**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

Making serial communication with PC using hyper terminal and UART communication protocol

Interfacing acceleration sensor with microcontroller

Interfacing acceleration sensor with PC

Recognizing hand gesture using acceleration sensor

Computer graphics control using acceleration sensor

Controlling Robotic vehicle using acceleration sensor

**CONCEPTS COVERED:**

**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

**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 UART communication protocol

Use of I2C protocol

Implementation of artificial intelligence using embedded C

**Actuators**

Basics on servo and stepper motor

Interfacing geared DC motor

Use of DC motor for Robotic vehicle 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

**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 the hand gesture through acceleration sensor and controlling a robotic vehicle

Interfacing acceleration sensor with PC for computer graphics manipulation

**Accelero-Botix Kit contents:**

1. Microcontroller development board with the following features:

Uses 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 4 DC motors or 2 Stepper motors

On board Servo interface

On-board regulated power supply

PC interface through UART

On-board Buzzer (optional)

Provision for external crystal connection

Exposed almost all I/O pins

Exposed I/O pins for ADC and sensors with 5V/1A power supply

Exposed I/O pins for servo motors and sensors with dual power supply

Five tact switches for external input and reset

Four test surface mounted LEDs for status and debugging purpose

Two supply indicator LEDs

Dual power supply through DC source (6V to 16V) or USB powered

On board USB programmer

Dual or single power supply option

Exposed ISP pins for programming

2. Acceleration sensor (1)

3. Serial cable (1)

4. USB cable (1)

5. A set of robotic chassis (1)

6. Geared DC motor (2)

7. Molded plastic Wheels with rubber grip (2)

8. Ball caster with 360 degree freedom (2)

9. Batteries for power supply (2)

10. Sensor connector (2)

**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.