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. About 550 Remote Centres (RC) have been established as a part of this programme.

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

https://spoken-tutorial.org/testimonials/media/?foss=70. The Spoken Tutorial project is also implemented successfully at IIT Bombay, with funding from NMEICT, MHRD.

The Pandit Madan Mohan Malaviya National Mission on Teachers and Teaching (PMMMNMTT), also an initiative of MHRD, combines T10KT and Spoken Tutorials to provide large scale blended training. Next on this series is a hands on Arduino workshop, to be conducted on Saturday, 08 February 2020, at IIT Bombay. Participants of this workshop will be able to work with this hardware by listening to appropriate Spoken Tutorials.

We will get the required hardware custom made and have them couriered to IIT Bombay for the Coordinators' Workshop and to all the RCs for the Main Workshop. This will help keep the costs low, without affecting the learning outcome. All participants can take home this hardware after the workshop.

As the Spoken Tutorial method offers hands on practice, with 100% active learning, those who undergo this training will be able to continue to work with the hardware even after the workshop. They will also be able to conduct Arduino workshops for their students, using Spoken Tutorials, on their own, without requiring any help from anyone else.

2. Methodology of the Workshop

It will be a one day workshop on Saturday, **08 February 2020**. All participants have to go to their chosen Remote Centre (RC). There will be a live video interaction through A-VIEW at the beginning. After that, all participants who join this course from a Remote Centre, will learn to do various experiments using the Arduino kit, at that RC. We will have two more interactions during the day. There will be about 5 hours available for Arduino training and 2 hours for interactions. Participants at each Remote Centre will be helped by a Course Coordinator who would have attended the Coordinators' workshop at IIT Bombay on **18 January 2020.**

3. Course content

Arduino is an open source platform used for building electronics projects. Arduino consists of both a physical programmable circuit board or microcontroller and a software, **IDE** (Integrated Development Environment) that runs on the computer. It is used to write and upload computer code to the physical board.

Learning Arduino from Spoken Tutorials

Following Arduino tutorials are available at https://spoken-tutorial.org/tutorial-search/?search_foss=Arduino&search_language=English

- Electronic components and connections
- Introduction to Arduino
- Arduino components and IDE
- First Arduino Program
- Arduino with Tricolor LED and Push button
- Arduino with LCD
- Display counter using Arduino
- Seven Segment Display
- Pulse Width Modulation
- Analog Digital Converter
- Wireless connectivity to Arduino

Participants are encouraged to go through these tutorials before they come to the workshop.

4. Teaching faculty

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

Prof. Kannan Moudgalya, Principal Investigator, PMMMNMTT, FOSSEE and Spoken Tutorial projects will coordinate this workshop.
Mr. Srikant Patnaik, Mr. Rajesh Kushalkar, Ms. Nancy Varkey and **Ms. Nirmala Venkat**, of FOSSEE/Spoken Tutorial projects at IIT Bombay, and **Prof. G.V.V. Sharma** of IIT Hyderabad will be the teaching faculty.

5. Course fee

The course fee for the workshop is Rs. 1,100/-, which has to be paid at the time of online registration. A kit comprising the following will be given to every participant, which they can take home after the workshop:

Arduino Uno compatible board, 10+ resistors, breadboard, tricolour LED, red LED, 7 segment displays (2), 16x2 LCD display, decoder IC, potentiometer, L293D H-Bridge IC, toy motor, push button switches (2), buzzer, DHT11 temperature humidity sensor, ESP8266 wifi module, and all required cables, jumper wires, and a plastic box.

Participants will also have to pay a maximum of Rs. 400 to the RC directly on the day of the workshop, from which, RC will provide lunch and coffee / tea / snacks.

Please note that the registration fee once paid is neither refundable nor adjustable under any circumstances.

Important payment instructions:
In case of a course fee transaction failure, the participant will get an auto generated mail with instructions for further process. Please go through the mail carefully. If the amount is already debited to your account, please do not make another payment.

In case of a double payment (or more than once), please send a mail to dbpaccounts@cse.iitb.ac.in requesting for a refund. The participant will also have to check the following link for his/her vendor creation in order to get a refund. IIT Bombay will not be able to process the refund if the vendor creation, as per IIT Bombay's requirement, is not completed by the participant.

Link:- https://portal.iitb.ac.in/vrp/index.jsp

6. Who should attend?

The participant should be a teacher or a research scholar from Electronics or allied engineering fields and should have basic electronics knowledge, required to work with Arduino, breadboard and electronic components.

7. Criteria for issuing Certificates

E-certificate will be provided to the participants after successful completion of the workshop.

8. Duration and Venue

The workshop will be conducted at Remote Centres of **IIT Bombay on Saturday, 8 February 2020, from 9.30 AM to 6.00 PM.** 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.

9. How to apply?

Enrollment will be strictly online, and no other mode of application will be entertained. The last date of registration is Friday, **13 December 2019.** The URL for registration is:

http://www.it.iitb.ac.in/nmeict/announcements.html

Please register early, as we require two months for manufacturing and shipping the kit to Remote Centres. We may also not extend the registration date beyond 13 Dec. 2019.

10. Registration on the ST Forum

To make the course effective it is important that all participants register in the ST forum:

1. 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.

11. Important points to 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 Arduino will be available at the Remote Centres. But if they wish, participants can bring their own laptops with Arduino IDE installed.

12. Address for communication

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One Day Workshop

Under 'Pandit Madan Mohan Malaviya National Mission on Teachers and Teaching' (PMMMNMTT)**,** funded by the Ministry of Human Resource Development, **Government of India**

on

Arduino, a Course in the IoT Series

8 February 2020

Conducted by
IIT Bombay

Course Coordinator

Professor Kannan Moudgalya
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Indian Institute of Technology Bombay
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