Nutan Maharashtra Vidya Prasarak Mandal's

Nutan Maharashtra Institute of Engineering & Technology
Under Administrative Support of Pimpri Chinchwad Education Trust
Talegaon, Tal : Maval , Dist. Pune
ISO-9001 :2008 Certified

ACDM/R/	Department of E&TC	Academic Year : 2020-21
Rev :0.0	**Activity Report**	**Semester : Odd /Even**
Date : 15/06/2016		**w.e.f. :**

Date : 15/10/2020

Activity Name:- IIT Spoken Tutorial FDP on Arduino

Date:- 5/10/2020 to 9/10/2020, Exam Date :13/10/2020

Co-Ordinator:- Prof. Sarika N. Patil & Prof. Sarika B. Patil

Venue:- online session on Google Meet IIT Spoken tutorial website.

Students From which Class:- SE,TE,BE-Comp, IT, Entc, Mech

No of Registered Students:- 201

Students appeared for Exam :197

Students Cleared Exam :192

Introduction:

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.

Arduino board designs use a variety of microprocessors and controllers. The boards are equipped with sets of digital and analog input/output pins, USB connection which is used for loading programs from computers, power jack, reset button etc.

A program written with the **IDE** for **Arduino** is called a sketch. The **Arduino IDE** supports the languages C and C++ using special rules of code structuring. It consists of only two functions, setup and loop. The setup function is used to initialize variables, input and output pin modes and other libraries needed in the sketch. After setup has been called, function loop is executed repeatedly in the main program. It controls the board until the board is powered off or reset.

Arduino can interact with buttons, LEDs, motors, speakers, cameras, TV and smart phones etc. It can used for almost any electronics projects.

The Spoken Tutorial effort for Arduino has been contributed by **Nirmala Venkat** and **Manivel** from Spoken Tutorials team and **Abhinav Dronamraju**, **Brijesh Gupta, Pratik Bhosale** and **Rajesh kushalkar** from FOSSEE team.

The domain review of basic level is done by **Srikant Patnaik** from FOSSEE. The content for Advance level is contributed by **Prof. Sharma** from IIT Hyderabad.

Learners: High School and UG/PG Electronics students, hardware professional.

Principal
Nutan Maharashtra Institute
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Contents of Session

Basic Level

1. Overview of Arduino
   - Learning objectives of Arduino
   - Prerequisites for learning Basic level Arduino tutorials
   - Prerequisites for learning Intermediate level Arduino tutorials
   - Who can use Arduino?
   - Glimpse of Spoken Tutorials available on Arduino series
2. Electronic components and connections
   - Breadboard and its internal connections
   - LED and its connections
   - Tri-color LED
   - Resistor
   - Simple circuit using LED, resistor and breadboard
   - Common mistakes when using breadboard to make connections
   - Pushbutton and its connections
   - Common mistakes when using pushbutton to make connections
   - Seven segment display and its connections
   - Demonstration of all the above components
3. Introduction to Arduino
   - About Arduino device
   - Features of Arduino
   - Components of Arduino board
   - Description of Microcontrollers
   - Few examples where a Microcontroller is used
   - Installation of Arduino IDE on Ubuntu Linux OS
   - Run the arduino executable file
   - The Arduino IDE window
4. Arduino components and IDE
   - Set up a physical connection between Arduino and a computer
   - Connect the Arduino board to the computer using the USB cable
   - Various components available in Arduino hardware
     - ATMEGA 328 microcontroller chip
     - About Arduino BootLoader
     - Digital Pins
     - Analog Pins
     - Blinking LEDs that are helpful for troubleshooting
     - Ground Pins
     - External power adapter
   - Arduino programming language
5. First Arduino Program
   - Write an Arduino program to blink an LED
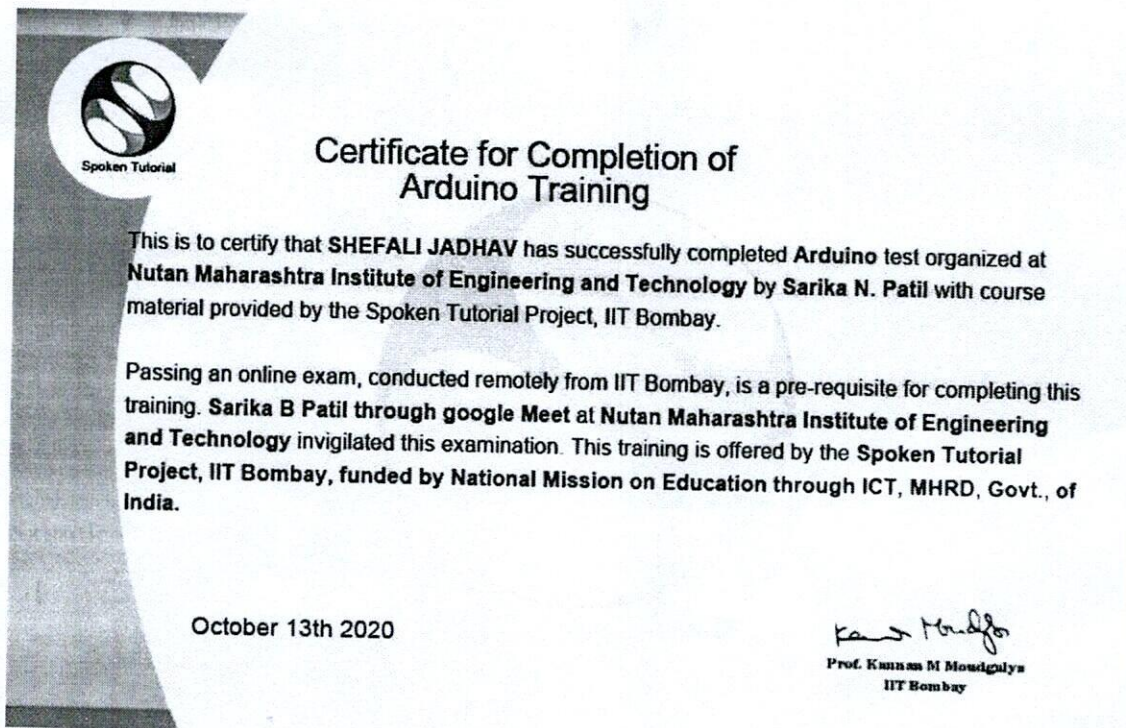   - Arduino program is saved as Sketch

- Default program environment with two empty functions -
  - setup - function for setting up a micro-controller
  - loop - infinite loop
- Program to turn on the LED
- Compile the program into binary format
- Program to turn off the LED

6. Arduino with Tricolor LED and Push button
   - Tricolor LED - Common Cathode Tricolor LED
   - Other external devices that are required for this experiment
   - Understand the connection circuit details
   - Connect a tricolor LED to Arduino board
   - Write a program to blink tricolor LED
   - Use Pushbutton to control the blinking
   - How to reduce the delay of the blink

7. Arduino with LCD
   - Connect an LCD to Arduino board
   - See the details of the circuit connection
   - See how to do the soldering
   - Setup the components as per the circuit diagram
   - The aim is to write two strings on the LCD display
   - Write a program to display a text message on the LCD

8. Display counter using Arduino
   - Connect an LCD and a Push button to Arduino board.
   - Add a pushbutton and make a simple counter
   - Write a program in the Arduino IDE
   - See that pushbutton is working successfully
   - Modify the program to set a counter
   - Output: count is increased whenever the button is pressed

9. Seven Segment Display
   - Connect a seven segment display to Arduino board
   - Types of seven segment display
   - Connection details of common cathode seven segment display
   - Connection details of common anode seven segment display
   - Circuit connection explanation
   - Live setup of the connection
   - Program to blink LEDs in seven segment display
   - High and low state of LED's in the seven segment
   - Program to display digits 0 to 4 in seven segment display
   - Compile and upload the program

10. Pulse Width Modulation
    - About Pulse Width Modulation
    - About duty cycle and frequency
    - Formula to calculate the duty cycle
    - Experiment to control the brightness of LED by varying the duty cycle
    - Experiment to control the speed and direction of a DC motor
    - Circuit connection explanation of the above experiments
    - Source code for the above experiments

- Demonstration of the output
11. Analog to Digital Conversion
    - About DHT11 sensor
    - Arduino resolution concepts
    - Circuit connection details of DHT11 sensor and Arduino
    - Features of DHT11
    - Download the DHT11 Arduino library to run this program.
    - Code to detect the temperature and humidity using DHT11 sensor
    - Display the output in the Serial Monitor screen
    - Display the output in the Serial Plotter screen
12. Wireless Connectivity to Arduino
    - About ESP8266-01 WiFi module
    - Various pins of ESP8266-01 WiFi module
    - Circuit connection of ESP8266 - 01 module with Arduino
    - Setup the read-write permission to the USB port
    - Download and install ESP8266 WiFi module in Arduino IDE
    - Establish a connection between WiFi module and a laptop or a mobile phone
    - Source code for the above experiment
    - Demonstration of the output

Sample Certificate received by students:

Certificate for Completion of Arduino Training

This is to certify that **SHEFALI JADHAV** has successfully completed **Arduino** test organized at **Nutan Maharashtra Institute of Engineering and Technology** by Sarika N. Patil with course material provided by the **Spoken Tutorial Project, IIT Bombay.**

Passing an online exam, conducted remotely from IIT Bombay, is a pre-requisite for completing this training. Sarika B Patil through google Meet at **Nutan Maharashtra Institute of Engineering and Technology** invigilated this examination. This training is offered by the **Spoken Tutorial Project, IIT Bombay, funded by National Mission on Education through ICT, MHRD, Govt., of India.**

October 13th 2020

Prof. Kannan M Moudgulya
IIT Bombay

FDP Coordinator

HOD

Prof. Sarika N. Patil   Prof. Sarika B. Patil

Dr. V.V. Deotare

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