

1. Introduction

IIT Bombay has conducted many large-scale teacher training workshops under the Train 10,000 Teachers (T10KT) programme, sponsored by the National Mission on Education through ICT (NMEICT), MHRD, Govt. of India, and trained over 2,00,000 teachers.

Another successful technology developed at IIT Bombay is Spoken Tutorial, using which about 50 lakh students have been trained on various ICT topics. The effectiveness of this method can be seen from the testimonials available here:

<https://spoken-tutorial.org/testimonials/media/?foss=70>

and this [TEDx talk](#). The Spoken Tutorial project is also implemented successfully at IIT Bombay, with funding from NMEICT, MHRD.

It is now proposed to offer the highly effective Spoken Tutorial based ICT training to a large number of teachers, across the country, through the T10KT methodology, with IoT series training being taken up next. The first workshop in the IoT series will be on eSim. eSim is a Free/Libre and Open Source Software (FLOSS) EDA tool for circuit design, simulation and PCB design. It is an integrated tool built using FLOSS such as [KiCad](#) and [Ngspice](#). eSim is released under GPL. eSim offers similar capabilities and ease of use as any equivalent proprietary software for schematic creation, simulation and PCB design, without having to pay a huge amount of money to procure licenses. Hence it can be an affordable alternative to educational institutions and SMEs. It can serve as an alternative to commercially available/ licensed software tools like OrCAD, Xpedition and HSPICE.

The FOSSEE (Free/Libre and Open Source Software for Education) project at IIT Bombay (<https://fossee.in>) has been promoting eSim, and other FLOSS, such as Scilab, OpenFOAM, Python, Osdag, OpenModelica, DWSIM & R, and Open Source hardware, such as Arduino and OpenPLC. FOSSEE is also funded by NMEICT, MHRD.

The first workshop in the IoT series which is on eSim, is organised by the Teaching Learning Centre (ICT) at IIT Bombay, funded by the Pandit Madan Mohan Malaviya National Mission on Teachers and Teaching

(PMMNMNTT), MHRD, Govt. of India. The one day eSim workshop will be conducted on Saturday, 21 September 2019 at IIT Bombay, in a blended mode, described below. Details of the workshop will be announced later. The medium of instruction for this workshop is English.

This workshop is open to teachers from Electronics or allied engineering fields, provided they have basic electronic circuit design knowledge. We welcome the faculty of engineering/science and polytechnic colleges and ITI.

3. Objectives of the workshop

1. Creation of schematic of an astable multivibrator in eSim
2. Simulating it and comparing the results with the corresponding hardware and with hand calculations.
3. Creating the Gerber file for the above circuit in eSim.

Those who complete the Gerber file may optionally send it to a PCB making company (we will share their details during the workshop), get a circuit on a PCB made, and do the testing. This is not a part of the workshop on 21 September 2019, however. Individual users have to bear all required expenses. IIT Bombay has no interest in this part.

2. Methodology of the Workshop

It will be a one day workshop, on 21 September 2019. All participants will have to go to their chosen Remote Centre. They will learn eSim through Spoken Tutorials, with help from Coordinators, already trained for this purpose at IIT Bombay. As the learning will happen only through carefully designed Spoken Tutorials which are developed at IIT Bombay, the quality of learning will be very high. As Spoken Tutorial method offers hands on practice, with 100% active learning, those who undergo this training will be able to start using eSim immediately after the workshop. They will also be able to conduct eSim workshops for their students, using Spoken Tutorials, on their own, without requiring any help from anyone else.

All the participants, from all the Remote Centres, will be able to interact with the eSim team at IIT Bombay, ask them questions, etc. through the video conferencing software A-VIEW and a specially designed timed

Discussion Forum. There will be about 4 hours available for eSim training and 2 hours for interactions.

4. Outline of the workshop

The participants will, In the forenoon session:

1. Watch Spoken Tutorials and create practice creation of circuit schematic.
2. Create the schematic of an astable multivibrator and simulate it.
3. Compare the results with the corresponding hardware and hand calculations.

In the afternoon session:

1. Practice Gerber files creation using Spoken Tutorials.
2. Create the Gerber files for the astable multivibrator using eSim.

4 (a). Learning eSim from Spoken Tutorials

The following tutorials are available under eSim series:

1. Schematic Creation and Simulation.
2. Simulating an Astable Multivibrator
3. Mapping Components with Footprints.
4. Setting Parameters for PCB designing.
5. Laying Tracks on PCB.
6. PCB Layout for Astable Multivibrator

4 (b). Useful content and activities in eSim

A significant issue with the acceptance of open source software on a large scale by academia, is due to the lack of documentation. We proposed and implemented a novel/unique approach to solve this problem through Circuit Simulation and Lab Migration.

In the Circuit Simulation activity, students, faculty and practitioners of electrical and electronics and allied fields can rebuild any circuit from any source (books, journals, other software, etc.) using eSim, compare the results with published results. Contributors are awarded certificates and honoraria and links to their work of the FOSSEE portal. we now have more than 50 simulations for download and use.

We invite colleges to migrate their electronics simulation labs to eSim. FOSSEE team can help in this activity. We also invite students and faculty who are good in eSim to join hands with the FOSSEE team.

5. Teaching faculty:

This workshop will be conducted using Spoken Tutorial methodology. Participants will learn eSim by listening to the Spoken Tutorials and practicing them on 'eSim'.

The teaching faculty will be **Prof. Pramod Murali**, Dept of Electrical Engineering and **Prof. Kannan Moudgalaya**, Principal Investigator, PMMMNMTT, FOSSEE and Spoken Tutorial Projects, IIT Bombay.

6. Course fee

Every participant has to pay Rs. **200** to IIT Bombay at the time of online registration. This includes the cost of the circuit on hardware, which the participants take with them after the workshop. On the day of the workshop, i.e., **on 21 September 2019**, they have to pay Rs. **400** to the Remote Centre that they would be attending, to defray the cost of organising the workshop, lunch, and coffee/tea. Please note that the registration fee once paid is neither refundable nor adjustable under any circumstances.

7. Who should attend?

This workshop will be useful to the faculty from electronics or allied engineering fields but faculty from other domains are also welcome to attend this workshop, provided they have **knowledge on basic electronic circuit design**. We expect this workshop to be useful to the faculty of engineering/science and polytechnic colleges and ITI.

8. Criteria for issuing Certificates

E-certificate will be provided to the participants after successful completion of the workshop and filling up the feedback form.

9. Duration and Venue

The workshop will be conducted on Saturday, **21 September 2019 from 9.30 AM to 6.00 PM** at [Remote Centres](#) of IIT Bombay. This workshop will be conducted through a blended mode, using both live video conferencing facility (A-VIEW) and hands-on sessions using Spoken Tutorials. A detailed workshop schedule will be available soon.

10. How to apply?

Enrollment will be strictly online, and no other mode of application will be entertained. **The last date of registration is 25 August 2019, 12.30 pm**. The URL for registration is:
<http://www.it.iitb.ac.in/nmeict/announcements.html>

Register on Spoken Tutorial Website:

1. Participants should register on ST website to be eligible to participate in Forums. Click on the **Register** link in this URL - <https://spoken-tutorial.org/>
2. Fill up the registration form and submit.
3. You will get an email.
4. Activate your account by clicking the link in the email.
5. Note down your Username and Password.

Note

- Neither IIT Bombay nor the Remote Centre will bear the travel expenses of the participating representatives. There shall also be no accommodation provided to the participants.
- All participants are required to bring **earphones**, as they will have to listen to video tutorials. Without earphones, the workshop will not at all be effective.
- Computers to practise Spoken Tutorials and to work with eSim will be available at the Remote Centres. But if they wish, participants can bring their own laptops with eSim installed.

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One day Workshop

Under

Pandit Madan Mohan Malaviya National Mission on Teachers and Teaching (PMMMNMTT)
(Supported by FOSSEE and Spoken Tutorials)

Funded by the Ministry of Human Resource Development, **Government of India**

on

eSim, a First Course in the IoT Series

21 September 2019
Conducted by
IIT Bombay



eSim Course Instructor

Prof. Pramod Murali

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Indian Institute of Technology Bombay

Course Coordinator

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