



Jagadish Chandra Bose Research Centre
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2 Days Workshop on Robotics

This Robotics workshop mainly focuses on the students eager to **learn Robotics** from Basic. They will get the chance to expand their knowledge in the field of designing, construction, operation, and application of Robot with real time hand on practical experience.

Workshop Duration: 2 days (16 hrs.)

The duration of this workshop will be two consecutive days, with eight hour session each day in a total of sixteen hours properly divided into theory and hands on sessions. At the end of this workshop, a small competition will be organized among the participating students and winners will be awarded with a Merit Certificate.

Day 1 (Session 1)

Introduction to Robotics

Basics of Robot Electronics:

- Basic Electronic Components
- Fundamental Electrical Concepts
- Sensors
- Operational Amplifier
- Integrating Circuit
- Interfacing of Sensors
- Motors and Controlling Circuit
- Interfacing of Motors



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Day 1 (Session 2)

Introduction to Microcontrollers

This session would deal with the basics of Microcontroller. The focus will be on the AVR series micro controller- ATmega8, which is one of the most powerful and widely used 8 bit micro controller.

- What is Microcontroller?
- Difference between Microcontroller and Microprocessor.
- Microcontroller Architecture and Interfacing.
- How can we use Microcontroller in our Own Circuits?

Introduction to Programming Languages

- Programming Languages- Assembly vs Embedded C.
- Microcontroller Programming using 'Embedded C'.

Discussion on Different Algorithms

- Line Following Robot Algorithms
- Edge Avoiding Robot Algorithm
- Obstacle Avoider Robot Algorithm
- Wall Following Robot Algorithm
- Sound Operated Robot Algorithm
- Light Searching Robot Algorithm

Installation of Software and Debugging

- Writing your First 'Embedded C' Program in AVR Studio.
- Program Compilation and Debugging.
- Loading Compiled 'C' Program into Microcontroller

Day 2 (Session 3)



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Assembling the DIY kit

Assembling plays a major role that deals with the mechanical section of Robotics including mounting of components and mechanical stability.

Generating different LED Patterns

Development of Line Following Robot

As the name suggests, Line Follower Robot is well programmed mobile machine that can follow a path visible like Black Line on White Surface or vice versa. A simple fuzzy logic will do the job of maneuvering the robot according to the Line Following Algorithm discussed in session 2.

Development of Edge Avoiding Robot

Edge Avoiding Robot is a mobile machine that senses the presence & absence of surface below it and avoids the absence of the surface using the Edge Avoiding Algorithm discussed in session 2.

Note: These are just the major aspects that we will be discussing, each point will be elaborated in detail with demonstrations of the tools and techniques.

Project to be covered

- Black Line Follower
- White Line Follower
- Intelligent Line Follower
- Edge Avoider Robot
- Wall Follower Robot
- Light Searching Robot
- Photophobic Robot
- Phototropic Robot
- Sound Operated Robot (Optional)



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Kit Content

1. 1x (Atmega8 mini Robotics Development Board)
 - a. Programming via boot loading through USB Port or 6-Pin ISP (In System Programming) cable.
 - b. Driver Software not required (Plug & Play device).
 - c. Three ports available for user interface: PORTB-8 Pin, PORTC-7 Pin, PORTD-8 Pin
 - d. External Reset Switch
 - e. On board crystal oscillator of 12 MHz frequency.
 - f. On board LCD interface port.
 - g. HXD® BUZZER for audible interaction with the users.
 - h. Dedicated DTMF decoder IC module plug-in slot.
 - i. Two supply inputs: One through battery and Second through Adapter.
 - j. On board 5 volt regulated power supply for the board and external peripherals.
 - k. Two H-Bridge implemented on the board using L293D IC to drive two DC motor with 1A drive current at voltages 4.5 to 36 volt.
2. 1x (ATmega8 with inbuilt Bootloader)
3. 1x (USB Connector cable)
4. 1x (Screw driver)
5. 1x (Ball Caster wheel)
6. 2x (IR Based Digital Sensors)
7. 4x (Support Studs)
8. 1 Pair wheel 76mm Diameter
9. 1 Pair D.C Plastic gear motors



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10. Other required Tools and accessories etc.

Prerequisite for Workshop

- Passion to learn new creative things.
- Knowledge of basic chips and micro controllers.
- Having basic knowledge of Computers.
- Basics of programming.
- PC/laptop must have at least 2GB RAM.
- Windows is preferable
- In case of MacBook or Linux, You need virtual window or .exe installers.
- Laptop/PC must have Bluetooth and its drivers.

Who Could Attend?

- College students seeking future in Robotics.
- Education Faculty & Staff in Robotics.
- Electronics, Instrumentation & Communications Students.
- Students from any branch can attend the workshop.

Benefits of Workshop

- Detailed knowledge about 8051/AVR microcontrollers.
- Students can design any Application based on Robotics.
- How to do debugging in hardware projects.
- Programming/ Analytical skills.



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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)