



INDIAN INSTITUTE OF ROBOTICS

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Training Document

Designed and written by:
INDIAN INSTITUTE OF
ROBOTICS



PROGRAM FLOW-1

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

PROGRAM FLOW-2

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

PROGRAM FLOW-3

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

PROGRAM FLOW-4

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

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

PROGRAM FLOW-5

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

PROGRAM FLOW-6

LED, 7 SEGMENT LED AND LCD INTERFACING

- LED BLINKING
- DISPLAYING NUMBERS & CHARACTERS ON 7 SEGMENT LEDES
- 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

PROGRAM FLOW-7

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

- I2C & SPI COMMUNICATION PROTOCOLS
- WIRED AND WIRELESS COMMUNICATION PROTOCOLS
- BLUETOOTH, ZIGBEE, XBEE ETC COMMUNICATION PROTOCOLS



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