EXPERIMENT NO-8

1) Aim- Implementing potentiometer sensor.

2) Hardware required-

Arduino board

Potentiometer

Hook-up wires

Breadboard

3) Theory-

Potentiometers are used to provide a variable resistance, like a potentiometer. The value can be read as an analog value, with the Arduino board. The value goes from 0 to 1023 depending on the rotation of the knob on the potentiometer. Potentiometers have a range of resistance. They can be attuned from zero ohms to whatever maximum resistance that is specific to it. For example, a potentiometer of 10 kΩ can be adjusted from 0 Ω to its maximum of 10 kΩ. The maximum value also depends on the amount of power supplied to the module, make sure that the board is set to 5V for the correct values. The angular range is 300 degrees with a linear change in value. The resistance value is 10k ohms. This module can be used to turn on and off a light, as well as change the frequency of a blinking light.

4) Circuit-

- First make sure that the Arduino is powered off.
- Plug the potentiometer on the breadboard, with each leg on an independent line. Note: some potentiometers have a different layout, with 2 pins facing one side, and the middle pin facing the other side. In this case, plug the potentiometer in the middle of the breadboard so it will be easier to add wires to the circuit.
- Connect one of the external leg of the potentiometer to the ground of the Arduino (GND).
- Connect the other external leg to the power supply (5V).
- Plug the middle leg to an analog pin of the Arduino, for example here A0.

5) Code-

```
#define POTENTIOMETER_PIN A0
void setup()
{
Serial.begin(9600);
}
void loop()
{
Serial.println(analogRead(POTENTIOMETER_PIN));
delay(100);
}
```

6) Diagram-

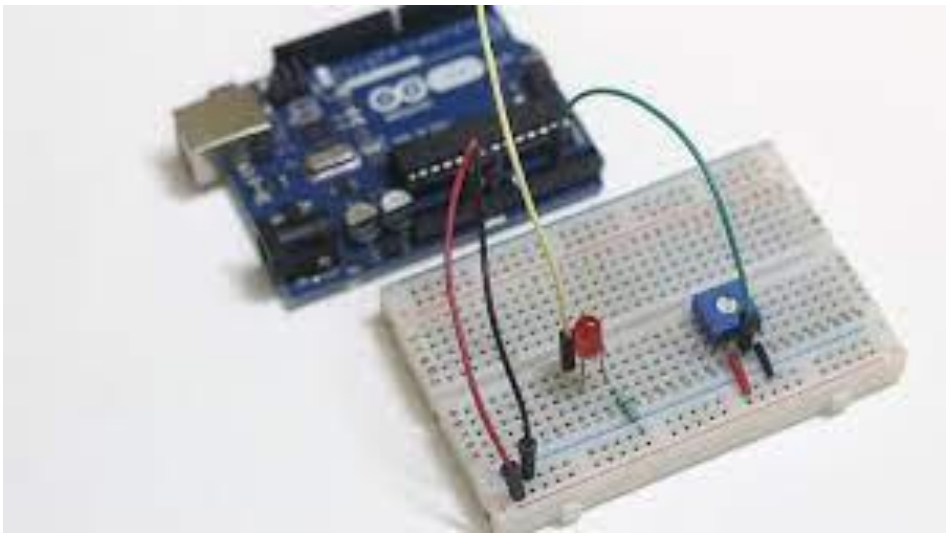

Fig1. Potentiometer sensor

7) Result- The potentiometer is used successfully.

8) Precautions-

1) All the connections should be tight.

2) The connections must be proper.

EXPERIMENT NO- 9

1) Aim- To control electronic appliances using Relay shield sensor.

2) Hardware required-

Arduino board

Relay sensor

Bulb

Hook-up wires

Breadboard

3) Theory-

An electrically operated switch like a relay is used to turn ON/OFF a load by allowing the flow of current throughout it. This relay is simply controlled by low voltage (5V) which is generated by the pins of Arduino So, a relay module controlling with the Arduino board is very simple. Usually, relays are very helpful whenever you want to control an electrical circuit with a low-power signal. This relay module is powered with 5V which is suitable to use with an Arduino. Similarly, there are other types of relay modules available that are powered with 3.3V which are ideal for different microcontrollers. Actually, a relay is a switch that is operated electrically through an electromagnet.

4) Circuit-

The required components to build this circuit mainly include the Arduino Board, Resistors – 1K & 10K, BC547 transistor, 6V/12V relay, 1N4007 diode & a 12V fan. Once the button is pushed then the fan will be switched ON and until the same button is again pushed, the fan will stay in the same condition.

5) Code-

```
int pinButton = 8;
int Relay = 2;
int stateRelay = LOW;
int stateButton;
int previous = LOW;
long time = 0;
long debounce = 500;
```

```
void setup() {
pinMode(pinButton, INPUT);
pinMode(Relay, OUTPUT);
}

void loop() {
stateButton = digitalRead(pinButton);
if(stateButton == HIGH && previous == LOW && millis() - time > debounce) {
    if(stateRelay == HIGH){
    stateRelay = LOW;
    }
    else {
         stateRelay = HIGH;
    }
time = millis();
}

digitalWrite(Relay, stateRelay);
previous == stateButton;
}
```

6) Diagram-

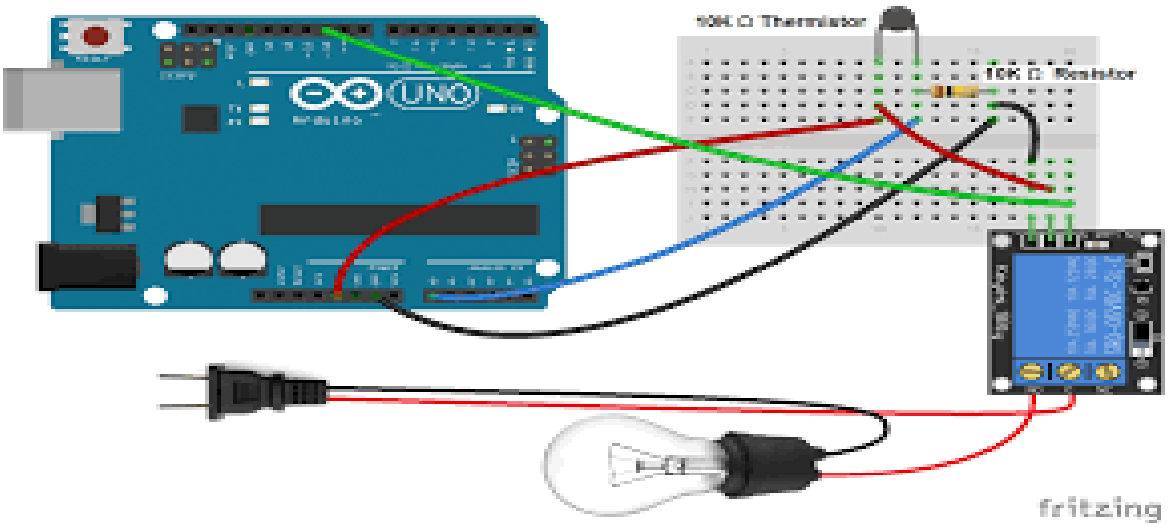

Fig1. Relay Sensor

7) Result- The relay sensor set up is made.

8) Precautions-

1) All the connections should be tight.

2) The connections must be proper.