

National Mission on Education through ICT

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Scilab Workshop
RV College of Engineering
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- ▶ **National Mission on Education through ICT**
- ▶ **Projects at IIT Bombay**
- ▶ **How you can participate in both**



National Mission on Education through ICT

- ▶ **Launched by the Ministry of Human Resources Development (MHRD), Government of India**
- ▶ **Objective: to raise the levels of education in India**
- ▶ **Outlay: Rs. 4,600 crore over three years**
- ▶ **40% for content generation**
- ▶ **60% for bandwidth**
 - ▶ **To give 1 GBPS bandwidth to each one of 500 universities and 20,000 colleges**
 - ▶ **Out of these, 3,000 are engineering colleges: 5% government run, rest private**
- ▶ **Largest and most ambitious plan**
- ▶ **Likely to continue in the next plan period**



Content generation: Line items

1. **NPTEL phase II / III**
2. **PG Classes**
3. **UG Classes**
4. **Video content digitization, conversion, chunking and dubbing CEC / IGNOU / NCERT / SIET / OTHERS**
5. **Provision of e-books and e-journals free to the learners**
6. **Standardisation of quality assurance of contents & certification / automation of certification**
7. **Developing suitable pedagogical methods for various classes, intellectual calibers and research in e-learning**
8. **Development of language converter and translation tool kit**
9. **Development and realization of Virtual Reality Laboratories and supporting facilities for e-learning**
10. **Development of Certification & Testing Modules for Virtual Technological Universities & creation of VTU multi media research and international programmes**



Content generation: Line items - continued

11. Experimentation and Development of ultra low cost access devices for wider coverage of learners & their field trials
12. Talk to a teacher to provide a substitute for coaching for the economically poor students
13. Development of software controlled hardware programming for robotics & other crucial areas
14. Adaptation & deployment of open source simulation packages equivalent to MATLAB, ORCAD etc.
15. Development of unified ERP system for Educational Institutions
16. Publicity & training of motivators & trainers to ensure full utilization of the systems by institutions & students. Teacher Empowerment 'B'
17. Conversion of available content in various regional languages
18. Development of Vocational Educational modules and use of haptic devices for education & training



Necessary conditions for a project to be funded by this mission:

- ▶ **It should be related to education - for research, other funding sources are available**
- ▶ **It should be inter-institutional**
- ▶ **Any material developed through this mission has to be delivered as open source**
- ▶ **It should belong to one of the 18 line items mentioned earlier**
- ▶ **No funding will be provided for infrastructure development**
- ▶ **Funding for clear deliverables: number of courses, number of faculty members trained, number of students trained, etc.**



- ▶ **Administrative structure**
 - ▶ **Project Approval Board**, chaired by the Secretary of MHRD
 - ▶ **Standing committee**, chaired by the Mission Director, recommends projects
 - ▶ **Review committees**
- ▶ **Mission Director**
 - ▶ **Mr. N. K. Sinha**, Joint Secretary, Distance Learning/training
 - ▶ **We must be one of a few countries to have such a high level position for distance education**



Procedure to get funding

- ▶ **Submit a project**
- ▶ **Project reviewed**
 - ▶ **Inputs from standing committee members and other experts**
 - ▶ **The first six months are taken as pilot phase**
 - ▶ **Asked to participate in one of the already approved projects**
 - ▶ **In the worst case, asked to re-write the proposal**
- ▶ **After a successful completion of the pilot phase, the remaining funds are released in a phased manner**



- ▶ **Ten minute spoken tutorial**
- ▶ **Gives more details of format, where to submit, presentation details, etc.**
- ▶ **NMEICT invites your proposals**



Open source educational resources at IIT Bombay

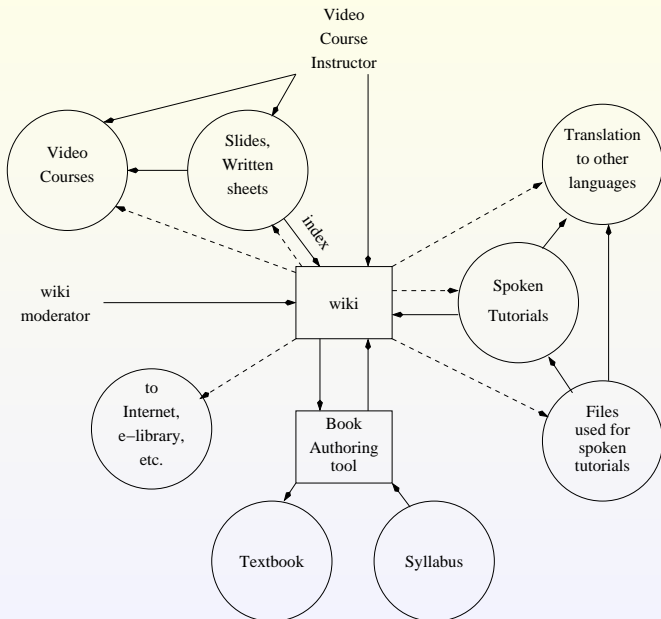


Free transmission of IIT Bombay's courses

- ▶ <http://cdeep.iitb.ac.in>
- ▶ Transmitted more than 100 courses in the last three years
- ▶ Completely free
- ▶ Through satellite and webcast
- ▶ Recorded courses will be available through VOD and DVDs
- ▶ Hope to convert the videos into wiki and then into textbooks



Free Course to Free Textbook



Join Prof. Phatak's 1,000 Teacher Training Programme

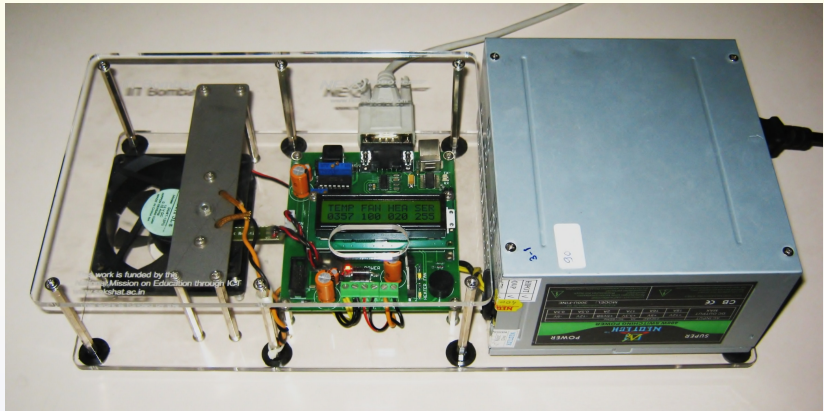
- ▶ **Coordinated by Prof. Phatak**
- ▶ **Two week workshops on a subject**
- ▶ **Colleges from Srinagar to Salem have participated in them remotely**
- ▶ **Two way audio-video interactions**
 - ▶ **EDUSAT**
 - ▶ **A-VIEW**
- ▶ **First workshop was on C, taught by Prof. Phatak**
- ▶ **Next workshop is on Databases: Prof. Sudarshan**
- ▶ **To be held in December**
- ▶ **We invite colleges from here to participate**
- ▶ **Other areas: fluid mechanics, heat transfer, etc.**
- ▶ **Also get good teachers from universities to deliver courses**



- ▶ **Single board heater system**
- ▶ **= Lab in a box**



Picture of the single board heater system



What does this system do?

Controlling the temperature of a plant (a blade)

- ▶ by heating with current
- ▶ by cooling with a fan

More details [▶ here](#)



- ▶ **All experiments for the first control course can be taught using this lab in a box**



Useful in the following courses

- ▶ **Process control**
- ▶ **Computer control**
- ▶ **Instrumentation**
- ▶ **Micro controllers/embedded systems**
- ▶ **Real time systems**





1. Local Experiments

- ▶ **Each student has a PC**
- ▶ **Also a Single Board Heater System (SBHS)**



2. Remotely Triggered Experiments

- ▶ **At a remote site, SBHS, PC running LabView**
- ▶ **Student has a PC at her end**
- ▶ **Free run time engine of LabView**
- ▶ **Can only enter parameters**
- ▶ **Cannot change algorithms**



3. Remote Control with Full Access

- ▶ **Student has a complete LabView**
- ▶ **Student can run her own algorithms**
- ▶ **Student needs to buy LabView**
- ▶ **Goes against Mission policy: student need not pay**



4. Open Source Solution

- ▶ **Java, Scilab at student end**
- ▶ **Java, Scilab, SBHS at remote site**
- ▶ **Student implements control algorithm**
- ▶ **Java server communicates over Internet**
- ▶ **Scilab at remote end effects end control action**



5. Only Java at SBHS End

- ▶ **Configuration is same as before**
- ▶ **Only Java at the SBHS end**
- ▶ **Only three actions:**
 - ▶ **253: read temperature**
 - ▶ **254: write heater current**
 - ▶ **255: write fan current**
- ▶ **SBHS PC acts as a data acquisition device**
- ▶ **Motivation for this in the next slide**



6. 21 SBHS and one PC at Remote End

- ▶ 20 students, each with a PC and Scilab
- ▶ Each implements their own algorithm
- ▶ Control their own SBHS at the remote end
- ▶ Each communicates with their SBHS through their own Java server
- ▶ All 21 SBHS pipes go through ONE/few PC at server end
- ▶ PC acts as 21 parallel DAQ
- ▶ Only one URL is required



- ▶ **Time constant = 30 seconds**
- ▶ **Possible to do one experiment within 7-8 minutes**
- ▶ **One hour is enough for experimentation**
- ▶ **24 one hour slots in a day**
- ▶ **For 21 SBHS, there will be 504 slots in a day**



- ▶ **A student books a slot through Moodle**
- ▶ **Chooses a SBHS (amongst 21) also**
- ▶ **Tries to access this SBHS at the appointed time**
- ▶ **Java server validates**
 - ▶ **eligibility to access that SBHS**
 - ▶ **calculates the balance time available**
- ▶ **If validated, informs the balance time available**
- ▶ **Connection is established**
- ▶ **Up to 21 people can access the machines in this way**



- ▶ **Created a bank of 21 units: 21 people can experiment simultaneously**
- ▶ **Up to 504 students can use it in a day**
- ▶ **Only Internet is needed**
- ▶ **Currently available with my control course, freely transmitted**
- ▶ **Is anyone interested in participating in this course?**



You may own your SBHS

- ▶ **If you are happy with it, you may own this device**
- ▶ **Available for only Rs. 2,500**
- ▶ **Design is available as open source with bill of materials**
- ▶ **Bill of material is Rs. 1,500**
- ▶ **You need only Scilab (free software) to use it**



Real time DAC/control through open source software

- ▶ **COMEDI is a suite of device drivers in linux**
- ▶ **Has interfaces for more than 100 A/D cards**
- ▶ **Set up a rack full of all these cards**
- ▶ **Give standard inputs - 0-5 mV and 4-20 mA**
- ▶ **GUI support through RTAI lab of Scilab**
- ▶ **Web enable this, so that students can access remotely**
- ▶ **Repeat this for all popular micro controllers**
- ▶ **Set up all educational support through the web**



Building a Low Cost PC



- ▶ **Motherboard**
 - ▶ Low speed processor
 - ▶ 1GB RAM
 - ▶ USB, wifi, etc.
 - ▶ Cost = \$10
- ▶ **Display device**
 - ▶ 7"
 - ▶ Cost = \$10
- ▶ **Other expenses**
 - ▶ Keyboard, mouse, etc.
 - ▶ Cost = \$5
- ▶ **Linux OS**
- ▶ **Total cost = \$35 for 100,000 pieces**
- ▶ **Is anyone here interested in building it?**



Open source software at IIT Bombay



Why Open Source Software?

- ▶ **Commercial software is expensive**
- ▶ **Possibly cheap, even free (?) for students**
- ▶ **Students use commercial software in colleges**
- ▶ **Commercial software is not available at small and medium companies - cost**
- ▶ **Use of unauthorised software by commercial establishments result in disasters - companies may even have to close down - jail sentence, etc.**
- ▶ **Most of SME's in India do not use ANY software: commercial software is expensive; they are not aware of open source software**
- ▶ **Puts small companies at a great disadvantage**
- ▶ **There is no alternative to open source software**



- ▶ Python - Prof. Prabhu Ramachandran
- ▶ Blender - Prof. Sridhar Iyer
- ▶ Scilab - I am leading this
- ▶ \LaTeX - I am leading this

Participation is welcome in all of these projects



- ▶ **A good substitute for Matlab**



What is Scilab?

- ▶ **Free and open source**
- ▶ **Easy to use**
- ▶ **Excellent computational environment**
- ▶ **Visit <http://www.scilab.in>**



- ▶ **Good documents are missing**



Textbook Companion Project



- ▶ **Coding standard textbook examples into Scilab/Python**
 - ▶ **Choose any standard textbook**
 - ▶ **Get coded all numerical examples and some problems using Scilab/Python**
 - ▶ **Get the correctness certified by the subject expert**
 - ▶ **Get honorarium**
 - ▶ **Partner with IIT**



Textbook companions created by summer interns

- ▶ **Fluid mechanics by Fox and McDonald - NIT Trichy, 4th year B.E. student**
- ▶ **Control system design by Smarajit Ghosh - NIT Srinagar, 4th year B.E. student**
- ▶ **Engg. mathematics by Kreyszig - BIT Ranchi, 2nd year B.E. student**
- ▶ **Three more created by IIT Bombay students**
- ▶ **Six more in pipeline**



- ▶ **Spoken tutorials**



Demo of a spoken tutorial



Salient features of spoken tutorials

- ▶ **All required software is available free of cost**
- ▶ **Small file size: 11 hours of ST in one CD of Rs. 10**
- ▶ **Even children can create them**



- ▶ **PHP / MYSQL**
- ▶ **Java**
- ▶ **GCC**
- ▶ **L^AT_EX**
- ▶ **Linux**
- ▶ **Moodle**
- ▶ **Python**
- ▶ **Scilab**

The list is growing!



Can reduce digital divide

- ▶ **How to book train tickets through irctc.com**
- ▶ **How to send emails**
- ▶ **How to search for low interest loans**
- ▶ **How to do a web search and locate colour TVs at low cost**



- ▶ **Outline is created for chosen software:**
 - ▶ **Chapter**
 - ▶ **Section**
 - ▶ **Spoken tutorials of ten minute duration**
- ▶ **Script writing for spoken tutorial and review**
- ▶ **Recording the script and reviewing**
- ▶ **Translation of the script into other languages and review**
- ▶ **Audio recording of the translated script and review**
- ▶ **Forming study plans out of these**



- ▶ **Would you want to lead the efforts for a software?**
- ▶ **Would you want to dub into Kannada and other languages?**



Using English video with local languages?

- ▶ **Attempts to convert the code also into local languages are not successful**
- ▶ **Deprive people of employment opportunities**
- ▶ **In fact, this is a sensitive topic**
- ▶ **English is a compulsory language for all Indian children**
- ▶ **What they need is help but not to lose employment**



- ▶ **Funded by National Mission on Education through ICT, MHRD, Government of India**
- ▶ **You can also get funding - visit**
- ▶ **<http://spoken-tutorial.org/NMEICT-Intro>**



- ▶ **Open source efforts are not only idealistic, but make economic and commercial sense as well**
- ▶ **It has a potential to empower ALL Indian children to collaborate and make us a developed nation**
- ▶ **We invite you to join the NMEICT**



- ▶ **kannan@iitb.ac.in**
- ▶ **<http://spoken-tutorial.org/NMEICT-Intro>**



Details of single board heater system

- ▶ **A setup designed and developed at IIT Bombay**
- ▶ **Consists of a heater assembly, fan, temperature sensor, microcontroller (ATmega16) and associated circuitry**
- ▶ **Heater assembly**
 - ▶ **Consists of an iron plate placed at a distance of about 3.5 mm from the nichrome coil**
 - ▶ **Gets heated on passage of current**
- ▶ **Computer fan**
 - ▶ **Positioned below the plate**
 - ▶ **Meant for cooling the assembly**
- ▶ **The temperature is sensed by the temperature sensor, AD590**
 - ▶ **Reading in Kelvin scale**

To return, click [◀ here](#)



- ▶ Is a 8-bit Microcontroller with advanced RISC Architecture
- ▶ Provides Up to 16MIPS throughput at 16MHZ
- ▶ Has 16K bytes (8K X 16) of In-system programmable Flash, 512 bytes of EEPROM and 1K byte of internal SRAM
- ▶ Two 8-bit Timer/Counter and one 16-bit Timer/Counter
- ▶ Four PWM channels
- ▶ 8-channel, 10-bit ADC
- ▶ Programmable serial USART
- ▶ Operating voltage: 4.5-5.5V
- ▶ Speed: 0-16 MHz



What is special about this system?

- ▶ **The time constant is less than 1 minute**
- ▶ **Can see meaningful (and noisy) measurements with naked eye**
- ▶ **Can do a realistic experiment in 10 minutes**
- ▶ **Suitable for carrying out ALL experiments of a few control courses**
- ▶ **Only need 220V power supply and a PC**
- ▶ **Easy to carry**
- ▶ **Costs only Rs. 2,400**
- ▶ **Design is open source!**



Announcement of dubbing competition

Dubbing Competition

Assamese (অসমীয়া) Bengali (বাংলা) Bhojpuri (भोजपुरी) Dogri (दोगरी)

Urdú (اُردُو) Telugu (తెలుగు) Tamil (தமிழ்) Sindhi (سنڌي) Sanskrit (संस्कृतम्) Punjabi (ਪੰਜਾਬੀ)

English Gujarati (ગુજરાતી) Hindi (हिन्दी) Kannada (ಕನ್ನಡ) Kashmiri (كश्مِیرِ) Konkani (कोंकणी)

Attractive Prizes

Bridge the Digital Divide

Dubbing Competition for all languages

How to Dub

- Download spoken tutorial from [here](#)
- Download Script from [here](#)
- Dub this into any language using [this file](#)
- Submit the dubbed tutorial at http://fossee.in/spoken_tut/
- Submission deadline: 5 pm on 8 September 2009
- You need a head phone with audio input

Prizes

- Following prizes for every language
 - First Prize: Rs. 1,000
 - Second Prize: Rs. 500
 - Third Prize: Rs. 300
 - Ten Consolation prizes
- More Prizes for languages with a lot of entries
- Early bird prizes for the first ten entries

Conditions

- Open to everyone and all languages
- Multiple submissions can be made
- Any other dubbing method is also welcome
- Prize winning entries to be released in public domain
- While translating, clarity of meaning is more important than precision

Further Information

- Email at cdeep@itb.ac.in
- Call Nancy/Vaidehi at 2576 4820 or 98202 35511
- A relevant article presented at the IEEE T4E workshop (2009) is [here](#)

CDEEP (www.cdeep.itb.ac.in)
National Mission on Education through ICT
www.sakshat.ac.in
4 September 2009



Spread Computer Literacy in your Mother Tongue

Oriya (ଓଡ଼ିଆ) Marathi (मराठी) Malayalam (മലയാളം) Maithili (मैथिली)

To return, click [here](#)

