



Jagadish Chandra Bose Research Centre  
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## Summer Training on Robotics

JCBRO Labs, Now came up with Summer Training in Robotics with embedded 'C' using AVR microcontrollers. AVR microcontrollers are useful for many applications.

A microcontroller is essentially a tiny computer and can be programmed to do many things. Input and output are handled through the numerous pins on the microcontroller. It is possible to hook up sensors, switches, lights, motors, and many other items to the pins, which allow it a great range of uses. Thus, AVR microcontrollers are often used for prototyping and robotics projects. Let's Learn Robotics with AVR microcontroller

**Course Duration:** 30/45 Days

**Course Content:**

### 1. Introduction to Robotics

- History of Robotics
- Why Robotics
- How Robotics works
- Application of Robotics
- Current Industrial Robotics
- Future of Robotics

### 2. Anatomy of Robotics

- What are Basic Modules?
- Why Need of Basic Modules
- Working Approach on Robotics

### 3. Introduction of Electronic Components

- What is Electronic Component?
- History of Electronic Component
- Various Electronic Component
- Application of Electronic Component



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- How to use Electronic Component

#### **4. Introduction to Sensors**

- What is Sensor?
- Various Basic Industrial Sensors-IR- Analog Sensor
- IR Digital Sensor
- Color IR\_TSOP Sensor
- Light Sensor
- Sound Sensor
- Selection of Sensor
- Basic working Technique of Sensor
- Application of Sensor
- How to Interface Sensor

#### **5. Introduction to Computational Devices**

- What is Computational Device?
- Transistor
- Logic Gates
- Microprocessor
- Microcontroller
- Difference B/W Various Computational Devices
- Application of various Computational Devices
- Selection of Computational Devices
- How to use Various Computation Devices
- Work on AVR Family with ATMEGA Series

#### **6. Introduction to Programming Languages**

- Various programming Languages
- Selection of programming Language
- Need of Flow Diagram
- How to write First LED BLINKING Code in Embedded C
- Why always First LED BLINKING Code?
- Practice on various LED Pattern
- Debugging of Error Program

#### **7. Interfacing to Actuator**

- What is Actuator?



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## 8. How to work on Educational & Engineering Level Actuator

- DC Motor
- DC Geared Motor
- Stepper Motor
- Servo Motor

## 9. How to Drive Motor

- H-Bridge Motor Drive
- Programming for Motor Driver

## 10. Introduction to LCD Display

- Pin Description of 16x2 LCD Display
- Application of 16x2 LCD Display
- Programming of 16x2 LCD Display

## 11. Introduction to 7-Segment Display

- What is 7-Segment Display
- Types of 7- Segment Display
- Application of 7-Segment Display
- Programming of 7-Segment Display

## 12. Introduction to Timer/Counter

- What is Timer/Counter
- Application of Timers/Counter
- Registers of Timers/Counter's Different Modes
- Programming on AT89S52 Timers/Counter

## 13. Introduction to Interrupts

- What is interrupts
- Application of Interrupts
- Registers of Interrupts Different Modes
- Programming on ATMEGA Interrupts



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## 14. ADC

- What is ADC?
- Use of ADC
- What is Resolution?
- Uses of different ADC Registers
- Interfacing of Analog Devices with Digital World

## 15. Serial Communication

- Difference between Parallel and Serial Communication
- USART / UART Protocol
- RS232 Standard
- TTL Converter
- UART Programming

## 16. Robot Assembly with all Sensors and Actuators on board.

### Training Kit

#### *AVR(ATmega 16) Robotics Training Kit Content*

- 1x (ATmega8 mini V4 Development Board)
- 1x (ATmega8 with inbuilt Robosapiens Bootloader)
- 1x (USB Connector cable)
- 1x LCD 16x2
- 1x (High Quality Plastic Chassis Board)
- 1x (DTMF Decoder Module for Mobile Controlled Robot)
- 1x (Screw driver)
- 1x (Ball Caster wheel)
- 2x (IR Based Digital Sensors)
- 4x (Support Studs)
- 1 Pair wheel 76mm Diameter
- 1 Pair D.C Plastic gear motors
- Other required Tools and accessories etc.
- Sound Sensor.
- Sound Sensor.



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- Light Searching Sensor.
  - Software CD with more than 30 Working Codes for different Projects

## **Projects Covered**

- LED Blinking
- Running LEDs
- Sand Glass Filling of LEDs
- Decoration LEDs/ LED Patterns Etc.
- Sensor Interfacing
- DC Motor Driving
- Black Line Follower using two IR-Sensor
- White Line Follower using two IR-Sensor
- Sound Operated Robot
- Light Searching Robot
- Wall follower Robot
- Edge Avoider Robot
- Mobile Controlled Robot
- Blinking LEDs using TIMER0
- Blinking LEDs using Interrupts
- Stepper Motor Driving
- Servo Motor Driving
- Displaying your Name on LCD
- Blinking Text on LCD
- Seven Segment Display
- Seven Segment Multiplexing
- Digital Voltage Measurement
- PC to  $\mu$ C Communication
- $\mu$ C to PC Communication
- PC -  $\mu$ C Full Duplex Communication
- Digital Visitor Counter
- Digital Clock
- Temperature Controlled Fan

## **Who Could Attend?**

- College students seeking future in Robotics.
- Education Faculty & Staff in Robotics.
- Electronics, Instrumentation & Communications Students.



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- Students from any branch can attend the Summer Training Program.

### **Course Material & CD**

- Software tool kit CD having (Study E-Book, Videos, Softwares)
- 1 Take Away Robotic Kit will be provided to all the groups (each having 4students)