

# EMBEDDED DESIGN WITH ARDUINO

Sr. no	Details	Days
1	<p><b>Hardware Fundamentals</b></p> <p>Basic Electronics Laws and Components Resistance, Capacitor, Inductors, Diode, Transistors, Opto coupler, Voltage Regulator, Regulated Power supply, Protection of Circuits from Over voltage, Noise, EMI RF interferences for reliability of Circuits,</p> <p>Digital Fundamentals and ICs Mux/Demux, Encoder/Decoder/F Latch, Shift register, Tri State logic, driver ices etc</p> <p>Linear Fundamentals and Opamp, Voltage Comparators and ADC</p> <p>Fault Finding Techniques for circuits not working.</p>	3 Days
2	<p><b>C &amp; Embedded C language</b></p> <p>Introduction to C programming, Data types, Format specifier Qualifiers, Operators, decision control structure Loop control structure Arrays, strings, Pointers</p>	1 Days
3	<p><b>Introduction to Arduino Uno Board</b></p> <p>1) <b>What Exactly Is an Arduino?</b></p> <ol style="list-style-type: none"> <li>Exploring the Arduino Board.</li> <li>Types of Arduino Boards</li> <li>Installing the Arduino IDE</li> <li>Compiling and Uploading Programs</li> <li>Working with LED's</li> <li>Managing Projects and Sketches</li> <li>Changing Preferences</li> <li>Using Serial Ports to see the events</li> </ol> <p>2) <b>Arduino UNO</b></p> <ol style="list-style-type: none"> <li>Architecture</li> <li>Arduino Uno 328 pin Mapping</li> <li>Understanding of Input / Output</li> </ol> <p>3) <b>Arduino Input and Output Programming</b></p> <ol style="list-style-type: none"> <li>Take input from the switch or sensor</li> <li>Drive anything from Arduino output</li> <li>Digital I/O:</li> <li>pinMode()</li> <li>digitalWrite()</li> <li>digitalRead()</li> </ol> <p>4) <b>Arduino Interrupt</b></p> <ol style="list-style-type: none"> <li>What is interrupt and when to use it?</li> <li>Interrupts ()</li> <li>noInterrupts ()</li> <li>External Interrupts:</li> <li>attachInterrupt ()</li> <li>detachInterrupt ()</li> </ol>	8 Days

## 5) Display Interfacing with Arduino

- a) Liquid Crystal Display
- b) Pin Configurations LCD
- c) Arduino LCD Function
- d) Display on LCD
- e) Arduino LCD Interfacing
- f) Display Custom Character and Text

## 6) Seven Segment Display

- a) Pin Configuration
- b) Common Anode Segment
- c) Common Cathode Segment
- d) Interfacing with Arduino
- e) Seven Segment Multiplexing

## 7) Analog to Digital Conversion (ADC)

- a) Understanding the ADC
- b) Analog Sensors and how to deal with it
- c) Temperature Sensor Interfacing
- d) Analog IR Sensor Interfacing
- e) Arduino library functions
- f) `analogReference ()`
- g) `analogRead ()`
- h) `analogWrite ()` – PWM

## 8) Memory

- a) Different types of Memories
- b) Role of EEPROM
- c) `read ()`
- d) `write ()`

## 9) Communication Protocols

- a) What is Serial Communication
- b) UART
- c) Serial Peripheral Interface – SPI
- d) Serial Communication between Arduino
- e) Arduino and PC interfacing

## 10) Wireless Modules

- a) Bluetooth Interfacing
- b) GSM Modem Interfacing
- c) GPS Module Interfacing
- d) TV/IR Remote Decoding and Working
- e) Radio Frequency (RF) Module
- f) RFID Interfacing
- g) Sensors
- h) Reed Switch
- i) Motion Sensor
- j) Ultrasound Module
- k) Infrared Sensor (IR)
- l) Thermistor Interfacing

```
return RES
(A_NOINIT) return RES
& STA_PROTECT) return RES

Convert to byte address if
(!(CardType &
sector * =
0A 0A 09 0B 0E
28 20 20 2E 3F 2F 32
0C 0E 1B
09 39 39
11 08 0
00 00 0
00 00 0
03 04
39 D5
AE E4 D
43 AB 60
Multip
82 A1 3A
66 84 35 3B 41 A8 0E
EF 7A 5E 27 7B
if (CardType &
send_cmd(ACMD23, count);
WRITE MULTIPLE BLOCK
send_cmd(CMD25, sector) =
```



	<ul style="list-style-type: none"> <li>m) Motors</li> <li>n) Selection and types of Motors</li> <li>o) DC Motor</li> <li>p) H-Bridge (L293D IC)</li> <li>q) Stepper Motor</li> <li>r) Servo Motor</li> <li>s) Understanding PWM</li> <li>t) Relay</li> <li>u) Working and Application of Relay</li> <li>v) Controlling with Arduino</li> <li>w) Home Appliances Control using Relay</li> <li>x) Opto Coupler</li> <li>y) What are opto coupler</li> <li>z) Advantages and their interfacing</li> </ul> <p>11) Buzzer</p> <ul style="list-style-type: none"> <li>a) How sound are generated</li> <li>b) Why busser are preferred and their types</li> <li>c) How to interface Buzzer</li> </ul>	
4	<p><b>Arduino Hardware interfacing Modules</b></p> <ol style="list-style-type: none"> <li>1. Led Interfacing</li> <li>2. Liner Keypad, matrix key pad interfacing</li> <li>3. Seven Segment Display</li> <li>4. LCD Display Interfacing with Arduino Library</li> <li>5. Motors</li> <li>6. DC Motor, Stepper Moto</li> <li>7. Relay</li> <li>8. Op Coupler</li> <li>9. Buzzer</li> <li>10. Timer and Counters Interfacing</li> <li>11. Different Types of Sensors</li> <li>12. Analog to Digital Conversion (ADC)</li> <li>13. Communication Protocols UART, SPI</li> <li>14. Arduino Interrupt</li> <li>15. Memory</li> <li>16. Wireless Modules Bluetooth, Wi-Fi module</li> </ol>	10 days
5	Certificate Distribution and feedbacks	1 days