ACCELERO-BOTIX

Hand Gesture Controlled Robot

"The principal goal of education is to create men and women who are capable of doing new things, not simply repeating what other generations have done."

-Jean Piaget

Accelero-Botix

Accelero-Botix is a new approach to the Human Machine Interface. It is based on implementation of acceleration sensor for robotics, graphics and embedded application development. This technology is now most widely used in virtual reality, mobile phones, gaming solutions, animated movies etc.

What will you learn after attending the workshop:-

- Fundamentals of AVR series of microcontroller
- Programming the microcontroller using embedded C
- Interfacing and controlling various devices like keypad, LED, buzzer, motors, sensors, etc, with microcontroller
- Basics of I2C protocol
- Interfacing acceleration sensor with microcontroller
- Recognizing hand gesture using acceleration sensor
- Controlling Robot using acceleration sensor

CONCEPTS COVERED:

Day-1: (Session-1, 4hrs before lunch break of 1hrs)

INTRODUCTION

- Introduction to robotics
- Introduction to embedded systems
- Introduction to Human machine interface (HMI)
- Introduction to Human Computer interaction (HCI)

Microcontroller

- Overview of available microcontrollers
- The AVR series of microcontrollers and its core
- AVR microcontroller features and capabilities

Kit distribution & Kit parts identification

Day-1: (Session-2, 4hrs after lunch break of 1hrs)

Programming

- Embedded C
- Use of Embedded C IDE
- Use of flash tool
- Writing code in embedded C

- Accessing various functions of AVR microcontroller using embedded C
- Basic I/O operations
- Use of I2C protocol
- Implementation of artificial intelligence using embedded C

Day-2: (Session-1, 4hrs before lunch break of 1hrs)

Actuators

- Basics on servo and stepper motor
- Interfacing geared DC motor
- Use of DC motor for Robot maneuvering

Sensors

- Basics on different types of sensors used in robotics
- Basics on different motion sensors like acceleration and gyro sensor
- Different interfacing technologies used to interface sensors

Day-2: (Session-2, 4hrs after lunch break of 1hrs)

Acceleration Sensor: Concepts and Activities

- What is an acceleration sensor?
- Working principle of an acceleration sensor
- Types of acceleration sensors available in market
- Different interfacing technologies used with acceleration sensor
- Hardwire interfacing circuitry of a 3 axis acceleration sensor
- Register configuration of an acceleration sensor
- Reading x, y, z and tilt parameters
- Configuring the acceleration sensor for shake detection
- Configuring the acceleration sensor for tap detection
- Configuring the Acceleration sensor for orientation detection
- Mapping hand gesture through acceleration sensor and control robot

Accelero-Botix Kit Contents:

1. Microcontroller development board with the following features:

   - Built with popular Atmel's AVR Microcontroller
   - On-board LCD interface option (it can also be used for any other general purpose application)
   - On-board Motor Driver for connecting 2 DC motors / 1 Stepper motor
   - On-board 5v regulated power supply
   - Onboard 12MHz external crystal connection
   - Onboard 2-tact switches for external input and reset
   - Onboard 4 test LEDs for status and debugging purpose
   - Onboard 2 supply indicator LEDs
   - Onboard dual power supply option through DC source (6V to 16V) or USB power
   - On board USB programmer
   - Onboard exposed ISP pins for programming
   - Onboard exposed I/O pins
   - Onboard exposed I/O pins for ADC and sensors with 5V/1A power supply

2. Acceleration sensor (1)
3. USB cable (1)
4. A set of robotic chassis (1)
5. Geared DC motor (2)
6. Sensor connectors/cables (2)
7. Batteries for power supply (2)
8. Battery Snappers (2)
9. Screw Driver (1)
10. CD containing study materials, sample codes, software etc (1)

Duration:
We conduct the workshop on 2 consecutive days, each day 8 hours session so in total 16 hours properly divided into theory and hands on sessions.