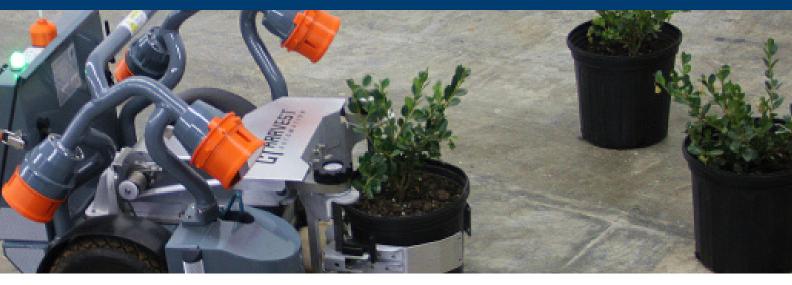




Training Document

Designed and written by: INDIAN INSTITUTE OF ROBOTICS



ROBOTICS COURSE CONTENTS

- INTRODUCTION TO ROBOTICS
- SCOPE OF ROBOTICS
- TYPES OF ROBOTS
- APPLICATIONS OF ROBOTS

BASIC ELECTRONICS

- RESISTORS
- CAPACITORS
- DIODES
- TRANSISTORS
- RECTIFIERS
- POWER SUPPLIES

- TRANSISTORS
- THYRISTORS
- LEDS, 7 SEGMENT LEDS
- POTENTIOMETERS
- CONCEPTS OF INTEGRATED
 CIRCUITS

CONCEPTS OF MOTORS

- AC MOTORS
- DC MOTORS
- BLDC MOTORS

- STEPPER MOTORS
- SERVO MOTORS
- GEARED MOTORS

CONCEPTS & TYPES OF SENSORS

- INTRODUCTION TO SENSORS
- CONNECTIONS OF SENSORS
- WORKING OF SENSORS
- 30+ SENSORS COVERED

MOTOR CONTROLLING CIRCUITS

• MOTOR CONTROLLING USING DRIVER ICS

- LM358 (DUAL OP-AMP)
- LM35 (TEMPERATURE SENSOR)
- L293D (DUAL H-BRIDGE ICS)
- 7805 / 7809 / 7812 (VOLTAGE REGULATOR)
- SERVO MOTOR CONTROL BOARDS
- STEPPER MOTOR CONTROL FOR 3D PRINTERS

CONCEPTS AND USES OF OTHER ROBOTICS PARTS

- SERVO BRACKETS MOTOR
 CLAMPS
- CASTOR WHEELS
- GEARS

- WHEELS
- GRIPPERS
- PAN TILT
- BREADBOARDS

CONCEPTS AND USES OF OTHER ROBOTICS PARTS (CONTD...)

- RADIO FREQUENCY- TX/RX
 BOARD
- DUAL DC MOTOR DRIVER
- MOTOR CONTROLLER H-BRIDGE DUAL MOTOR DRIVER
 CONTROL BOARD
- SERVO MOTOR CONTROLLER
 BOARD
- AVR 40 PIN CONTROLLER
 BOARD
- 16X2 SERIAL LCD MODULE
- 7 SEGMENT LED MODULES
- USB PROGRAMMER CABLE
- VGA TO HDMI CABLE
- CONNECTING WIRES
- ISP CONNECTING CABLES

- LED MATRIX MODULE
- SERIAL 16 SERVO

 CONTROLLER CHIP
- EIGHT CHANNEL RELAY
 INTERFACE BOARD
- ETHERNET TO SPI INTERFACE
 BOARD
- 2 CHANNEL 5V RELAY

 CONTROL BOARD
- PC MCU SERIAL LINK
 SOCKET
- 4X4 UNIVERSAL 16 KEYPAD
- PARALLEL PORT CABLE
- L298 MOTOR DRIVER IC
- MAX 232 DRIVER IC
- LM335 TEMPERATURE IC
 TRANSISTORS

INTRODUCTION TO EMBEDDED SYSTEMS

- INTRODUCTION & EVOLUTION OF EMBEDDED SYSTEM
- BASIC COMPONENTS OF EMBEDDED SYSTEM
- TYPES OF HARDWARE IN EMBEDDED SYSTEM
- CLASSIFICATION OF PROGRAMMING LANGUAGES IN EMBEDDED
 SYSTEM
- ADVANTAGE & DISADVANTAGE OF LOW LEVEL & HIGH LEVEL
 PROGRAMMING LANGUAGE OF EMBEDDED SYSTEM

MICROPROCESSOR & MICROCONTROLLER

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- MICROPROCESSOR V/S MICROCONTROLLER
- ARCHITECTURE OF MICROPROCESSORS & MICROCONTROLLERS
- INSTRUCTION SET OF MPU & MCU
- TYPE OF MICROCONTROLLERS
- MEMORY CLASSIFICATION

COMPUTER LANGUAGES

- LOW LEVEL LANGUAGES
- MIDDLE LEVEL LANGUAGE
- HIGH LEVEL LANGUAGE
- HOW LANGUAGES WORK WITH COMPILERS

EMBEDDED TOOLS

- ASSEMBLER
- INTERPRETER
- COMPILER

- SIMULATOR
- EMULATOR
- DEBUGGER

INTRODUCTION TO ARDUINO & PROGRAMMING

- INTRODUCTION TO ARDUINO
- BENEFITS OF USING ARDUINO IN ROBOTICS
- PROGRAMMING CONCEPTS OF ARDUINO IN ROBOTICS
- CONNECTING CONTROLLING AND INTERFACING COMPONENTS
 WITH ARDUINO TO PERFORM MACHINE CONTROL
- PROJECTS ON ARDUINO & ROBOTICS

LED, 7 SEGMENT LED AND LCD INTERFACING

- LED BLINKING
- DISPLAYING NUMBERS & CHARACTERS ON 7 SEGMENT LEDS
- DATA DISPLAY AND SCROLLING ON LCD MODULES

SWITCHES, RELAYS AND OTHER CONTROLLING COMPONENTS

- TYPES OF SWITCHES
- KEYBOARD INTERFACING WITH MICROCONTROLLER
- LED & MOTORS CONTROLLING USING SWITCHES
- LCS INTERFACING AND CONTROLLING USING SWITCHES

INTERRUPTS & TIMERS

- PWM TIMING CIRCUITS AND PROGRAMMING
- OTHER TIMING ICS AND FUNCTIONING

ADC INTERFACING

- INTRODUCTION TO ADC
- WHY ADC IS USED
- DATA COMMUNICATION USING ADC
- TYPES OF ADC TECHNIQUES
- CONCEPTS OF MULTIPLEXING & DEMULTIPLEXING
- DATA DISPLAY ON LED AND LCD

SENSOR CONNECTIONS

- 20+ SENSORS AND THEIR CONNECTIONS
- INTERFACING SENSORS WITH MUC
- CONTROLLING THE CIRCUITS USING SENSORS AND PROGRAMMING

COMMUNICATION PROTOCOLS

- 12C & SPI COMMUNICATION PROTOCOLS
- WIRED AND WIRELESS COMMUNICATION PROTOCOLS
- BLUETOOTH, ZIGBEE, XBEE ETC COMMUNICATION PROTOCOLS



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