Robotix Lab Research Academy

We breed robots here!!

Syllabus for Electronics for roBOTix

0. Introduction to Robotics
    - 0.1 What is a robot?
    - 0.2 Classification of robots
    - 0.3 History of robotics
    - 0.4 Advantages and disadvantages of robots
    - 0.5 Robot components, characteristics and applications
    - 0.6 Robot vs. machine
    - 0.7 Robots and society
1. Introduction to Electric Systems
    - 1.1 Electric charge and current
    - 1.2 Electromotive force and potential difference
    - 1.3 Ohm's law, resistors, resistor coding, resistivity
    - 1.4 Conductors, insulators and semiconductors
    - 1.5 Capacitor, capacitance and applications
2. Simple DC Circuits
    - 2.1 Breadboard, power supply and DMM
    - 2.2 Resistances in series and parallel
    - 2.3 Capacitors in series and parallel
    - 2.4 Power and energy
3. Measuring Systems
    - 3.1 Ammeter
    - 3.2 Voltmeter
    - 3.3 Galvanometer
    - 3.4 Multimeter
    - 3.5 Wheatstone bridge and potentiometer
    - 3.6 Calibration and errors

4. **Actuators**
    - 4.1 Introduction
    - 4.2 Characteristics
    - 4.3 Hydraulic actuators
    - 4.4 Pneumatic actuators
    - 4.5 Electric motors
    - 4.6 Microprocessor control of electric motors
    - 4.7 Applications in robotics
5. **Mechanical Components**
    - 5.1 Gears
    - 5.2 Simple machines
    - 5.3 Screws and fasteners
    - 5.4 Linkages
    - 5.5 Structures
6. **Electromagnetism**
    - 6.1 Direction of magnetic field and field due to an electric current
    - 6.2 Force on a current-carrying conductor, Fleming's left hand rule
    - 6.3 Motors
    - 6.4 Electromagnetic induction and direction of induced emf
    - 6.5 Fleming's right hand rule and generators
7. **Semiconductor Materials**
    - 7.1 Semiconductors
    - 7.2 p-type and n-type semiconductors
    - 7.3 Junction diode and zener diode
    - 7.4 Rectifier circuits
    - 7.5 Transistor – construction and characteristics
    - 7.6 Transistor – Applications
    - 7.7 Operational amplifiers
    - 7.8 Applications of op-amp
    - 7.9 555 Timer and applications
8. **Number Systems**
    - 8.1 Number systems
    - 8.2 Binary numbers
    - 8.3 Conversion from one system to the other
9. **Digital Systems**
    - 9.1 Basic logic functions
    - 9.2 Logic gates
10. **Interfacing Digital and Analog Systems**
    - 10.1 Need for conversion
    - 10.2 Digital to analog conversion
    - 10.3 Analog to digital conversion
    - 10.4 Simple Comparator

11. Sensors
    - 11.1 Introduction
    - 11.2 Sensor characteristics
    - 11.3 Position sensors
    - 11.4 Velocity and acceleration sensors
    - 11.5 Force and pressure sensors
    - 11.6 Light and infrared sensors
    - 11.7 Touch and tactile switches
    - 11.8 Ultrasonic sensors
    - 11.9 Applications
    - 11.10 Importance in robotics
12. Hands-on sessions
    - 12.1 Motorised mechanical kit
    - 12.2 Simple DC circuits
    - 12.3 Transistors, diodes, LDR in circuits
    - 12.4 555 timer circuits
    - 12.5 IR sensor circuit
    - 12.6 Simple Line follower robot