**Practical 1: Introduction to Arduino Circuits**

**1(a) AIM: Introduction to Arduino Circuits and Breadboarding**

Overview of Arduino and its Capabilities

• The Arduino is a development board for the ATMEGA328 micro- controller.

• There are other useful features like input/output pins, a USB port for communication between the Arduino and a computer, and a 9V DC power connector. The different parts can be referred in the figure below.

• One of the reasons the Arduino is so popular is that it is super easy to write the Arduino code. Most microcontrollers are programmed with the C language or assembly code, which is difficult to mas- ter, whereas Arduino programming language uses C/C++, which is much easier to learn and use.

• The Arduino is a versatile electronics development platform, so you can connect a huge variety of input and output devices to it. Input devices could be a temperature sensor, magnetometer, PIR sensor, ultrasonic range finder, and many more.

Breadboarding basics for connecting components

• The rows of a solderless breadboard are connected inside, allowing you to connect components by plugging them into the same row as each other.

• The special long rails along the edges are for easy access to power and ground.

**1(b) AIM: Write a Program to enable switching effect in LED using Arduino**

• ОBЈЕСТIVE:

To combine basic hardware and software interactions, offering a tan- gible demonstration of how code can control physical components.

• COMPONENTS REQUIRED:

|  |  |  |
| --- | --- | --- |
| Name | Quantity | Component |
| U1 | 1 | Arduino Uno R3 |
| D1 | 1 | Red LED |
| R1 | 1 | 220Ω |

**AIM: Write a Program to interface Light Sensitive Resistor with Arduino**

• OBJECTIVE:

To glow a bulb by sensing the light intensity falling on the Light Sensitive Resistor, which is also known as Light Dependent Resistor (LDR) using Arduino.

• COMPONENTS REQUIRED:

|  |  |  |
| --- | --- | --- |
| Name | Quantity | Component |
| U1 | 1 | Arduino Uno R3 |
| L1 | 1 | Light Bulb |
| R1 | 1 | 1 ΚΩ Resistor |
| R2 | 1 | 10 ΚΩ Resistor |
| R3 | 1 | Photoresistor |

**Practical 3: Interface Arduino with a Temperature Sensor**

**AIM: Write a Program to interface Temperature Sensor with Arduino**

• OBJECTIVE:

To know the types of sensors used to measure the temperature of the surroundings using Arduino and display the result on Serial Monitor or any other available display units.

• COMPONENTS REQUIRED:

|  |  |  |
| --- | --- | --- |
| Name | Quantity | Component |
| U1 | 1 | Arduino Uno R3 |
| D1 | 1 | Red LED |
| D2 | 1 | Yellow LED |
| D3 | 1 | Green LED |
| U2 | 1 | Temperature Sensor (TMP36) |
| R1.R2.R3 | 3 | 220Ω |

**Practical 4: Interface Arduino with Humidity Sensor**

**AIM: Write a program to interface Arduino with humidity Sensor**

• OBJECTIVE:

To know the procedure to interface Humidity sensor with Arduino and provide the output on Serial monitor or any available display.

To know an alternate approach for indicating humidity control rate by using an LED.

• COMPONENTS REQUIRED:

|  |  |  |
| --- | --- | --- |
| Name | Quantity | Component |
| U1 | 1 | Arduino Uno R3 |
| D1 | 1 | RGB LED |
| UDHT11.PROXY | 1 | Temperature Sensor [TMP36] |
| R1.R2.R3. R4 | 4 | 1 ΚΩ |

**Practical 5: Programs using Line tracking sensors**

AIM: Write a Program to interface Arduino with Line tracking sensors

• OBJECTIVE:

To provide a stepping stone for students to implement a robot by using Line tracking sensors.

• COMPONENTS REQUIRED:

|  |  |  |
| --- | --- | --- |
| Name | Quantity | Component |
| U1 | 1 | Arduino Uno R3 |
| BAT1 | 1 | 9V Battery |
| M1.M2 | 2 | Hobby Gearmotor |
| U2 | 1 | H-bridge Motor Driver |
| U3.U4.U5.U6.U7 | 5 | IR sensor |
| U8 | 1 | 5V Regulator LM7805] |

**Practical 6: Program Arduino using Ultrasonic Sensors**

**AIM: Write a program to interface Arduino with an Ultrasonic sensor.**

• OBJECTIVE:

To make students aware about the procedures for interfacing an Ar- duino board with an Ultrasonic sensor. This practical will provide an idea of implementing a range finding based projects.

• COMPONENTS REQUIRED:

|  |  |  |
| --- | --- | --- |
| Name | Quantity | Component |
| U1 | 1 | Arduino Uno R3 |
| D1 | 1 | Red LED |
| PINGI | 1 | Ultrasonic Distance Sensor |
| R1 | 1 | 1kΩ |

**Practical 7: Program Arduino using digital infrared motion sensors**

**AIM: Write a program to interface Passive Infrared Sensor**

• OBJECTIVE:

To make student understand the procedure used for interfacing a Digital Infrared Sensor (more specifically, PIR (Passive Infrared Sensor)). It will help students to explore various object tracking based projects.

• COMPONENTS REQUIRED:

|  |  |  |
| --- | --- | --- |
| Name | Quantity | Component |
| U1 | 1 | Arduino Uno R3 |
| D1 | 1 | Red LED |
| PIR1 | 1 | PIR Sensor |
| R1 | 1 | 1ΚΩ |

**Practical 8: Program Arduino using Gas Sensor**

**AIM: Write a program to interface Arduino with Gas sensor.**

• OBJECTIVE:

To make student understand the procedure required to interface a Gas Sensor with an Arduino. It will help students to explore various Gas leakage or smoke presence detection-based projects.

• COMPONENTS REQUIRED:

|  |  |  |
| --- | --- | --- |
| Name | Quantity | Component |
| U1 | 1 | Arduino Uno R3 |
| D1 | 1 | Red LED |
| D2 | 1 | Yellow LED |
| D3 | 1 | Green LED |
| D4 | 1 | Red LED |
| R2.R3.R4.R5 | 4 | 220Ω |

**Practical 9: Program Arduino using Servo Motor**

**AIM: Write a program to interface an Arduino with servo motor.**

• OBJECTIVE:

To make student understand the procedure to interface a Servo Motor with an Arduino. It will help students to explore various robot related automation projects.

• COMPONENTS REQIRED:

|  |  |  |
| --- | --- | --- |
| Name | Quantity | Component |
| U1 | 1 | Arduino Uno R3 |
| SERVO1 | 1 | Positional Micro Servo |

**Practical 10: Program to create Joystick by using an Arduino**

**AIM. Write a program to design a Joystick using an Arduino Board.**

• OBJECTIVE:

To make students understand the procedure to design a Joystick using Arduino. It will help students to explore various infotainment related applications related projects.

• COMPONENTS REQUIRED:

|  |  |  |
| --- | --- | --- |
| Name | Quantity | Component |
| U1 | 1 | Arduino Uno R3 |
| D1 to D11 | 11 | Red LED |
| R12 | 1 | Potentiometer 10kΩ |
| R1 to R11 | 11 | 220Ω |