



# Andhra Pradesh State Skill Development Corporation



## INTERNET OF THINGS (IoT)

### LED FADING & LDR INTERFACING WITH ARDUINO



## LDR Interfacing with Arduino

**Aim:** Our goal in this project is to interface LDR with Arduino and print output on a serial monitor.

**Software:** Arduino IDE.

### Components Required:

1. System -1
2. Arduino Uno Board -1
3. Arduino dumping cable -1
4. LDR-1
5. Resistor  $1K\Omega$  -1
6. Breadboard-1
7. Connecting Wires –Required

### Theory:

A Light Dependent Resistor (LDR) or a photoresistor is a device whose resistivity is a function of the incident electromagnetic radiation. Hence, They are light sensitive devices. They are also called photoconductors, photoconductive cells or simply photocells. They are made up of semiconductor materials having high resistance. LDR's are light dependent devices whose resistance is decreased when light falls on them and that is increased in the dark. When a light dependent resistor is kept in dark, its resistance is very high. This resistance is called dark resistance. It can be as high as  $10^{12} \Omega$  and if the device is allowed to absorb light its resistance will be decreased drastically. If a constant voltage is applied to it and intensity of light is increased the current starts increasing.

### Procedure:

1. Open Arduino IDE.
2. Write the code in the text editor.
3. Save the sketch with .ino extension.
4. Connect the hardware circuit and Connect your Arduino Board to the USB port of your computer.
5. Select the serial device of the Arduino board from the Tools | Serial Port menu.
6. Compile the file by clicking on verify button
7. If successful, the message "Done Compiling." will appear in the status bar.
8. If there is any errors it will show them in Transcript window, rectify those errors and compile it again.
9. Push the reset button on the board then click the Upload button in the IDE. Wait a few seconds. If successful, the message "Done uploading." will appear in the status bar.



## Code:

```
int LDR_Pin = A0; //analog pin 0
void setup(){
  Serial.begin(9600);
}
void loop(){
  int LDRReading = analogRead(LDR_Pin);
  Serial.println(LDRReading);
  delay(250); //just here to slow down the output for easier reading
}
```

**Result:** We can observe LDR readings in a serial monitor.

## Led fading with LDR using Arduino Uno

**Aim:** our goal in this project is to fade the led with LDR using Arduino Uno

**Software:** Arduino IDE.

### Components Required:

1. System -1
2. Arduino Uno Board -1
3. Arduino dumping cable -1
4. LDR-1
5. Resistor  $1K\Omega$  -1
6. Breadboard-1
7. Connecting Wires –Required

**Theory:** Led brightness can be varied by applying a variable voltage to it. Suppose if led max voltage requirement is 2 volts. If we supply varying voltage suppose 0.9 volts or 1.5 volts we can fade led. At 2 volts led will glow with full intensity/brightness and at 1 volt the led brightness will be half.

PWM(Pulse width modulation) is basic technique used by microcontrollers to fade or control the brightness of led. PWM actually outputs a varying voltage on digital pins of microcontrollers. Varying voltage is generated using the timers of microcontrollers. I assume you people know about PWM. In case no, I am just giving a short introduction.

PWM utilizes timers and a particular pin is switched on and off for a specified period of time. A period is generally known as a duty cycle; we can compute the output voltage by changing the duty cycle. 100% duty cycle represents full voltage output and 50% duty cycle outputs half voltage.



Arduino provides a lot of feasibility for pwm even a predefined library is present. We only need to initialize the pwm pin and output the voltage we want to that pin. Pwm functionality is present on Arduino Uno pins (3, 5, 6, 9, 10, or 11). PWM signal ranges between 0 to 255. Where 255 represents 5 volts and 0 represents 0 volts. 127 represents 2.5 volts.

Arduino analogWrite(x,y) function allows us to output a pwm voltage of desired voltage. In function the x argument is the pin number to which we want our pwm signal to appear. my argument is pwm value.

Let's start the main project. I am going to output the pwm signal on pin 9 of arduino. To read the input voltage by light sensor I am using analog channel 0 of the arduino.

In the project below I am going to read an analog signal from LDR(light detecting resistor) and then write the signal corresponding to the pwm value to led in order to fade it. Actually writing means fading led. Analog Write outputs value in the form of PWM(Pulse width modulation). For high values PWM duty cycle will be high and for low values PWM(Pulse width modulation) duty cycle will be low.

## Code:

```
int ledpin = 9;
int ldrpin = 1;
int value = 0;
void setup()
{
  Serial.begin(9600);
}
void loop()
{
  value = analogRead(ldrpin);
  value = constrain(value,400,500);
  value = map(value,400,500,255,0);
  Serial.println(value);
  analogWrite(ledpin, value);
  delay(200);
}
```

**Result:** the LED will be off in complete brightness, and as the brightness in the surrounding decreases, the LED begins to glow brighter.