

Practical-4

Aim: What is relay? Explain it's Structure, Types, Applications. Programming & Interfacing of Relay with Arduino Uno.

1) What's Relay? It's Structure?

A **Relay** is an electro-mechanical or solid-state device, used to control a device or a circuit electrically by applying a control signal to its coil. It is also known by the names auxiliary, miniature or control relay.

Structure:

There are different categories of the relays depending upon the structure and the operation of the relay. However, a general relay structure of a relay comprises of the following parts.

- Electromagnet.

The electromagnets used in the relays are made up with the help of the coil. The coil wire is wrapped on a core of soft iron. The soft iron core is used for the path for magnetic flux. As the name suggests electromagnetic relay works on the electromagnet.

- Moveable Armature.

The moveable armature is used in contact with the electromagnet. The complete working of the relay is dependent on the electromagnet used in the relay and the moveable armature. When the electromagnet is forced to perform its operation due to any overload condition or the predefined condition as per the operation of the relay, the moveable armature is used for the connection purposes or the contact purposes.

- Switch Point Contacts.

The switch point contacts in a relay are used for the switching purposes. There are basically switch points in a general relay. With the help of the switch points, the switching operation of the relay is performed.

- Spring.

The above-mentioned components in a structure of relay are held together at their fixed position with the help of the spring. The spring can be adjusted for the switching purpose of the relay.

2) What's SPDT, DPDT &Types of Relay & It's applications.

Different types of Electrical Relay Switches are available in market

1. SPST – Single Pole Single Throw
2. DPST – Double Pole Single Throw
3. SPDT – Single Pole Double Throw
4. DPDT – Double Pole Double Throw

but most frequently used Relays are SPDT Relay and DPDT Relay both are acts as Electromechanical switch.

SPDT Relay

Single Pole Double Throw (SPDT) Relay contains two coil terminals and common terminal, then two switching terminals N/O (Normally Open), N/C (Normally Close)



If there is not enough DC supply in coil terminals then Relay represents idle condition that is common terminal connected in N/C terminal. When the coil gets required DC supply then coil gets Magnetically Energized and this magnetic flux force attracts common terminal lever which is made of iron and makes the connection to N/O terminal, now the N/C becomes open. **DPDT Relay**

Double Pole Double Throw (DPDT) Relay contains two coil terminals, two separate common terminals C1, C2 and two Normally Open (N/O1, N/O2), two Normally Close (N/C1, N/C2) terminals, this Relay makes two different connection and control with one control signal to the coil.



If there is no bias at coil then Relay stays in idle condition that is common terminals are connected with N/C terminals, when DC bias arrives to coil then it gets magnetically energized and attract common terminal levers and makes connection between common terminals and N/O terminals, now the N/C terminals becomes open and those terminals are works with their pairs.

Application Of Relay

- Relays are used for isolating a low voltage circuit from high voltage circuit.
- They are used for controlling multiple circuits.
- They are also used as automatic change over.
- Microprocessors use relays to control a heavy electrical load.

3) **RELAY with LED Blink using Arduino UNO --> It should include:**
Tinkercad circuit connection setup image, code, output
(screenshot/serial monitor/image of activity).

CODE:

```
void setup() { pinMode(10,OUTPUT);

pinMode(9,OUTPUT);

}
```

```
void loop() { digitalWrite(10,HIGH);  
  
digitalWrite(9,HIGH); delay(3000);  
  
digitalWrite(10,LOW);  
  
digitalWrite(9,LOW); delay(3000);  
  
}
```

OUTPUT:

