

AUTOMATIC STREET LIGHT CONTROLLER SIMULATION USING ARDUINO UNO

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WHAT IS AUTOMATIC STREET LIGHT SYSTEM ?

Automatic Street Light Control System is a simple and powerful concept, which uses transistor as a switch to switch ON and OFF. By using this system manual works are removed. It automatically switches ON lights when the sunlight goes below the visible region of our eyes. It automatically switches OFF lights under illumination by sunlight. This is done by a sensor called Light Dependent Resistor (LDR) which senses the light actually like our eyes. By using this system energy consumption is also reduced because now-a-days the manually operated street lights are not switched off properly even the sunlight comes and also not switched on earlier before sunset.

COMPONENTS

- LDR
- LED
- Arduino Uno
- Resistor
- 16x2 LCD Display

DESCRIPTION OF COMPONENTS

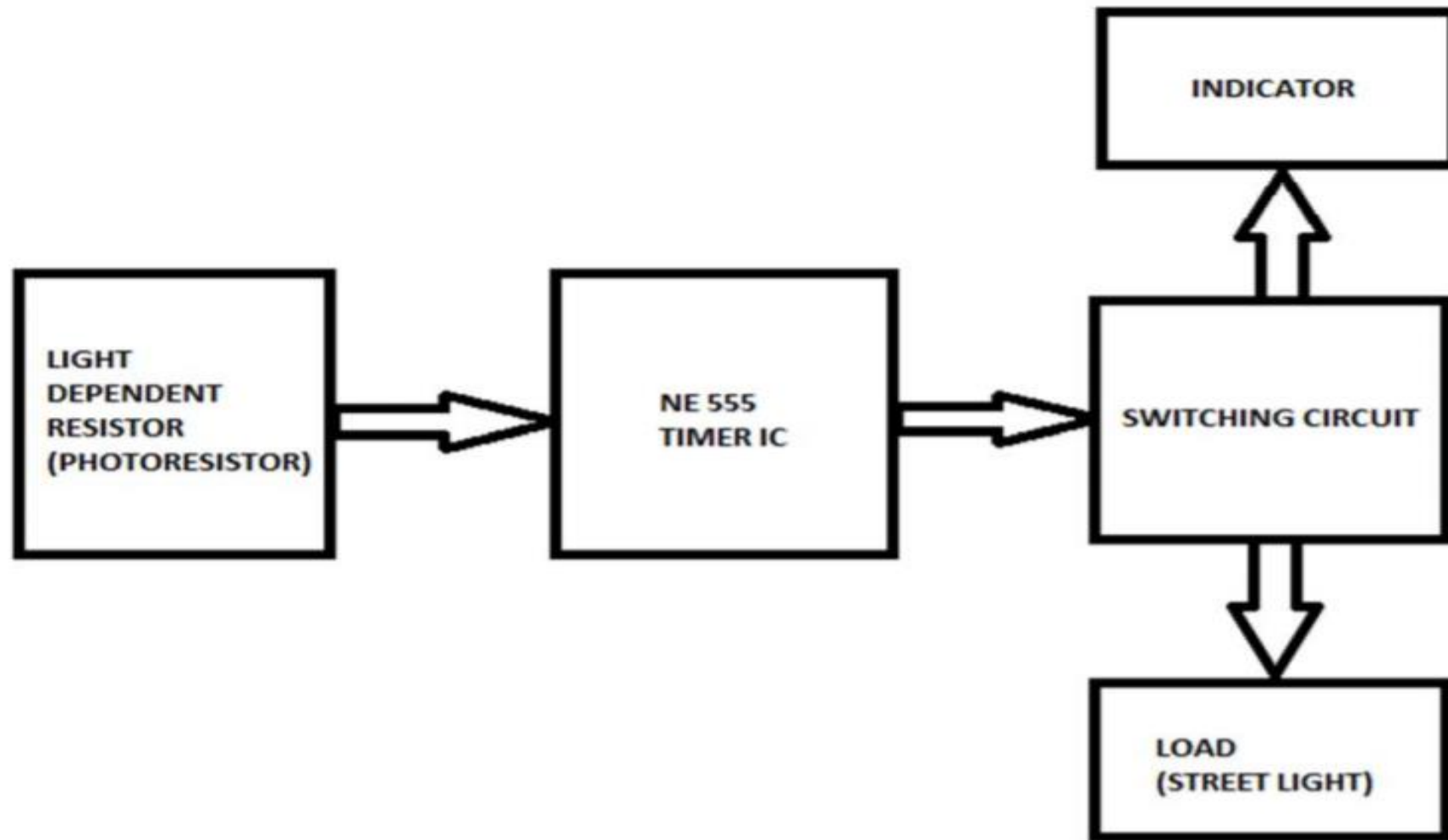
- **LDR:** Light Dependent Resistors (LDRs) also known as Photoresistors, or photocells, are low-cost variable resistors where the resistance changes depending on the amount of light hitting its surface. In dark environments the resistance is high; in light environments the resistance is lower. Due to the imprecise nature of photoresistors, they are unsuitable for measuring exact levels of light but are capable of detecting changes. They can be used to respond to events such as the transition from daytime to night-time (and vice versa) for home automation and gardening applications, and are often used to control street lighting. In this project, Arduino Uno will controlling it with ADC pin and Digital Output pin.
- **LED:** The LED(Light Emitting Diode) is a light source which uses semiconductors and electroluminescence to create light. Currently the LED lamp is popular due to it's efficiency and many believe it is a 'new' technology. It common uses: indication lights on devices, small and large lamps, traffic lights, large video screens, signs, street lighting(although this is still not widespread). LEDs create light by electroluminescence in a semiconductor material. Electroluminescence is the phenomenon of a material emitting light when electric current or an electric field is passed through it – this happens when electrons are sent through the material and fill electron holes. An electron hole exists where an atom lacks electrons (negatively charged) and therefore has a positive charge. Semiconductor materials like germanium or silicon can be “doped” to create and control the number of electron holes. Doping is the adding of other elements to the semiconductor material to change its properties. By doping a semiconductor you can make two separate types of semiconductors in the same crystal. The boundary between the two types is called a p-n junction. The junction only allows current to pass through it one way, this is why they are used as diodes. LEDs are made using p-n junctions. As electrons pass through one crystal to the other they fill electron holes. They emit photons (light).

- **Resistor**: A resistor is a component that resists the flow of electricity. This flow of electricity is called current. Each resistor has a value that tells how strongly it resists current flow. This resistance value is called the ohm, and the sign for the ohm is the Greek letter omega: Ω . (Later on you will see the symbol $k\Omega$, meaning kilo-ohm, which is one thousand ohms.) In electronic circuits, resistors play an important role to limit the current and provide only the required biasing to the vital active parts like the transistors .
- **LCD**: Liquid Crystal Displays (LCDs) offer several advantages over traditional cathode-ray tube displays that make them ideal for several applications. Of course, LCDs are flat, and they use only a fraction of the power required by CRTs. They are easier to read and more pleasant to work with for long periods of time than most ordinary video monitors. There are several tradeoffs as well, such as limited view angle, brightness, and contrast, not to mention high manufacturing cost. As research continues, these limitations are slowly becoming less significant. In this project, LCD will be used for give your information about ADC Value from LDR.
- **Arduino Uno**: The Arduino Uno is a microcontroller board based on the ATmega328 .It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.”

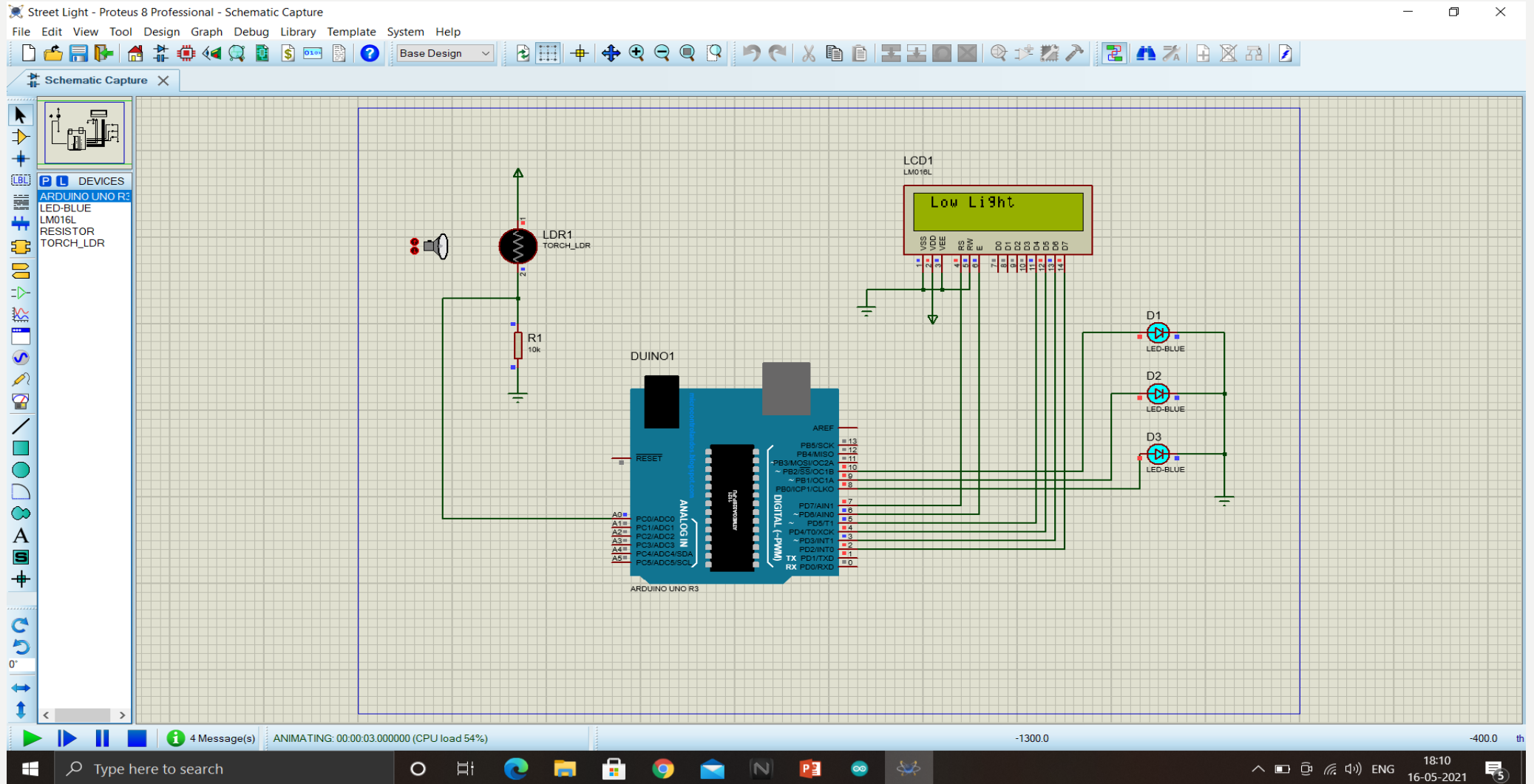
APPLICATIONS OF AUTOMATIC STREET LIGHTS

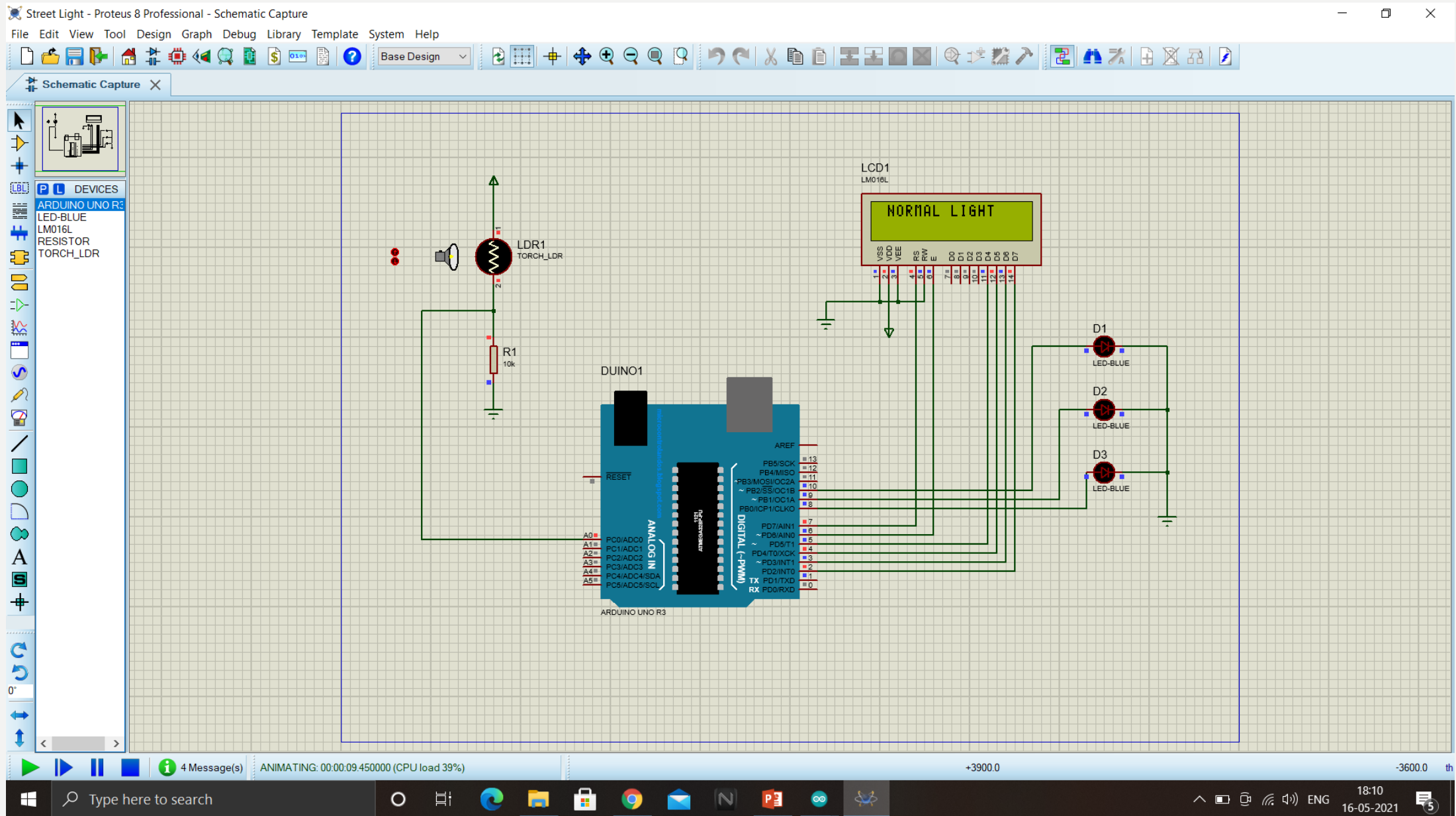
- Government Units & Municipalities
- Corporate & Big Businesses
- Great Way to Light Up Streets
- Along Roads & Highways
- Schools & Universities

BLOCK DIAGRAM



SIMULATION





CODE

```
#include <LiquidCrystal.h>

int a,b,c;

LiquidCrystal lcd(7,6,5,4,3,2);


void setup ()
{
  pinMode(8,OUTPUT);
  pinMode(9,OUTPUT);
  pinMode(10,OUTPUT);
  lcd.clear();
  lcd.begin(16,2);
  lcd.setCursor(1,0);
  lcd.print("STREET LIGHT");
  lcd.setCursor(1,1);
  lcd.print("PROJECT");
  delay(1000);
  lcd.clear();
  Serial.begin(9600);
}
```

```
void loop ()
{
a=analogRead(A0);
b=map(a,0,1023,0,255);
Serial.println(b);
if(b<220)
{
lcd.setCursor(1,0);
lcd.println("Low Light");
digitalWrite(8,HIGH);
delay(500);
digitalWrite(9,HIGH);
delay(500);
digitalWrite(10,HIGH);
}
if(b>220)
{
lcd.setCursor(1,0);
lcd.println("NORMAL LIGHT");
digitalWrite(8,LOW);
digitalWrite(9,LOW);
digitalWrite(10,LOW);
}
}
```

ADVANTAGES AND DISADVANTAGES

ADVANTAGES

- Cost of operating automatic solar street lights is far less when compared to the conventional street lights.
- Since automatic street light systems feature no moving parts, they require less maintenance than conventional street lights.
- The automatic solar street light system is a stand-alone arrangement & therefore requires no external wiring or having to connect with the grid.

DISADVANTAGES

- The automatic street light system requires a higher initial investment in comparison to conventional street lights.
- Rechargeable batteries of the automatic street light system are required to be replaced a few times.
- Risk of theft of the automatic street light system is relatively higher since they are non-wired & are much expensive.

FUTURE SCOPE

- With the advancement in science & technology future scope of automatic solar street lights is very bright. Demand for power affects human life in many ways. It is not only important but essential to find ways to conserve power in order to prevent exhausting resources. Switching to a smart automatic street light system will also reduce power wastage which conventional street lights are known to do.

CONCLUSION

- In coming days, this will prove a great boon to the world, since it will save a lot of electricity of power plants that get wasted in illuminating the streets lights. As the conventional sources are depleting very fast, then it's time to think of alernatives.

REFERENCES

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THANK YOU