Tinkering Lab Technical Workshops Series – 2019

Three Days Intensive Workshop on

Advanced Arduino

"Working with multiple sensors & output devices"

- Organized by Venture Center -

Learn	• How to communicate between two Arduinos with/without wires? • How to communicate between a smartphone and the Arduino? • How to use Arduino with a sensor that requires more than 5V DC? • How to save data on an external storage device using the Arduino? • How to use smart cards with the Arduino? • In-depth discussion of internal libraries… • Working with multiple sensors & output devices...and many more interesting topics...
Organized by	• Tinkering Lab at Venture Center
Supported by	• NIDHI-Centre of Excellence (CoE) at Venture Center supported by Department of Science and Technology, Government of India (http://nidhicoe.venturecenter.co.in/)
For whom	• Industry professionals • Innovators & Entrepreneurs • Students
When	**Thursday- Saturday | 10-12 October 2019 | Time: 1600 – 1830**
Where	E-class room, Venture Center, 100 NCL Innovation Park, Dr. Homi Bhabha Road, Pashan, Pune-411008
Contact	Technical queries: Ms Sayali | 020-25865877/75/76 | sayali@web.venturecenter.co.in Registration related queries: Ms Lipika | 020-25865877/75/76 | eventsdesk@venturecenter.co.in
Cost	See table below

Large companies	Rs. 8,000/-
Micro, Small, Medium enterprises/ individuals	Rs. 3,000/-
VC resident companies	Rs. 2,000/-
Students with valid id card	Rs. 2,000/-

Limited seats: 20 seats; Registration closes once 20 seats are full or 5 Oct 2019 (whichever comes sooner)

Note: Organizers reserve the right to accept or refuse or delay registrations so to optimize the composition of the group and hence maximize learning for all participants.
Fees once paid is not refundable under any circumstances

How to apply?

- **Apply online at:** http://bit.ly/10-12oct-arduino
- Participation to the workshop will be based on your application and inputs from the faculty. After reviewing the organizers will confirm your participation by sending you an acceptance mail
- **Email of acceptance > verification > Payment > Seat confirmation**

Introduction

The Arduino is a microcontroller that you can program to run motors and use along with sensors such as motion detectors, temperature sensors, etc. It can give your project interactivity without requiring an expensive and complicated circuit. Instead, you use a computer to program the Arduino, upload your code to the Arduino, and hook up your circuit on a breadboard. This workshop discusses advanced Arduino concepts/sensors and provides everyone with hands-on sessions using the Arduino. This workshop combines insightful lectures with practical lab exercises to reinforce key concepts.

Workshop Outline

This Course on Advanced Arduino discusses the following:

- Internal libraries: Serial and Software Serial. Serial Input.
- Rotary encoder, Relay and Demultiplexer.
- Internal libraries: Wire(I2C) and SPI
- Wireless modules: RF transmitter/receiver, Bluetooth and Smartcard.
- Arduino programming tricks, tips and pitfalls. External Interrupts.
- Internal libraries: EEPROM and SD card.
- OLED display, Realtime clock.

Prerequisite: Familiarity with basic Arduino programming
Participants will have to bring their own laptops in working order.
Participants should download and install the following prior to attending first session:
1. Arduino IDE software on their laptop: https://www.arduino.cc/en/Main/Software
2. CoolTerm software on their laptop: http://freeware.the-meiers.org/
3. Bluetooth Terminal HC-05 on their smartphone:
https://play.google.com/store/apps/details?id=project.bluetoothterminal&hl=en_I

One kit per participant will be given, which has to be returned at the end of the workshop.
(Optional: Participants can purchase the Kit at the price of 10,000 INR during the workshop. Kit contains:

Acceleration (3-axis) – ADXL345	PIR motion sensor - HCSR501	Wireless module - NRF24L01 (2)
Light LM393	Demultiplexer - 74HC4051	OLED display
Vibration sensor - SW420	Rotary encoder - KY-040	MM/MF/FF jumper cables
Capacitative touch sensor - TTP223	Adafruit motor shield v1.0 (clone) E-179	RFID module - RC522
IR reflectance sensor - TCRT5000/KY-008	Servo - VTS	Stepper motor
Ultrasound distance sensor - HC-SR04	SD card shield	Arduino (UNO 328 DIP)
IR distance sensor - GP2Y0A21YK	LCD module I2C 16x2	Medium sized breadboard
Altitude, atmospheric pressure, temperature - BMP280	5V relay - KY-019	Realtime clock (DS1302)
Luminosity sensor - TSL2561	RF Link transmitter module	Pushbutton, LEDs & Resistors
Opto-coupler sensor module E-267	Bluetooth module - HC05	

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Workshop includes
• Access to restricted website with online compilation of resources • Workshop includes tea/coffee. • Certificate of participation issued by Venture Center • Membership in mailing list to follow-up on workshop and intimation of relevant events/ funding/ opportunities from Venture Center. • One-year free reference membership to Venture Center Library (http://www.vclibrary.org/) • 30% discount on DIY membership for Tinkering lab and Prayashala for 3 months ***Please note, the participants will have to arrange for their own travel/local transport and accommodation.** • General information and useful contacts regarding Pune city are available on: http://www.venturecenter.co.in/puneguide/

Time (hrs)	Topic and Contents	Venue	Faculty
Day 1			
1600 – 1615	Welcome and background of Venture Center Introduction to Workshop	E-class room	Dr. V Premnath
1615 – 1645	Sessions 1	E-class room	Dr. Chirag Kalelkar
1645 – 1700	Tea/Coffee	Foyer area	
1700 – 1830	Sessions 2 Lab session & hands-on experiments	E-class room	Dr. Chirag Kalelkar & volunteers
Day 2			
1600 – 1645	Sessions 3	E-class room	Dr. Chirag Kalelkar
1645 – 1700	Tea/Coffee	Foyer area	
1700 – 1830	Sessions 4 Lab session & hands-on experiments	E-class room	Dr. Chirag Kalelkar & volunteers
Day 3			
1600 – 1645	Sessions 5	E-class room	Dr. Chirag Kalelkar
1645 – 1700	Tea/Coffee	Foyer area	
1700 – 1815	Sessions 6 Lab session & hands-on experiments	E-class room	Dr. Chirag Kalelkar & volunteers
1815- 1830	Feedback and Valedictory	E-class room	Dr. V Premnath

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Speakers (in alphabetical order of last names)	
 Chirag Kalelkar	Dr. Chirag Kalelkar did Ph.D. in Physics from Indian Institute of Science, Bangalore in 2006. He worked as Faculty Research Associate at the University of Maryland (2006-2008), Enhanced Post-doctoral Fellow at the National Chemical Laboratory (2008- 2009), visiting Post-doctoral Fellow at the Raman Research Institute (2010-2011) and as Research Associate at the Massachusetts Institute of Technology (2011-2012). Dr Kalelkar works on aqueous foams. Presently, Dr Kalelkar is an Assistant Professor at Indian Institute of Technology, Kharagpur.
 Premnath Venugopalan	Dr. Premnath is currently the Head- NCL Innovations, Head -Intellectual Property Group at NCL, Scientist-Polymer Science & Engineering Division at NCL and Director-Venture Center. He has helped found and be the first Director of Venture Center, CSIR-Tech (a technology commercialization company), Orthocrafts Innovations (degradable synthetic polymer based biomed products start-up) and BiolMed Innovations (silk based biomaterials start-up). He holds a B.Tech. from the IIT-B and a Ph.D. from the MIT, USA. He has also been a Chevening Technology Enterprise Fellow with the Centre for Scientific Enterprises, London Business School and Cambridge University, UK. He brings with him considerable experience in technology development and commercialization (two successfully commercialized families of biomedical products), incubation and innovation management, working with start-up companies (in Cambridge-UK and India) and engaging with large corporations on research and consulting projects as project leader.

About the organizers	
Tinkering Lab	The Tinkering Lab is a facility developed and managed by Venture Center, NCL Innovation Park, Pune, India. The main aim of the Tinkering Lab is to help inventors and entrepreneurs to build prototypes of their ideas and generally "tinker" around exploring new ideas. The focus is on electronics, instrumentation and optics besides related prototyping and design. For more information, visit http://tinkeringlab.co.in/
VENTURE CENTER	Entrepreneurship Development Center (Venture Center) – a CSIR initiative – is a Section 60 company hosted by the National Chemical Laboratory, Pune. Venture Center strives to nucleate and nurture technology and knowledge-based enterprises by leveraging the scientific and engineering competencies of the institutions in the Pune region in India. The Venture Center is a technology business incubator supported by the Department of Science & Technology's National Science & Technology Entrepreneurship Development Board (DST-NSTEDB). Venture Center focuses on technology enterprises offering products and services exploiting scientific expertise in the areas of materials, chemicals and biological sciences & engineering. For more information, visit http://www.venturecenter.co.in/

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NIDHI CENTER OF EXCELLENCE @ Venture Center An initiative of DST and CSIR-NCL	The National Science and Technology Entrepreneurship Development Board (NSTEDB), Department of Science and Technology, Government of India has awarded Venture Center with the status of a NIDHI-CoE (National Initiative for Developing and Harnessing Innovations — Center of Excellence an umbrella programme conceived by DST). This award is accompanied by a grant of Rs. 50 Cr for 5 year duration to help Venture Center scale-up its activities and demonstrate greater success to accommodate more than 100 startups at any time and to upgrade and add new facilities for supporting science and technology based startups. ***NIDHI-COE is catalyzed and supported by NSTEDB Division, Department of Science and Technology, New Delhi.*** For more information, visit: http://nidhicoe.venturecenter.co.in/