osmania	300	24
11	B.A. Management & Marketing of Insurance (1 st & 2 nd Year)		350	109
	B.A. Management & Marketing of Insurance (3 rd Year)	Osmania	120	
12	Foreign Language courses – German, Spanish, French & Russia (at the level of certificate course) 50X4	EFLU	200	
13	B.A. Fine Arts	MCRC Jamia	300	40
14	B.A. in Film Studies	Kolkata	210	
15	B. A. Vocational Studies (Advertising papers)		34	26
16	B. A. Vocational Studies (Financial Accounting papers)		25	16
17	B. A. Vocational Studies (Computer & Networking papers)		72	56
18	B.A. Tourism		355	45
19	B. A. Human Resources Management	Pune	105	72
20	B.A. Social Welfare Administration – 3 year		355	

21	B. A. Vocational Studies		355	26
22	B. A. Marketing Management & Retail Business		350	203
23	B.A. Office Administration & Secretarial Practice	Pune	310	17
24	B.A. Public Administration	Osmania	200	14
25	B.A. LLB (1 st & 2 nd Year)		300	241
	B.A. LLB (3 rd , 4 th & 5 th Year)	EFLU	400	38
26	B. A. Vocational Studies - Mass Communication Video Production	Kolkata	300	47
27	B. A. Population Studies		270	63
28	B. A. Education		380	104
29	B A. Criminology – 3 Year	Sagar	268	
30	B. Sc. Forensic Science – 3 Year	Sagar	271	

31	B.Sc. (Hons) Food Technology (1 st Year)		221	25
	B.Sc. (Hons) Food Technology (2 nd & 3 rd Year)		355	06
32	B.Sc. Life Sciences (1 st Year)	Ahmedabad	84	59
	B.Sc. Life Sciences (2 nd & 3 rd Year) (200+150)		350	29
33	B.Sc. (Hons) Home Science (1 st , 2 nd , 3 rd & 4 th year)	EFLU	500	64
34	B.Sc. (Hons.) Bio-Medical Sciences		380	29
35	B.Sc. (Hons) Electronics		350	38
36	B.Sc. (Gen) Mathematical Science	Chennai	400	77
37	B.Sc. Agriculture (1 st and 4 th Year)		110	111
	B.Sc. Agriculture (2 nd Year)		280	
	B.Sc. Agriculture (3 rd Year)	Imphal	300	19
38	B.Sc. (Hons) Polymer Science	Chennai	300	22
39	B.Sc. Physics (Hons.)	Chennai	250	129
40	B.Sc. Agro-Chemical and Control		50	

41	B. Sc Bio-Informatics		183	35
42	B.Sc. Applied Physical Sciences (Environmental Science)	Chennai	130	79
43	B.Sc. Applied Physical Sciences (Industrial Chemistry)	Roorkee	250	56
44	B.Sc. (Hons) Bio-Chemistry – 1 st Yr.	Osmania	120	
	B.Sc. (Hons) Bio-Chemistry – 2 nd & 3 rd Yr.		175	01
45	B.Sc. Physical Sciences	Osmania	300	
46	B. Arch.	Chennai	400	04
47	B.Ed. (Special Education for Visually Impaired)		225	06
48	B.Ed (English) (1 ½ year)	EFLU,	100	11
49	B.El.Ed. (Elementary Education) (1 st , 2 nd , 3 rd & 4 th)		500	
50	B.Library and Information Science – 1 year		100	47

51	B.P.Ed. (1 st & 2 nd Year)		150	11
	B.P.Ed. (3 rd Year)	Imphal	250	06
52	B. Pharmacy	Sagar	524	01
53	BFA Painting Applied Art Sculpture (core paper)		80	31
54	BFA Painting Applied Multimedia		220	04
55	Bachelor for Theatre Arts		80	38
56	Bachelor of Business Studies	MCRC, Jamia	300	82
57	Manuscriptology (core papers)		20	
58	Cyber Security/Information Security		185	20

Deliverables to CEC Media Library

- **Final Subject Mapping alongwith Metadata in CEC format and syllabus for the UG Subject.**
- **Video Programs: 25 – 30 min**
High resolution SD files on MPEG - 2 / DV Format with resolution 720 x 576 @ 25 Mbps on Optical Disc
- **Low resolution SD files on MP4 Format with resolution 480 x 360 compressed @ 500 Kbps or better.**
- **E-content with all elements embedded in the CEC template.**
- **Short Learning Objects (LoRs) upto 2 min duration.**
- **Completion Certificate in prescribed format.**

Achievement So Far:

Phase I

- No. of subjects taken up : **29 UG Subjects**
- No. of modules proposed to be developed : **8341**
- No. of Modules developed : **8948**
- No. of subjects completed : **29 UG Subjects**

Phase II

- Phase –II started on: **December, 2014**
- No. of subjects : **58 UG Subjects**
- No of modules proposed to be developed : **16703**
- No of Modules developed till October, 2015: **2551**
- Approximate no. of Modules under Development: 4000
- CEC Plans to complete Phase – II by **December, 2016**
- CEC proposes to partly outsource the content development for timely completion of the project.

Financial Status of the Project -Phase -I

GRANTS RECEIVED FROM MHRD FOR PHASE- 1	Amount in Lakhs
Sanction letter No.16-38/2009-DI dated 28.02.2011 Grants Received on 09.03.2011	Rs. 540.00
Sanction letter No.16-38/2009-DI dt. 16.12.2011 Grants Received on 02.01.2012	Rs. 300.00
Sanction letter No.16-38/2009-DI dt. 28.03.2012 Grants Received on 31.03.2012	Rs. 310.00
Sanction letter No.16-38/2009-DI dt. 18.02.2014 Grants Received on 27.02.2014	Rs. 442.00
Total Grants received	Rs. 1592.00
Total Gross Expenditure (1st April, 2010 to 31.10.2015)	Rs.1564.90
Unspent Fund	Rs. 27.10
Committed liabilities	Rs. 185.00
Balance amount to be released by MHRD	Rs. 157.90

- Phase –II

GRANTS RECEIVED FROM MHRD FOR PHASE- 2	Amount in Lakhs
F.16-38/2009/DL dt.19.05.2014	133.512
F.16-38/2009/DL dt.19.05.2014	267.024
F.16-38/2009/DL dt.19.05.2014	1379.624
Total Grants received	1780.16
1.Total Gross Expenditure (1 st April, 2014 to 31.10.2015)	866.68
2. Amount Committed for various activities in content development	850.00
Unspent Fund	16.68
Balance amount to be released by MHRD	4602.90

Availability of the Content to Users

- 26 Subjects have already been uploaded on CEC portal.
- We are in the process of uploading 3 more subjects.
- **Online availability:**
The uploaded content is available on CEC Web-Portal: www.cec.nic.in/e-content
- **Offline availability**
For the users who are not connected with the Internet the content can be copied on a memory device

Development and Delivery of MOOCs

CEC approach for Development and Delivery of MOOCs

- **CEC proposes to repurpose e-content resources for developing MOOCs to be made available on MHRD MOOCs platform **SWAYAM** except from development of some introductory and some additional Multimedia Content as per the requirement of the course**
- **CEC will involve subject matter experts (SME) and academics who have contributed for the development of e-content courseware in various subjects.**
- **The courses are proposed to be offered by Tripartite arrangement between CEC , Media centers and the host University, where the media centers are located.**

Repurposing E-content Resources for MOOC's

- **Files to be retained at Media Centres for development of MOOCs/online courses and for archival of content.**
- **A copy of all the items delivered to CEC.**
- **Text files – Objectives, Summary, Text (Case Study and FAQs), Assignment (Quiz & Tutorials), Reference (Glossary and Links) etc. - in MS Word (.doc/.docx).**
- **Downloads/E-books – PDF file formats.**

Plan to deliver EduSat/Webcast live lecture transmission in MOOC's Compliant Format in some new areas specially skill/vocational courses

- **CEC is planning for delivering daily 4 live Lectures from CEC New Delhi and another 4 live Lectures are planned by Media Centre focusing on following areas in MOOCs compliant form in structured skill based/vocational MOOCs courses:**
- Fundamentals/Basics of Subjects
- Skill development and vocational course contents
- Lecture Series by eminent scholars/Scientist
- Soft Skills and communication skills/career counseling

Preparatory steps for offering/delivery of MOOCs:

- **CEC plans to start 2 MOOC's on existing Course Builder and IITBombayX platform, the course developer rights and password for each course to be provided by IIT-M/IIT-B as a Pilot**
- **CEC plans to repurpose about 9000 modules of e-content developed under Phase – I into approx. 150-200 MOOCs and about 100 MOOCs courses have been identified.**
- **CEC would require to create MOOC's/Multimedia labs at CEC and Media Centre to develop/re-purpose e-content into MOOC's at large scale**

Contd.

- **We would require minimum 2 MOOC's/ Multimedia Lab at CEC @ 15-20 system each lab with ICT resource persons and atleast 2-3 systems and resource persons at each Media Centre**
- **The courses would be offered by a tripartite arrangement between CEC, Media Centre and the Proctored exam and certification would be by the Host University where Media Centre is located.**

CEC Requirements for MOOCs

- **CEC has already requested MHRD regarding permission to provide Rs. 50 Lakhs out of e-content funds for starting MOOC's Activities including Training and Pilot running of MOOCs.**
- **Formal communication regarding 'Go ahead' from MHRD to develop and run MOOC's and funding for re-purpose and development of MOOC's based on MHRD costing committee report to enable CEC to sustain the activity.**
- **CEC is working in a hutment which does not have any space available for MOOC's Lab. We would require hire/make temporary constructions/arrangements for 2 MOOC's lab and related activities which would require working space of approx. 16,000 sqr. ft. in a properly furnished building.**

Thank You
For YOUR
KIND
ATTENTION

Talk to a Teacher

Teachers empowerment, students empowerment,
and integration of tools for empowerment
(synchronous delivery)

IIT Bombay:

Kannan M. Moudgalya, D. B. Phatak

IIT Kharagpur:

Raja Datta

**Domain Experts Committee Meeting
23 November 2015**



Outline

- ▶ **Budget and project components**
- ▶ **Plan vs. delivery**
- ▶ **Requests to this committee**
- ▶ **Brief description of T10KT and Spoken Tutorials**



Components

1. **10,000 Teacher Training Programme (T10KT)**
2. **Spoken Tutorials**



10,000 Teacher Training Programme: Deliverables

1. **Conduct 15 courses**
 - ▶ 9 at IIT Bombay
 - ▶ 6 at IIT Kharagpur
2. **Train 1,50,000 teachers**
3. **Establish 10 Nodal Centres**
4. **Establish 500 Remote Centres**



Spoken Tutorials: Deliverables

- 1. Create 5,000 Spoken Tutorials of 10 minute duration each**
- 2. Train 1,50,000 students and faculty**



Overall Budget (in lakh)

	I Year	II Year	III Year	Total
IITB	5557	3879	3937	13373
IITKgp	1299	1893	2637	5829
Total	6856	5772	6574	19202



Cost of training through T10KT

- ▶ **Projected cost per person = Rs. 6,290**
- ▶ **Achieved cost per person = Rs. 5,287**
- ▶ **Partly due to using MOOCs HALF the time in the latter courses**
- ▶ **No quality degradation**
- ▶ **With MOOCs use in remaining courses, cost will continue to come down**
- ▶ **QIP cost: Rs. 12,000 to 18,000**



Recurring Budget (Rs. Lakh)



	IITB	IITKgp	Total
Salary	1475	625	2100
Consumables	420	250	670
Nodal centres upkeep	350	0	350
Remote centres upkeep	1400	0	1400
10K Workshops	5661	3774	9435
Coordinator W/s	225	150	375
Publicity/sponsorship	180	150	330
Travel	255	150	405
Contingency	337	180	517
Coord. honorarium	75	75	150
Total	10378	5354	15732



Non-Recurring Budget (Lakh)



	IITB	IITKgp	Total
Equipment	475	475	950
Nodal centre establishment	1120	0	1120
Remote centre establishment	1400	0	1400
Total	2995	475	3470



Details of funds received

Year	Date of receipt	Amount recommended by SC (Rs. crore)	Amount Released (Rs. crore)
1	6 Feb. 2013	30%	57.60
2	18 Sept. 2014	57.60	20.00

- ▶ The SC (27-28 May 2014) recommended the release of Rs. 57.60
- ▶ Only Rs. 20 crore was released on 18 Sept. 14
- ▶ The current presentation is for the release of the balance Rs. 37.60 crore of Year 2.



First request to this committee

- ▶ **To get the balance funds of Rs. 37.60 crore**
- ▶ **It is a part of the Rs. 57.60 crore already approved by SC on 27-28 May 2014**



Current financial position

- ▶ IITB has salary money for 1 month only
- ▶ We have two courses, one each in IITB and IITKgp, in Dec. 2015
- ▶ To pay TA/DA to about 20,000 people
- ▶ For future courses, need to start working - coordinator training should happen in the next two months
- ▶ Need money urgently



T10KT Training Alone: Planned vs. Delivered

		Planned	Delivered
13-14	No. workshops	3+1	4+2
	No. trained	40,000	56,377
14-15	No. workshops	3+2	5+2
	No. trained	50,000	49,407
Total	No. trained	90,000	1,05,784



T10KT Overall: Planned vs. Delivered

	Planned (3 years)	Delivered (< 2 years)
People trained	1,50,000	1,05,784
Nodal Centres	10	0
Remote Centres	500	350

We are at about the midpoint of this project!



Spoken Tutorials: Planned vs. Delivered

		Planned	Delivered
13-14	No. trained	50,000	2,44,215
	ST creation	1,100	1,140
14-15	No. trained	50,000	4,52,199
	ST creation	2,200	1,960
Total	No. trained	1,00,000	6,96,414
	ST creation	3,300	3,130



Second request to this committee

**Extend the duration of this project to until
Dec. 2016**



PRSG Meetings

1. 3 Oct. 2013
2. 25 June 2014
3. 8 Jan. 2015
4. 16 July 2015



Some PRSG Recommendations

1. **Release money urgently**
2. **Good processes learnt (esp. spoken tutorials) should be shared with Govt. departments**
3. **Spoken tutorial should become a separate project**



Some independent assessments

- ▶ **ISTE's independent assessment**
- ▶ **A Ph.D thesis on the efficacy of T10KT**



Some recognitions

- ▶ **GOOGLE MOOC** research award for the offline work of Spoken Tutorials
- ▶ **WIPRO** is “officially” using Java spoken tutorials as an accepted study material for its 5,000 trainees a year
- ▶ **1,750** programmes “officially” use spoken tutorials in “time table slots”
- ▶ **Several** research and newspaper articles



Another PRSG Recommendation

**Release Rs. 4.51 crore to Amrita University
- sanctioned by PAB in Phase I, but not
released yet**



Brief on T10KT



T10KT: Empowerment of teachers

Remote Centre 1



IIT Bombay



Remote Centre 90



Remote Centre 2



Remote Centre 89



Features of T10KT

- ▶ **Coordinator training: contact mode, two months in advance**
- ▶ **10,000 Teacher Training through A-VIEW**
- ▶ **Mornings - lectures, afternoons - labs**
- ▶ **Ten working days**
- ▶ **10,000 people trained = 300 QIP**
- ▶ **Extensive collection of instructional material created**
- ▶ **Now, MOOCs for half the time**



Benefits of T10KT

- ▶ **Empowered young faculty members in many colleges - it takes a long time through QIP courses**
- ▶ **Large number of women teachers attending these courses**
- ▶ **Experience in rural colleges is equal to that in urban colleges**



Brief on Spoken Tutorials



What is a Spoken Tutorial?

- ▶ **Audio-video tutorial of ten minutes length**
- ▶ **Created for self learning**
- ▶ **Workshops can be conducted by non-experts**
- ▶ **Highly scalable**
- ▶ **Focus: spreading ICT, open source software**



What is a Spoken Tutorial? - ctd

- ▶ **Explanation can be in vernacular languages**
- ▶ **Useful to bridge digital divide also**



What is a Spoken Tutorial? - ctd

- ▶ **Low cost educational methodology**
- ▶ **Only 1MB per minute**
- ▶ **In a CD costing Rs. 8, can pack 700 minutes of recording!**



Dubbing

- ▶ **Dub only audio**
- ▶ **Video remains the same**
- ▶ *If original spoken tutorial is made properly, dubbing is easy - only 5% of the effort*



Sample Tutorials in Our Languages

Assamese (dubbing)

Bengali (Sci)

Indian English (PHP)

Hindi (Linux)

Khasi (CS)

Malayalam (dubbing)

Mythili (CS)

Rajasthani (CS)

Sindhi (CS)

Telugu (Sci)

Bodo (Ubuntu)

Bhojpuri (dubbing)

Gujarati (Xfig)

Kannada (CS)

Konkani (CS)

Marathi (Sci)

Oriya (dubbing)

Sanskrit (\LaTeX)

Tamil (\LaTeX)

Urdu (Sci)



IT Jobs through English

- ▶ English is useful for IT jobs: video
- ▶ Mother tongue for learning: audio
- ▶ Useful for children weak in English, without affecting employment
- ▶ After listening to tutorial in mother tongue, go through tutorial in English also: can possibly improve English
- ▶ Helpful to school students studying in vernacular medium, for example



Focus Areas

- ▶ **IT**
 - ▶ **Technologies, employment, good marks in exams**
- ▶ **Bridging digital divide**
- ▶ **First aid, public health**



To Bridge Digital Divide

- ▶ **How to buy train tickets through <http://irctc.co.in>**
- ▶ **How to locate low cost agricultural loans**
- ▶ **How to locate information on primary health care**
- ▶ **How to obtain information on first aid**
- ▶ **How to do web search to locate the shop that sells TVs at the lowest price**
- ▶ **This list is endless**



Sample Tutorials on Digital Divide

- ▶ **Registering user at IRCTC**
- ▶ **Buying a train ticket at IRCTC**
- ▶ **Managing tickets at IRCTC**



Target Audience

**A remote child, working alone, at midnight,
without anyone to help her**



Website of the Spoken Tutorial Project

- ▶ <http://spoken-tutorial.org>
- ▶ Videos are available for free download



Final recommendation of PRSG

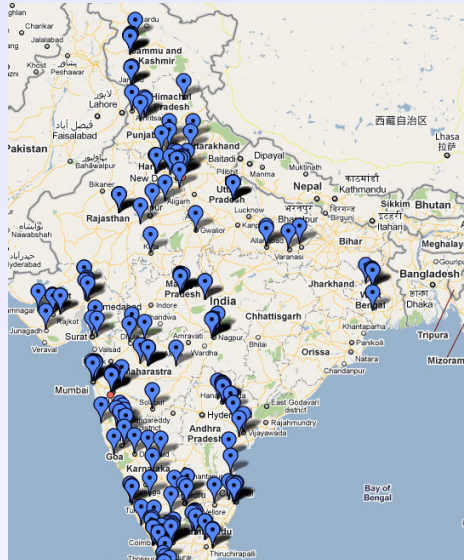
Please release Rs. 4.5 crore, due to Amrita



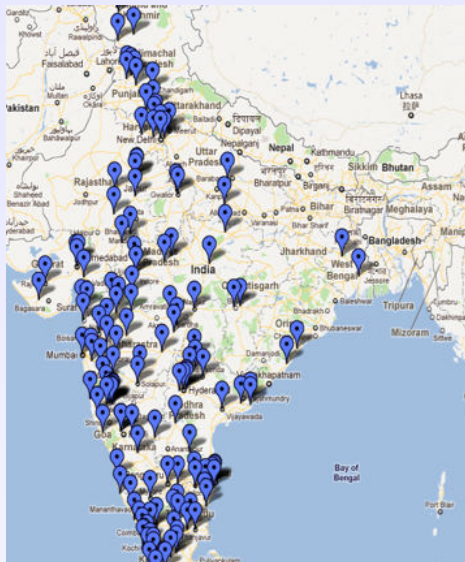
Thanks



Geographical locations - C. Prog. July 2010



Geographical locations covered - DBMS Dec. 2010



Qualitative feedback

- | | |
|---|---|
| 1 | “Though I have taught Computer Programming several times, I did not find this workshop boring, I enjoyed the lectures, labs, and assignments sessions.” |
| 2 | “This workshop gave a very good experience on new methodology like clickers, moodle etc. More workshops like this are advisable and welcome.” |
| 3 | “Its been a great experience being part of such a distance learning program, gained confidence in this subject ..it will be reflected when the session of my college starts...learning with so many colleagues is amazing” |



T10KT Workshops, 2013-14



No	Workshop name	Inst.	RC	Teachers
1	Engineering thermo-dynamics	IITB	167	5,706
2	Research methods in education technology	IITB	194	6,950
3	Database management systems	IITB	245	9,140
4	Analog electronics	IITKgp	218	8,049
5	Engineering mechanics	IITB	218	7,505
6	Signals & Systems	IITKgp	237	10,344
7	Fluid mechanics	IITKgp	229	8,683
Total				56,377



T10KT Workshops, 2014-15



8	Computer programming	IITB	272	9,381
9	Computer networking	IITB	246	8,481
10	Cyber security	IITB	207	6,015
11	Control systems	IITKgp	241	9,216
12	Pedagogy for effective use of ICT in engineering education	IITB	148	4,582
13	Introduction to design of algorithms	IITKgp	221	7,468
14	Environmental studies	IITB	158	4,264
Total				49,407



Budget

	First year		Second year		Third year		Total	
	Bom	Kgp	Bom	Kgp	Bom	Kgp	Bom	Kgp
Equipment	325	325	50	100	25	50	400	475
Salary	275	125	300	200	300	300	875	625
Consumables	100	50	100	100	100	100	300	250
Nodal centres(10)	750	0	250	0	250	0	1250	0
Remote centres(500)	1600	0	600	0	600	0	2800	0
10K workshops (15)	1950	650	1950	1300	1950	1950	5850	3900
Coordinator W/S (15)	75	25	75	50	75	75	225	150
Publicity/sponsorship	50	50	50	50	50	50	150	150
Travel	50	30	60	50	70	70	180	150
Contingency	100	100	100	100	100	100	300	300
Coord. honorarium	25	25	25	25	25	25	75	75
Total							12405	6075

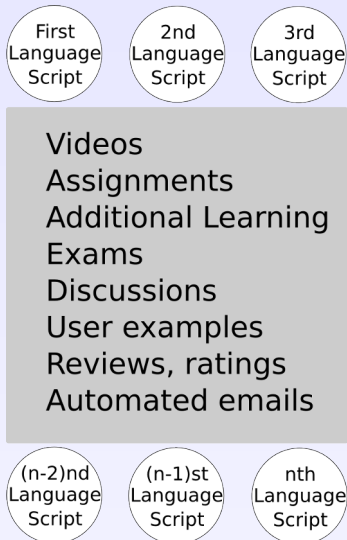
- ▶ Total budget = Rs. 18480 lakh
- ▶ Equipment budget includes portal servers - Moodle installations for colleges, etc.
- ▶ If e-cloud is available, equipment budget can be reduced by Rs. 4 (=2+2) crore.
- ▶ Salary is calculated on the basis of 150 people at each IIT.
- ▶ We propose to raise the nodal centres to the level of a hub.
- ▶ Costing for the 10 day course is on the basis of Rs. 6,500/person (TA/DA).



Spoken Tutorials: Current Status



Spoken Tutorial Framework



Family of Spoken Tutorials

Outline, brochures, workshops, etc.

Tutorial 1



Videos
Assignments
Additional Learning
Exams
Discussions
User examples
Reviews, ratings
Automated emails



Tutorial 2



Videos
Assignments
Additional Learning
Exams
Discussions
User examples
Reviews, ratings
Automated emails



Tutorial m



Videos
Assignments
Additional Learning
Exams
Discussions
User examples
Reviews, ratings
Automated emails



Infrastructure required for using Spoken Tutorials

- ▶ **Ordinary desktop/laptop/Aakash**
- ▶ **Ear phone for listening (Rs. 20)**



Using Spoken Tutorials

- ▶ Listen to a command, pause
- ▶ Try the command on the software
- ▶ If it works, go to the next command
- ▶ If not, rewind, listen to it
- ▶ Repeat until the tutorial is completed



Spoken Tutorial Based Workshops

- ▶ **Spoken tutorials are created for self learning**
- ▶ **Workshops can be conducted without domain experts**
- ▶ **Can support many workshops in parallel**
- ▶ **We join through Skype for the first time workshops**



IITB through Skype at Kerala Workshop



SELF FOSS Study Workshops

Spoken tutorial based **E**ducation and
Learning through **F**ree FOSS Study
Workshops

Further abbreviated as **SELF Workshops**



Features of SELF Workshops

1. **Instructional material**
2. **Duration of the workshop**
3. **Conductor of the workshop**



1. Instructional Material

- ▶ a. Checklist for infrastructure
- ▶ b. Instruction sheet for learners
- ▶ c. Instruction sheet for conductors



1a. Checklist for infrastructure

PC No.	Is the PC Booting?	Can log into PC? (if applicable)	These can be separated in 2 PCs, possibly			
			PC for spoken tutorial			
			FOSS loaded?	Spoken Tut. Copied?	Plays in VLC?	Audio works?
PC 1						
PC 2						
⋮						
PC 50						



1a. Checklist Explained - for Every PC Check:

- ▶ **Is the PC booting?**
- ▶ **Can you log into it?**
- ▶ **Is FOSS loaded?**
- ▶ **Is spoken tutorial copied?**
- ▶ **Are all the resource files copied?**
- ▶ **Does the spoken tutorial play in VLC?**
- ▶ **Does the audio work through head phone?**



1b. Instruction Sheet for Learners

- ▶ **Only instructions at the beginning - no theory**
- ▶ **Every instruction should be for an activity**
- ▶ **Verb is present in every instruction**
- ▶ **Theory comes later**



1b. A Sample Instruction Sheet - L^AT_EX I

1. **Click Places button at the top left hand corner and then click the Home Folder. The folder that opens is called your home folder.**



1b. A Sample Instruction Sheet - L^AT_EX II

2. Please locate the folder `LaTeX_Workshop` that is available on Desktop. The sub-folder `01-compilation` contains the following files that you need for this tutorial: `hello.tex` and `compiling.mov`.
3. Please copy `hello.tex` from this folder to your home folder.



1b. A Sample Instruction Sheet - L^AT_EX III

4. **Open the terminal using the command `Ctrl-Alt-t`, by pressing all these three keys simultaneously.**
5. **Open the file that you copied above into the editor using the command**
`gedit hello.tex &`

Do not forget the symbol ampersand



1b. A Sample Instruction Sheet - L^AT_EX IV

(&) at the end of the command,
obtained by pressing shift 7. Please
leave spaces exactly as given above.

- 6. Right click on `compiling.mov`, point the cursor on Open With and select VLC Media Player, now listen to this spoken tutorial.**



1b. A Sample Instruction Sheet - L^AT_EX V

7. **As shown in the video at 1:57min, compile from the terminal the file `hello.tex` using the command**
- ```
pdflatex hello.tex
```

**Note that `pdflatex` is ONE command. Please do not leave a space between `pdf` and `latex`.**



# 1b. A Sample Instruction Sheet - L<sup>A</sup>T<sub>E</sub>X VI

8. **Pause the video at 2:04min. You should now be able to give the command `pdflatex hello.tex` and get a file `hello.pdf`. If there is any difficulty in this step, please listen to the tutorial from 1:57min to 2:04min once again.**
9. **The video talks about a pdf viewer called `skim` at 3:04min.**



# 1b. A Sample Instruction Sheet - L<sup>A</sup>T<sub>E</sub>X VII

- ▶ Please do not attempt to use `skim` - it is NOT available on Linux.

You have to use the pdf viewer `evince` instead. Give the following command from the terminal to open the pdf file:

```
evince hello.pdf &
```

Once again, do not forget the `&` symbol in the above command.



# 1b. A Sample Instruction Sheet - L<sup>A</sup>T<sub>E</sub>X VIII



# 1b. Salient Features of Instruction Sheets

- ▶ **Exact time of an activity - see 7, 8, 9**
- ▶ **Difference pointed out - see 9**
- ▶ **Detailed instructions - see 9**





## 2. Duration of SELF Workshops

- ▶ **Two hours**
- ▶ **Learn some of the possible tutorials**
- ▶ **Learn the methodology to use the tutorials**
- ▶ **Reminder is completed at leisure, easily**



## 2. What can you learn in 2 hours?

### - L<sup>A</sup>T<sub>E</sub>X

- ▶ How to write a letter?
- ▶ How to write a report?
- ▶ How to write Maths?
- ▶ How to write Equations?
- ▶ Introduction to presentation using Beamer
- ▶
- ▶ Give guarantee on this



# What you do not learn in 2 hours?

- ▶ **Green field research is permissible**
- ▶ **If stuck, go to the next tutorial**
- ▶ **There are lots of things to learn any way**
- ▶ **Keep green field research outside tutorial**
- ▶ **Our method is dictatorial, but effective**



# Answering Student Doubts

- ▶ **Through discussion forums**
- ▶ **Doubt clearing sessions through audio chat and A-VIEW**
- ▶ **We need to institutionalise these methods**



## 2. Two hour workshop - Reasons

- ▶ **Many workshops can be conducted with the same resources**
- ▶ **Less resources are wasted on uninterested students**
- ▶ **No need to give eats**
- ▶ **Less honorarium for the conductor, organiser**



# 3. Conductor of the SELF Workshop

- ▶ **Is NOT a domain expert**
- ▶ **We do not want them to answer domain related questions**
- ▶ **There is no guarantee that the conductor will give the correct answer**
- ▶ **If domain answers are given a conductor cannot handle many students - we want 20:1 ratio**



# 3. Conductor of the SELF Workshop

- ▶ **Shall not answer domain related questions**
- ▶ **Shall point out the mistakes**
  - ▶ **& is not given**
  - ▶ **Command is typed in the editor - not terminal**
- ▶ **May ask the learner to repeat**
  - ▶ **Only 10 minute tutorial**
  - ▶ **Maximum 5 minutes to be repeated**
- ▶ **Need not be a domain expert**



# Salient Features of Workshops

- ▶ **The learning outcome is well defined**
- ▶ **Quality maintained, with *no dilution***
- ▶ **Different from the conventional train the trainer programme, where the quality usually decreases**





# Salient Features of Workshops

- ▶ **Students learn at their own pace**
- ▶ **Learn using a language of choice**
- ▶ **All can come to same level**
  - ▶ **Children of house maids, construction workers and so on can hope to become as good as the children of professors!**
  - ▶ **irrespective of initial preparation levels**
  - ▶ **students with poor initial conditions may have to work harder**



# Efficacy of SELF Workshops

**IIT Bombay is NOT at all required to conduct these workshops!**



# Benefits

- ▶ Excellent self learning methodology
- ▶ Scale-up of workshops is possible
- ▶ Can learn in a language of one's choice
- ▶ Can learn at a convenient pace
- ▶ Can learn at a convenient time
- ▶ Hi-tech solutions to even linguistic minority
- ▶ Knowing English keyboard retains job opportunities
- ▶ Learn English and other languages



# SELF Workshops are Effective

- ▶ **Linux workshop at Alwar, Rajasthan**
- ▶ **Pre-workshop and post-workshop tests**
- ▶ **Average marks went up by 85%**
- ▶ **Everyone passed the second test**
- ▶ **Certificates issued to everyone!**



# ORCA Spoken Tutorials for Workshops

- ▶ We recently conducted a workshop for VI at IGNOU, Delhi
- ▶ All students learnt ORCA at their own pace - each had a head phone
- ▶ They did not complete all the tutorials - they would complete by themselves at home - created for self learning
- ▶ Workshop can be conducted by people



# Current Status of Workshops

- ▶ **2500 workshops completed in the past one year!**
- ▶ **Trained 80,000 to 1,00,000 students!**



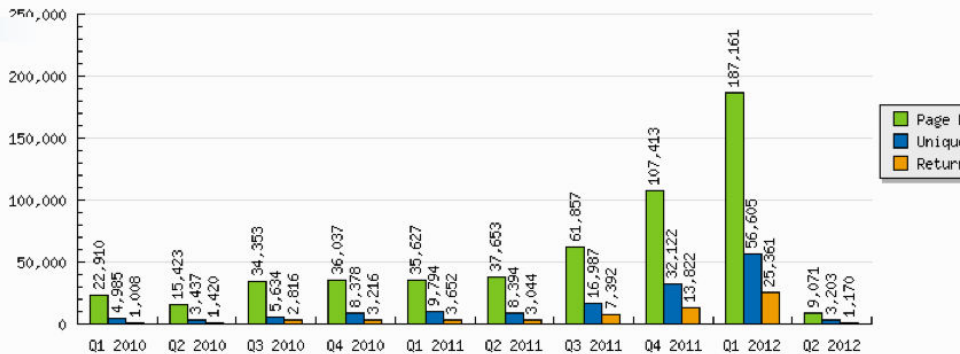
# Popularity of our website <http://spoken-tutorial.org>

Spoken Tutorial

Eng

[Daily](#) | [Weekly](#) | [Monthly](#) | [Quarterly](#) | [Yearly](#)

09:57:59 7 April 2012 ■ Summary Log



More than 2 000 page loads a day

IIT Bombay, IIT Kharagpur

Talk to a Teacher

86/92

# How can you participate? 1.

## Colleges

### Organise SELF Workshops at your college

- ▶ For your students
- ▶ For your staff members
- ▶ For students in nearby colleges





# Spoken Tutorials Available for Workshops

- ▶ C, Java
- ▶ Python
- ▶ PHP/MySQL
- ▶ Linux / Ubuntu
- ▶ Scilab
- ▶ L<sup>A</sup>T<sub>E</sub>X
- ▶ Blender, GIMP
- ▶ ORCA
- ▶ LibreOffice
  - ▶ Writer, Calc, Impress, Math, Draw, Base
- ▶ OpenFoam
- ▶ GeoGebra



# Spoken Tutorials: What is Proposed Now?



# Spoken Tutorials: Deliverables

- ▶ **500 original spoken tutorials**
- ▶ **5,000 dubbed spoken tutorials**
- ▶ **1,50,000 students to be trained**



# Budget for Spoken Tutorials

| <b>Year</b>                   | <b>First</b> | <b>Second</b> | <b>Third</b> | <b>Total</b> |
|-------------------------------|--------------|---------------|--------------|--------------|
| <b>Equipment</b>              | <b>25</b>    | <b>25</b>     | <b>25</b>    | <b>75</b>    |
| <b>Salary</b>                 | <b>175</b>   | <b>200</b>    | <b>225</b>   | <b>600</b>   |
| <b>Nodal centres (5,7,10)</b> | <b>50</b>    | <b>70</b>     | <b>100</b>   | <b>220</b>   |
| <b>Consumables</b>            | <b>30</b>    | <b>40</b>     | <b>50</b>    | <b>120</b>   |
| <b>Contingency</b>            | <b>30</b>    | <b>40</b>     | <b>50</b>    | <b>120</b>   |
| <b>Travel</b>                 | <b>20</b>    | <b>25</b>     | <b>30</b>    | <b>75</b>    |
| <b>Publicity/sponsorship</b>  | <b>10</b>    | <b>10</b>     | <b>10</b>    | <b>30</b>    |
| <b>Total</b>                  | <b>340</b>   | <b>410</b>    | <b>490</b>   | <b>1240</b>  |

**Total budget = Rs. 1240 lakh**



# Total budget

1. Total budget: Rs. 197.20 crore
2. IIT Kharagpur: Rs. 60.75 crore



# A-VIEW: Phase II



**A-VIEW**  
Amrita Virtual  
Interactive E-learning World

- ◆ 7000 colleges connected
- ◆ Global Recognition by CISCO
- ◆ 80 lakh training hours



Supported by  
National Mission on Education  
(NME-ICT), Ministry of HRD

Developed by  
Amrita University



Partner  
IIT Bombay

[www.aview.in](http://www.aview.in), [aview@amrita.edu](mailto:aview@amrita.edu)  
+91 476 280 4405, +91 94470 51380

# Agenda

- Phase 1
  - Overview
  - Accomplishments
  - Awards & Testimonials
- Phase 2
  - Overview
  - Budget Summary
  - Development Modules

# A-VIEW Phase 1 Overview

A-VIEW can be used as a Versatile E-Learning Platform for setting up online

- Classrooms
- Meetings
- Training & Workshops
- Conferences





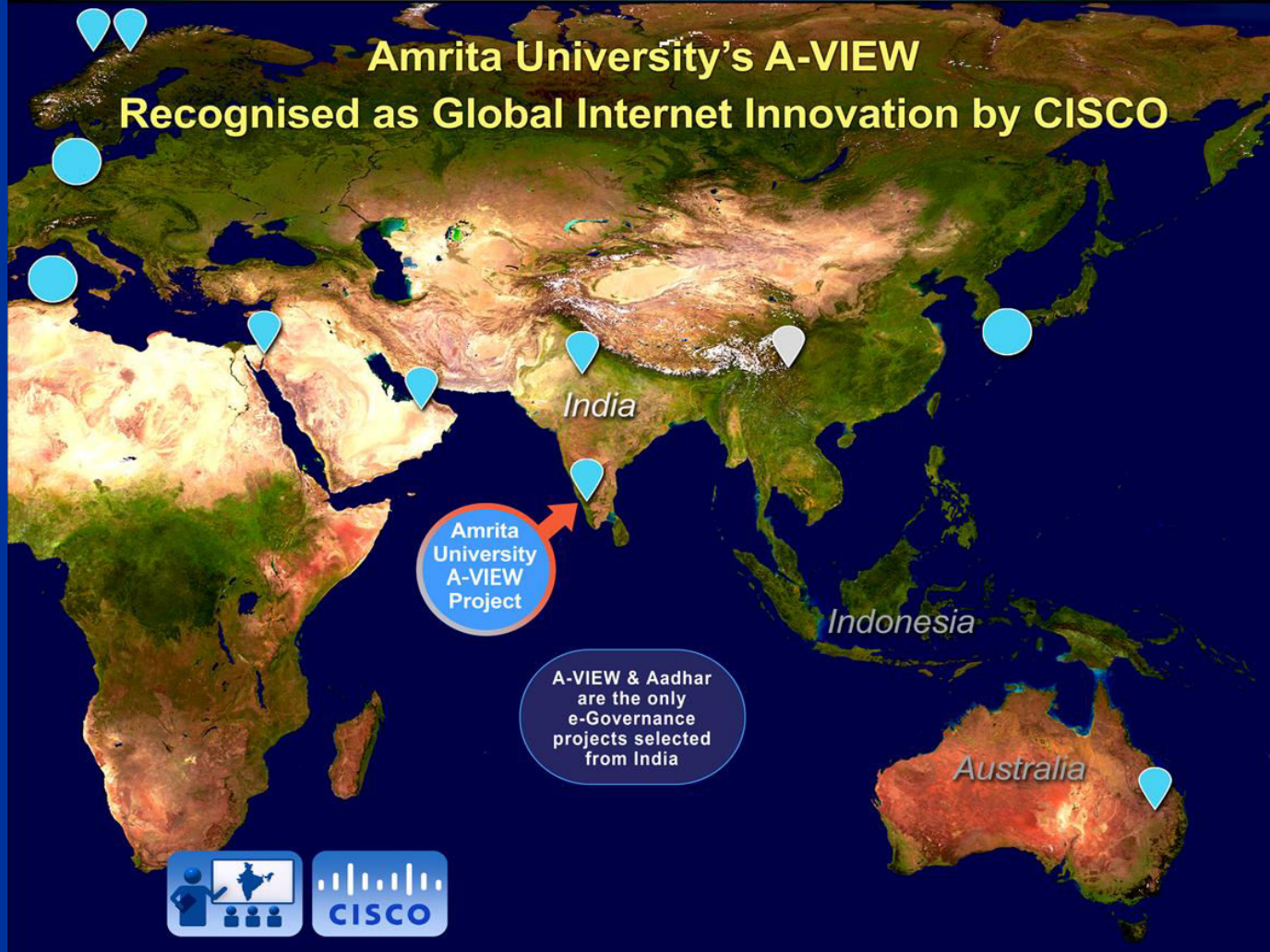
# A-VIEW Overview

- Real-time audio-video and synchronized content sharing
- Live assessment and feedback
- Multi-platforms & Multi-devices



# Global Recognition by CISCO

Amrita University's A-VIEW  
Recognised as Global Internet Innovation by CISCO



# Major A-VIEW Deployments

## A-VIEW Partners

| <b>Institution</b>     | <b>Programme</b>                                   |
|------------------------|----------------------------------------------------|
| IIT-BOMBAY             | T10KT, Ask A Question                              |
| IIT-MADRAS             | QEEE, Live Classes, Teachers from 7 IITs           |
| IIT-KHARAGPUR          | T10KT (Teacher Training)                           |
| IIRS-ISRO              | Online Course Delivery; Satellite Network (trial)  |
| NITTTR's               | Vocational training, Online Course Delivery        |
| Maharashtra Govt, CBSE | Teacher Training, Schools tuitions                 |
| DOTe TN, MP            | Online Course Delivery for Polytechnics            |
| Skill Ministry; DGET   | ITI / ATI Skill Training; Skill development Pilots |

# A-VIEW Features

## Live Interaction

### Live Audio/Video Streaming



Hand raise to  
ask question



Question & Chat



Tablet Poll



Mobile Quiz

# A-VIEW @ World Skills Day

- Skill Ministry using A-VIEW for Capacity Building
- More press: <http://aview.in/allevnts/Skill-Ministry-using-A-VIEW>

## THE NEW INDIAN EXPRESS

### Central Ministry Adopts Amrita Varsity App

Express News Service

**Kollam:** Ministry of Skill Development and Entrepreneurship has adopted the distance learning platform developed by Amrita University in its ambitious skill training program for over 50 crore Indians, after it was demonstrated in front of Prime Minister Narendra Modi on World Youth Skills Day.

During the inauguration of the event, the Prime Minister interacted with thousands of trainees across the nation using the platform



Prof. Kamal Bijlani of Amrita University demonstrating A-VIEW to PM Narendra Modi and MoS for Skill Development Rajiv Pratap | EXPRESS

named A-VIEW (Amrita Virtual Interactive E-Learning World). Prof Kamal Bijlani, the chief architect of A-VIEW, demonstrated the

usage of A-VIEW with 100 ITIs. The new skill development program by the Central Government aims to reach its target by 2022. The Skills

Ministry has used A-VIEW in the past to train 15000 ITI trainees remotely.

A-VIEW, a free application developed by the University, is the preferred distance education video conferencing software package used in India. A-VIEW along with GOI's Aadhar were the only two internet-based technology innovations from India chosen by CISCO to receive their prestigious award.

It is a proven large-scale distance education and skill training platform already deployed in over 8,000 in-

stitutions in India. A-VIEW is also being used in CBSE schools and National Skill Development Centres.

For the past several years, IIT-Bombay has been using A-VIEW to successfully train 10,000 teachers. Recently, the Government of Maharashtra trained over 35,000 school teachers simultaneously using the platform.

A-VIEW, developed by Amrita University in partnership with IIT-Bombay and NMEICT, Ministry of HRD, features a number of easy-to-use features for skill development.

- Live interaction with 200 ITIs via A-VIEW.
- Around 15,000 ITI teachers have been trained

**A-VIEW** AMRITA UNIVERSITY    **MAKE IN INDIA**    Distance Learning Platform for Skill Development    Supported by NME-ICT

Welcome Mahalakshmi Gu...

Users   Chat   Viewer   Question

| Name (Count 106)             | IC | Status |
|------------------------------|----|--------|
| Spokes_GovITI Indranaga      | 0  |        |
| Spokes_Gov ITI, Indranagar   | 0  |        |
| Spokes_ITI Bhadohi           | 0  |        |
| Spokes_Gov ITI, BhadohiSan   | 0  |        |
| Spokes_ITI Chaukaghat        | 0  |        |
| Spokes_Gov ITI, Chaukaghat   | 0  |        |
| Spokes_ITI Gorakhpur         | 0  |        |
| Spokes_Gov ITI, Gorakhpur    | 0  |        |
| Sri Bhujangadhar Tinsuki     | 0  |        |
| Spokes_Gov ITI, Tinsukia     | 0  |        |
| Suchesh S                    | 0  |        |
| Amrita E-Learning Research L | 0  |        |
| Udham Singh rana             | 0  |        |
| Spokes_Gov ITI, Shahpur      | 0  |        |
| Vasan Babu                   | 0  |        |
| Spokes_Gov ITI Madurai       | 0  |        |
| Vijender Singh               | 0  |        |
| Spokes_Gov ITI, Rohtak       | 0  |        |
| zKarthika c                  | 0  |        |
| Amrita E-Learning Research L | 0  |        |
| zSibi Bhaskaran AERL         | 0  |        |
| Amrita E-Learning Research L | 0  |        |

**Presenter**

**1006 ITI Udaipur Rajasthan**

**1005 ITI Kozhikode Kerala**

**1004 ITI Jodhpur Rajasthan**

Collaboration connected. Video connected. Course : Skill Development And Entrepreneurship Lecture : World Youths Skill Day

A-VIEW (Amrita Virtual Interactive E-Learning World) Version 3.7.11663- © 2007-2014

# A-VIEW @ Digital India Week

Dr. Ashwini Kumar Sharma, MD, NIELIT used A-VIEW to reach out to thousands

**A-VIEW**  
AMRITA UNIVERSITY

MHRD  
Funded by NME-ICT

रा.इ.सू.पी.सं  
NIELIT

Welcome Sibi Bhaskaran ...

Users Chat Viewer Question

| Name (Count 59)                                        | IC | Status |
|--------------------------------------------------------|----|--------|
| M: NIELIT Delhi<br>NIELIT Delhi                        | 0  |        |
| V: NIELIT Calicut<br>NIELIT Calicut                    | 5  |        |
| V: NIELIT Guwahati<br>NIELIT Guwahati Main Centre      | 1  |        |
| V: NIELIT Tripura<br>NIELIT Agartala                   | 1  |        |
| Ujwal Biswas<br>Advanced Training Institute M          | 0  |        |
| DET Satara BRC6<br>BRC MAHABALESHWAR_DII               | 0  |        |
| Manish Sharma<br>Gita Mittal Career Developme          | 0  |        |
| NITTR Bhopal Teacher<br>National Institute of Technica | 0  |        |
| PRASHANT PATEL<br>UniSTAR Education                    | 1  |        |
| Sibi Bhaskaran AERL<br>Amrita E-Learning Research L    | 0  |        |
| Rajneesh Raina<br>NIELIT Jammu                         | 0  |        |

Presenter

NIELIT Tripura

NIELIT Calicut

NIELIT Guwahati

Collaboration connected. Video connected. Course : NIELIT Course Lecture : Digital India Week

A-VIEW (Amrita Virtual Interactive E-Learning World) Version 3.7.11663- © 2007-2014  
Amrita E-Learning Research Lab © 2015

# A-VIEW in Digital India Week

- NIELIT Center at Jammu & Kashmir





# Teacher Training by Maharashtra Govt

**35,000 School Teachers Trained Simultaneously  
by Maharashtra Government**



# Teacher Training in Regional languages

## 35,000 School Teachers Trained Simultaneously by Maharashtra Government

**A-VIEW**  
AMRITA UNIVERSITY

MI-RD  
Funded by NME-ICT

Welcome Wshersflar AERI

Presenter  
Omni University

Page 44: 1

पाठ्यपुस्तकातील समाविष्ट व्याकरण

- नाम
- सर्वनाम
- विशेषण
- क्रियापद
- काल व त्याचे प्रकार
- विरामचिन्हे
- समानार्थी शब्द
- विरुद्धार्थी शब्द
- वाक्यचार व म्हणी
- जोडशब्द
- प्रत्यययुक्त शब्द
- उपसर्गयुक्त शब्द

Whiteboard : Only Selected Viewer can write

Users Chat Viewers Questions

| Name (Count 447)                                        | IC | Status |
|---------------------------------------------------------|----|--------|
| M: 5th Standard Teachers<br>Department of School Educat | 0  | 🌱      |
| HEMANT BANZHUKE<br>DRAVID HIGH SCHOOL, YA,              | 0  | ★      |
| Dhile ERC Firpaker<br>Karn. A.M.Pill Secondary at       | 0  | ?      |
| RAGAD ERC BANGAON<br>MANGON_DIE BANGAD                  | 0  | ?      |
| DIE BEED ERC Mujalgaon<br>B.R.C. Mujalgaon_DIE Beed     | 0  | ?      |
| Nagpur ERC Kati<br>DIE Nagpur                           | 0  | ?      |

Collaboration connected. Video connected. Course: RMSA- Teachers Training Programme Lecture: 5th Standard School Teachers Training...

# A-VIEW Features

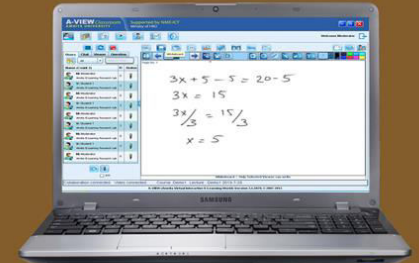
## Content Collaboration



Desktop Sharing



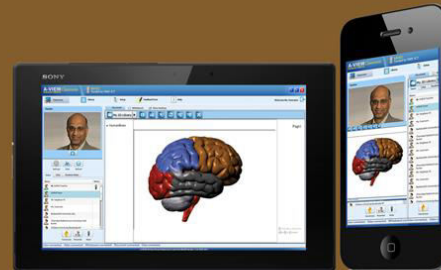
Document Sharing



Whiteboard



Video Sharing

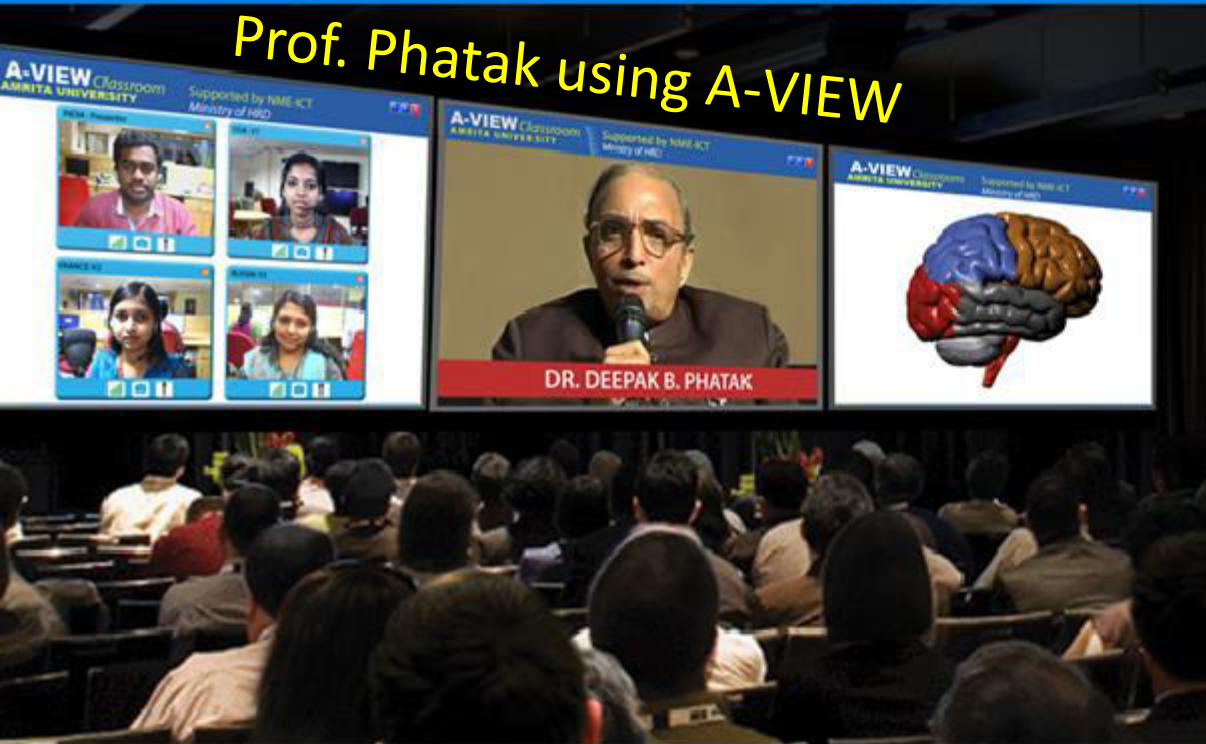


2D/3D Viewer

# Teacher Training Programme by IIT's

## 1 Lakh Teachers Trained

Prof. Phatak using A-VIEW



Train 10,000 Teachers  
Simultaneously - T10kT

Teacher Training Programme  
by

**IIT Bombay**

and

**IIT Kharagpur**

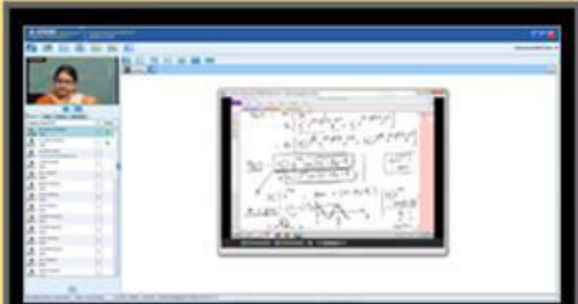
# Teacher Training Programme by IIT's-QEEE



IIT Delhi



IIT Madras



IIT Madras



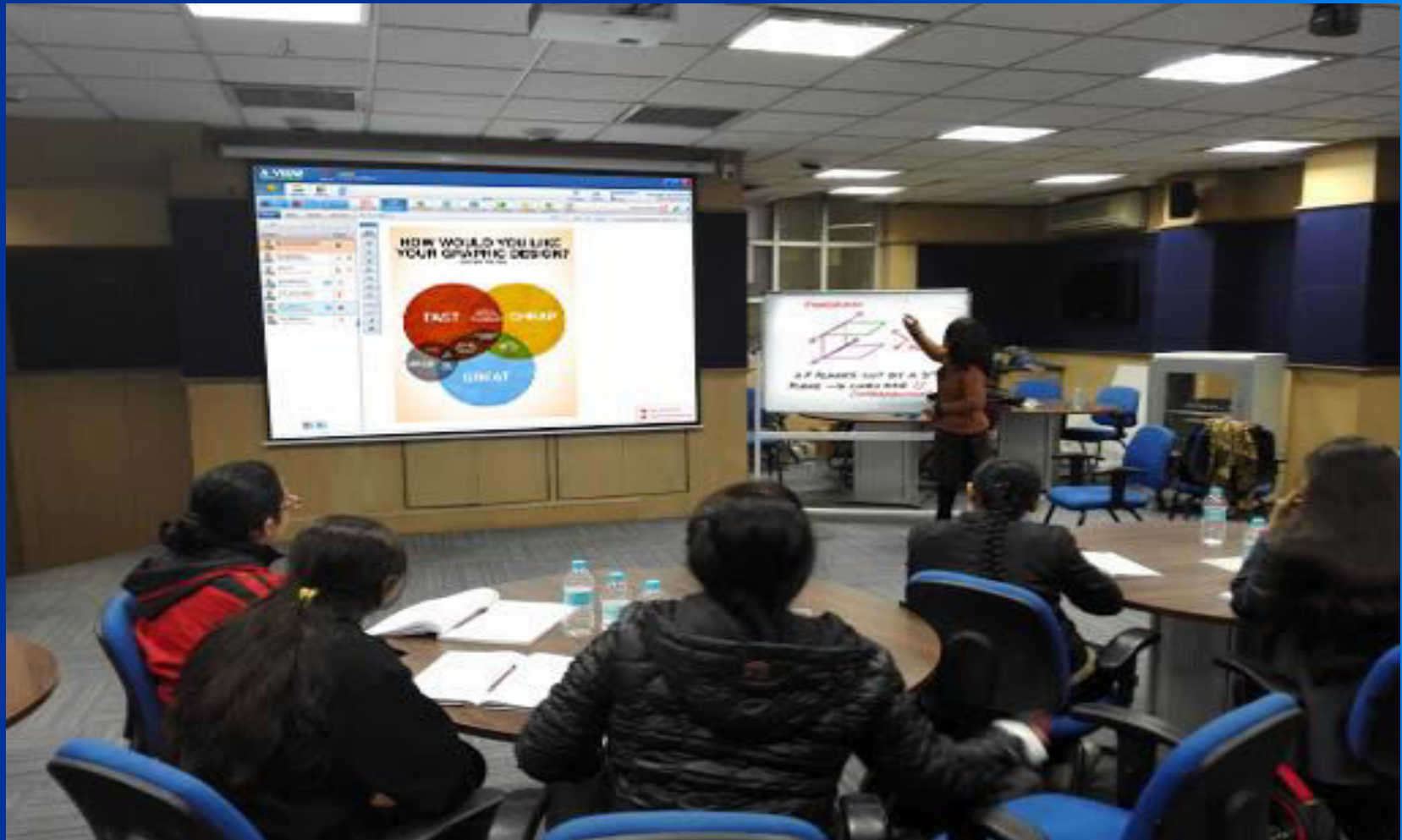
IIT Bombay

Live classes by IITs  
to Thousands of  
Engineering Students

QEEE Programme by IIT Madras

Completed 3 Phases

# Free online Tuition programs by CBSE



# A-VIEW as a Meeting Tool

The screenshot displays the A-VIEW virtual meeting interface. At the top, the logo for Amrita University and MHRD (Funded by NME-ICT) are visible. The interface includes a toolbar with various icons for navigation and communication. A 'Users' panel on the left lists participants with their names, IC numbers, and status. The main area shows a grid of video thumbnails for participants: Presenter, Sheethal, Sarika, Bhagya, Vinod, Jisha, Vani, and Ullas. A status bar at the bottom indicates 'Collaboration connected. Video connected.' and provides version information: 'A-VIEW (Amrita Virtual Interactive E-Learning World) Version 3.7.11663- © 2007-2014'.

| Name (count 50)                                   | IC | Status |
|---------------------------------------------------|----|--------|
| P Venkat Rangan<br>Amrita E-Learning Research Lab | 0  |        |
| Sheethal<br>Amrita E-Learning Research Lab        | 1  |        |
| Sarika<br>Amrita E-Learning Research Lab          | 1  |        |
| Bhagya<br>Amrita E-Learning Research Lab          | 0  |        |
| Vinod<br>Amrita E-Learning Research Lab           | 1  |        |
| Vani<br>Amrita E-Learning Research Lab            | 1  |        |
| Jisha<br>Amrita E-Learning Research Lab           | 0  |        |
| Ullas<br>Amrita E-Learning Research Lab           | 1  |        |
| Damodharan<br>Amrita E-Learning Research Lab      | 1  |        |

Users not attending

PTT

Collaboration connected. Video connected.

A-VIEW (Amrita Virtual Interactive E-Learning World) Version 3.7.11663- © 2007-2014

# A-VIEW as a Meeting Tool



**Mr. Ashok Thakur**, Ministry of HRD, addressing VCs of various Universities using A-VIEW (along with Prof. Kamal Bijlani, Director, Amrita E-Learning Research Lab)



# JNTU VC Meet with 220 Principals

**A-VIEW**  
AMRITA UNIVERSITY

MHRD  
Funded by NME-ICT

Welcome Ratish Nair

Users Chat Viewer Question

| Name (Count 223)                                              | IC | Status |
|---------------------------------------------------------------|----|--------|
| M: JNTU teacher<br>Jawaharlal Nehru Technolog                 | 0  | 🔊      |
| V: Dr. Maheshwar Datta<br>Keshav Memorial Institute of        | 3  | 🔊      |
| Netaji Institute Moderator<br>Netaji Institute of Engineering | 2  | ★      |
| Principal Narayana<br>Narayana ing & Technical Ca             | 0  | ?      |
| RRS College Of Engineeri<br>RRS College of Engineering a      | 1  | ?      |
| Kshatriya College of Engi<br>Kshatriya College of Engineer    | 0  | ?      |
| vaagdevi college<br>Vaagdevi College of Engineer              | 0  | ?      |
| ACEEC Moderator<br>ACE Engineering College                    | 3  | ?      |
| Dr.Ravindra Tiwari<br>Global Institute of Engineeri           | 0  | ?      |
| Ramakrishna dandu<br>Sushrut Institute of Bharma              | 0  | ?      |

Presenter



Presenter

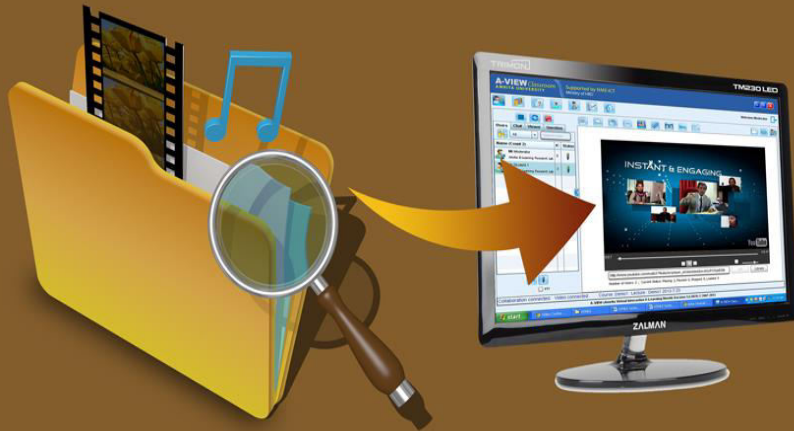
Video in BigScreen

Collaboration connected. Video connected. Course : JNTUH Meeting Lecture : Meeting with JNTUH VC

A-VIEW (Amrita Virtual Interactive E-Learning World) Version 3.7.11663- © 2007-2014

# A-VIEW Features

## Record & Playback



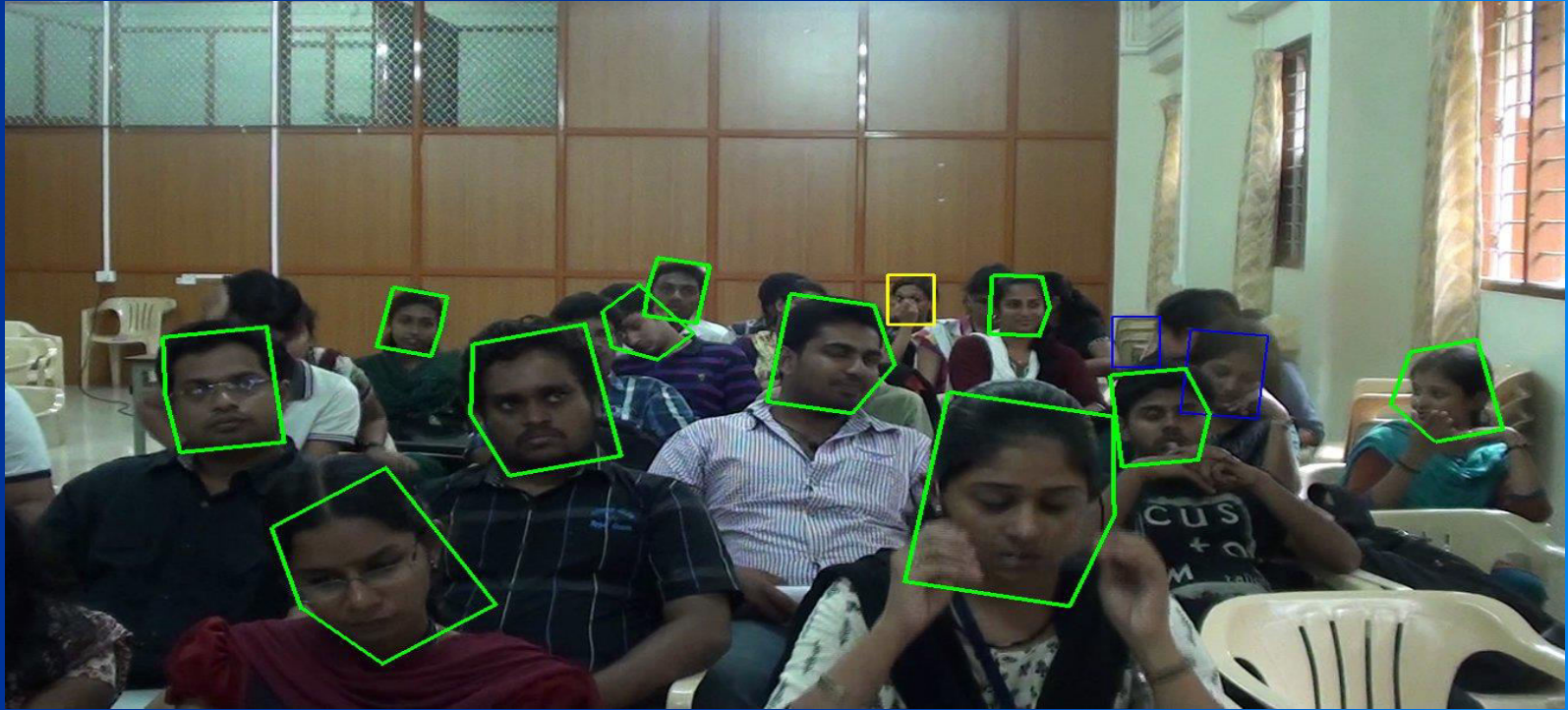
## Administration

### Manage

- Courses
- Classes
- Users
- Lectures

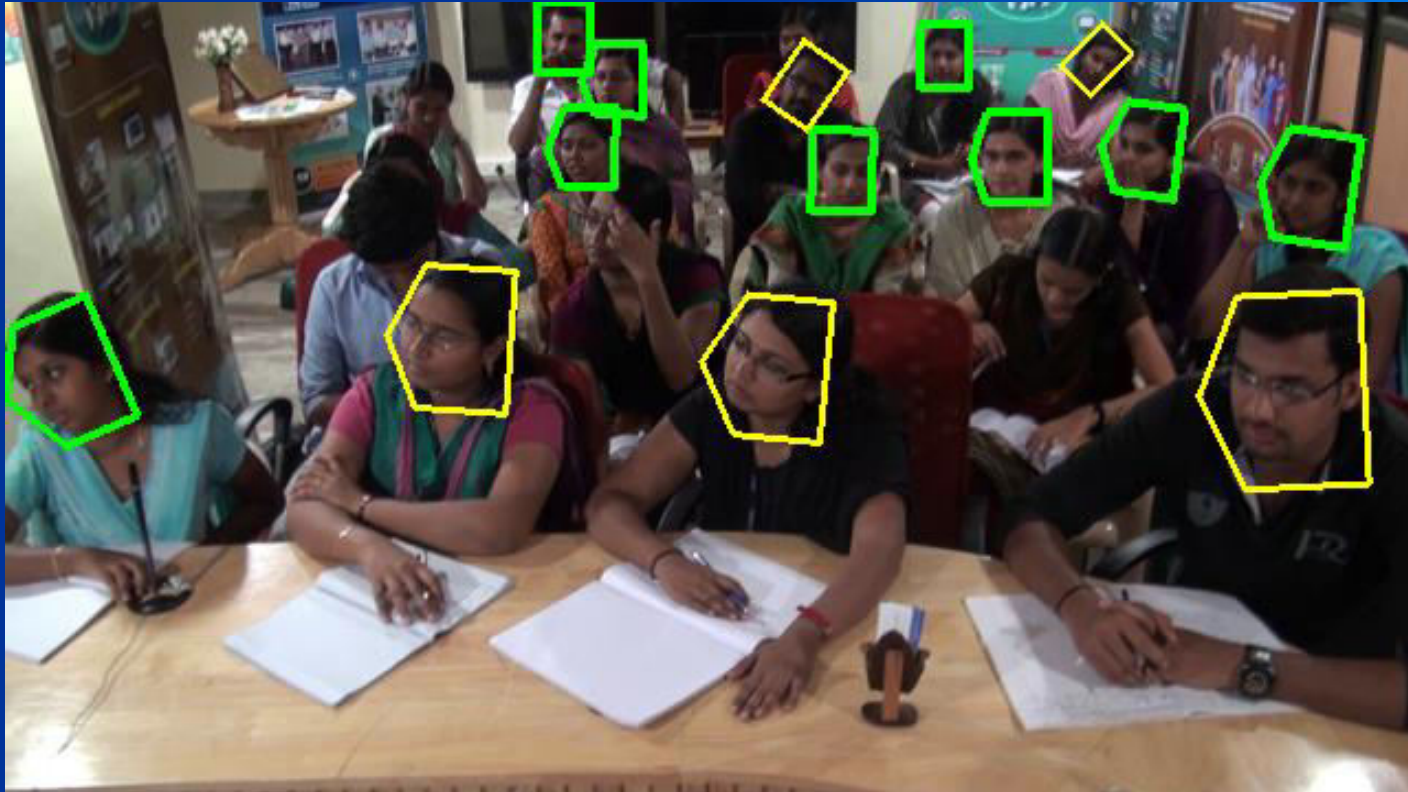


# People Count



- Green color show better detection
- Yellow color shows average detection
- Blue color show bad detection

# People Count



# Student Node Monitoring – IIT Bombay

## Computer Networks : Screenshots

Date : 2014-07-04

Unable to see thumbnail view? [Click here to see list view of the screenshots](#)

RC ID : 1001



RC ID : 1002



RC ID : 1003



RC ID : 1005



RC ID : 1007



RC ID : 1008



RC ID : 1011



RC ID : 1013



RC ID : 1014



RC ID : 1015



RC ID : 1016



RC ID : 1019



RC ID : 1020



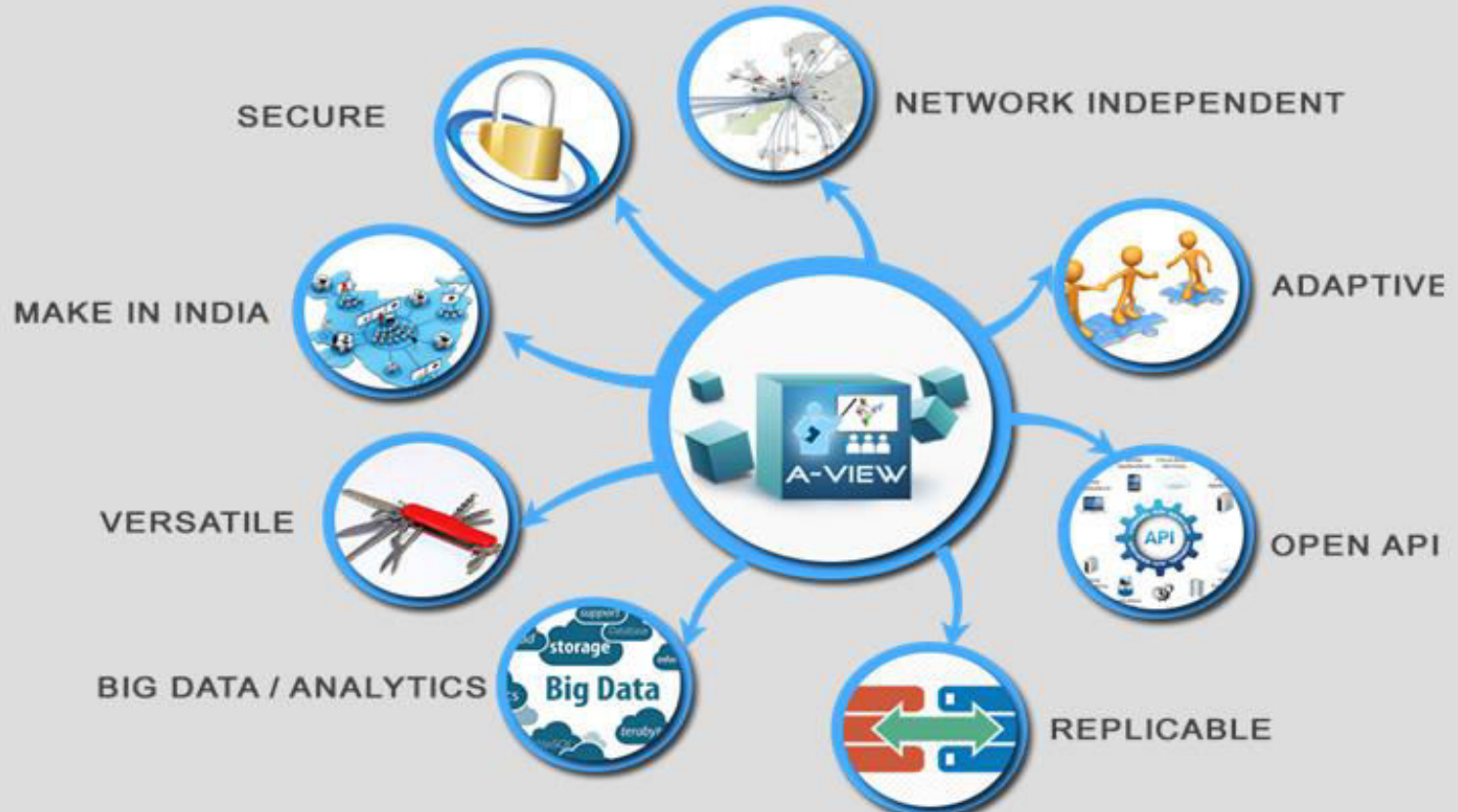
RC ID : 1022



RC ID : 1024



# A-VIEW UNIQUE STRENGTHS



# A-VIEW Unique Strengths

## •Network Independent:

- Any type of server like Cloud, Regional or Local Servers.
- A-VIEW installed on NMEICT Cloud Baadal, BSNL servers, local servers

## •Security/Control:

- Complete control & security -live audio/video streams, content, recordings.

# A-VIEW Unique Strengths

## •Integration Open APIs:

- Anyone can integrate A-VIEW to their existing web portal or software system.

## ➤Adaptive Open APIs:

- Any organization can extend the existing functions and features.



# A-VIEW Unique Strengths

## ➤ **Replicable:**

- Complete A-VIEW setup can be duplicated by any organization.

## ➤ **Analytics:**

- Massive amount of Usage Data can be saved and analyzed.

# A-VIEW Unique Strengths

## ➤ **Versatile:**

- Used for Classroom, Meetings, Training, Workshops.
- Custom features for huge number of users

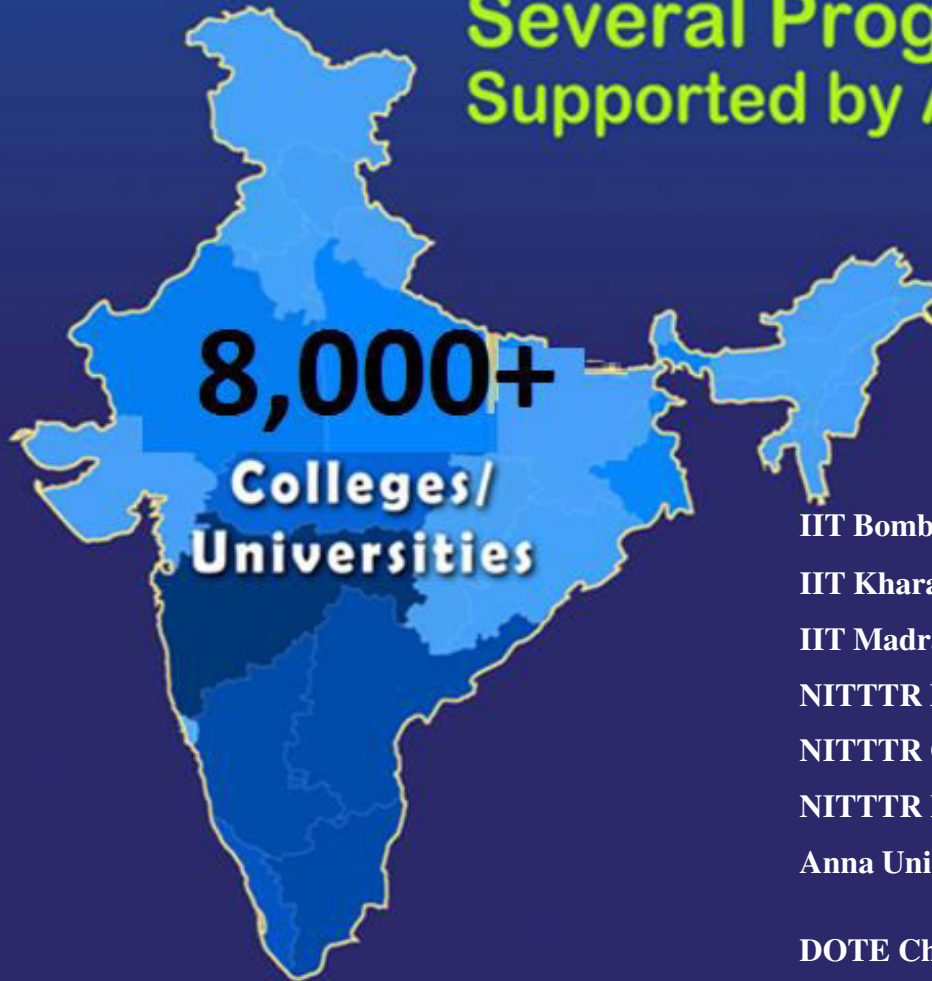
## ➤ **Make in India:**

- Entire software platform is developed by Amrita University.
- Team includes expert professionals from Microsoft, Amazon.

# A-VIEW Unique Strengths

- A-VIEW can be popularized and scaled for Digital India.
- These features make A-VIEW an ideal **National Live Large-Scale E-Learning Platform**.

# Several Programmes Supported by Amrita University



## Major Users

IIT Bombay

IIT Kharagpur

IIT Madras

NITTTR Bhopal

NITTTR Chennai

NITTTR Kolkata

Anna University

DOTE Chennai

Mumbai University

JNTU Hyderabad

IIRS Dehradun

DOTE Madhya Pradesh

CBSE School

Maharashtra Government

Directorate General of  
Employment & Training

INFLIBNET Centre

- Online Live Courses by Indian Institute of Remote Sensing (IIRS – Dehradun)
- 15 courses using A-VIEW
- Able to train 10,000 participants

- A-VIEW on Satellite Network (under trial)
- Satellite and Internet Networks fully integrated
- Provides complete national video conference-based training platform

## Tamil Nadu

- Subject wise training program for Polytechnic students across Tamil Nadu.

## Madhya Pradesh

- Principal Secretary frequently conducts online meetings
- Connected around 7 Govt Engineering colleges and 44 Govt Polytechnics.
- Subject wise training program for Polytechnic students (Evaani Course)

- Skill Development Training Programs
- 20 teaching hubs
- 200 remote centers
- Trained around 15,000 staff



# Digital Literacy program by NIELIT

- A-VIEW Platform for its National Digital literacy Mission (NDLM) program.
- Planning to connect around 7,200 centers & Partners for Digital India Week

# Programs using A-VIEW

- National Doubt Clearance program “Ask a Question”
- Led by Dr. Kannan Moudgalya IIT -Bombay
- More than 80 sessions successfully completed through A-VIEW

The screenshot displays the A-VIEW Classroom interface. At the top, it shows the logo for A-VIEW Classroom (SARSHAT AMRITA) and MHRD (Ministry of Human Resource Development) funded by NME-ICT. The interface includes a navigation bar with options like Classroom, Library, Setup, Feedback Form, and Help. A welcome message for Ms. Swarnam is visible in the top right corner.

The main content area features a video feed of a teacher on the left and a central whiteboard displaying a slide titled "What is given to workshop conductors". The slide lists the following items:

- ▶ CDs/Downloads from website
- ▶ Checklist to get workshop ready
  - ▶ Working of PC, head phones, required software, etc.
- ▶ Instructions for **conductors** (not domain experts) of the workshop
- ▶ Precise instructions for the learners

At the bottom of the slide, the name "Kannan Moudgalya" and the text "Spoken Tutorials: IT literacy, employment, digital divide" are visible. Below the slide, the text "SELF Study Workshops" is displayed.

The interface also includes a "Users" panel on the left with a list of participants and their status. The list includes:

| Name                                        | Status |
|---------------------------------------------|--------|
| Mr. AVIEW Teacher                           | Online |
| AVIEWTeam                                   | Online |
| Mr. Varghese VS                             | Online |
| Ms. Swarnam                                 | Online |
| Barkatullah University (bu)                 | Online |
| Chanakya National Law University Amit Kumar | Online |
| Chitkara University Barotiwala HP           | Online |

At the bottom of the interface, there are icons for "Handraise", "Presenter", and "Mute". A status bar at the very bottom indicates "User connected. Video connected. Whiteboard connected. Document connected. Chat connected." and the version information "A-VIEW (Amrita Virtual Interactive E-Learning World) Version 1.5; © 2007-2011".

# Programs using A-VIEW

- Weekly Interaction Program delivered by eminent academicians
- Nearly 60 Universities across India regularly participate
- Sessions held from National/International locations

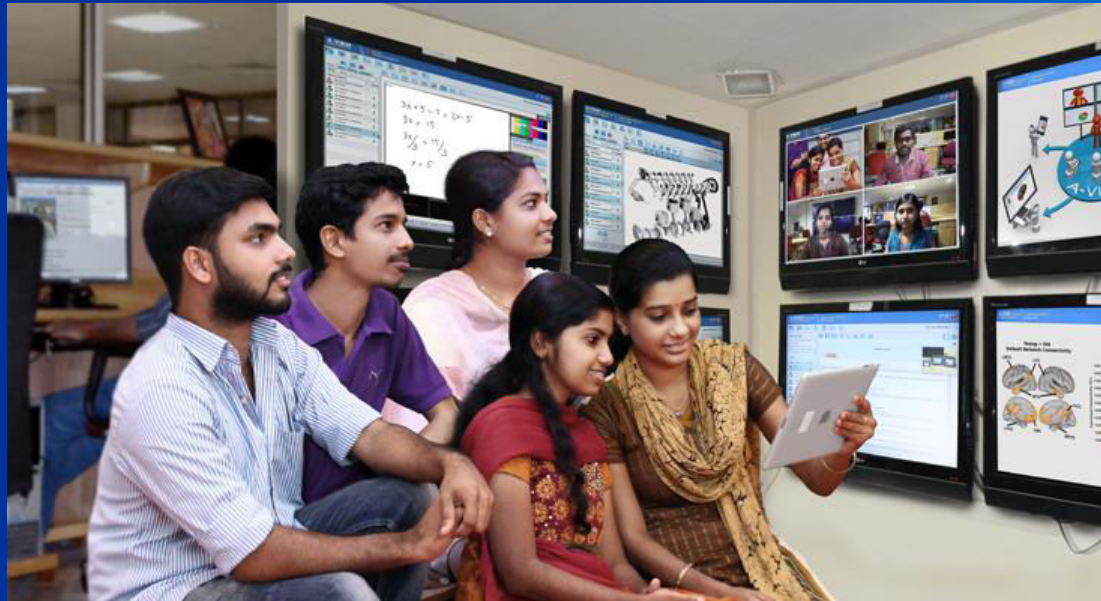


# Programs using A-VIEW



## ➤ Online Gurukul – Pilot Stage

- Free tuition for students in Kerala by eminent career experts
- Leading industrial experts interact directly with college students
- More than 30 sessions successfully completed
- Hundreds of college students benefited



# Programs using A-VIEW



[www.connectone.in](http://www.connectone.in)

- Online Network of Entrepreneurs at TBIs across India
- Business Guidance and Start up Advice by Experts
- Library of information rich videos of entrepreneurs



# Programs using A-VIEW



- Community of College Students and Green Activists for Sustainable Development
- Regular talks and meetings with experts over A-VIEW



Dr. R. K. Pachauri on Amrita's *Green Campuses* initiative using A-VIEW

# A-VIEW Training



Hands on Workshop in progress at Mumbai University

# A-VIEW Training



Hands on Workshop in progress at GTU Gujarat



# A-VIEW Training



Hands on Workshop in progress at FISAT Angamally, Kerala

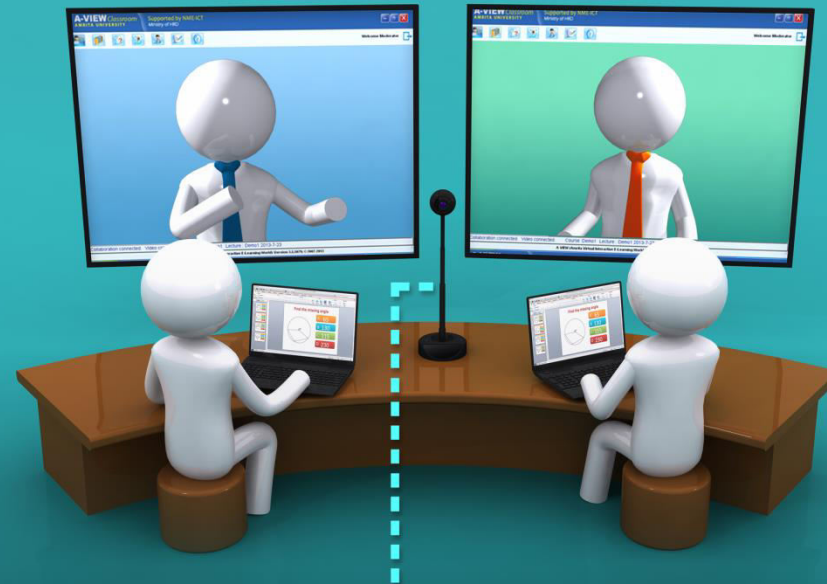
# A-VIEW Experience

## Single Users



# A-VIEW Experience

## Small Group Meetings



Conference Cam with built-in  
Camera, Speakers and Microphone

# A-VIEW Experience

## Interaction in Classroom



Whiteboard Interaction



Live Question



Mobile Quiz



Tablet Poll

# Awards & Testimonials

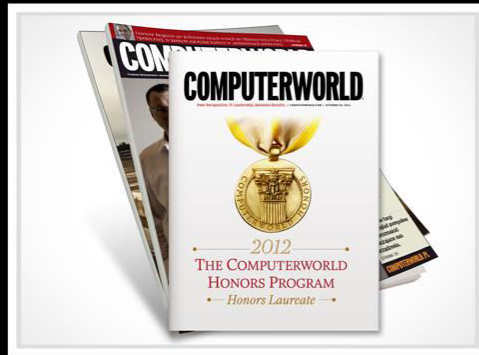
# Awards & Recognition



World Education Summit 2011  
Best Innovation in Open and Distance  
Learning



Educational Excellence Award  
Indo Global Educational Summit  
2012



Computer World Honors Laureate  
2012 For Training and Education



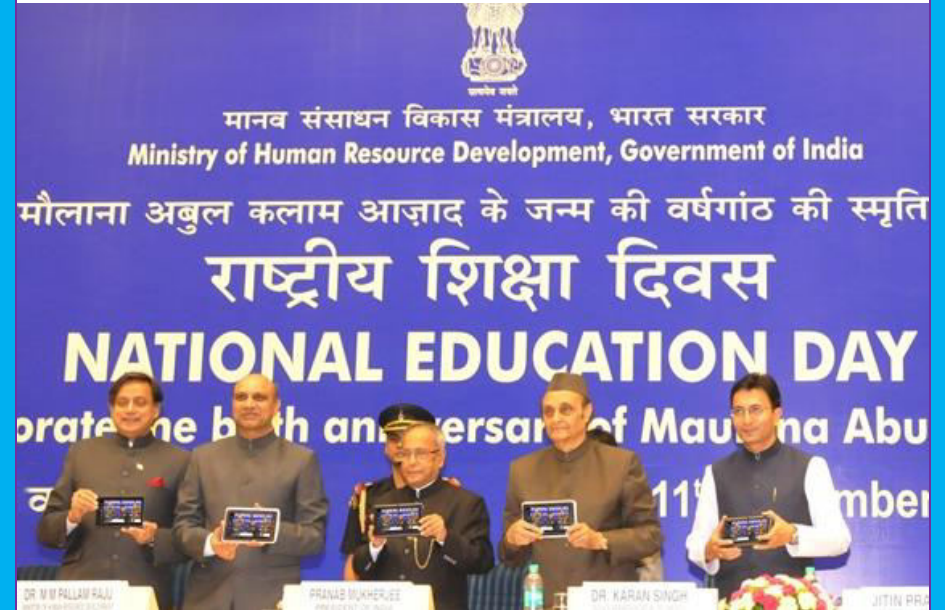
Manthan Award South West India 2014  
e-Education, Learning and Development

# A-VIEW Milestones

First major release of A-VIEW on 12<sup>th</sup> August 2009 by **Dr. A.P.J. Abdul Kalam**



A-VIEW on tablet - Launched on 11<sup>th</sup> November 2012 by Shri **Pranab Mukherjee**



# Testimonials



**Mr. S. Ramadorai**

Vice Chairman, TCS

*“The ‘Train the Trainers’ program, conducted through A-VIEW, which helps in improving the teaching standards in India, is very effective.”*



# Testimonials



*“It was a great experience for me to use A-VIEW, the efficacy of A-VIEW is evident, and we plan to use it more regularly.”*

**Dr. Ranjan Bose**

IIT, Delhi

# Grants Overview

---

| Particulars                                     | Amt          |
|-------------------------------------------------|--------------|
| <b>Total Project Approval</b>                   | <b>34.46</b> |
| Released to IIT-B vide PAB approval in Dec 2010 | 10.34        |
| Released to IIT-B vide PAB approval in Dec 2011 | 19.61        |
| Total Grants –in-aid released from NMEICT:      | 29.95        |
| <b>Balance to be received from NMEICT</b>       | <b>4.51</b>  |

---

# Grants Timeline

- 2009
  - PAB approves AVIEW Project for 34.36 Crores
  - Rs. 10.34 Crores released from NMEICT to IIT-B
  - Rs. 10.34 Crores received at Amrita University
- December 09, 2011
  - PAB Approves Second Instalment of 24.12 Crores to IIT-B
  - NMEICT transfers a sum of Rs. 19.61 Crores against the approved 24.12 crores
  - Rs. 19.61 Crores received at Amrita University in instalments
  - **Balance of Rs. 4.51 Crores not released, still available at NMEICT**

## Grants Timeline

- July 16 2015
  - AVIEW Project Phase 1 completed
  - AVIEW project borrows Rs. 4.51 Crores from Amrita University
  - **PRSG accepts completion of deliverables**
  - Recommends release of balance 4.51 Crores
- **Requesting release of Rs. 4.51 Crores**

# A-VIEW Phase II

# Agenda

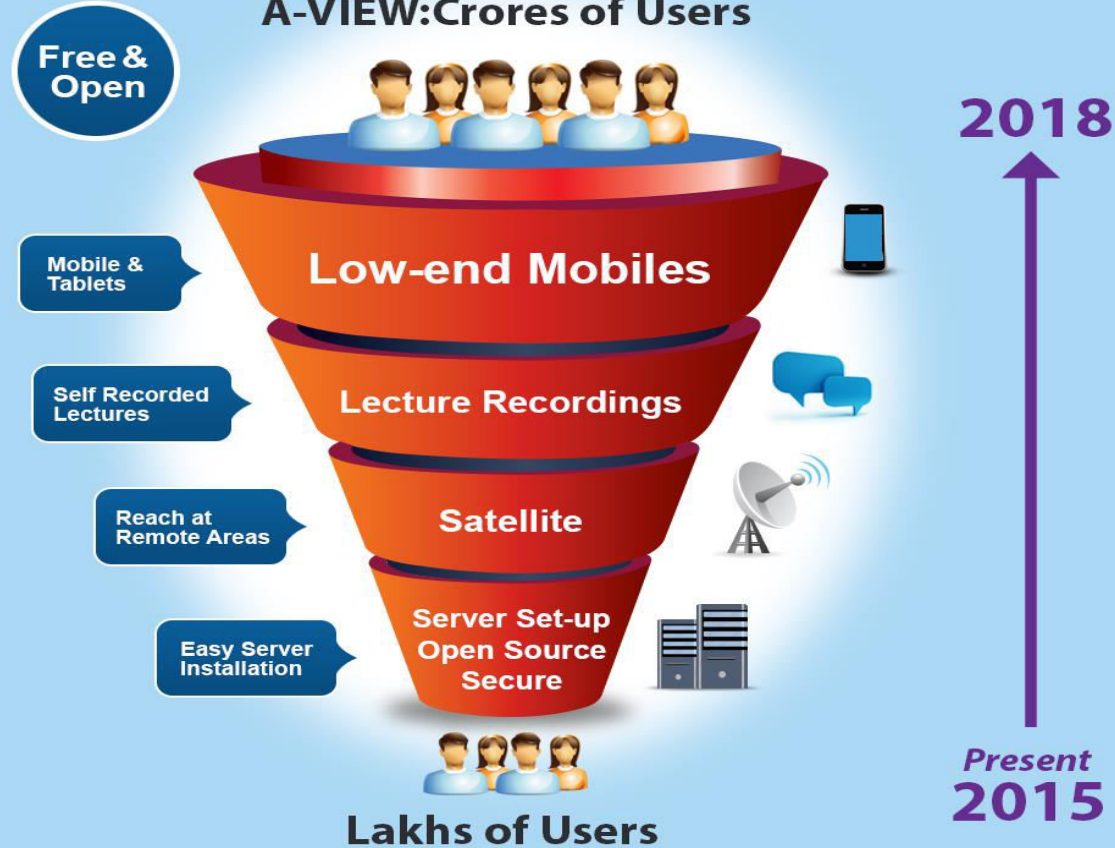
- Phase 1
  - Overview
  - Accomplishments
  - Awards & Testimonials
- Phase 2
  - Vision & Overview
  - Development Modules

# Phase II – Vision & Overview

# A-VIEW Phase II



**A-VIEW: Crores of Users**



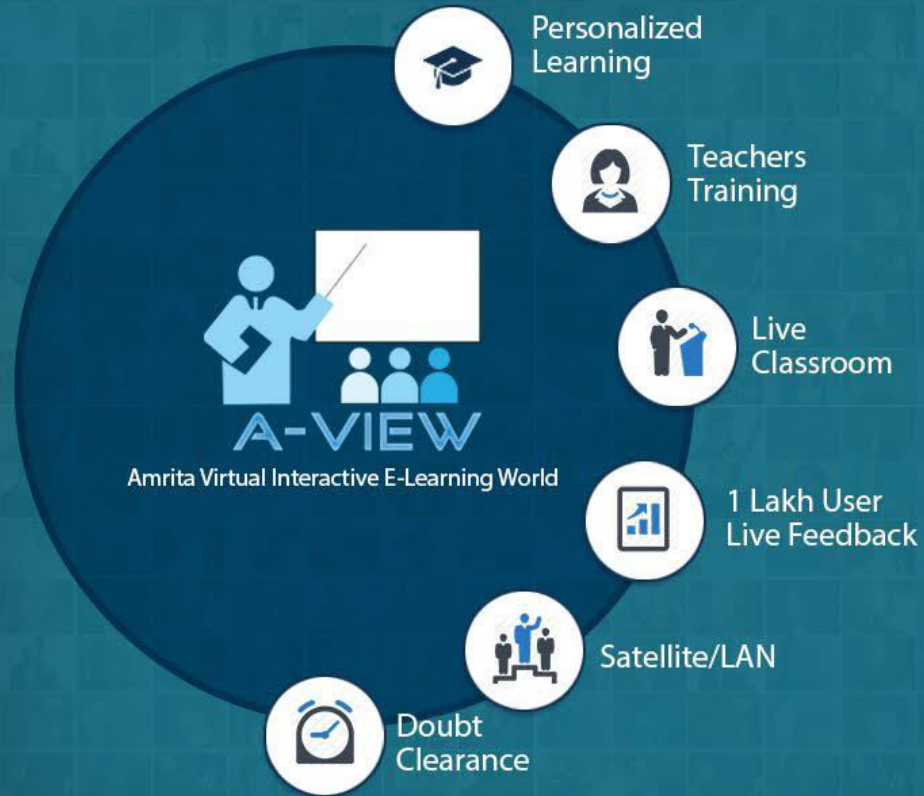


# A-VIEW Phase II Vision: Crores of Users



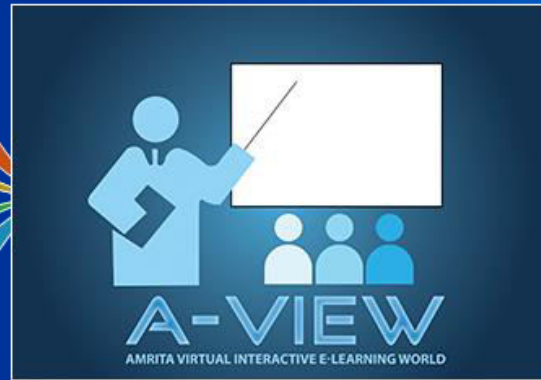
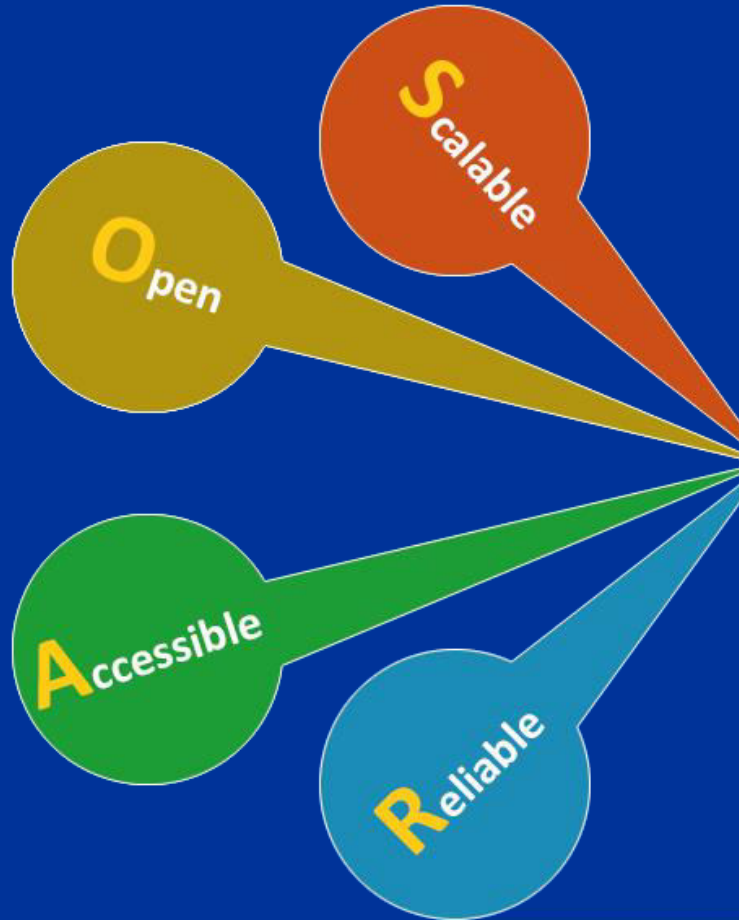
Massively  
Scalable  
Live Interactive  
Collaborative  
E-Learning  
Platform

# A-VIEW Phase 2 : Mission





# A-VIEW Phase II



# A-VIEW Phase II – Contribution to the Nation

- National Online Real-Time Platform over Internet & Satellite
  - Online Teacher Training
  - E-Learning Tools for Crores of Learners
  - Meeting Tools for Crores of Learners
  - Digital Literacy of Teachers & Students
- Online Exams and Proctoring
- Surveillance, Attendance during Live Classes
- Tool for Self Recording Lectures

# Phase II – Modules

M1:  
Implementation for  
1 Crore Users

M2: Integrated A-  
VIEW: Satellite,  
LAN, CDN, Mobile

M3: A-VIEW on  
Low-End Mobiles  
and Tablets

M4: Open A-VIEW

M5: Classroom  
Surveillance and  
Monitoring

M6: A-VIEW  
Producer: Self  
Recording Lectures

M7: Adaptive Plug  
and Play Devices

M8: Major A-VIEW  
Enhancements  
(User Requests)

M9: Automation  
Testing & System  
Integration

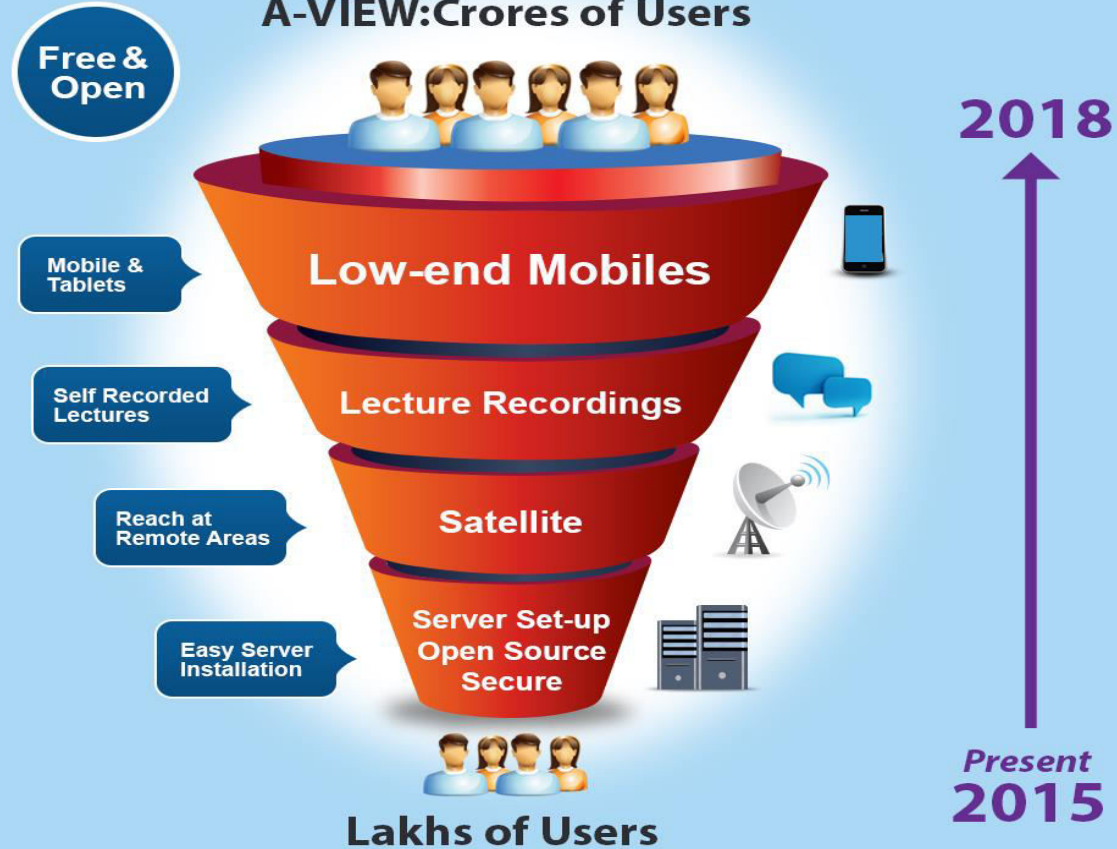
M10: Online  
Collaboration

# Phase II – Development Modules

# A-VIEW Phase II



**A-VIEW: Crores of Users**





# Phase II – Modules

M1:  
Implementation for  
1 Crore Users

M2: Integrated A-  
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Enhancements  
(User Requests)

M9: Automation  
Testing & System  
Integration

M10: Online  
Collaboration

# A-VIEW Phase II: Overall Budget

## Implementation for Crores of Users (For 3 Years, Figures in Lakhs of Rs)

| # | Item     | Functional Description                       | Year I | Year II | Year III | Budget (in Lakhs) |
|---|----------|----------------------------------------------|--------|---------|----------|-------------------|
| 1 | Module 1 | Implementation of A-VIEW for Crores of Users | 79.71  | 81.83   | 121.74   | 283.28            |

## Development & Testing (For 3 Years, Figures in Lakhs of Rs)

| #  | Item      | Functional Description                         | Year I | Year II | Year III | Budget (in Lakhs) |
|----|-----------|------------------------------------------------|--------|---------|----------|-------------------|
| 2  | Module 2  | Integrated A-VIEW: Satellite, CDN, Mobile, LAN | 61.10  | 51.97   | 56.67    | 169.74            |
| 3  | Module 3  | A-VIEW on Low End Mobiles and Tablets          | 48.60  | 31.57   | 34.18    | 114.35            |
| 4  | Module 4  | Open Source Server Components                  | 36.80  | 34.37   | 37.31    | 108.48            |
| 5  | Module 5  | Classroom Surveillance and Monitoring          | 74.10  | 39.66   | 43.03    | 156.79            |
| 6  | Module 6  | A-VIEW Producer - Self Recorded Lectures       | 42.10  | 31.07   | 33.68    | 106.85            |
| 7  | Module 7  | Adaptive Plug and Play Devices                 | 42.40  | 36.63   | 39.74    | 118.77            |
| 8  | Module 8  | Major A-VIEW Enhancements (Users Requests)     | 71.70  | 60.22   | 65.74    | 197.66            |
| 9  | Module 9  | Automation Testing and System Integration      | 41.00  | 33.04   | 35.94    | 109.98            |
| 10 | Module 10 | Online Collaboration                           | 41.60  | 36.19   | 39.26    | 117.05            |
|    |           | Subtotal In Lakhs (Rs)                         | 459.40 | 354.72  | 385.54   | 1199.66           |

|                     | Year I        | Year II       | Year III      | 3 Year Total   |
|---------------------|---------------|---------------|---------------|----------------|
| <b>Total Budget</b> | <b>539.11</b> | <b>436.55</b> | <b>507.28</b> | <b>1482.94</b> |

**Total Team**

**67**

# Module 2: Integrated A-VIEW: Satellite, LAN, Mobile, CDN

  
TEACHER

  
TEACHER ASSISTANT

  
SYSTEM ADMIN

  
MONITOR



  
Live Users



  
DTH/Satellite



## Huge Virtual Classrooms

# JNTU Kakinada Blended Platform Case Study

# A-VIEW as a Blended Learning Platform Plug-In

## MOOC Online

- Pre-recorded Learning Videos
- Online Assessments
- Blogs / Wikis
- Discussion Forum


## Online Real-Time Platform (A-VIEW)

- Live Classes
- Lecture Recordings
- Instant Poll / Quiz
- Mobile Chat
- Online Surveillance, Proctoring

# JNTU Kakinada Case Study

- Semester-wise MOOC Program
  - 2 Courses
  - 1000 Students
- JNTUK-Hosted MOOC Web Site
  - Learning Materials
  - Self Assessments
  - Discussion Forum
- <http://jntukucev.ac.in/moocs-schedule/>

# JNTU Kakinada Case Study



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA  
UNIVERSITY COLLEGE OF ENGINEERING VIZIANAGARAM


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[Home](#) » [News](#) » MOOCs Schedule MOOCs Schedule

## MOOCs Schedule

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📅 August 20, 2015 👤 WM UCEV 📄 News

### Software Engineering in Practice

Monday and Thursday 10.00 A.M to 12.00 P.M from 17-08-2015 (Through WebEx)  
Attendance is compulsory for this course  
Audit course (will be displayed on the marks memo)  
Regarding Examination- Decision will be intimated soon

### Big Data Analytics

Monday, Wednesday and Friday 2.00 P.M to 3.00 P.M from 17-08-2015 ( Through A-View)


Attendance is compulsory for this course  
Internal and External Examinations-same as regular elective subjects  
Online questions will be given by JNTUK. Descriptive paper will be given by Internal Mentor  
Same credits as regular Elective subjects

### Computer Aided Engineering

Tuesday and Thursday 2.30 P.M to 4.30 P.M from 26-08-2015 ( Through A-View)

Attendance is compulsory for this course  
Internal and External Examinations-same as regular elective subjects  
Same credits as regular Elective subjects

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 WM UCEV

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[◀ Recounting and Revaluation results I-I, II-I, III-I and IV-II B.Tech. Examinations 2014-2015](#) [Result of \[R13,R10,R07\] II B.Tech. I Semester Supplementary Examinations June-2015 ▶](#)

# A-VIEW as a Plug-In for JNTU-K MOOC

- Using A-VIEW as Plug-In for:
  - Live Lectures
  - Doubt Clearance Sessions
  - Class Monitoring
  - Live Lecture Recording
- Provide a complete Blended Learning Platform



# Blended Learning Platform



Watch Learning Materials

Local Classroom



Assessment



Online Collaboration



Virtual Classroom

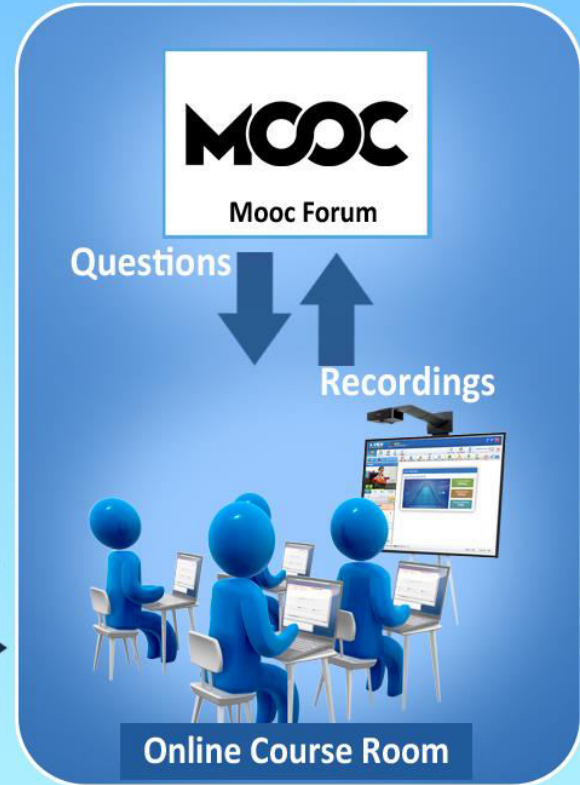


Low Bandwidth Mobile Application

# JNTU Kakinada Next Semester

- Core Subjects Offered MOOC-Style
  - 263 Affiliate Colleges
  - 50,000 Students
- Live Lectures
- Doubt Clearance Sessions
- Teacher Self Recording

# Blended Doubt Clearance



# A-VIEW Producer: Self Recorded Lectures

## A-VIEW Producer



### Carbon

CARBON IS THE MOST IMPORTANT element of life. period. Sure, there are many others without which life would not exist, but from the spiral backbone of DNA to the intricate rings and streams of the enzymes and proteins, carbon is the element whose unique properties tie it all together. The very term "organic compound" refers exclusively to chemicals containing carbon.

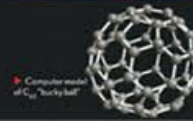
Not content to be the foundation of all life on earth, carbon also forms diamond, the hardest known substance (at least for now; challenges are discussed under boron, element 5). But contrary to popular belief, diamonds are not particularly rare, nor are they unusually beautiful, nor are they forever; all these are myths created by the DeBeers diamond company. Diamonds would cost a trifle as much but for DeBeers's monopoly control. Cubic diamonds or crystalline silicon carbide are just as pretty. And at high enough temperatures, diamonds burn up into nothing but carbon dioxide.

Computer model of  $C_{60}$  "buckyball"   
 Coal (mostly polycrystalline diamond) carbon

If I were writing these words twenty-five years or so ago, I would probably have been doing it with carbon. The "lead" in pencils is actually graphite, a form of carbon, and has been since the 16th-century discovery in the English Lake District of the great mine at Borrowdale, the first source of pure graphite.

Carbon atoms like to form sheets, like a honeycomb with a carbon atom at each corner. Join the sheets and you have graphite. Roll them into a sphere and you have a  $C_{60}$  "buckyball," named for Buckminster Fuller who invented the geodesic dome. Bend the sheets into tubes and you have the strongest material known to science: carbon nanotubes.

Carbon has now become a focus of political controversy centered on the fact that our civilization is pumping carbon dioxide back into the atmosphere at about 100,000 times the rate it was put away by the dinosaurs and their swamps. Interestingly, the situation with nitrogen is exactly reversed.



Toy industrial diamonds embedded in the steel disk

# Integrated A-VIEW (Satellite, CDN, LAN, Mobile)

# Huge Virtual Classroom - Overview

## Summary

- Tens of thousands of online users in a Virtual Classroom

## Overview

- 10's of thousands of simultaneous connected users to live classes
- Video Delivery Network with application/physical layer multicast
- Clients connect to closest points of presence
- Automatically switch from receive-only mode to live-interaction mode

# Huge Virtual Classroom - Overview

## Overview (cont.)

- Policies for interaction, queuing if too many users want to interact
- Receive-only clients: Webinar, DTH, Satellite
- Receive video on multiple channels
- Automatically switch to channel with best quality

# Interaction Architecture



Hand Raise



Poll



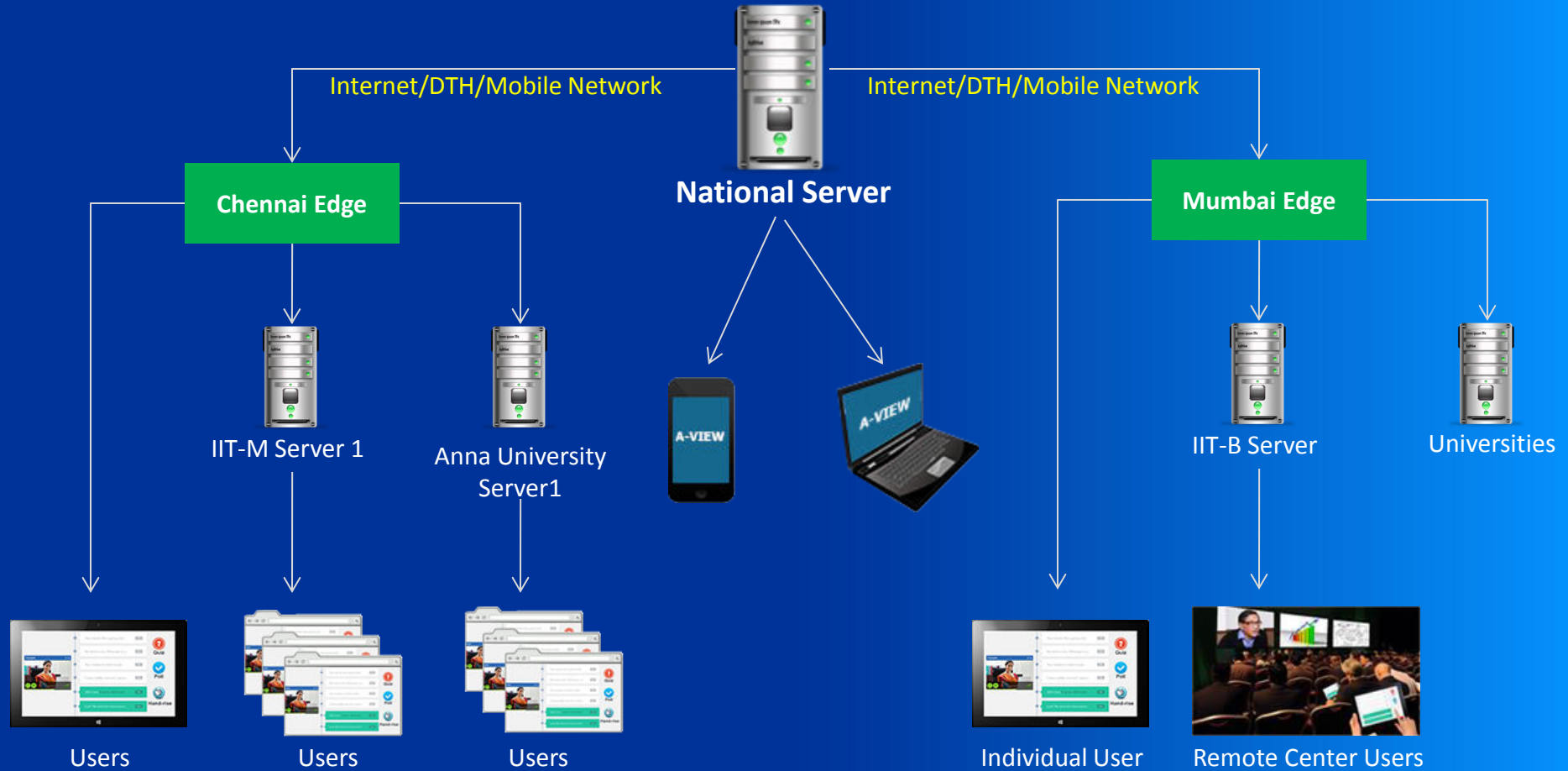
Question / Chat



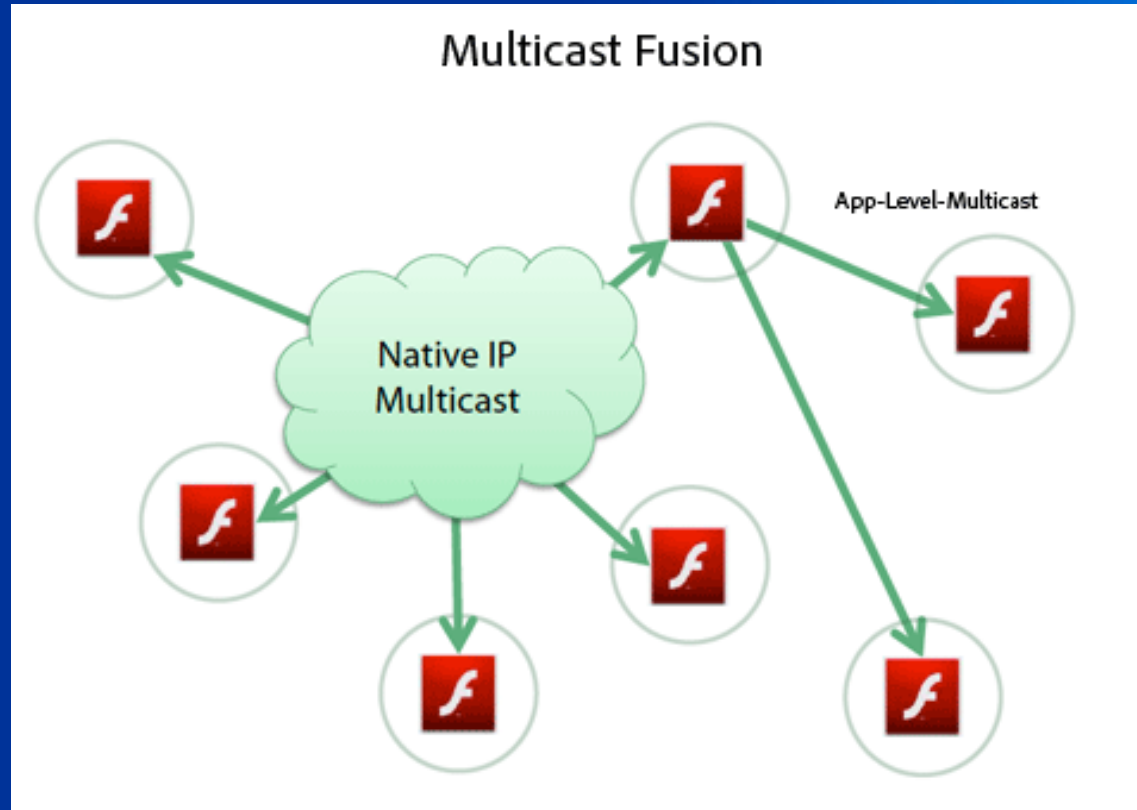
Quiz



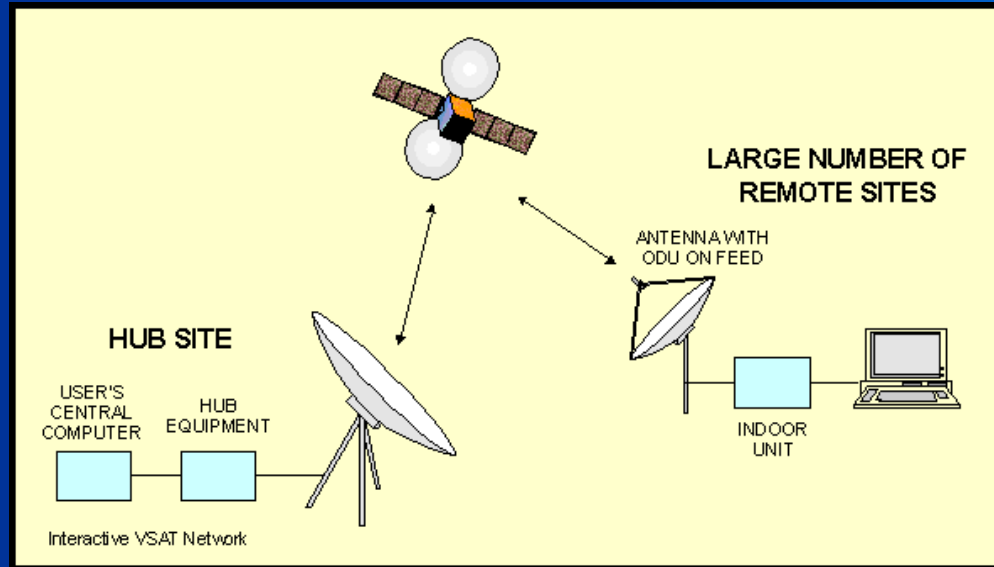
# Video Delivery Network



# Hybrid Multicast



# Leveraging DTH



# User Interface for each Role Type



**Teacher**

Content



**Teaching Assistant**

Content, Forum, Interaction



**System Admin**

Troubleshooting



**Monitor**

Supervision, Analytics



# Interaction Architecture

- Goal: Tens of thousands of online users in a Virtual Classroom
- New audio-video Webinar mode
  - Audio-video sent via multiple channels with redundancy
  - Users are in receive-only mode by default
  - A-VIEW Web, DTH, Broadband, Satellite etc ...
- Video Delivery Network (similar to CDN)
  - Receive Audio/Video from closest Edge/POP (Points of Presence)
  - Multicast Video (Application or Physical)
  - Client selects from “best quality”
    - choose cricket match from best reception TV channel

# Interaction Architecture (2)

- **Interaction: Text Chat, Poll/Quiz, Feedback**
  - New light weight app for tablets and mobile
  - Low bandwidth high reliable interface
- **Automatic switch from receive-only to full interaction**
- **Huge bandwidth savings, server/network scale**
- **Result: Reliable delivery to tens of thousands of online users**

# Huge Virtual Classroom: Role-based apps

## Summary:

Customized user experience for each user role

## Overview:

- Monitor app
- Teacher/TA app
- Sys admin app
- Student app

# User Roles (1)

## Teacher

- Teach Class
- Content Management

## Teaching Assistant

- Content Management
- Discussion Forum
- Live Interaction



# User Roles (2)

## System Administrator

- Manage/Monitor Infrastructure, Bandwidth
- Troubleshoot User Issues

## Classroom Monitor

- Monitor/Proctor Class

## Management

- System Usage
- Effectiveness Analysis
- Program Benefits Analysis

# Phase II – Modules

M1:  
Implementation for  
1 Crore Users

M2: Integrated A-  
VIEW: Satellite,  
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M3: A-VIEW on  
Low-End Mobiles  
and Tablets

M4: Open A-VIEW

M5: Classroom  
Surveillance and  
Monitoring

M6: A-VIEW  
Producer: Self  
Recording Lectures

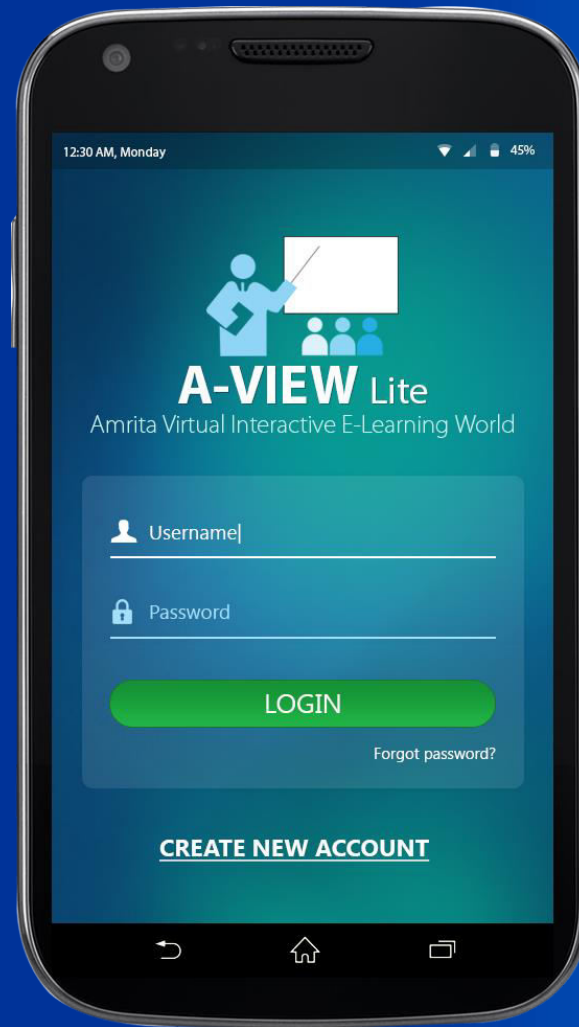
M7: Adaptive Plug  
and Play Devices

M8: Major A-VIEW  
Enhancements  
(User Requests)

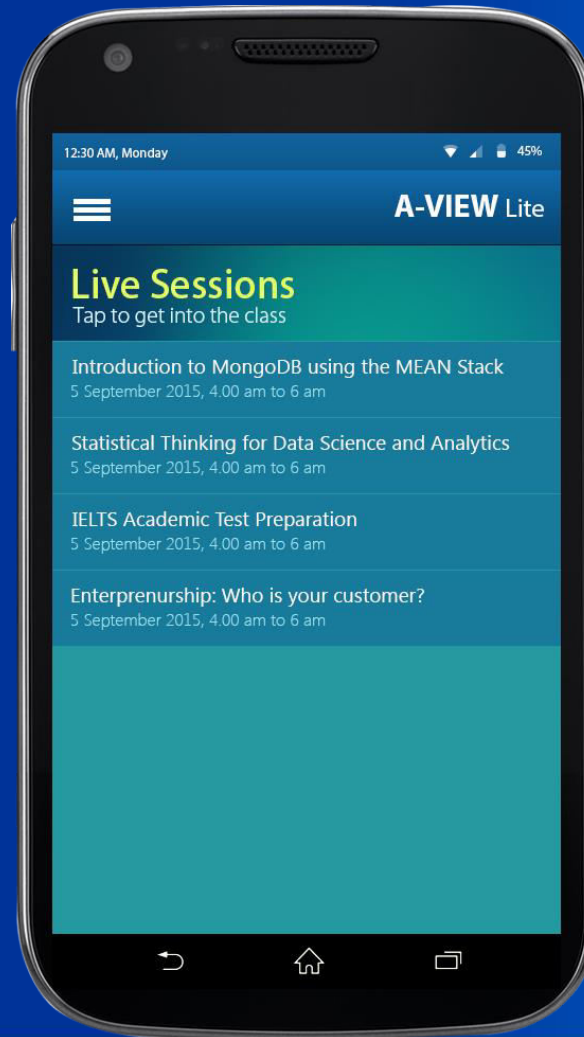
M9: Automation  
Testing & System  
Integration

M10: Online  
Collaboration

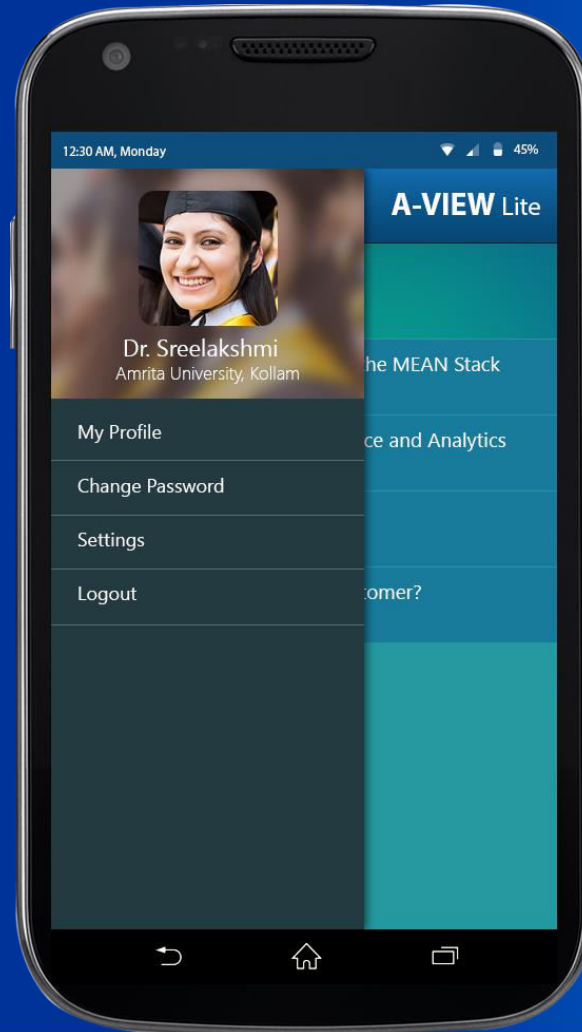
# Low-End Mobile Platform



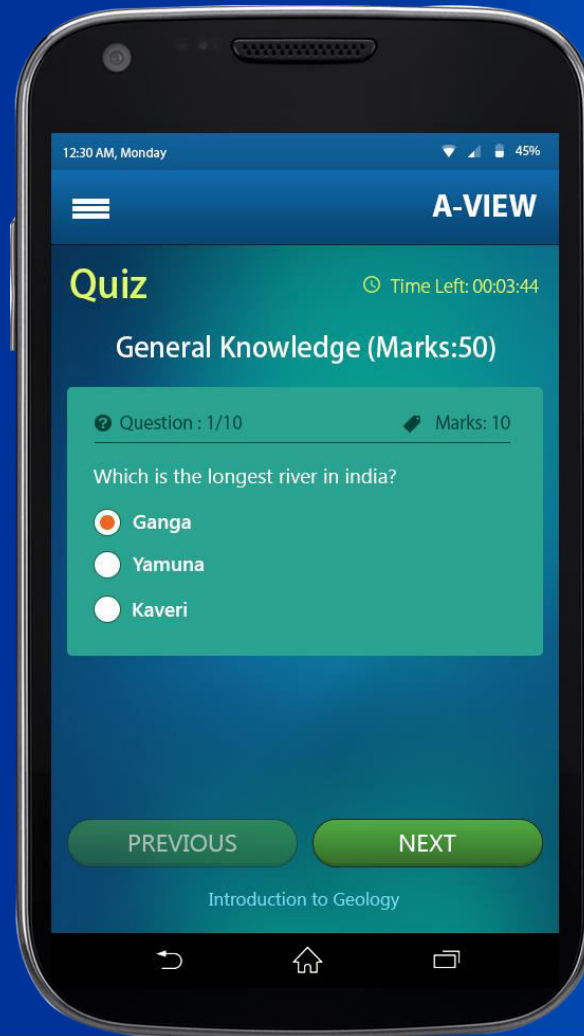
# Personalized Learning from Anywhere



# Personalized App



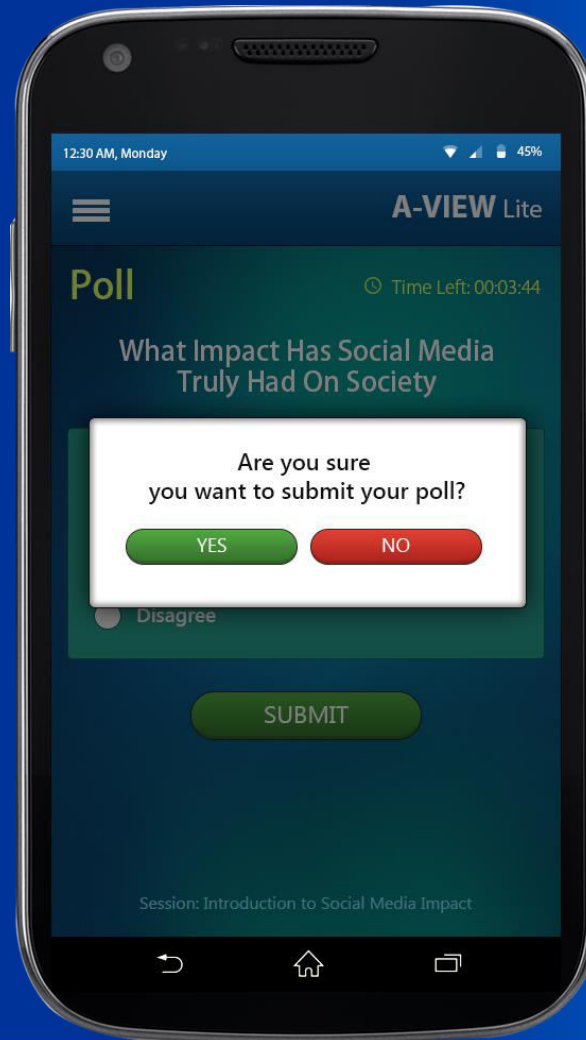
# Live Mobile Quiz



# Live Poll



# Live Poll





# Module 3: A-VIEW on Low-End Mobiles and Tablets

- Enable Personalized Learning
- Whatsapp of Education
- Low-end android mobile phones to high-end phones
- Massive Live Classes (1 Lakh)
- Instant polling and quizzes
- Download course content and recordings for offline viewing

# Live Interaction

Live Audio/Video Streaming



Hand raise to ask question



Question & Chat



Tablet Poll



Mobile Quiz

# Immediate Feedback Mechanism



# Immediate Feedback Mechanism




# Mobile Application Features

- **Chat:** Text Chat, Private Chat
- **Assessments:** Poll, Quiz
- **Feedback:** Automatic Handraise Recognition, Manual Handraise, Live Questionnaires
- **Analytics:** Feedback Form
- **Bandwidth:** Low Bandwidth, Multiple Channel (Wireless, Data Plans)
- **Download Recordings for Offline Viewing (MP4)**
- **Live Video and Audio Interaction**
- **Content Collaboration:** Desktop Sharing, Whiteboards

# Tablet: Live Session with 3D Model

**A-VIEW**  
AMRITA UNIVERSITY

Welcome MeenaS



P : Prof. Kannan Moudgalya



Question

| Question                                                   | Vote |
|------------------------------------------------------------|------|
| Jeeva N: What is the difference between AC and DC current? | 1    |

?

👍

# Tablet: Interaction

The screenshot displays the A-VIEW virtual classroom interface. At the top, the logo for A-VIEW AMRITA UNIVERSITY is on the left, and the text "Welcome MeenaS" is on the right. To the right of the welcome text are icons for a hand, a play button, a question mark, and a refresh symbol. Below this is a navigation bar with tabs for "Video", "Document", "Whiteboard", "Desktop", "3D Viewer", "Users / Chat", and "Question". The main area shows two video feeds. The left feed is labeled "P : Prof. Kannan Moudgalya" and shows a man in a light blue shirt speaking at a podium. The right feed is labeled "Jeeva N" and shows a man with glasses and a teal shirt looking at a laptop. Both video feeds have a small video-off icon at the bottom center.

# Tablet: Document Sharing

The screenshot shows the A-VIEW tablet interface. At the top, there is a header with the A-VIEW logo and the text "Welcome MeenaS". Below the header is a navigation bar with tabs for "Video", "Document", "Whiteboard", "Desktop", "3D Viewer", "Users / Chat", and "Question". The main content area displays a document titled "Document Sharing" with the following text:

**What Qualifications Do You Need to Become a Plumber?**

- BPEC
- NVQ Diploma
- City and Guilds
- Emergency First Aid

**Specialise in the following areas of plumbing:**

- Boilers & appliances
- Pipe fitting
- Kitchen installation
- Sanitary systems
- Central heating
- Bathroom design

On the right side of the document, there is a vertical toolbar with icons for a folder, a refresh button, a zoom in/out button, and an information button.

The screenshot shows the A-VIEW smartphone interface. At the top, there is a header with the A-VIEW logo and the text "12:30 AM, Monday". Below the header is a navigation bar with tabs for "VIDEO", "DOCUMENT", "WHITEBOARD", "DESKTOP", and "3D VIEWER". The main content area displays a document titled "Document Sharing" with the following text:

**Plumbing Courses**

**What Qualifications Do You Need to Become a Plumber?**

- BPEC
- NVQ Diploma
- City and Guilds
- Emergency First Aid

**Specialise in the following areas of plumbing:**

- Boilers & appliances
- Pipe fitting
- Kitchen installation
- Sanitary systems
- Central heating
- Bathroom design

At the bottom of the screen, there is a vertical toolbar with icons for an information button, a zoom in/out button, a refresh button, a folder icon, and a menu icon.



# Tablet: Whiteboard

**A-VIEW**  
AMRITA UNIVERSITY

Welcome MeenaS

Video Document Whiteboard Desktop 3D Viewer Users / Chat Question

Page No: 1

Whiteboard : Only Selected Viewer can write





12:30 AM, Monday

**A-VIEW**  
AMRITA UNIVERSITY


VIDEO DOCUMENT WHITEBOARD DESKTOP 3D VIEWER

Whiteboard : Only Selected Viewer can write


# Tablet: Voting

Welcome MeenaS

|       |          |            |         |           |              |          |
|-------|----------|------------|---------|-----------|--------------|----------|
| Video | Document | Whiteboard | Desktop | 3D Viewer | Users / Chat | Question |
|-------|----------|------------|---------|-----------|--------------|----------|






**How social media affects new generation?**  
By Prof. Gopal on 10.15 AM 

---

**Drawbacks of Social Media?**  
By Prof. Karan on 10.15 AM 

---

ENTER



# Phase II – Modules

M1:  
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1 Crore Users

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M4: Open A-VIEW

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M6: A-VIEW  
Producer: Self  
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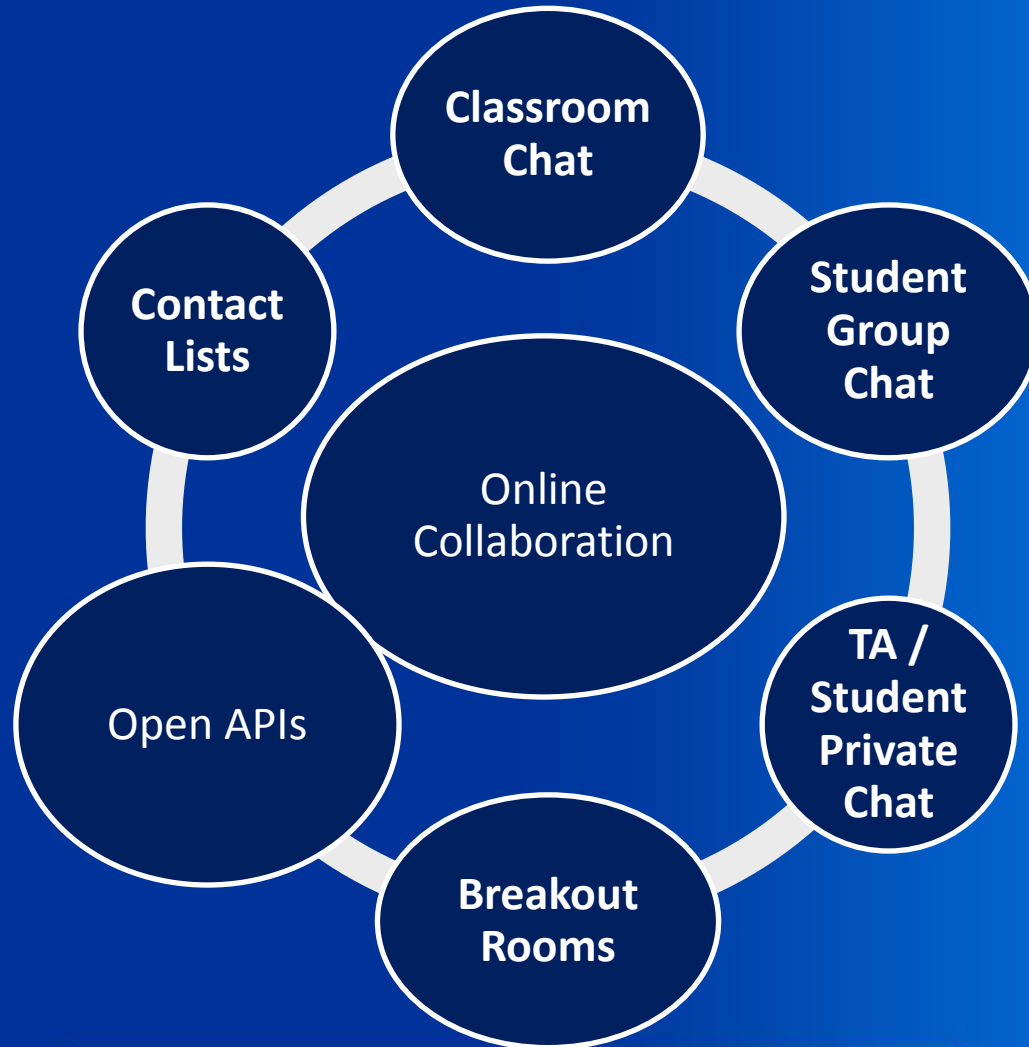
M7: Adaptive Plug  
and Play Devices

M8: Major A-VIEW  
Enhancements  
(User Requests)

M9: Automation  
Testing & System  
Integration

**M10: Online  
Collaboration**

# Module 10: Online Collaboration



# Online Collaboration

## Summary

- Per-Class Online Chat Room
- Whatsapp for Education

## Overview

- Student Group Chat
- Student Private Chat
- Contacts, Groups etc.
- Share Files
- Meeting Minutes

# Online Collaboration

Physics 101 - Anna University - Online Course Room

Search ?

Krishna Kumar

| MEMBERS           | GROUPS                 |
|-------------------|------------------------|
| Sethu Subramanian | All Physics 101        |
| Vivek             | Physics 101 TA's       |
| Kamal             | My Physics 101 Friends |
| Ashwini           |                        |
| Jayahari          |                        |

Live Chat

Deepak. B. Phatak :

Send

Video Window



<Discussion Thread....>

Post

<Text....>

**B** *I* U - abc x, x' Aa -

Rating

Recording Library

Class Calender

Class Website

# Teacher-Student Classroom Chat

## A-VIEW



**Moderator:** Any Questions?

**TA:** What is the phase difference between two windings of A.C servomotor ?

**Akhila:** Relative permittivity

Enter your message

# Student Group Chat

The screenshot displays a tablet interface for an online learning group chat. At the top, the header includes the logo "A-VIEW II" on the left, the text "Online Learning Group" in the center, and navigation links "My Profile | Contacts | Courses | Notifications" below it. On the right side of the header, there is a status bar showing "BELL", signal strength, Wi-Fi, time "4:21 PM", and battery level "100%". Below the status bar, the word "Student" is displayed next to a small avatar icon.

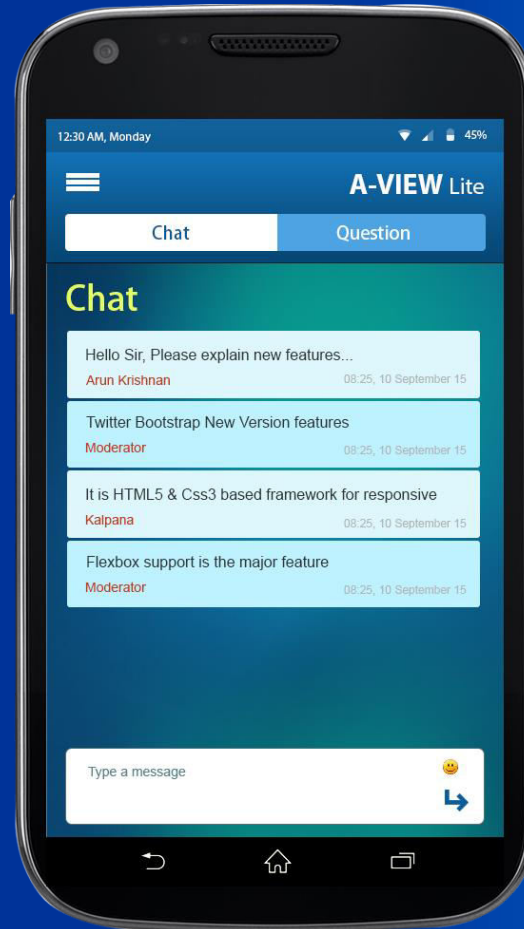
The main content area is titled "Video Chat" in red text. It features a large video window on the left showing a young woman with a ponytail. Below this are three smaller video thumbnails of other participants: a young man, a young woman, and another young woman. To the right of the video windows is a chat log with the following text:

Arathy: How are you?  
Ashwin: Fine

Below the chat log is a text input field. To the right of the chat log is a chemistry poster titled "Chemistry of UNIVERSAL INDICATOR". The poster features a central image of a conical flask containing a green liquid, with various chemical structures and diagrams surrounding it. The poster includes the chemical formula  $\text{NaOH}$  and a color-coded legend for pH levels.



# Mobile Online Collaboration



# Online Collaboration : Applications

- **Student Collaboration**
  - Students can share course materials, tips, ...
- **Tutoring**
  - Students and TA's and Experts
- **Teacher Training and Collaboration**
  - Teachers can share course materials, tips, guidance
- **Research collaboration**
- **Government and Academic Collaboration**

# Online Collaboration: Features

- **Public chat with every one in Class**
  - Students, Teachers, TA's and Experts
- **Group Chat**
  - Chat with other Students or Coaches or colleagues
- **Contact Lists: Import / Export**
  - Students: Study Group, Friends
  - Teachers: Colleagues, Friends, TA's

# Phase II – Modules

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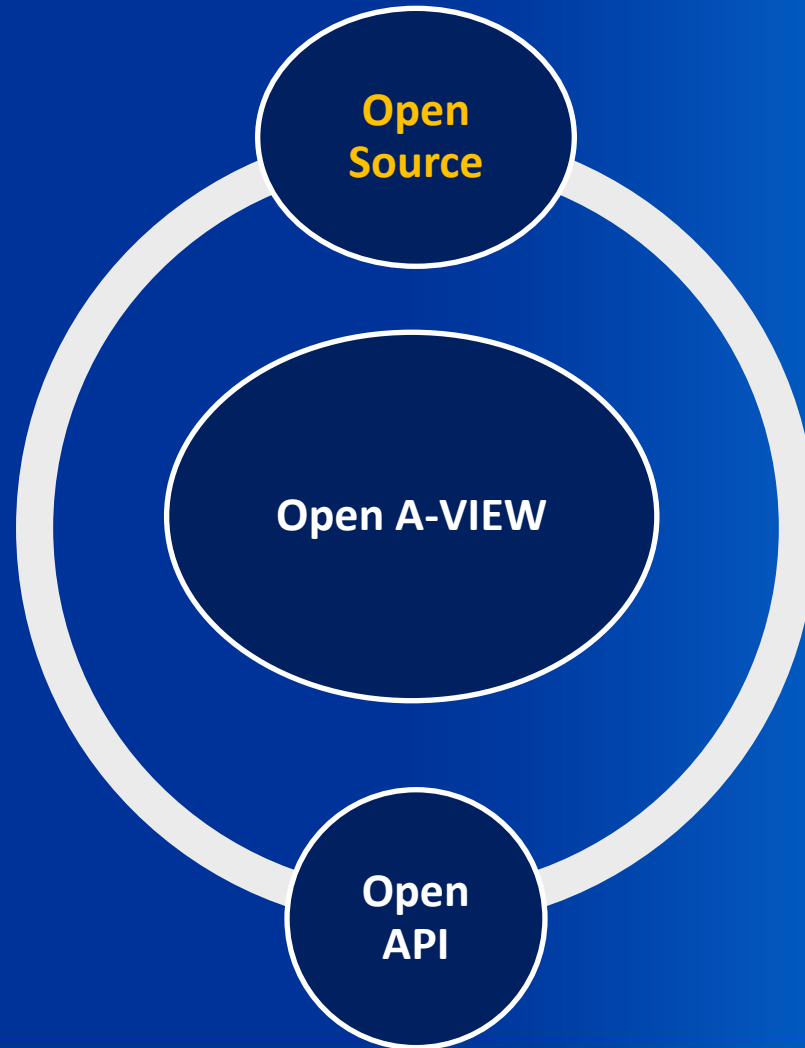
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M8: Major A-VIEW  
Enhancements  
(User Requests)

M9: Automation  
Testing & System  
Integration

M10: Online  
Collaboration

# Module 4: Open A-VIEW



# Feature: Open Source

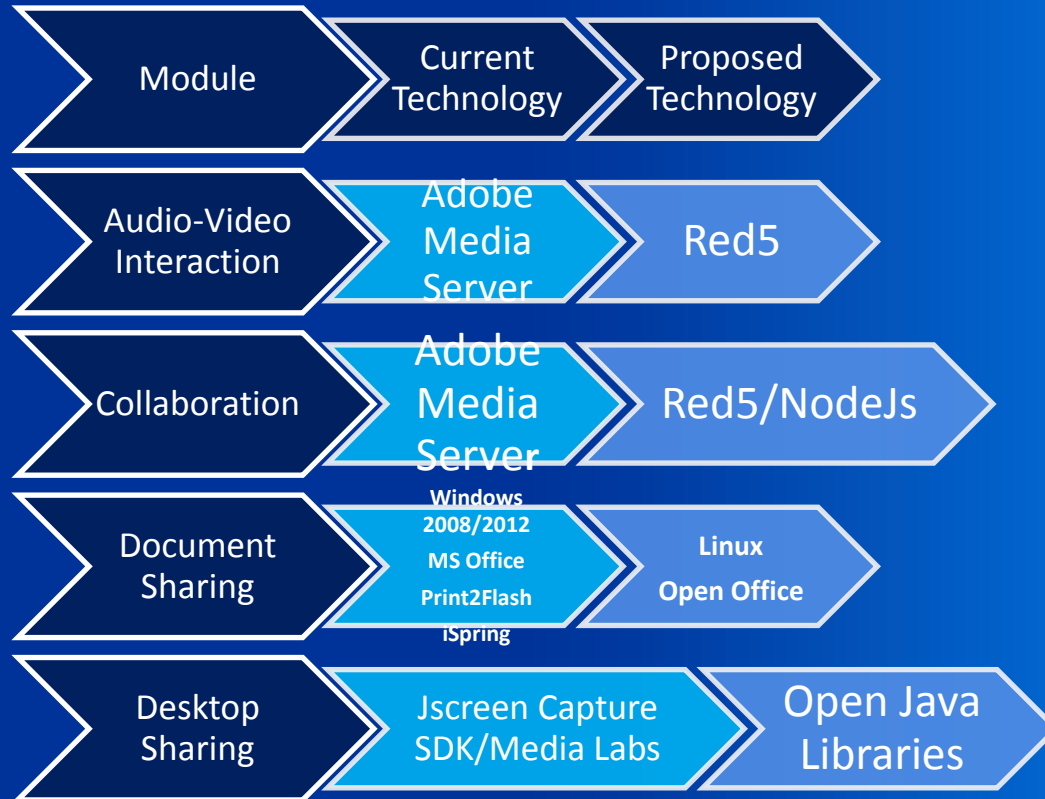
## Summary

- Substitute third-party licensed products with free or open source equivalent

## Overview

- Simplify deployment for small groups
- Reduce cost for developer community
- Identify capacity of free version vs. licensed version

# Substitution of licensed software



# Feature: Open API

## Summary

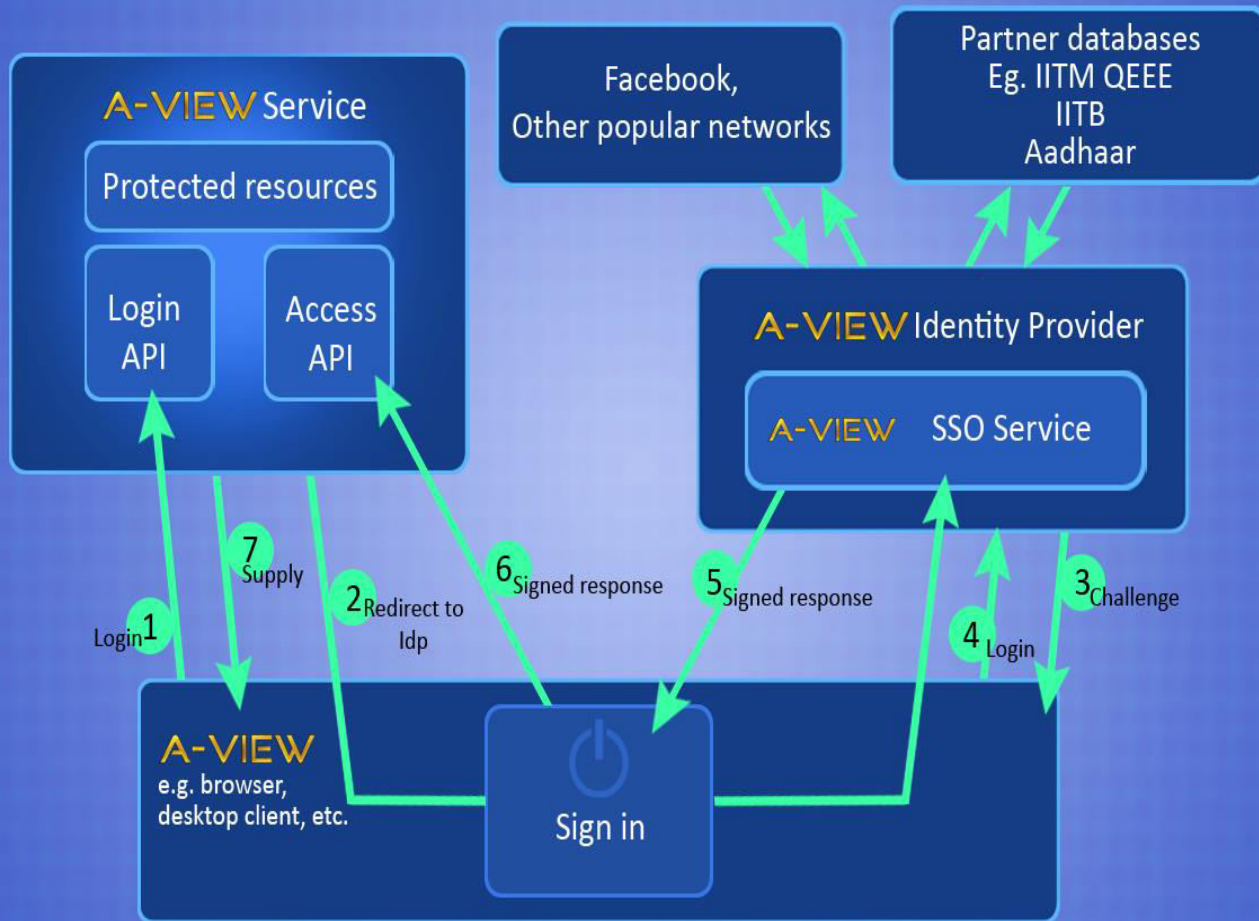
- Integrate A-VIEW into external systems using A-VIEW Open APIs

## Overview

- Single sign-on work
- A-VIEW for live interaction
- A-VIEW for generating recordings



# Single Sign-On API



# Single Sign-On Features

- Flexible Integration without needing to replicate password databases
  - Popular Social Networks (e.g., Facebook)
  - National Databases (e.g., Aadhar)
  - Institutional Databases (e.g., IITM QEEE, IITB)
- Open Standards
  - OAuth/OAuth2
- Plugin Architecture
  - Any one can write SSO Plugin for their own User Database
- Examples published as part of Source Code

# IITM QEEE Integration Example

The screenshot shows a web browser window with the URL `115.248.204.180/qeee/`. The page features the QEEE logo and navigation links: HOME, ABOUT US, FAQ, and CONTACT. The main content area is titled "BRIDGE PROGRAMS" and includes a photograph of several individuals in a laboratory setting. To the right, a "Welcome To QEEE" section contains a login form with the following elements:

- LOGIN label
- Username field containing "rajanarendra"
- Password field with masked characters "\*\*\*\*\*"
- Login button
- Forgot Password? link

The footer contains logos for IITM and MHRD, along with the text: "qeee.in © 2014 | Version : 5.0.6 | February 25, 2015 11:28:43". A status bar at the bottom left shows "Waiting for 115.248.204.180..."

# IITM QEEE Integration Example

The screenshot displays a web browser window with the URL `115.248.204.180/qeee/template/course.php`. The page features the QEEE logo (Quality Enhancement in Engineering Education) and a user profile for P. venkateswara rao. The main content area is titled "Courses" and includes a "Live Courses" section with a "Survey Link" option. Two course cards are visible: "Designing with Com..." and "QEEE Testing", each with a "Course Details" button. The footer contains the text "QEEE-ACETGAP | qeee.in © 2014 | Version : 5.0.6 | February 25, 2015 09:43:33".

# IITM QEEE Integration Example

The screenshot displays the A-VIEW web client interface. The browser address bar shows `aview.qeee.in/webclient/aview_sso.php`. The page header includes the A-VIEW logo (Amrita University), MHRD logo (Funded by NME-ICT), and QEEE logo. A navigation bar contains various icons for user management, chat, and other features. A welcome message reads "Welcome karthikac QEEE".

The main interface is divided into several sections:

- Users Panel:** A table listing participants with columns for Name, IC, and Status.
- Presenter:** A large video window showing a male presenter in a white shirt.
- Thumbnail:** A smaller video window showing a group of people, labeled "TCE\_TCEChitra Dr.G.Chitra".

At the bottom, a status bar indicates "Collaboration connected. Video connected. Course : QEEE-II Lecture : Session 3". The footer text reads "A-VIEW (Amrita Virtual Interactive E-Learning World) Version 3.7.13496- © 2007-2014".

| Name (Count 25)                                | IC | Status |
|------------------------------------------------|----|--------|
| M: Ashwin Mahalingam<br>QEEE                   | 0  |        |
| P: itm_studio1 Studio1<br>QEEE                 | 0  |        |
| V: TCE_TCEChitra Dr.G.Chitra<br>QEEE           | 1  |        |
| ITM Presenter<br>QEEE                          | 0  |        |
| AITMAP_atam AITAM<br>QEEE                      | 0  |        |
| Amrita Rec<br>Amrita E-Learning Research L     | 0  |        |
| AMRITATN_amritacbe Am<br>QEEE                  | 1  |        |
| AVEW Recording<br>Amrita E-Learning Research L | 0  |        |

# A-VIEW as a Plug-In

- A-VIEW can act as a Plug-In for:
  - Live Sessions
  - Online Chat Rooms
  - Proctoring / Exam Surveillance
  - Teacher Self-Recording of Lectures
- Help provide a complete Blended Learning Platform

# Blended Learning Platform



Watch Learning Materials

Local Classroom



Assessment



Online Collaboration



Virtual Classroom



Low Bandwidth Mobile Application

# Phase II – Modules

M1:  
Implementation for  
1 Crore Users

M2: Integrated A-  
VIEW: Satellite,  
LAN, CDN, Mobile

M3: A-VIEW on  
Low-End Mobiles  
and Tablets

M4: Open A-VIEW

M5: Classroom  
Surveillance and  
Monitoring

M6: A-VIEW  
Producer: Self  
Recording Lectures

M7: Adaptive Plug  
and Play Devices

M8: Major A-VIEW  
Enhancements  
(User Requests)

M9: Automation  
Testing & System  
Integration

M10: Online  
Collaboration



# Module 5: Classroom Surveillance and Monitoring

The screenshot displays the A-VIEW II University Control Panel interface. At the top, the title 'A-VIEW II' is on the left, and 'University Control Panel' with sub-links 'Monitoring | Plugins | Users' is in the center. The top right shows system status: 'BELL', signal strength, '4:21 PM', Bluetooth, and '100%' battery. A user profile for 'IITB Monitor 1' is visible in the top right corner.

The main content area is titled 'Classroom Monitoring' and features six video feeds arranged in a 2x3 grid. Each feed shows a different classroom with students and a student count at the bottom:

- Top-left: 50 Students
- Top-middle: 75 Students
- Top-right: 20 Students
- Bottom-left: 48 Students
- Bottom-middle: 15 Students
- Bottom-right: 45 Students

On the right side of the interface, there is a vertical list of names, some of which are highlighted in blue:

- Arun Krishnan
- Veena
- Vijayakumar
- Sunil Kumar
- Naveen Narayan
- Prasanth M
- Athi Narayanan
- Ashish
- Hareesh
- krishnakumar
- Neema
- Abhirami
- Sethu
- Dharmik Dev
- Swathik
- Thumbi

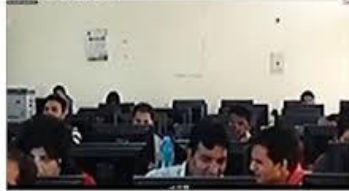
# Live Classroom Monitoring

## Computer Networks : Screenshots

Date : 2014-07-04

Unable to see thumbnail view? [Click here to see list view of the screenshots](#)

RC ID : 1001



RC ID : 1002



RC ID : 1003



RC ID : 1005



RC ID : 1007



RC ID : 1008



RC ID : 1011



RC ID : 1013



RC ID : 1014



RC ID : 1015



RC ID : 1016



RC ID : 1019



RC ID : 1020



RC ID : 1022



RC ID : 1024

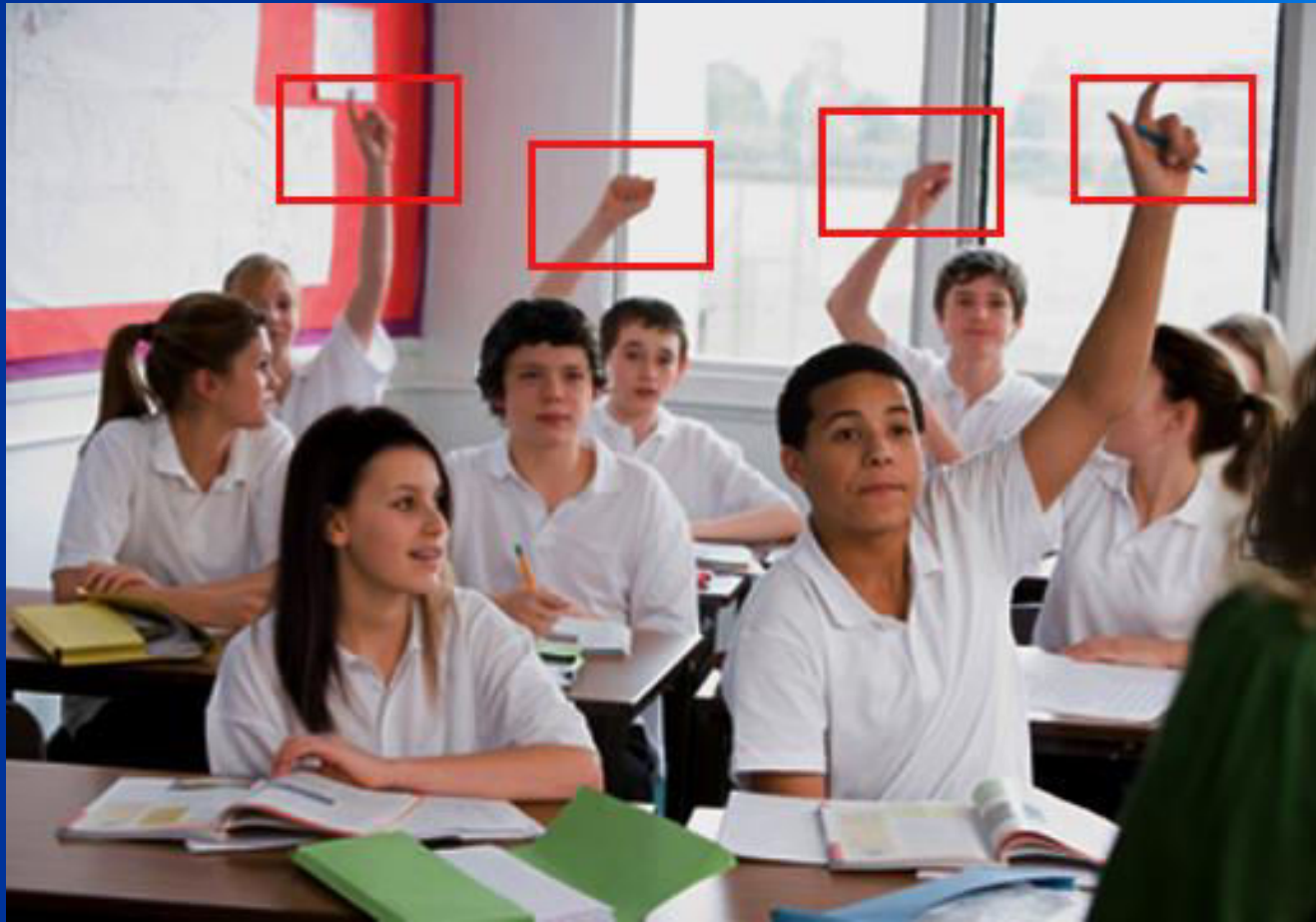


# Module 5: Classroom Surveillance and Monitoring

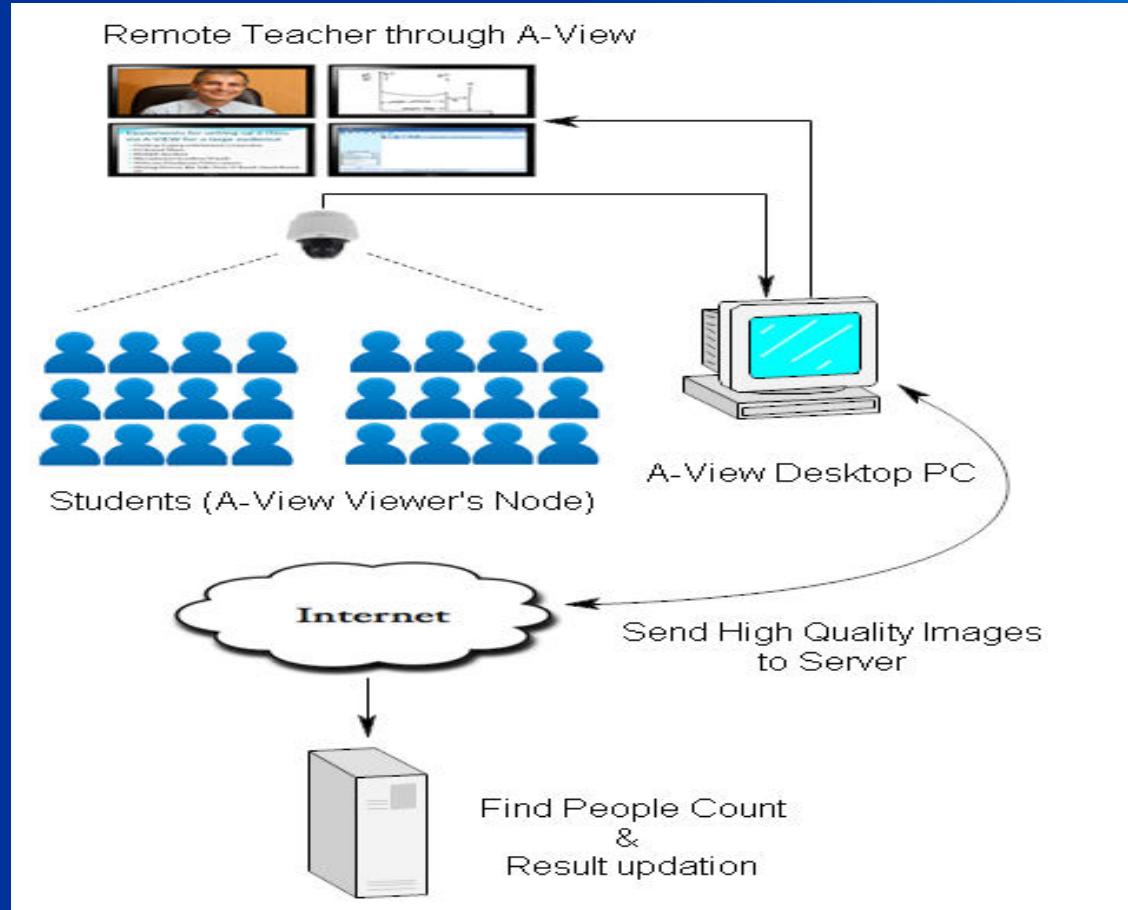
## Summary:

- Image Recognition
- People count
- Handraise count
- Classroom interaction
- Automatic attendance estimate
- Live classroom monitoring
- Proctoring students/groups
- Expression analysis
- PTZ remote control ...

# Handraise Count



# Image Recognition - Architecture



# Live Class Monitoring - Features

- **Snapshots:** Automatic snapshots at configured intervals, timestamps
- **Auto Count:** Attendance Estimate, Attentiveness Analysis
- **Ease of Use:** Choose interested student nodes, save as “Custom”
- **Ease of Admin:** Automatic allotment to all available monitors
- **Interaction:** Private chat with student nodes
- **Analytics:** Reports by Email, Dashboards
- **Quality:** High resolution video images

# Phase II – Modules

M1:  
Implementation for  
1 Crore Users

M2: Integrated A-  
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Low-End Mobiles  
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M4: Open A-VIEW

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Surveillance and  
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M6: A-VIEW  
Producer: Self  
Recording Lectures

M7: Adaptive Plug  
and Play Devices

M8: Major A-VIEW  
Enhancements  
(User Requests)

M9: Automation  
Testing & System  
Integration

M10: Online  
Collaboration

# Module 6: A-VIEW Producer: Self Recorded Lectures

## A-VIEW Producer



### Carbon

CARBON IS THE MOST IMPORTANT element of life. period. Sure, there are many others without which life would not exist, but from the spiral backbone of DNA to the intricate rings and streamers of the steroids and proteins, carbon is the element whose unique properties tie it all together. The very term "organic compound" refers exclusively to chemicals containing carbon.

Not content to be the foundation of all life on earth, carbon also forms diamond, the hardest known substance (at least for now; challenges are discussed under boron, element 5). But contrary to popular belief, diamonds are not particularly rare, nor are they unusually beautiful, nor are they forever: all these are myths created by the DeBeers diamond company. Diamonds would cost a tenth as much but for DeBeers's monopoly control. Cubic zirconia or crystalline silicon carbide are just as pretty. And at high enough temperatures, diamonds burn up into nothing but carbon dioxide.

Y A "Crap rule" related these refer produce diamond cutters. C Crisply rately C<sub>60</sub>

If I were writing these words every-five years or so ago, I would probably have been doing it with carbon. The "five" in pencils is actually graphite, a form of carbon, and has been since the 16th-century discovery in the English Lake District of the great mine at Borrowdale, the first source of pure graphite.

Carbon atoms like to form sheets, like a honeycomb with a carbon atom at each corner. Stack the sheets and you have graphite. Fold them into a sphere and you have a C<sub>60</sub> "buckyball," named for Buckminster Fuller who invented the geodesic dome. Roll the sheets into tubes and you have the strongest material known to science: carbon nanotubes.

Carbon has now become a focus of political controversy centered on the fact that our civilization is pumping carbon dioxide back into the atmosphere at about 100,000 times the rate it was put away by the dinosaurs and their swamps. Interestingly, the situation with nitrogen is exactly reversed.

Computer model of C<sub>60</sub> "buckyball"

Elemental

Atomic Weight: 12.0107  
Density: 2.260  
Atomic Radius: 67 pm  
Crystal Structure

Try industrial diamonds embedded in the steel disk



# Assign forum questions to upcoming Live sessions

## edX Amrita

Introduction to Web Development

All Discussions

- Question 1
- Question 2**
- Question 3
- Question 4
- Question 5
- Question 6
- Question 7

### Question 2

What are the new features in HTML5 ?

**Post Response** A-VIEW Solo Session

Style [None] | Format Paragraph

**Submit**

All Discussions

- Session 1**  
May 10 to May 30  
at 3.00 pm
- Session 2**  
June 1 to June 30  
at 3.00 pm
- Session 3**  
July 10 to August 30  
at 3.00 pm
- Session 4**  
September 10 to October 30  
at 3.00 pm
- Session 5**  
November 10 to December 15  
at 3.00 pm
- Session 6**  
December 16 to December 30  
at 3.00 pm

# Video answers to Questions



Question 1

Question 2

Question 3

Question 4

Question 5

Question 6

## Question 2

What are the new features in HTML5?

Answer by Teacher



Answer by Teacher Assistant

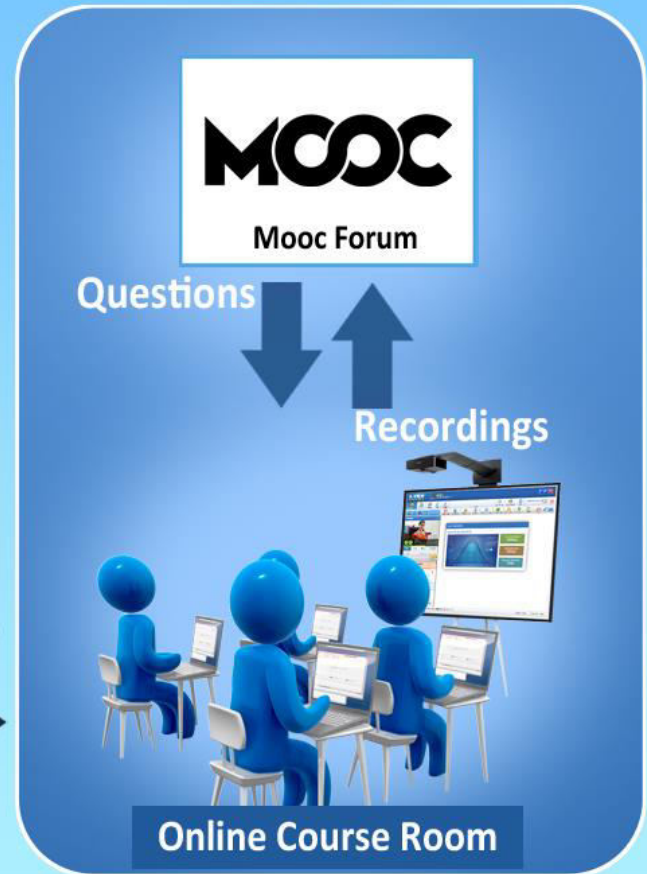


HTML5 is a core technology markup language of the Internet used for structuring and presenting content for the World Wide Web. As of October 2014 [update] this is the final and complete fifth revision of the HTML standard of the World Wide Web Consortium (W3C). The previous version, HTML 4, was standardised in 1997.

Enter your answer

Submit

# Blended Doubt Clearance



# Features

- MP4 self recording by teachers
- Integration for easy Course Creation
- Customize Lectures
- Self-contained, no external software needed

# Features

- Upload to Lecture Web Site
- Any platform, any language
- Class lectures automatically recorded
- Doubt clearance mechanism

## Summary

- Teachers can self-record lectures
- Class lectures are automatically recorded
- Recordings are generated as MP4 video files
- Searchable recordings
- Recordings annotated with metadata.
- Published to any course library (pluggable)

# Recording Module

## Features

Full recording including all modules that are not recorded currently (questions, video sharing, 2D/3D viewer).

Playback recordings exactly as seen by presenter.

Recordings are generated as MP4 video files.

Playback possible in Web Browser without any dependencies.

Notification mail once recording MP4 is made available.

Manual transcribe lecture in selected language.

Stitch back the lecture with manual transcript to assist students.

Make multiple languages available in recordings.

# Searchable Recording Library

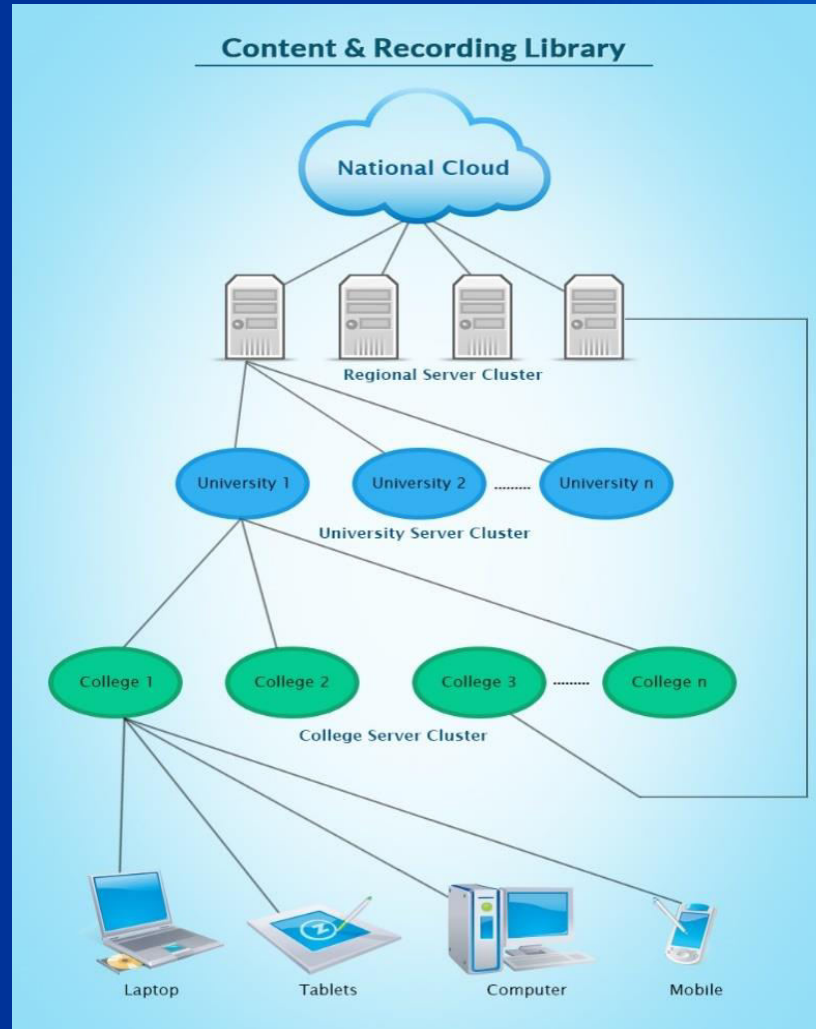
**Searchable Content & Recording Library**

🔍 Physics  Search Recordings

|                                      |                                                                                          |                                                                                             |                                                                                             |                                                                                                  |                                                                                                      |
|--------------------------------------|------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|
| Physics 101<br>-by Anna University   | <br>PPT | <br>Video | <br>Link | <br>Documents | <br>Questionnaire |
| Physics 101<br>-by IIT Bombay        | <br>PPT | <br>Video | <br>Link | <br>Documents | <br>Questionnaire |
| Physics 101<br>-by BITS              | <br>PPT | <br>Video | <br>Link | <br>Documents | <br>Questionnaire |
| Physics 101<br>-by Amrita University | <br>PPT | <br>Video | <br>Link | <br>Documents | <br>Questionnaire |
|                                      |                                                                                          |                                                                                             |                                                                                             |                                                                                                  |                                                                                                      |
|                                      |                                                                                          |                                                                                             |                                                                                             |                                                                                                  |                                                                                                      |



# Searchable Recording Library



# Searchable Recording Library - Features

- **Integrated Library**
  - Class Recording
  - Class Content
  - Class Transcript (Q/A, Course Assessments, Outlines)
  - Search by various parameters
- **Saved at best available location**
  - National, Regional, University, College
- **MP4 format for offline viewing**
- **Flexible Sharing Policies**
  - Share with Class, within University, within State, Nationally

# Phase II – Modules

M1:  
Implementation for  
1 Crore Users

M2: Integrated A-  
VIEW: Satellite,  
LAN, CDN, Mobile

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Producer: Self  
Recording Lectures

M7: Adaptive Plug  
and Play Devices

M8: Major A-VIEW  
Enhancements  
(User Requests)

M9: Automation  
Testing & System  
Integration

M10: Online  
Collaboration

# Module 7a: Video Quality

## Summary:

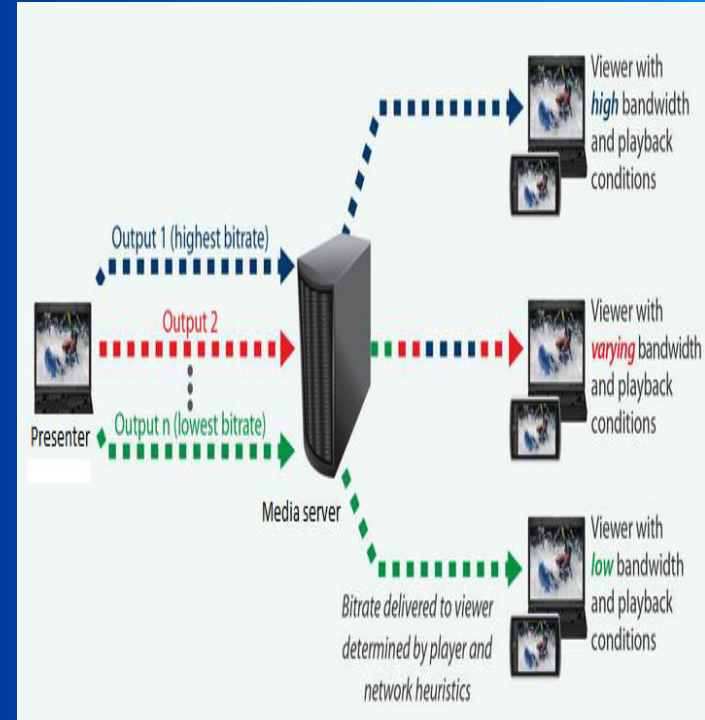
Improved audio-video quality with available codecs and adaptive bit-rate streaming

## Overview:

- Scalable video quality
- Adaptive bandwidth
- Manual bandwidth switching
- Codec investigation and integration
- Active visual feedback for users

# Video Quality - Adaptive Bitrate Streaming

- Switch between High, Medium and Low automatically
  - Multiple bit rates transmitted from Server
  - Viewer picks up high or medium or low based on available bandwidth
- Bandwidth Monitoring and Estimation
  - Automatically estimate available bandwidth
- Visual Feedback to User
- Manual Override (next slide)



# Adaptive Bitrate Streaming

- **Client to Service Bandwidth Monitoring**
  - Periodic speed test measurements
  - Use audio-video stream as a feedback mechanism
    - Measure packet loss, delay and effective bandwidth
  - Visual indications to user
    - Popup alert when bandwidth is too low
- **Intelligent Adaptive Behavior**
  - Adaptive Video Bandwidth Switching
    - Automatically reduce/increase video bandwidth
  - Manual overrides for user to reduce / increase / turn-off video
  - If Desktop sharing on, turn off presenter video on low bandwidth

# Video Quality - Manual Video Switching

The screenshot displays the A-VIEW virtual classroom interface. At the top, the header includes the A-VIEW logo (Amrita University) and MHRD (Funded by NME-ICT). The main toolbar contains various icons for session management, including Live Session, Meeting, Library, Quiz, Admin, Quicknote, Bandwidth, and Help. A 'Welcome Arun Krishnan Viewer' notification is visible in the top right.

The central area shows a 'Presenter' window with a video of Prof. Ashok Jhunjh. A dropdown menu is open over the video, showing 'Video Switching Mode' with options for 'Manual' (selected) and 'Automatic'. The 'Current Bandwidth' is displayed as 128 Kbps.

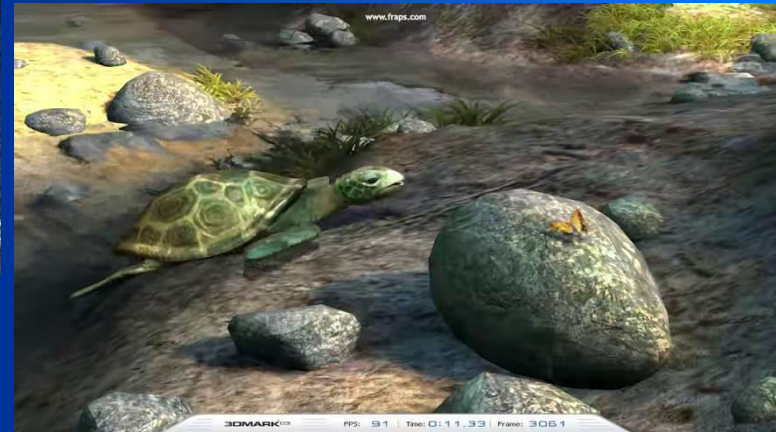
Below the presenter window is a 'Users' panel with tabs for 'Users', 'Chat', 'Viewer', and 'Question'. It features a search bar and a list of participants:

| Name                                        | Status |
|---------------------------------------------|--------|
| M: Prof. Kamal Bijlani<br>Amrita University |        |
| Arun Krishnan<br>Amrita University          |        |
| Sivaram<br>Amrita University                |        |
| Arun Krishnan<br>Amrita University          |        |
| Prof. Kamal Bijlani<br>Amrita University    |        |

At the bottom, there are two smaller video windows for Dr. G Venkatesh and Prof. Kannan Moudgalya. The footer shows the copyright information: © 2007 - 2014 A-VIEW(Amrita Virtual Interactive E-Learning World) | Version 4.0 and the session name 'Connected'.

# Video Quality – New Codecs

VP9 (used by Chrome) and H.265 (used by iPhone 6)





# Module 7b: Plug and Play Devices

## Summary:

Support for wide-variety of certified audio and video devices.

## Overview:

- Automatic Device Recognition
- Seamless reconfiguration
- Cloud-based Profiles and Roaming
- Device Certification
- Quality Lab

# Plug And Play Devices

The screenshot displays the A-VIEW virtual classroom interface. At the top, it shows the logo for A-VIEW (Amrita University) and MHRD (Funded by NME-ICT). The interface includes a top navigation bar with options like Live Session, Meeting, Library, and Quiz. Below this is a secondary navigation bar with icons for Start Video, Start Record, Refresh, Video Wall, Document, Whiteboard, Desktop, Video Sharing, 3D Sharing, 2D Sharing, Live Quiz, and Polling. The main area is divided into a Presenter window on the left, a Document Name field, and a central content area. The Presenter window shows a video of a woman and a list of users. A notification bubble in the bottom right corner indicates that a USB Headphone Audio Headset has been detected and asks the user to switch audio.

**A-VIEW**  
AMRITA UNIVERSITY

**MHRD**  
Funded by NME-ICT

Welcome Arun Krishnan  
Viewer

Live Session Meeting Library Quiz

Start Video Start Record Refresh

Video Wall Document Whiteboard Desktop Video Sharing 3D Sharing 2D Sharing Live Quiz Polling

Presenter Document Name 10 / 150 Download permission Allow

Library

Hide Slides Horizontal View Vertical View

Annotate

**Detected USB Headphone Audio Headset**

Switch audio?

Yes No

© 2007 - 2014 A-VIEW(Amrita Virtual Interactive E-Learning World) | Version 4.0

Session Name Connected

# Plug And Play Devices

The screenshot displays the A-VIEW virtual classroom interface. At the top, it features the A-VIEW logo (Amrita University) and MHRD funding information. The main toolbar includes various interactive tools like Live Session, Meeting, Library, Quiz, Quicknote, Admin, Bandwidth, and Help. A secondary toolbar offers options for Start Video, Start Record, Refresh, Video Wall, Document, Whiteboard, Desktop, Video Sharing, 3D Sharing, 2D Sharing, Live Quiz, Polling, and a redaction tool. The central area shows a presenter's video feed and a document viewer. On the left, a user list table is visible, and on the right, a vertical toolbar provides navigation and annotation options. A notification bubble in the bottom right corner indicates a detected HD video device.

**A-VIEW**  
AMRITA UNIVERSITY

MHRD  
Funded by NME-ICT

Welcome Arun Krishnan  
Viewer

Live Session Meeting Library Quiz Quicknote Admin Bandwidth Help

Start Video Start Record Refresh Video Wall Document Whiteboard Desktop Video Sharing 3D Sharing 2D Sharing Live Quiz Polling

Presenter Document Name 10 / 150 Download permission Allow

Library

Hide Slides  
Horizontal View  
Vertical View

Annotate

**Detected new HD Video Device**

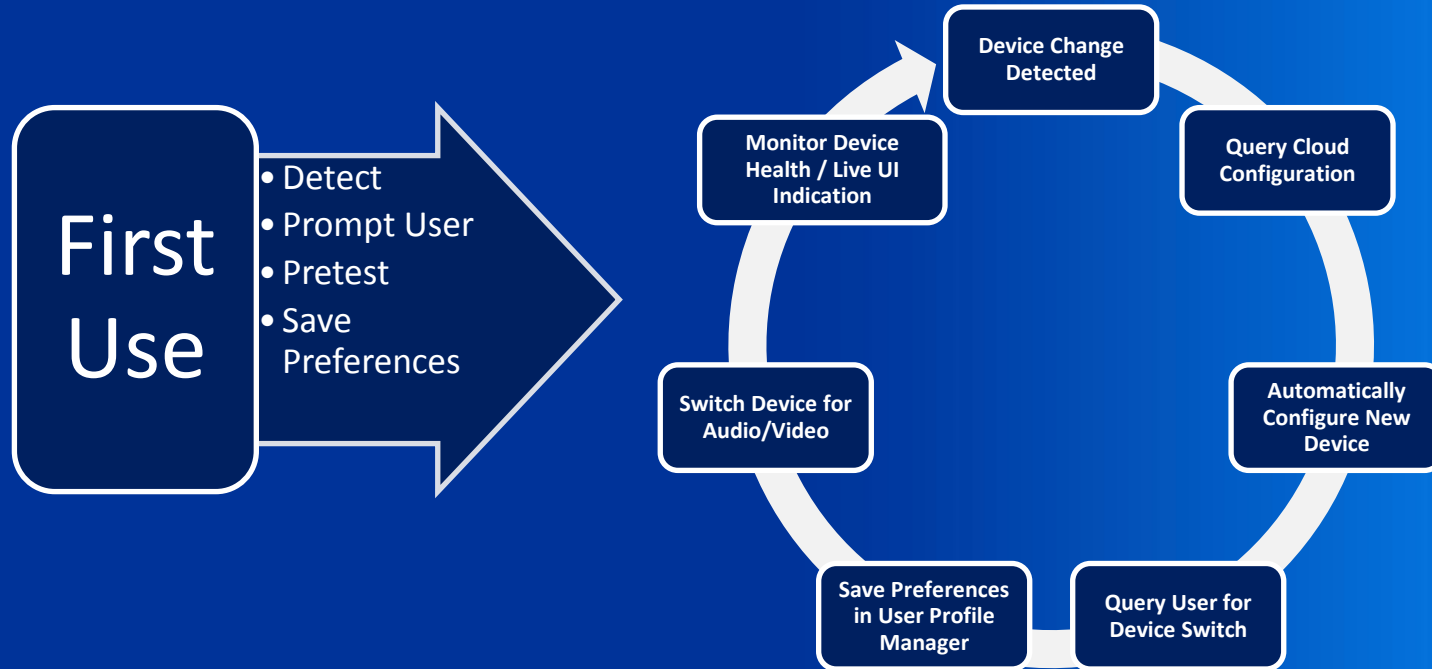
Switch video?

Yes No

© 2007 - 2014 A-VIEW(Amrta Virtual Interactive E-Learning World) | Version 4.0 Session Name Connected

| Name                                        | Status |
|---------------------------------------------|--------|
| M: Prof. Kamal Bijlani<br>Amrita University |        |
| Arun Krishnan<br>Amrita University          |        |
| Sivaram<br>Amrita University                |        |
| Arun Krishnan<br>Amrita University          |        |
| Prof. Kamal Bijlani<br>Amrita University    |        |

# Plug And Play Devices



# Plug And Play Devices- Features

- Automatic Device Change Detection
- Cloud-Driven Configuration
  - Well known Devices, Types, Settings stored in Cloud
  - Pushed down to Client periodically
- User Profile Manager
  - Saves User Profile to Cloud for subsequent use
- First-time Sign-in Wizard
  - A/V Device Selection
  - A/V Device Tuning and Pretesting
- UI-Health Status Indication
  - Mixer, A/V Studio Device
  - Signal, Noise Levels

# Phase II – Modules

M1:  
Implementation for  
1 Crore Users

M2: Integrated A-  
VIEW: Satellite,  
LAN, CDN, Mobile

M3: A-VIEW on  
Low-End Mobiles  
and Tablets

M4: Open A-VIEW

M5: Classroom  
Surveillance and  
Monitoring

M6: A-VIEW  
Producer: Self  
Recording Lectures

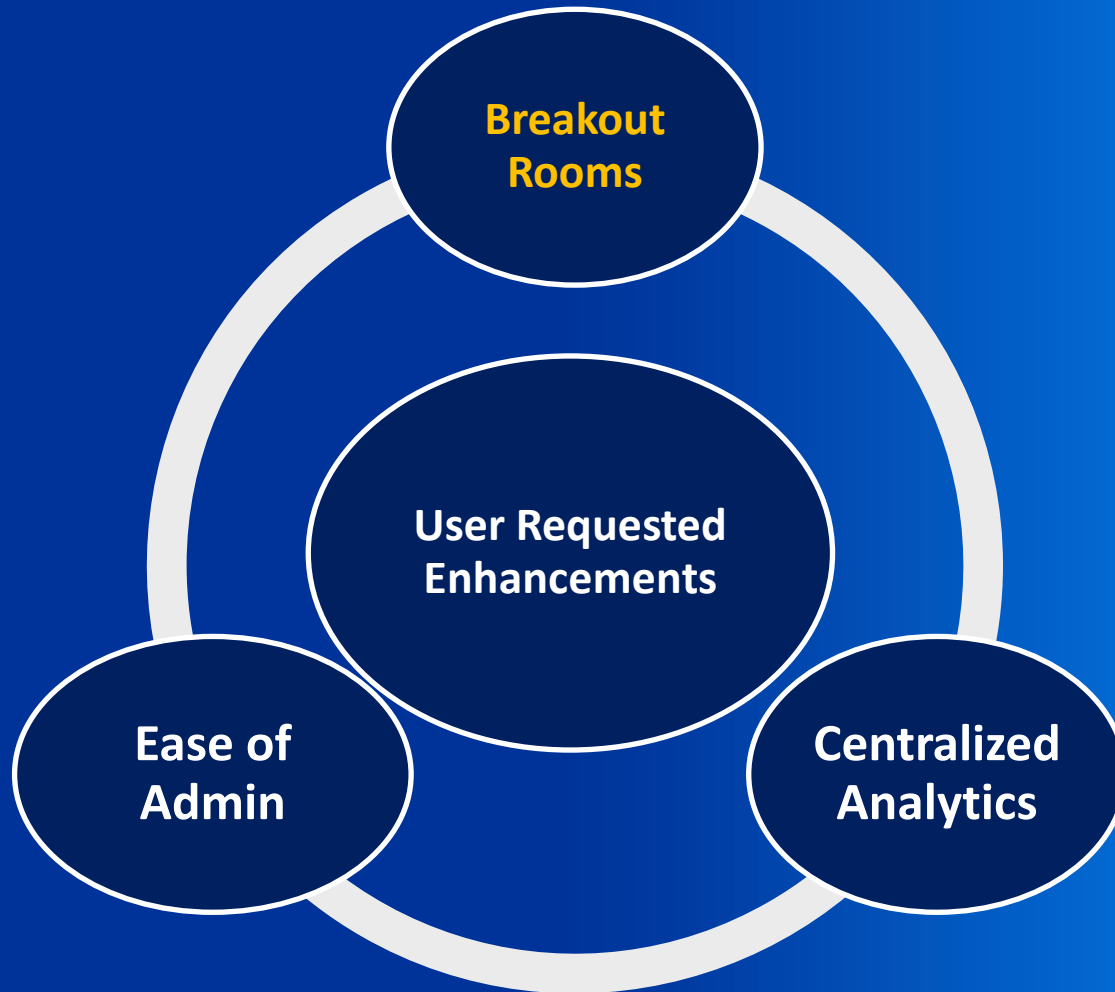
M7: Adaptive Plug  
and Play Devices

M8: Major A-VIEW  
Enhancements  
(User Requests)

M9: Automation  
Testing & System  
Integration

M10: Online  
Collaboration

# Module 8: A-VIEW Enhancements



# Feature: Breakout Rooms

## Summary:

Breakout room for group class work

## Overview:

- Breakout room for group class work
- Coaching breakouts
- Sys admin breakout for troubleshooting
- Teacher breakouts (panel of teachers)
- Automatic/manual assignment
- Breakout management - timers, send a message, teacher join










# Breakout Rooms

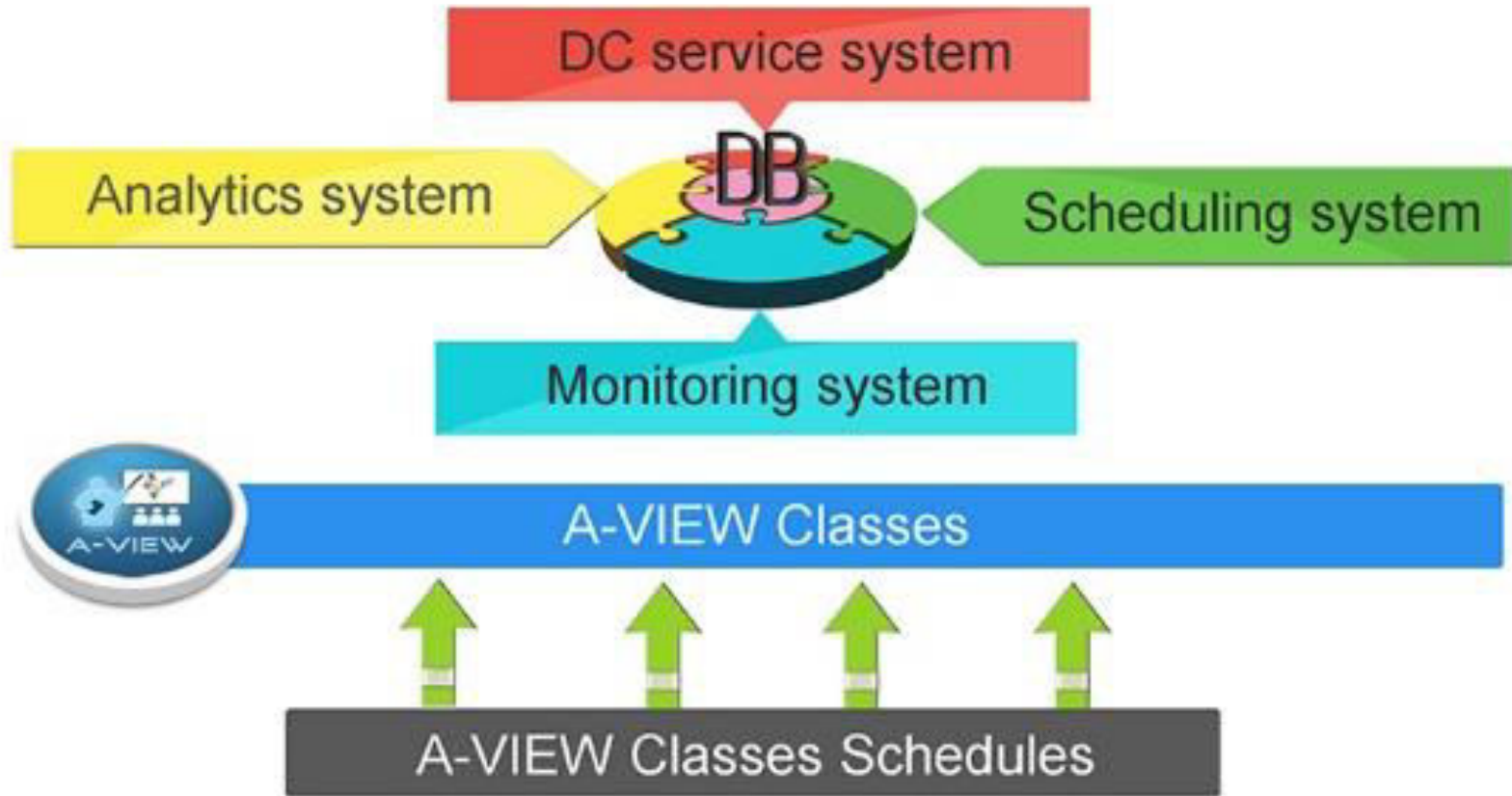
| Users                      | Chat | Viewers | Question |
|----------------------------|------|---------|----------|
| Main room                  |      |         |          |
| Room 1                     |      |         |          |
| Participant 1              |      |         |          |
| Participant 2              |      |         |          |
| Moderator                  |      |         |          |
| Room 2                     |      |         |          |
| Room 3                     |      |         |          |
| Stop multiple room meeting |      |         |          |



# Breakout Rooms : Applications

- **Classroom:** Divide a live class into multiple sub-groups to work on problems
- **Coaching:** Assign a coach to one or more selected students
- **Private Interaction:** Panel of teachers can have their own room
- **Troubleshooting:** Users with technical issue join Breakout with Sys Admins to get help

# Automatic Classroom Provisioning



# Automatic Classroom Provisioning - Features

- **Recommend optimal servers using:**
  - Past history: class attendance, geo-distribution of attendees, calculated bandwidth usage
  - Input configuration: expected class attendance and geo-distribution of attendees
- **Special consideration for the below:**
  - Schedule of the Class Series
  - Reward points for institutes with high usage
  - Special meetings (e.g., Government)




# Bulk User Management

**A-VIEW II** University Control Panel  
Monitoring | Plugins | Users IITB Admin 1

## User Management

All (3) | Administrator (2) | Author (1)

Bulk Actions ▾ Apply Change role to... ▾ Change

| <input type="checkbox"/> | Username                                                                                 | Name             |
|--------------------------|------------------------------------------------------------------------------------------|------------------|
| <input type="checkbox"/> |  Admin  | Deepak Dev       |
| <input type="checkbox"/> |  Malini | Malini Venugopal |
| <input type="checkbox"/> |  Arun   | Arun Krishnan    |
| <input type="checkbox"/> | Username                                                                                 | Name             |

Bulk Actions ▾ Apply

# Bulk User Management - Features

- Bulk User Creation/Deletion/Edits
- Import existing LMS user details
- Automatic user registration for courses
- Hooks for email, reminder integration
- Session report generation hooks
- APIs



# Feature: Centralized Analytics

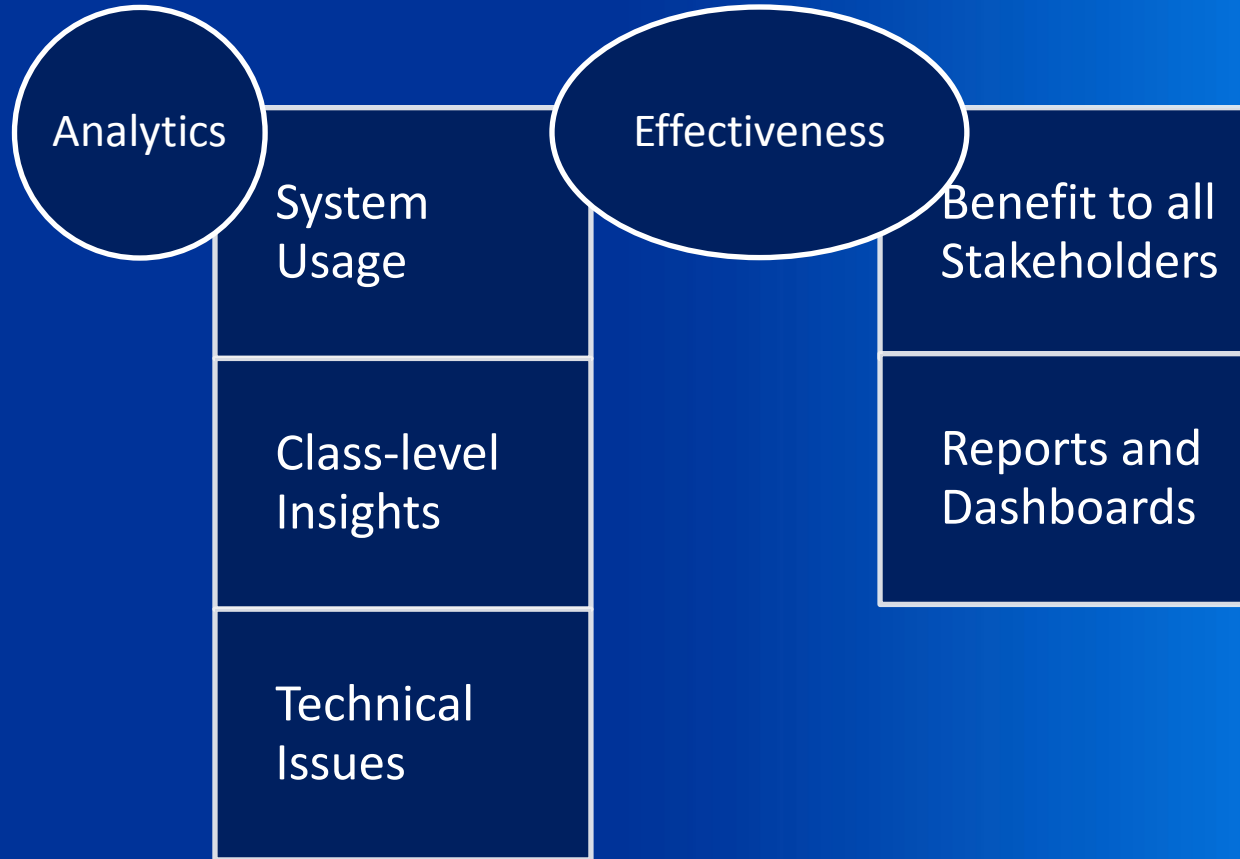
## Summary:

Capture, measure, analyze data to find out the effectiveness of the platform. Acts as a feedback mechanism to the system to reinforce strong practices and strengthen weak links of the platform.

## Overview:

- Collect and collate usage data
- Throw light on usage pattern across different parameters
- Helps in understanding usage
- Perform course correction for areas which are not well received

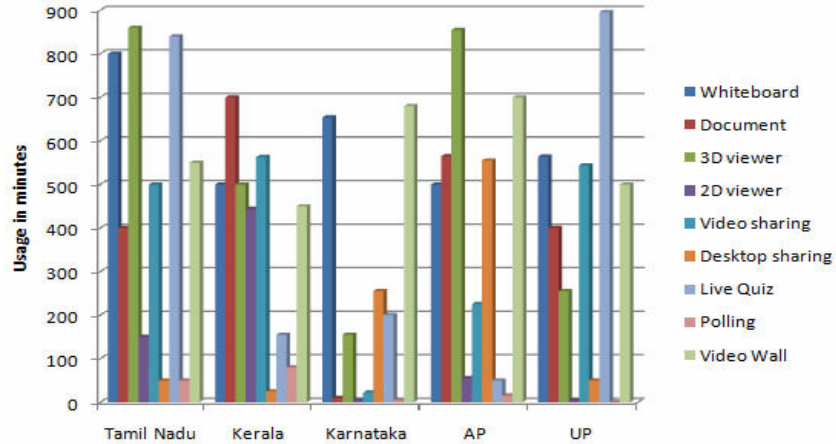
# Analytics / Effectiveness



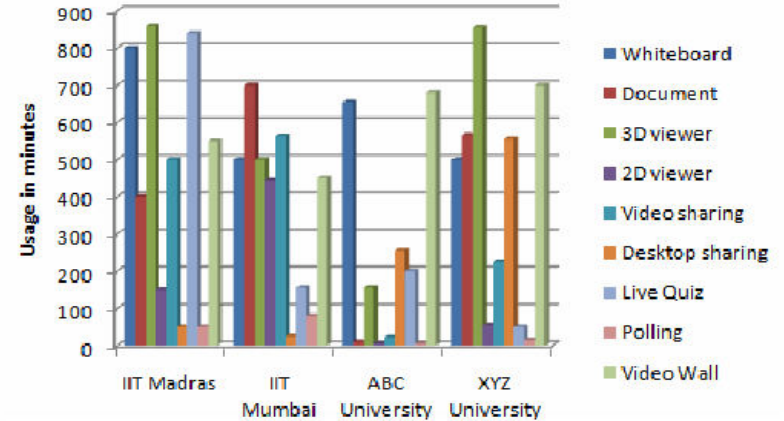
# Module Usage

Module Usage    Class Level    Lecture Level    Technical issues

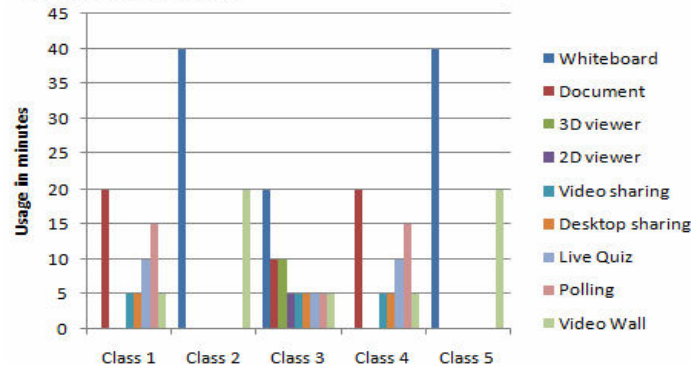
State wise module usage



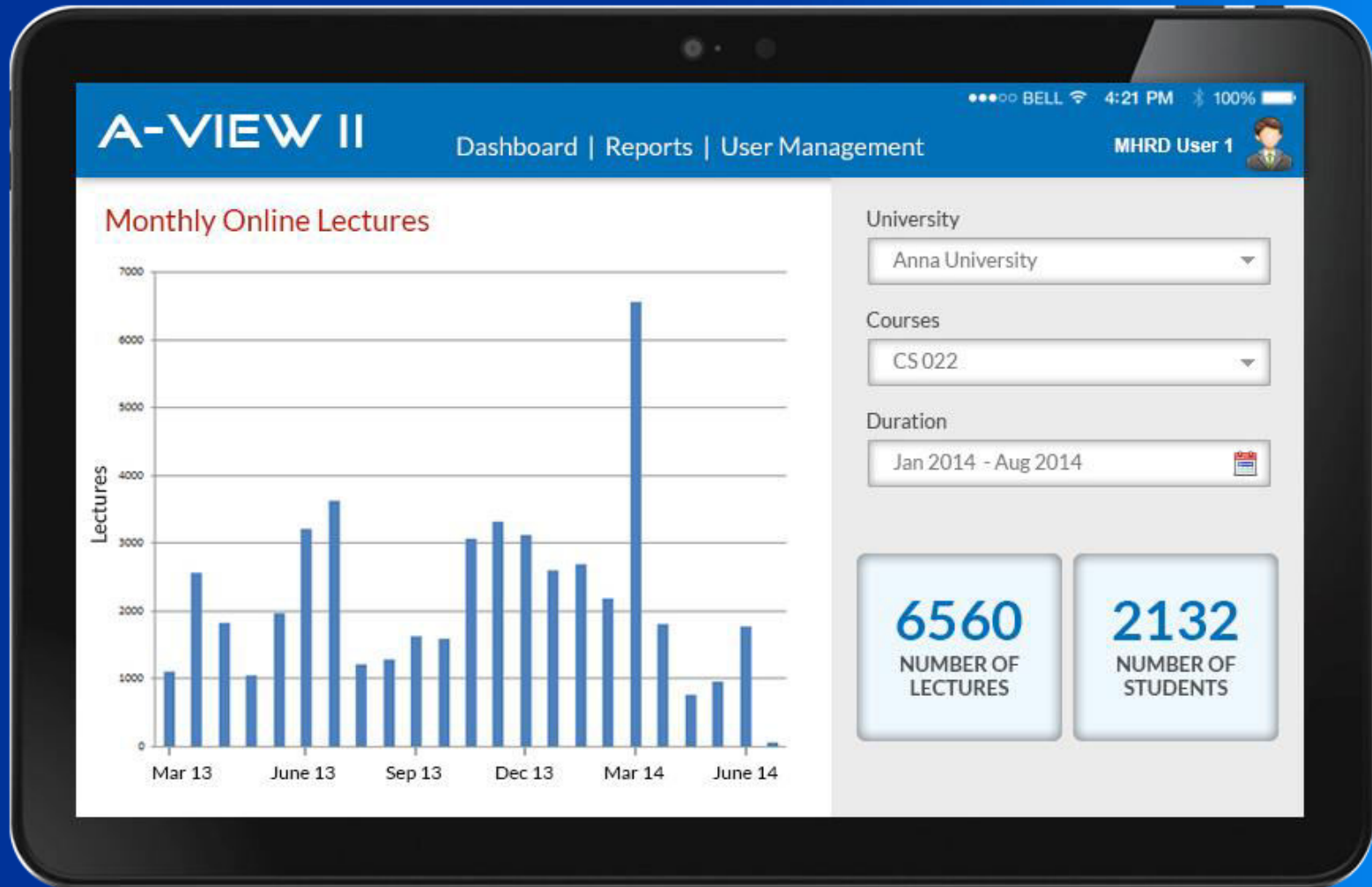
University wise module usage



Class wise module usage



# System Usage



# System Usage - Features

- How is the system being used ?
- What are the most active modules ?
- Which areas have issues with Live Interaction (e.g., bandwidth issues) ?
- Who are the active colleges ?
- What is the distribution across various States ?
- Customized for
  - Government Agencies
  - Institute Administrators
  - Teachers and Teaching Assistants
  - Developers
- Zoom-in by Region, State, University, and College
- Scheduled Reports by Email – Daily, Weekly, Monthly

# Class Level Insights

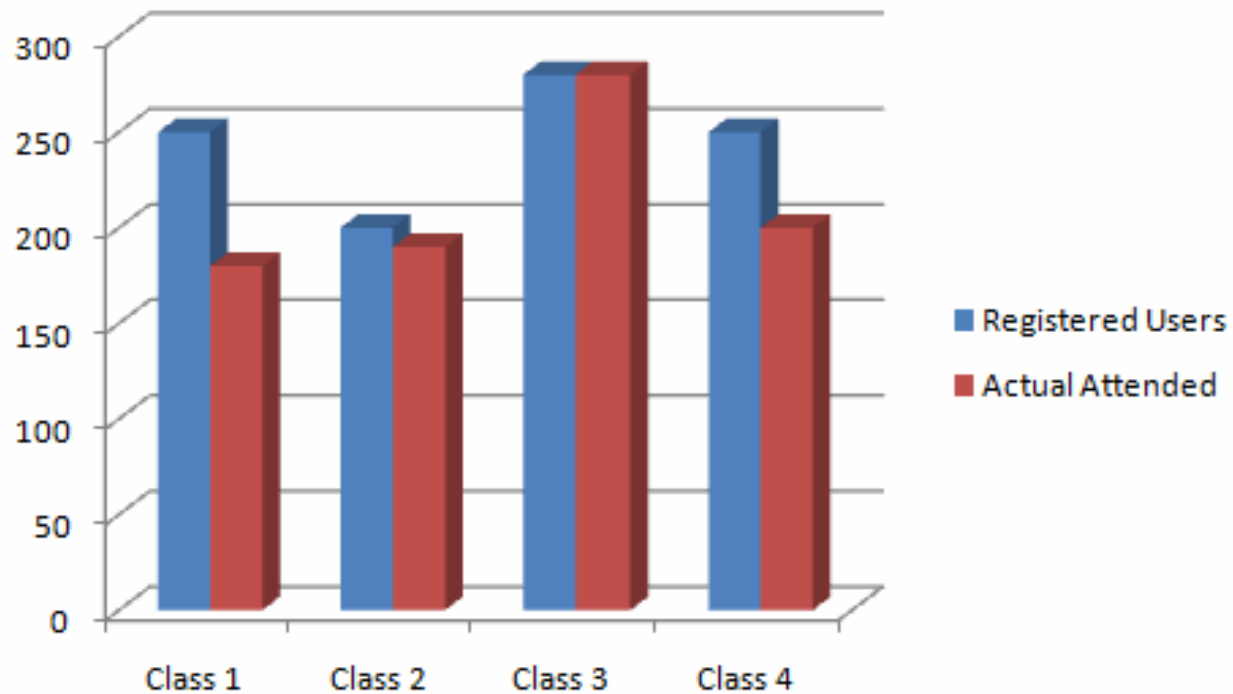
Module Usage

Class Level

Lecture Level

Technical issues

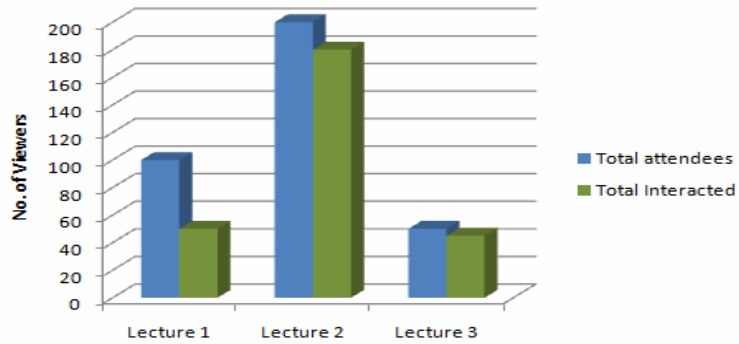
Class wise attendees (Avg.) Chart



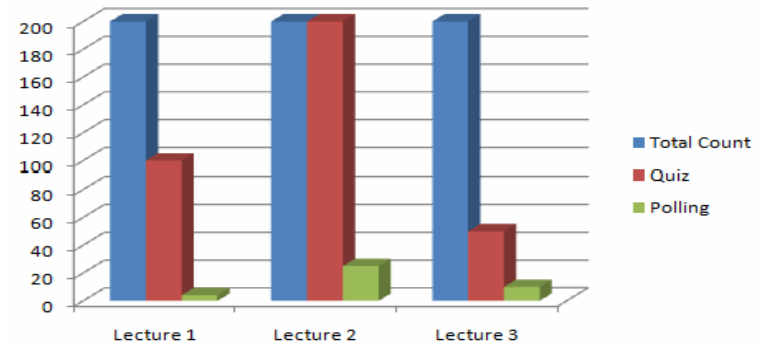
# Class Level Insights

Module Usage   Class Level   Lecture Level   Technical issues

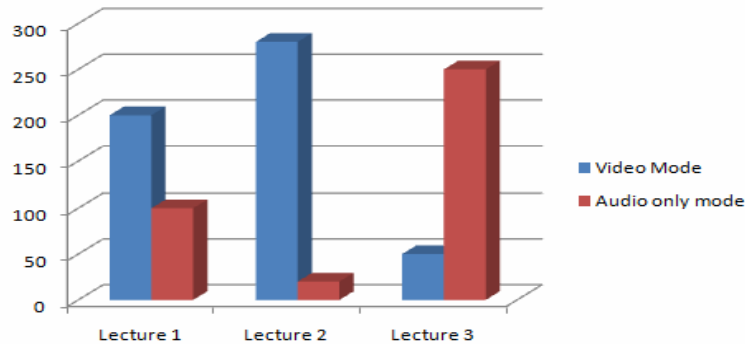
Lecture wise Interaction count



Quiz and polling chart



Video mode and Audio only mode

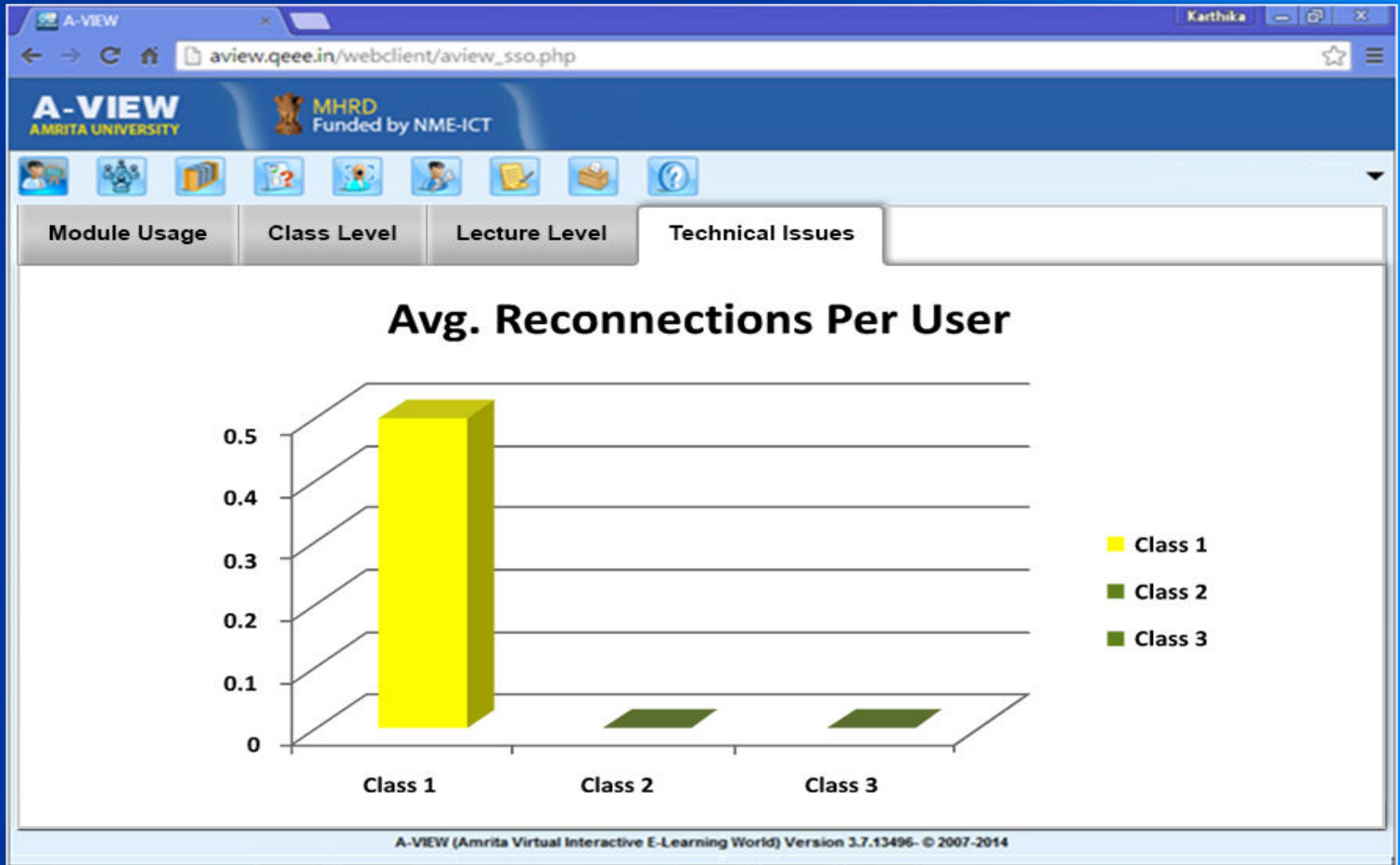


# Class/Lecture Level Insights - Features

- Attendance Percentage
- Live Interaction Ratio
- Percentage of users who are using audio vs. audio-video
- Percentage of users who are participating in Quizzes/Polls etc
- Customized for
  - Government Agencies
  - Institute Administrators
  - Teachers and Teaching Assistants
  - Developers
- Zoom-in by Region, State, University, and College
- Scheduled Reports by Email – Daily, Weekly, Monthly



# Technical Issues - Insights



# Benefits to Students



# Classroom Effectiveness



# Benefits of Effectiveness Analysis

- **Teaching Community**

- Understand quality / effectiveness of course content
- Understand how students are participating in class
- Understand learning patterns
- Pinpoint areas needing more Focus (e.g., too easy exams, quiz with poor results)

- **Government Agencies**

- Understand benefit to students
- Understand teaching quality
- Pinpoint E-Learning Adoption Issues across the Country

# Phase II – Modules

M1:  
Implementation for  
1 Crore Users

M2: Integrated A-  
VIEW: Satellite,  
LAN, CDN, Mobile

M3: A-VIEW on  
Low-End Mobiles  
and Tablets

M4: Open A-VIEW

M5: Classroom  
Surveillance and  
Monitoring

M6: A-VIEW  
Producer: Self  
Recording Lectures

M7: Adaptive Plug  
and Play Devices

M8: Major A-VIEW  
Enhancements  
(User Requests)

M9: Automation  
Testing & System  
Integration

M10: Online  
Collaboration

# Module 9: Automation Testing & System Integration

- Automation Testing
  - Server / Cloud Validation
  - Client Automation
  - Load Testing
    - Satellite
    - IP Multicast
- Tools for Deployment Validation
  - Private Cloud Deployments
  - Self-Check Tools for Admins

# Automation Testing & System Integration

- **System Integration**
  - Govt. Cloud
  - University Portal
  - External Course Web Sites
- **Beta Programs**
  - Early Preview for Major Partners
  - Identification of Compatibility Issues

# Phase II – Modules

**M1:**  
Implementation for  
1 Crore Users

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Enhancements  
(User Requests)

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Testing & System  
Integration

M10: Online  
Collaboration



# Module 1: Implementation for 1 Crore Users

- **Deploy to 1 Crore Learners and Teachers**
  - Divide the Country into Regions
  - Regional Phased Deployments
  - Bi-Annual Managed Refresh
- **Regional Support Coordinator**
  - Regional Implementation Plan
  - Dedicated Trainings in Selected Cities
  - Minimize Travel Budget for Admins

# Implementation for 1 Crore Users

- **Central Deployment Team**

- Assisted Remote Deployments
- Regular Online Trainings

- **24x7 Technical Support**

- Phone / Chat / Email Support
- Prioritized Ticketing System

- **24x7 IT Support**

- On-Call System Admins
- Network Alerting, Escalation

# Implementation for 1 Crore Users

- **Training & Documentation**
  - A-VIEW II Setup & Management
  - A-VIEW II – Configuring and Managing Users
  - A-VIEW II User Guide
  - Videos showing how to use A-VIEW II
  - Mobile App User Guide
  - Videos showing how to use the Mobile App
  - Multi-Language Documentation
  - Multi-Language Trainings

# Phase II – Development Modules Overview

# A-VIEW Phase II Vision: Crores of Users

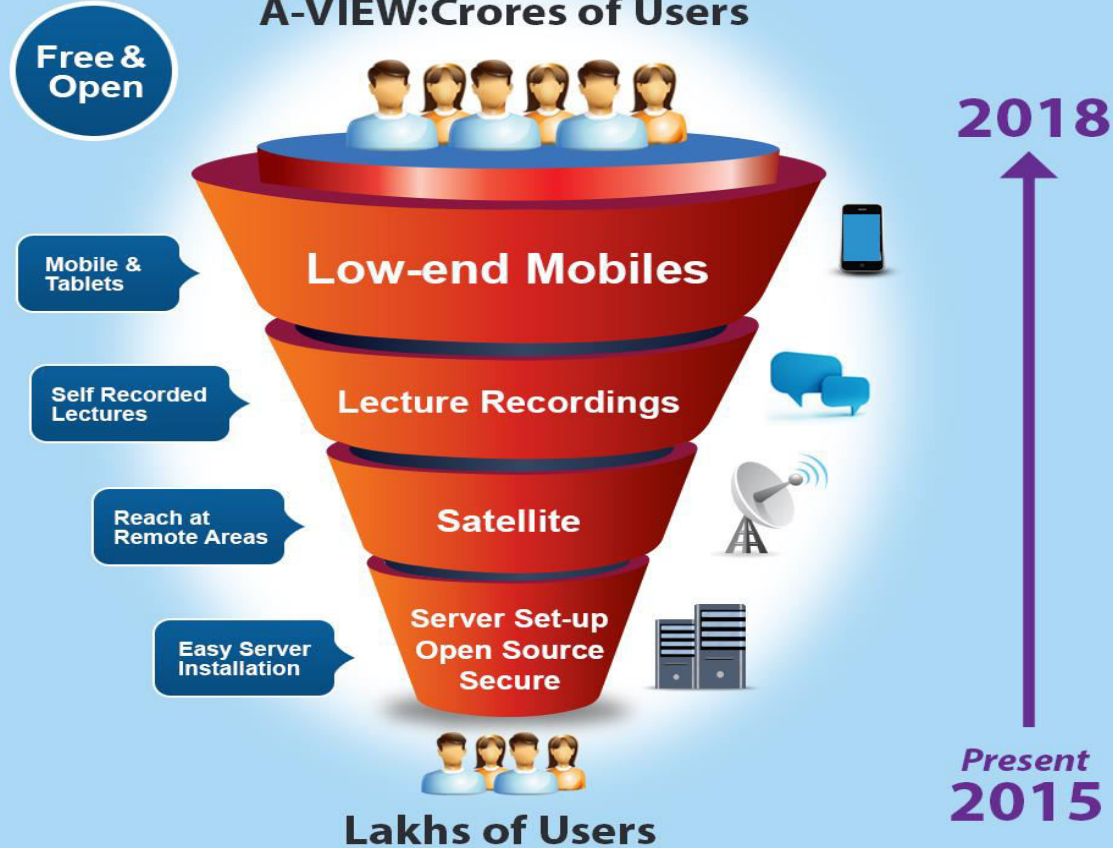


Large-Scale  
Live  
Interactive  
Collaborative  
E-Learning  
Platform

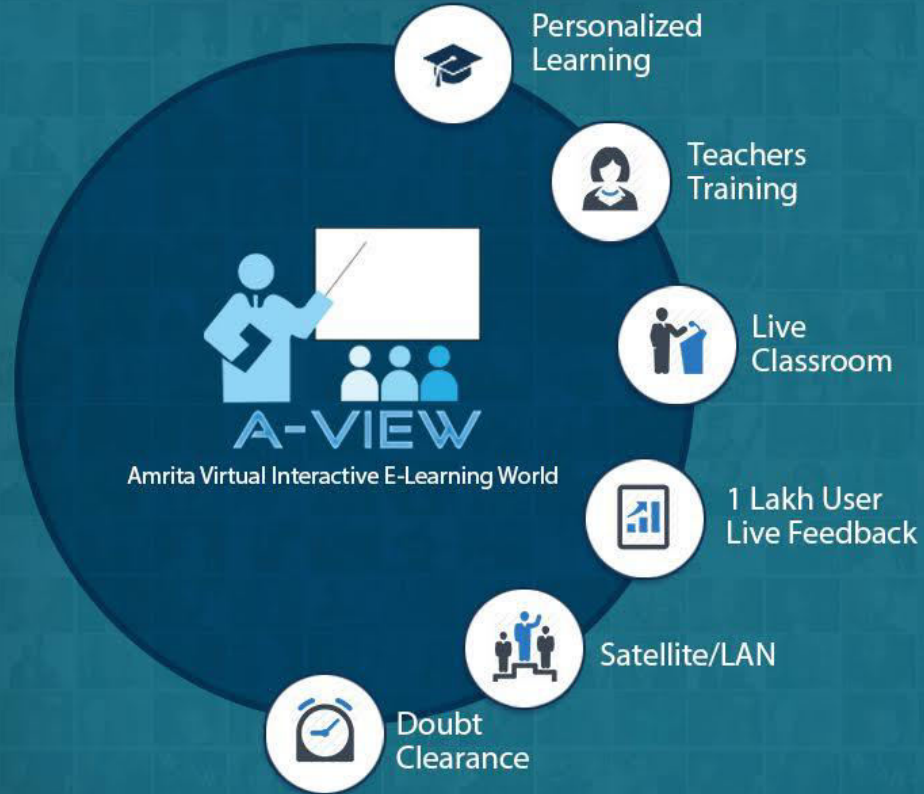
# A-VIEW Phase II



**A-VIEW: Crores of Users**



# A-VIEW Phase 2 : Mission



# A-VIEW Phase II

## Phase II

- Crores benefited
- 25,000 Institutions (Higher Edu)
- Large Scale: Schools, Skill Training

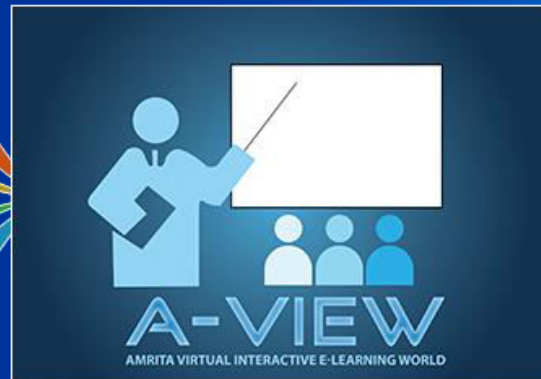
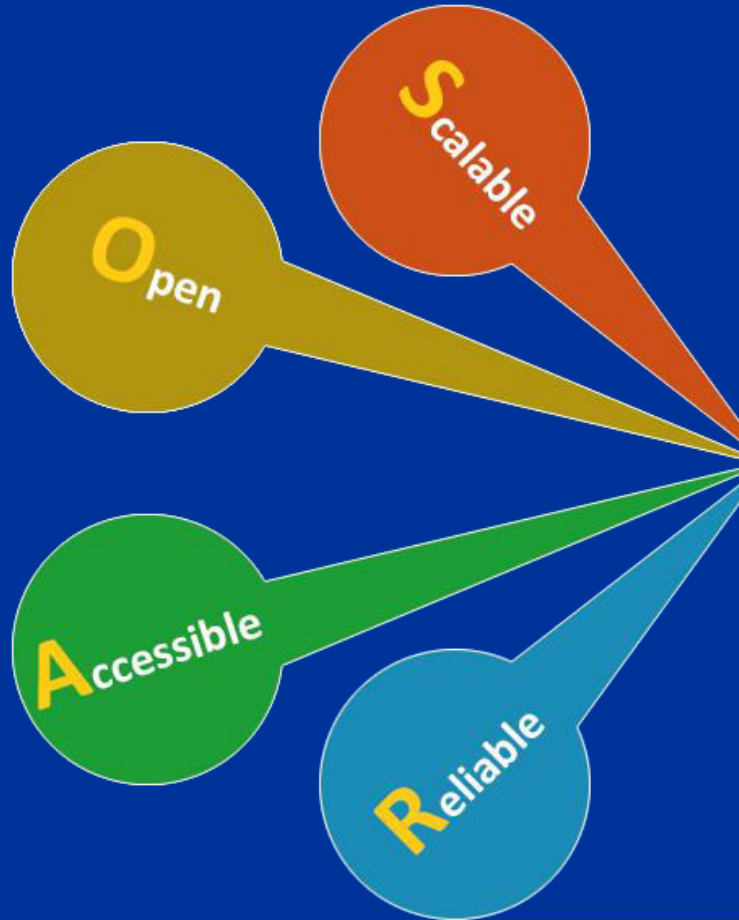
## Phase I

- Lakhs benefited
- 9000+ Institutions (Higher Edu)
- Pilots: Schools, Skill Training





# A-VIEW Phase II



# A-VIEW Phase II – Contribution to the Nation

- National Online Real-Time Platform over Internet & Satellite
  - Online Teacher Training
  - E-Learning Tools for Crores of Learners
  - Meeting Tools for Crores of Learners
  - Digital Literacy of Teachers & Students
- Online Exams and Proctoring
- Surveillance, Attendance during Live Classes
- Tool for Self Recording Lectures

# Phase II – Modules

M1:  
Implementation for  
1 Crore Users

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(User Requests)

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Testing & System  
Integration

M10: Online  
Collaboration

# Module 2: Integrated A-VIEW: Satellite, LAN, CDN, Mobile



- **Massive Live Classrooms**
  - Multicast / Unicast Video Delivery Network
  - Satellite Delivery for Remote Areas
- **A-VIEW User Ids for Students and Teachers**
  - Easy / Free Sign-Up

# JNTU Kakinada Blended MOOC Case Study

# A-VIEW as a MOOC Plug-In

## MOOC

- Pre-recorded Learning Videos
- Blogs / Wikis
- Course Building – Teachers
- Course Building - Students
- Online Assessments
- Discussion Forum

## Online Real-Time Platform (A-VIEW)

- Live Classes
- Lecture Recordings
- Instant Poll / Quiz
- Mobile Chat
- Online Surveillance, Proctoring

# JNTU Kakinada Case Study

- Semester-wise MOOC Program
  - 2 Courses
  - 1000 Students
- JNTUK-Hosted MOOC Web Site
  - Learning Materials
  - Self Assessments
  - Discussion Forum
- <http://jntukucev.ac.in/moocs-schedule/>



# JNTU Kakinada Case Study



## MOOCs Schedule



📅 August 20, 2015 👤 WM UCEV 📧 News

### Software Engineering in Practice

Monday and Thursday 10.00 A.M to 12.00 P.M from 17-08-2015 (Through WebEx)

Attendance is compulsory for this course

Audit course (will be displayed on the marks memo)

Regarding Examination- Decision will be intimated soon

### Big Data Analytics

Monday, Wednesday and Friday 2.00 P.M to 3.00 P.M from 17-08-2015 ( Through A-View)

Attendance is compulsory for this course

Internal and External Examinations-same as regular elective subjects

Online questions will be given by JNTUK, Descriptive paper will be given by Internal Mentor

Same credits as regular Elective subjects

### Computer Aided Engineering

Tuesday and Thursday 2.30 P.M to 4.30 P.M from 26-08-2015 ( Through A-View)

Attendance is compulsory for this course

Internal and External Examinations-same as regular elective subjects

Same credits as regular Elective subjects



WM UCEV

# A-VIEW as a Plug-In for JNTU-K MOOC

- Using A-VIEW as Plug-In for:
  - Live Lectures
  - Doubt Clearance Sessions
  - Class Monitoring
  - Live Lecture Recording
- Provide a complete Blended Learning Platform

# Blended Learning Platform



Watch Learning  
Materials

Local Classroom



Assessment



Online  
Collaboration



Virtual Classroom

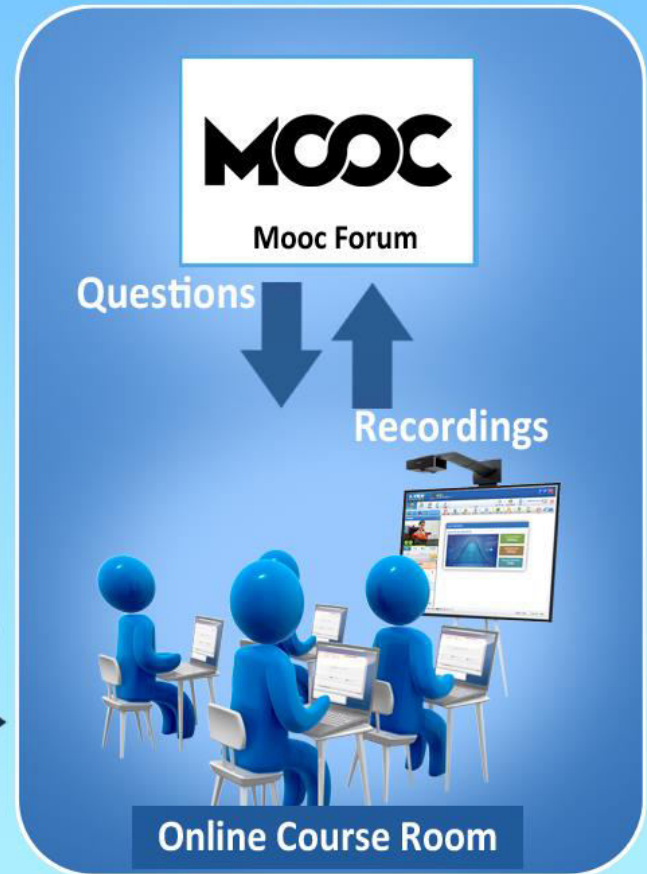


Low Bandwidth  
Mobile Application

# JNTU Kakinada Next Semester

- Core Subjects Offered MOOC-Style
  - 263 Affiliate Colleges
  - 50,000 Students
- Live Lectures
- Doubt Clearance Sessions
- Teacher Self Recording

# Blended Doubt Clearance



# A-VIEW Producer: Self Recorded Lectures

## A-VIEW Producer



### Carbon

CARBON IS THE MOST IMPORTANT element of life, period. Sure, there are many others without which life would not exist, but from the spiral backbone of DNA to the intricate rings and streamers of the steroids and proteins, carbon is the element whose unique properties tie it all together. The very term "organic compound" refers exclusively to chemicals containing carbon.

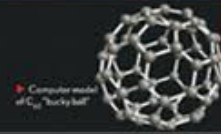
Not content to be the foundation of all life on earth, carbon also forms diamond, the hardest known substance (at least for now; challenges are discussed under boron, element 5). But contrary to popular belief, diamonds are not particularly rare, nor are they sexually beautiful, nor are they forever; all these are myths created by the De Beers diamond company. Diamonds would cost a tenth as much but for De Beers's monopoly control. Cubic zirconia or crystalline silicon carbide are just as pretty. And at high enough temperatures, diamonds burn up into nothing but carbon dioxide.

Y A "Crap rule" related these refer produce diamond cutters. C Continuously sinking  $C_{60}$

If I were writing these words twenty-five years or so ago, I would probably have been doing it with carbon. The "five" in pencils is actually graphite, a form of carbon, and has been since the 16th-century discovery in the English Lake District of the great mine at Borrowdale, the first source of pure graphite.

Carbon atoms like to form sheets, like a honeycomb with a carbon atom at each corner. Stack the sheets and you have graphite. Fold them into a sphere and you have a  $C_{60}$  "buckyball," named for Buckminster Fuller who invented the geodesic dome. Roll the sheets into tubes and you have the strongest material known to science: carbon nanotubes.

Carbon has now become a focus of political controversy centered on the fact that our civilization is pumping carbon dioxide back into the atmosphere at about 100,000 times the rate it was put away by the dinosaurs and their swamps. Interestingly, the situation with nitrogen is exactly reversed.



Computer model of  $C_{60}$  "bucky ball"

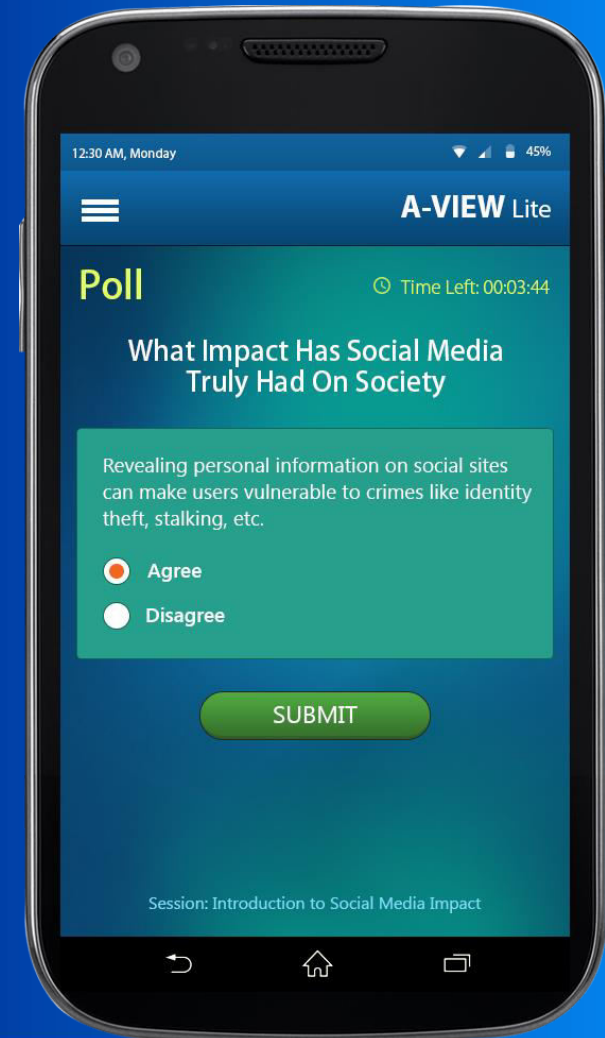
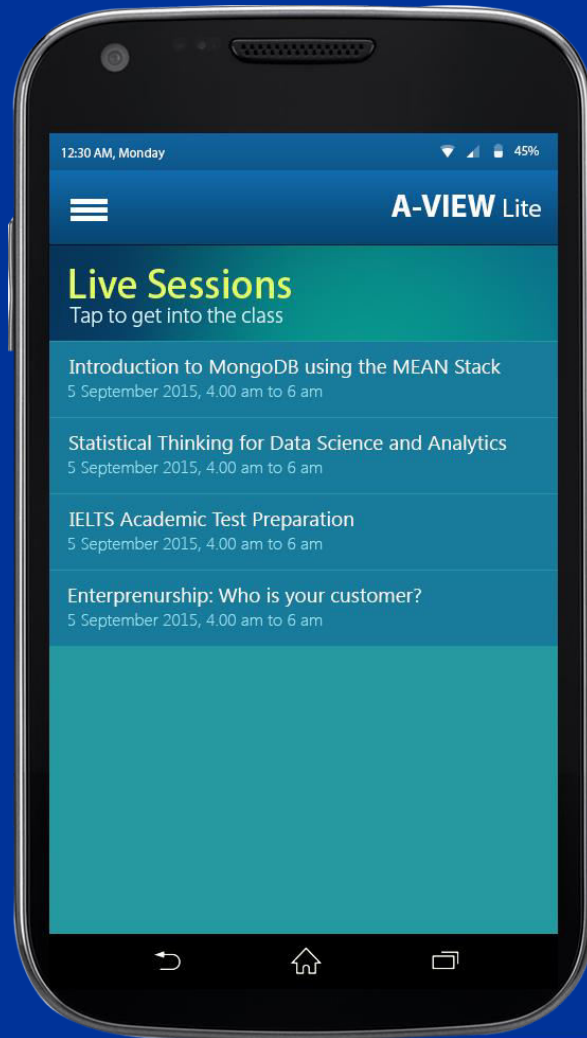


Try industrial diamonds embedded in the end of it.

**Elemental**

Atomic Weight: 12.0107  
Density: 2.260  
Atomic Radius: 67 pm  
Crystal Structure

# Module 3: A-VIEW on Low-End Mobiles and Tablets



# A-VIEW on Low-End Mobiles and Tablets

- Personalized Learning
- Whatsapp of Education
- Low-end phones and tablets
- Live Immediate Feedback
- Massive Live Classes (~ 1 Lakh Learners)



# Module 10: Online Collaboration

Physics 101 - Anna University - Online Course Room

Search ?

Krishna Kumar

| MEMBERS           | GROUPS                 |
|-------------------|------------------------|
| Sethu Subramanian | All Physics 101        |
| Vivek             | Physics 101 TA's       |
| Kamal             | My Physics 101 Friends |
| Ashwini           |                        |
| Jayahari          |                        |

Live Chat

Deepak. B. Phatak :

Send

Video Window



<Discussion Thread....>

Post

<Text....>

**B** *I* U

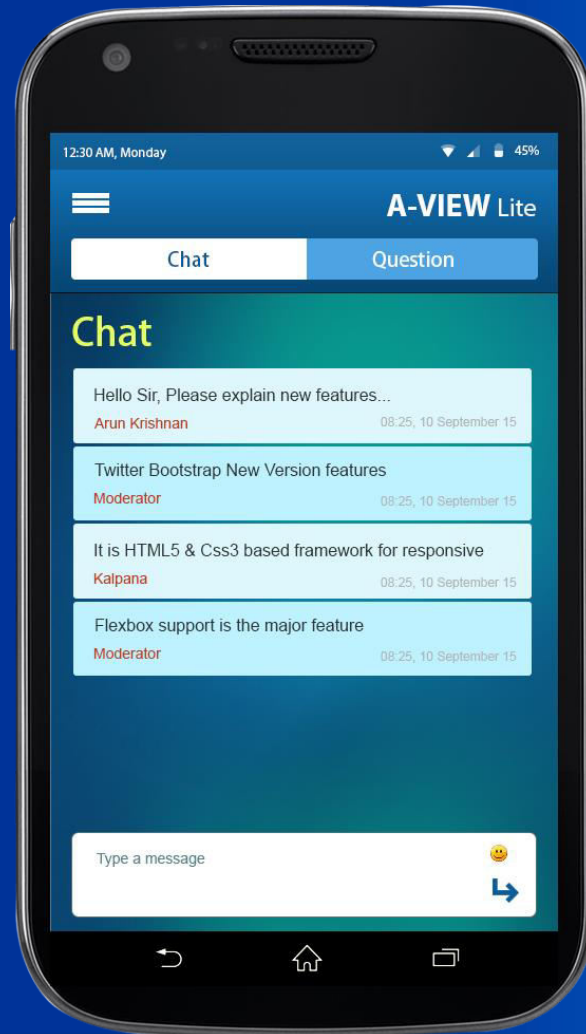
Rating

Recording Library

Class Calendar

Class Website

# Mobile Chat



# Student-Teacher Classroom Chat

## A-VIEW



**Moderator:** Any Questions?

**TA:** What is the phase difference between two windings of A.C servomotor ?

**Akhila:** Relative permittivity

Enter your message

# Module 4: Open A-VIEW – API for Blended Learning



Watch Learning Materials

Local Classroom



Assessment



Online Collaboration



Virtual Classroom



Low Bandwidth Mobile Application

# Open A-VIEW

- Open APIs for Integration to provide Live Classes
- Easy Integration into:
  - University Portals
  - Government Portals
  - LMS/CMS Platforms

# A-VIEW as a Plug-In

- A-VIEW can act as a Plug-In for:
  - Live Sessions
  - Online Chat Rooms
  - Proctoring / Exam Surveillance
  - Teacher Self-Recording of Lectures
- Provide a complete Blended Learning Platform

# Open A-VIEW

- **Open Source**
  - Open Source (Git Hub)
- **Zero-Cost Server Software**
  - Red5-based Video Conferencing Server
  - Open Source / Free Server Components

# Module 5: Classroom Surveillance and Monitoring

The screenshot displays the A-VIEW II University Control Panel interface. The top navigation bar includes the title 'A-VIEW II', the subtitle 'University Control Panel', and links for 'Monitoring | Plugins | Users'. The status bar shows 'BELL' as the carrier, the time '4:21 PM', and a 100% battery level. The user 'IITB Monitor 1' is logged in, with a profile picture of a person with a red cap.

The main content area is titled 'Classroom Monitoring' and features six live video feeds of classrooms. Each feed is accompanied by a student count:

- Top-left: 50 Students
- Top-middle: 75 Students
- Top-right: 20 Students
- Bottom-left: 48 Students
- Bottom-middle: 15 Students
- Bottom-right: 45 Students

To the right of the feeds is a vertical list of names, with some names highlighted in blue:

- Arun Krishnan
- Veena
- Vijayakumar
- Sunil Kumar
- Naveen Narayan
- Prasanth M
- Athi Narayanan
- Ashish
- Hareesh
- krishnakumar
- Neema
- Abhirami
- Sethu
- Dharmik Dev
- Swathik
- Thumbi



- **Class Surveillance / Monitoring**
  - Monitor Classes Remotely
  - Automatic Snapshot at Regular Intervals
  - Audit Functionality
- **Automatic Handraise**



# Video answers to Questions



Question 1

Question 2

Question 3

Question 4

Question 5

Question 6

## Question 2

What are the new features in HTML5?

Answer by Teacher



Answer by Teacher Assistant



HTML5 is a core technology markup language of the Internet used for structuring and presenting content for the World Wide Web. As of October 2014 [update] this is the final and complete fifth revision of the HTML standard of the World Wide Web Consortium (W3C). The previous version, HTML 4, was standardised in 1997.

Enter your answer

Submit

# A-VIEW Producer: Self Recorded Lectures

- MP4 self recording by teachers
- Integration for easy Course Creation
- Customize Class Lectures
- Self-contained, no external software needed

# A-VIEW Producer: Self Recorded Lectures

- Upload to Lecture Web Site
- Any platform, any language
- Class lectures automatically recorded
- Doubt clearance mechanism

# Module 7: Adaptive Plug and Play Devices

**A-VIEW**  
AMRITA UNIVERSITY

**MHRD**  
Funded by NME-ICT

Welcome Arun Krishnan Viewer

Live Session Meeting Library Quiz Admin Quicknote Bandwidth Help

Start Video Start Record Refresh Video Wall Document Whiteboard Desktop Video Sharing 3D Sharing 2D Sharing Live Quiz Polling

Presenter Video Switching Mode Manual Automatic Current Bandwidth 128 Kbps

Prof. Ashok Jhunjh

Users Chat Viewer Question

| Name                                        | Status |
|---------------------------------------------|--------|
| M: Prof. Kamal Bijlani<br>Amrita University |        |
| Arun Krishnan<br>Amrita University          |        |
| Sivaram<br>Amrita University                |        |
| Arun Krishnan<br>Amrita University          |        |
| Prof. Kamal Bijlani<br>Amrita University    |        |

Dr. G Venkatesh Prof. Kannan Moudgalya

© 2007 - 2014 A-VIEW(Amrta Virtual Interactive E-Learning World) | Version 4.0 Session Name Connected

# Adaptive Plug and Play Devices

- **Adaptive Video Quality**
  - Automatically reduce/increase video bandwidth
  - Manual User Overrides
- **Plug and Play Devices**
  - Device Certification
  - Support for Wide-Variety of Devices

# Module 8: Major A-VIEW Enhancements (User Requests)

- **Breakout Rooms**
  - Group Work
  - Coaching
- **Ease of Administration**
  - Bulk User Management
  - Automatic Class Provisioning
- **Analytics**
  - Effectiveness
  - Dashboards



# Module 9: Automation Testing & System Integration

- Automation Testing
  - Server / Cloud Validation
  - Client Automation
  - Load Testing
    - Satellite
    - IP Multicast
- Tools for Deployment Validation
  - Private Cloud Deployments
  - Self-Check Tools for Admins

# Automation Testing & System Integration

- **System Integration**
  - Govt. Cloud
  - University Portal
  - LMS/CMS Libraries
  - External Course Web Sites
- **Beta Programs**
  - Early Preview for Major Partners
  - Identification of Compatibility Issues

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  - A-VIEW II – Configuring and Managing Users
  - A-VIEW II User Guide
  - Videos showing how to use A-VIEW II
  - Mobile App User Guide
  - Videos showing how to use the Mobile App
  - Multi-Language Documentation
  - Multi-Language Trainings

**Thank You**

# A-VIEW Phase 1 Grants Status

# Grants Overview

---

| Particulars                                     | Amt          |
|-------------------------------------------------|--------------|
| <b>Total Project Approval</b>                   | <b>34.46</b> |
| Released to IIT-B vide PAB approval in Dec 2010 | 10.34        |
| Released to IIT-B vide PAB approval in Dec 2011 | 19.61        |
| Total Grants –in-aid released from NMEICT:      | 29.95        |
| <b>Balance to be received from NMEICT</b>       | <b>4.51</b>  |

---



# Grants Timeline

- 2009
  - PAB approves AVIEW Project for 34.36 Crores
  - Rs. 10.34 Crores released from NMEICT to IIT-B
  - **Rs. 10.34 Crores received at Amrita University**
- December 09, 2011
  - PAB Approves Second Instalment of 24.12 Crores to IIT-B
  - NMEICT transfers a sum of Rs. 19.61 Crores against the approved 24.12 crores
  - **Rs. 19.61 Crores received at Amrita University in instalments**
  - **Balance of Rs. 4.51 Crores not released, still available at NMEICT**

# Grants Timeline

- July 16 2015
  - AVIEW Project Phase 1 completed
  - AVIEW project borrows Rs. 4.51 Crores from Amrita University
  - **PRSG accepts completion of deliverables**
  - Recommends release of balance 4.51 Crores
- **Requesting release of Rs. 4.51 Crores**

# Current Status