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 the TEDx talk. This project is funded by 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 **C and C++** training being taken up next.
C and C++ are used for developing operating systems, compilers, parsers, interpreters, word processors, search engines and graphic programmes, to mention a few.
* **Support**: C requires less runtime support.
* **Portable programming language**: A variety of C and C++ programmes written for one computer system, can be compiled and run on another system, with little or no change.
* **Modular**: Written in routines called functions and classes, (C++) programs can be used in other applications or programs.
* **Preferred by professional programmers**: A variety of C and C++ resources and helpful support are widely available.
* **Standardized**: Many standards have been documented, maintained and updated for C and C++ as standard references.

The Spoken Tutorial project at IIT Bombay (https://spoken-tutorial.org) has been promoting C and C++, and other FLOSS (Free/Libre and Open Source Software), such as Scilab, Python, OpenFOAM, eSim, Osdag, OpenModelica, DWSIM, Drupal and R, and Open Source hardware, such as Arduino and OpenPLC.

The C and C++ workshop is organised by the **T**eaching **L**earning **C**entre (TLC) at IIT Bombay, funded by the *Pandit Madan Mohan Malaviya National Mission on Teachers and Teaching (PMMMNMTT)*, MHRD, Govt. of India. As Spoken Tutorial method offers hands-on practice, with 100% active learning, those who undergo this training will be able to start using C and C++ immediately after the workshop. They will also be able to conduct C and C++ workshops for their students, using Spoken Tutorials, without requiring any help from anyone else.

The one day C and C++ main workshop will be conducted on **Saturday, 29 February 2020,** through the select Remote Centres of IIT Bombay. This will be a blended training programme that uses A-VIEW for live interactions and Spoken Tutorials to learn to use C and C++. The medium of instruction for this workshop is English. Language dubbed Spoken Tutorials in 15+ Indian languages will also be available.

2. Methodology of the Workshop
It will be a one day workshop, on **29 February 2020**. All participants will have to go to their chosen Remote Centre. They will learn C and C++ through the active method of reproducing every command demonstrated in the award-winning Spoken Tutorials. As learning happens through self-learning, the self-confidence of the learners is very high. Moreover, they can use the same method to train their students on the important topic of C and C++, using Spoken Tutorials.

All the participants from all the Remote Centres, will be able to interact with the C and C++ team at IIT Bombay, ask them questions, etc. through the video conferencing software A-VIEW. There will be about 4 hours available for C and C++ training and 2 hours for interactions.

A timed discussion forum https://forums.spoken-tutorial.org/ will be used to answer the questions that the participants may have in different Remote Centres. One has to select the Spoken Tutorial, and the exact time (minute and second) when the doubt arises. It will be answered immediately by one of the volunteers. Answers can also be provided by other participants in the same Remote Centre or in other Centres. These answers double as additional learning material. This video explains how to use the Forum: https://youtu.be/H8YjIfkwbJk

Course Coordinators at Remote Centres, already trained for this purpose, ensure that the workshop goes through smoothly.

Using this approach, we have trained 3,500, 4,200, 4,300, 5,300, 2380, 2400, 2800 and 1500 teachers, respectively, on Koha, Moodle, Scilab, Python, eSim, Linux, R and Arduino workshops in the past 1 year. We expect to train about 5,000 teachers through this workshop.

3. Syllabus for the workshop

Basic Level
  1) First C Program
  2) First C++ Program
  3) Tokens in C and C++
  4) Functions in C and C++
  5) Scope of Variables in C and C++
  6) If And Else If statement in C and C++
  7) Nested if and switch statement in C and C++
  8) Increment and Decrement Operators in C and C++
  9) Arithmetic Operators in C and C++
  10) Relational Operators in C and C++
  11) Logical Operators in C and C++
  12) Loops in C and C++

Intermediate level
  13) Arrays in C and C++
  14) Working with 2-D Arrays in C and C++
  15) Strings in C and C++
  16) String Library Functions in C and C++
  17) Working with Structures in C and C++
  18) Understanding Pointers in C and C++
  19) Function call in C and C++
  20) File Handling in C

4. Teaching faculty

- **Prof. Bhaskaran Raman,** Department of Computer Science & Engineering, IIT Bombay
- **Prof. Kameswari Chebrolu,** Department of Computer Science & Engineering, IIT Bombay
- **Prof. Varsha Apte**, Department of Computer Science & Engineering, IIT Bombay

5. Course Fee

Every participant has to pay Rs. **100** as the course fee to IIT Bombay at the time of online registration. On the day of the workshop, i.e., **on 29 February 2020**, 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.

6. Who should attend?

As this workshop is not subject-specific, teaching faculty from all colleges (engineering, sciences, arts, commerce, management, law, medicine, etc.), polytechnic colleges, ITIs, and schools, can attend. Teachers registered in any Masters programme, and also all Research Scholars can also participate.

Why You Should Attend?

- You can help your colleagues who may not be good in C and C++, answer forum questions, etc.
- You will learn the pedagogy of Spoken Tutorials, which you can implement in your own college/school, without need of help from anyone else.
- You can possibly contribute to the creation of Spoken Tutorials in C and C++ or in any other topic.
- A series of activities are planned for those who do well in tests. For example, top 1,000 teachers to get trained on C and C++ lab courses, through a more detailed, longer duration, course; getting shortlisted for courses, such as Data Structures, etc.

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 on **Saturday, 29 February 2020 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.

9. How to apply?

Enrollment will be strictly online, and no other mode of application will be entertained. **The last date of registration is 28 February 2020, 12.30 pm**. The URL for registration is: http://www.it.iitb.ac.in/nmeict/announcements.html

Register on the Spoken Tutorial Website:
1. Before the workshop, participants should register on https://spoken-tutorial.org/
2. Fill up the registration form and submit.
3. An email will be received.
4. The account should be activated by clicking the link in the email.
5. The Username and Password should be noted. This is an extremely important step.
6. One needs the above information to post questions on the forum, explained from 8 to 9 minutes 45 seconds of this video.

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 learn C and C++ will be available at the Remote Centres. But if they wish, participants can bring their own laptops with Linux OS installed.

10. Address for communication

Dr. Kalpana Kannan
Project Coordinator, ESOS Project
Department of CSE, Kanwal Rekhi Building,
Indian Institute of Technology Bombay,
Mumbai - 400 076
Tel.: +91-22-2576 4989
Email: eoutreach@it.iitb.ac.in

C and C++ Course Instructor

Prof. Bhaskaran Raman
Department of Computer Science & Engineering,
Indian Institute of Technology Bombay

Project Coordinator

Prof. Kannan M. Moudgalya
Department of Chemical Engineering
Indian Institute of Technology Bombay
Powai, Mumbai 400076