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 microcontroller workshop, using **an Arduino Uno board, a breadboard, and some electronic components**, to be conducted on Saturday, **18 January 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 Coordinators' Workshop

The Coordinators' workshop will be conducted at IIT Bombay on **Saturday, 18 January 2020.** It is mandatory for each participating Remote Centre to send a teacher, who will act as the **domain expert** and a coordinator for the Main workshop. The required hardware will be provided free of cost to them.

The participating RC should take care of the travel expenses of the above mentioned teacher who would be coming to IIT Bombay for the Coordinators' workshop. The PMMMNMTT project will provide free accommodation for one night and lunch/snacks. The participants of this workshop shall help organise the Main workshop.

3. Methodology of the Main Workshop

It will be a one day workshop on Saturday, **8 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.** The fees for the main workshop is Rs. 1,900 per participant.

4. 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.

5. 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.

6. Course fee

The course fee for the Coordinators' workshop is Rs. 200/-, which has to be paid at the time of online registration.

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

7. Who should attend?

It is mandatory for each participating Remote Centre to send a **teacher,** who will act as the "domain expert" for the Main workshop. The teacher should be from Electronics or allied engineering fields and should have basic electronics knowledge, required to work with Arduino, breadboard and electronic components.

8. Criteria for issuing Certificates

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

9. Duration and Venue

The Coordinators' workshop will be conducted at **IIT Bombay on Saturday, 18 January 2020, from 9.30 AM to 6.00 PM.**

10. How to apply?

Enrollment will be strictly online, and no other mode of application will be entertained. The online registration for Coordinators' workshop will start within one working day after the remote centre express the willingness, an invitation link will be sent to the nominated Course Coordinator to register. The last date of registration is Wednesday, **20 November 2019.** 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

- IIT Bombay will NOT bear the travel expenses of the participating representatives. RCs have to bear the travel expenses.
- The PMMMNMTT project will provide **free accommodation (for one night only), lunch and refreshments** for all the participants during the workshop.
- Participants are required to bring **earphones,** as they will have to listen to video tutorials. For those who don't bring, low-cost earphones will be made available at the venue at a cost of Rs. 50/- each.

Address for communication

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One Day Coordinators' 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

18 January 2020

Conducted by

IIT Bombay

Course Coordinator

Professor Kannan Moudgalya
Department of Chemical Engineering
Indian Institute of Technology Bombay
Mumbai – 400076