#3:Light Intensity Measurement using LDR sensor and Arduino on TinkerCAD

Light Intensity is usually measured to control the switching on and off of the light in the Home Automation system. LDR sensor is the photoresistor that plays a major role in the Light Intensity Measurement circuit. Arduino is the brain behind smart lightning. LDR sensor full form is Light Dependent Resistor. The final step before deploying the smart lighting system is to fine-tune the Arduino code using the Arduino IDE, adjusting the thresholds for light intensity levels to ensure seamless and precise control over the LED brightness.

Devices and circuits are usually designed and simulated on software before building the circuit itself. This ensures circuit safety and makes it easy to build the circuit without worrying about any hazards from the design. TinkerCad is an online simulation software for electronics circuits. Let us explore how to measure Light Intensity using LDR and Arduino.

Arduino Circuit Diagram for LDR Sensor:

An Arduino circuit diagram using an LDR sensor typically involves connecting the LDR to an analog input pin on the Arduino. Here's a basic schematic:

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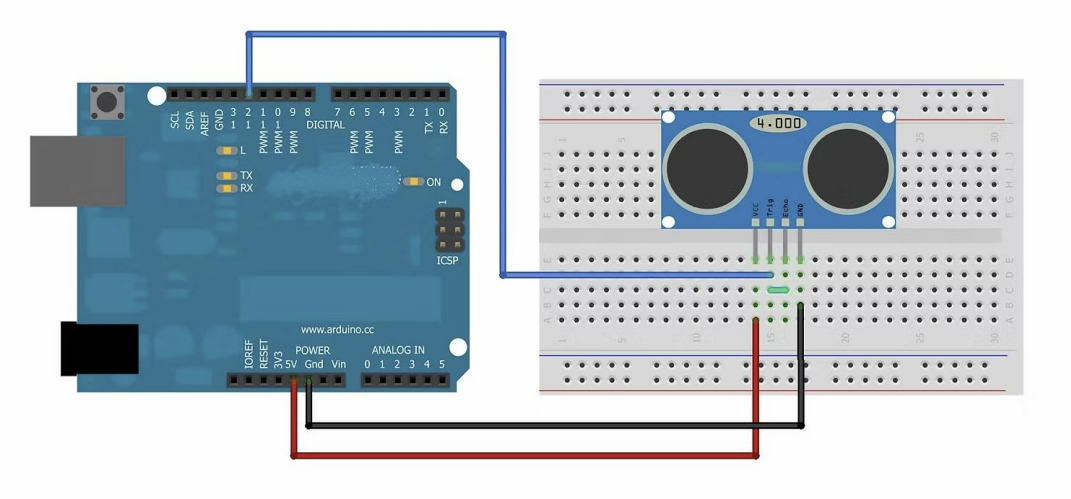
luaCopy code
LDR Terminal 1 ----> Arduino Analog Pin (A0)
LDR Terminal 2 ----> Ground
```

This setup allows the Arduino to read the analog voltage from the LDR, which changes based on light intensity.



Arduino Circuit diagram

6. LDR (Light-Dependent Resistor)

LDR

LDR is a #photoresistor that works on the principle of #photoconductivity. The surface of the LDR is made with a layer of semiconducting material that is responsible for measuring the light intensity. The principle states that when light falls on the surface of the semiconducting material, the electrons receive energy, and movement is caused inside the material.

When those electrons reach the valence band, electron-hole pairs are formed. This in turn reduces the resistance of the material and the corresponding voltage is given as the output of the device.

LDR Circuit:

An LDR circuit is a simple arrangement that utilizes the properties of the Light Dependent Resistor to control various electronic components based on changes in light intensity. One common LDR circuit involves using an LDR and a resistor to create a voltage divider. The voltage at the junction of the LDR and the resistor changes as the light intensity changes, which can then be used to trigger different actions in a circuit.

Applications of LDR:

LDRs find applications in various fields due to their light-sensitive nature. Some common applications include:

1. **Automatic Streetlights**: LDRs are used to detect darkness and turn on streetlights automatically when it gets dark.
2. **Camera Exposure Control**: In photography, LDRs help control the exposure settings of cameras based on available light.
3. **Security Systems**: LDRs can be used to trigger security alarms or lights when someone enters a room or area.

4. **Outdoor Light Control**: LDRs are used in garden lights and outdoor lighting systems to turn on lights as dusk sets in.
5. **Solar Panels**: LDRs can detect changes in sunlight to optimize the positioning of solar panels for maximum efficiency.
6. **Weather Stations**: LDRs can be used to measure sunlight levels in weather stations to understand climate conditions.

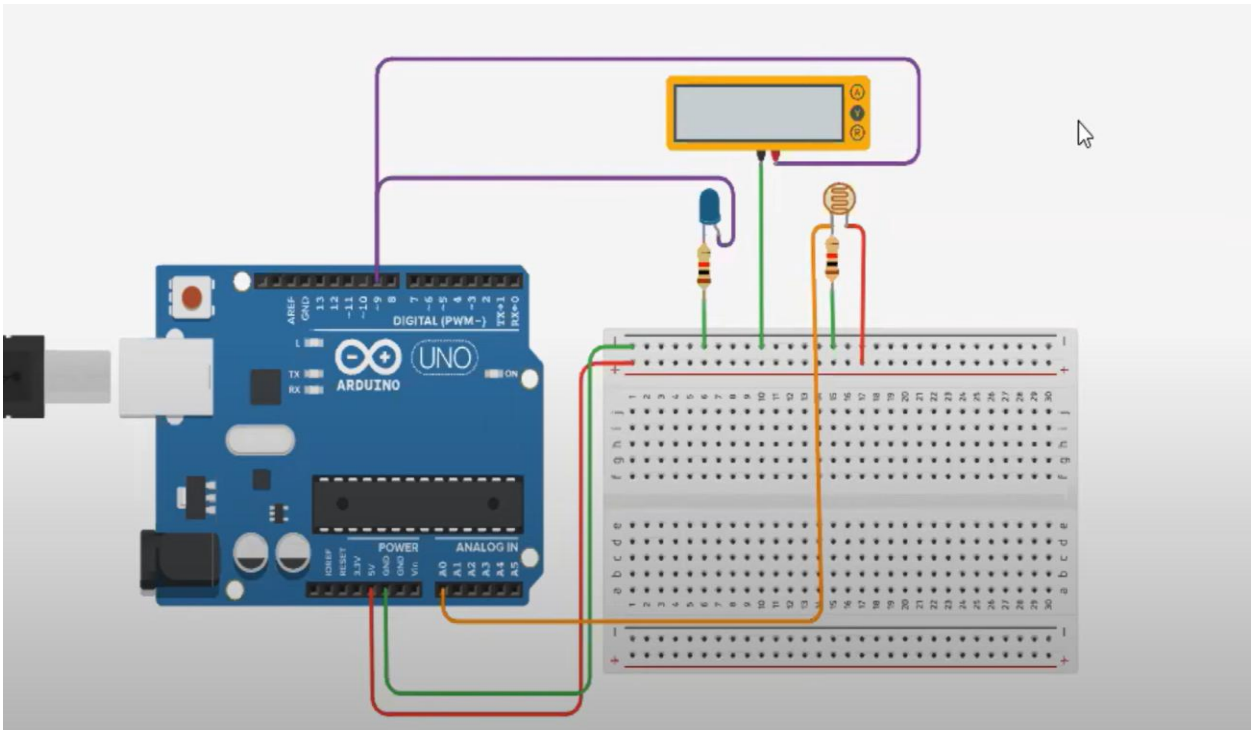
LDR Sensor Working:

The working principle of an LDR sensor is based on the fact that the resistance of the semiconductor material within the LDR changes with varying light levels. In bright light, the resistance decreases, allowing more current to flow through the LDR. In low light or darkness, the resistance increases, limiting the current flow. This change in resistance is exploited in circuits to detect and respond to changes in ambient light conditions. When the LDR is exposed to light, the voltage across it changes, which can be used to control other components in a circuit, such as LEDs, relays, or microcontrollers like the Arduino.

By combining LDRs with microcontrollers like the Arduino, you can create responsive and intelligent systems that adapt to changes in light conditions and trigger appropriate actions based on those changes.

Creating the light intensity measurement with the help of LDR sensor and Arduino:

First, it is necessary to define the ground and power supply line of the breadboard. This is done by connecting the 5V supply pin from the Arduino to one of the lines of the breadboard and the Ground (GND) pin of the Arduino to another line of pins of the breadboard. In the given circuit diagram, the wires in Red are connected to the power supply and those in Green are connected to the Ground.



The LDR has two terminals of which one is directly connected to the Analog pin (A0) of the Arduino and the same PIN is connected to the ground line of the breadboard through the resistor. The second pin of the #LDR is connected to the power supply line of the breadboard.

Next, in this circuit, LED is the output device. So the anode terminal of the LED is connected to the Digital pin (PIN 9) of the Arduino. The cathode terminal of the #LED is connected to the ground line of the breadboard through the resistor.

We are using Multimeter as the output indicator. Hence, the pin used for output, i.e. PIN 9 is connected to the positive (RED) terminal of the Multimeter and the negative (BLACK) terminal of the #multimeter is connected to the ground line of the breadboard.

Code:

https://github.com/sami-118/tinker-cad-project.git