SMART STREET LIGHT MANAGEMENT SYSTEM USING LORA TECHNOLOGY

AIM:

Design and Development of Smart Street Light Management System Using LoRa Technology.

PURPOSE:

Street lights are important for vehicle travellers especially in night times. Normal street lights are manually operated by lineman. These kinds of street lights consume lot power waste because of day time enabling. To solve this kind of problem we need smart street lights. Smart street lights are inbuilt embedded systems with sensors. LDR sensor can identify day and night, according to light condition LED light will be ON. If you add some more sensors to it then it will be useful in various aspects. Like by adding temperature, humidity and smoke detection sensors we can read environmental parameters through street light. Also it can update voltage and current values of street light using LoRa technology. The proposed project title is smart street light management system using LoRa technology using Arduino and ESP32 nodemcu.

DESCRIPTION:

Street light consists of Arduino and LoRa along with DHT11, LDR and mq2 (smoke) sensors. Arduino and LoRa modules connected together through SPI communication. All sensors interfaced to Arduino digital and analog pins respectively. At receiver side LoRa and ESP32 nodemcu connected together. On both side 16x2 LCD will be connected through digital IO pins to respective controllers.

WORKING:

When LDR detects dark condition then LED Street light will be ON otherwise light will be OFF. When street light ON, Arduino reads voltage and current of street light. Also it can read temperature

and humidity through DHT11sensor. All this sensors information transmitted to receiver side LoRa where ESP32 nodemcu displays on LCD. ESP32 nodemcu has inbuilt WIFI module that can upload data to IOT cloud server. We can monitor street light status, voltage, current temperature, humidity and smoke values in IOT server.

TECHNICAL SPECIFICATIONS:

HARDWARE:

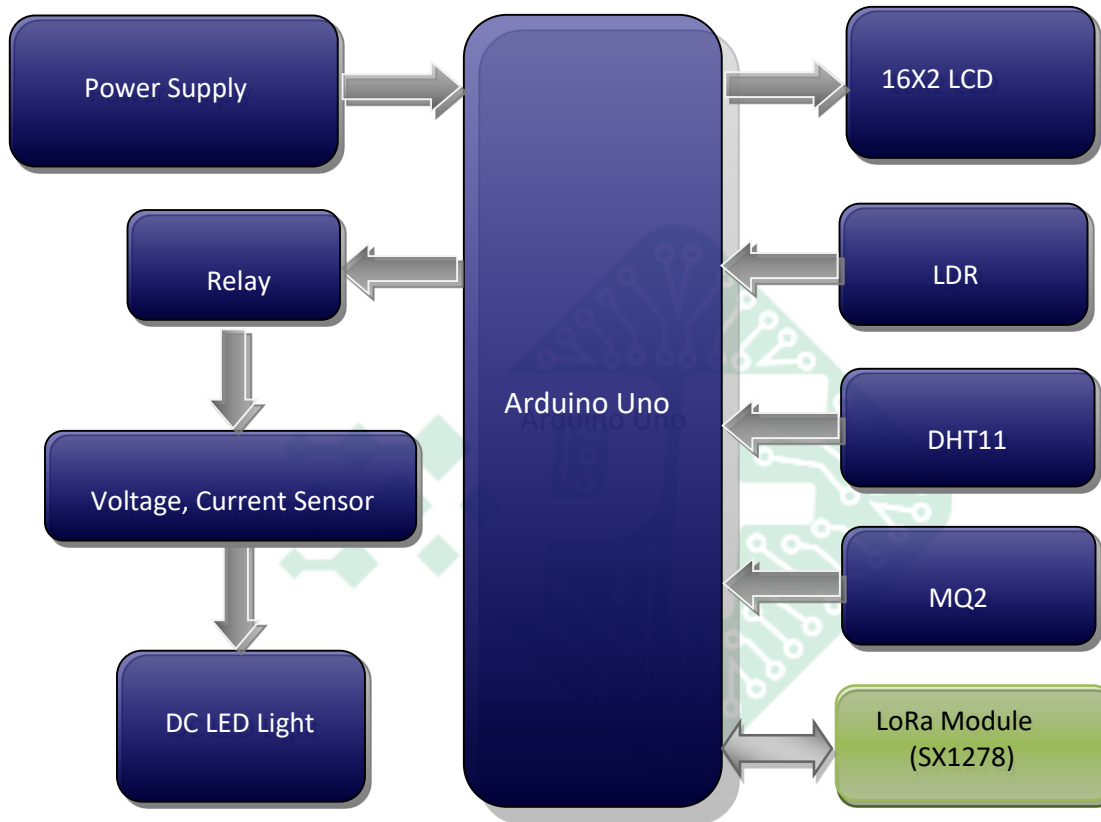|		
Microcontrollers	:	Arduino Uno and ESP32 Nodemcu
Crystal	:	16 MHz
LCD	:	16X2 LCD
LoRa Module	:	SX1278
Temp, Hum Sensor	:	DHT11
Smoke Sensor	:	Mq2
Voltage Sensor	:	Resistor based voltage divider
Current Sensor	:	Shunt Resistance
Relay	:	12V DC Electromagnetic
Load	:	DC LED light
Power Source	:	12VDC adaptor

SOFTWARE:

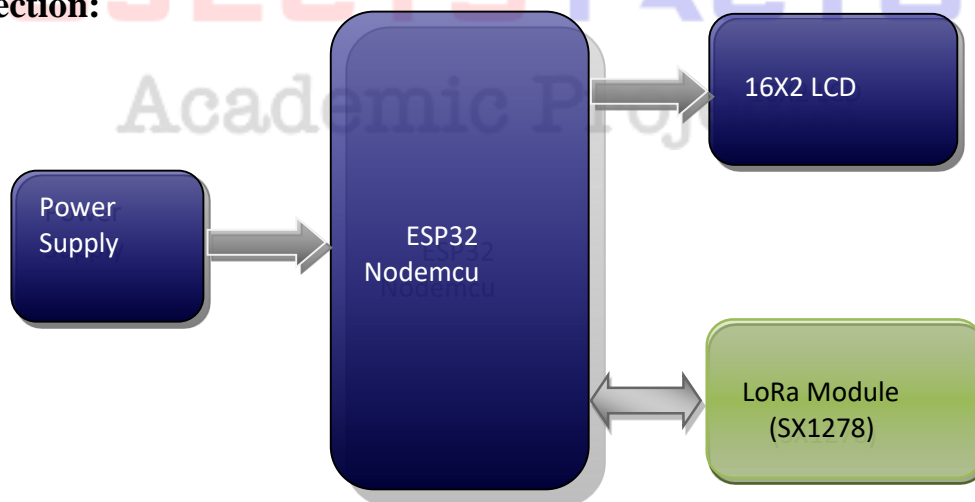Arduino IDE

Proteus based circuit diagram

APPLICATIONS:

 ➢ Smart Street light management
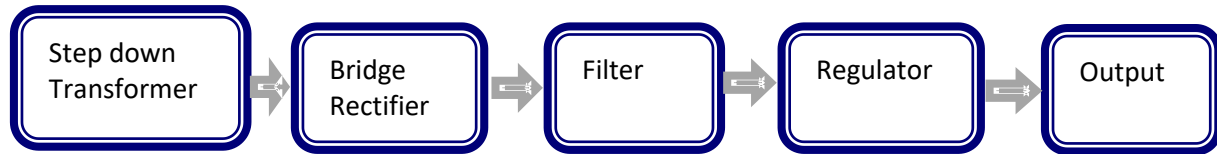 ➢ Street light parameter monitoring

BLOCK DIAGRAM:

Transmitter Section:

```
Power Supply  ───►  Arduino Uno  ───►  16X2 LCD
                                  ◄───  LDR
Relay  ◄───                       ◄───  DHT11
  │                               ◄───  MQ2
  ▼
Voltage, Current Sensor           ◄──►  LoRa Module
  │                                      (SX1278)
  ▼
DC LED Light
```

Receiver Section:

```
                    ESP32      ───►  16X2 LCD
                    Nodemcu
Power Supply  ───►             ◄──►  LoRa Module
                                      (SX1278)
```

POWER SUPPLY BLOCKDIAGRAM:

Step down Transformer → Bridge Rectifier → Filter → Regulator → Output

INTERFACES COVERD:

- We have covered LoRa module interface
- Sensors like voltage, current, ldr, mq2 and DHT11 interface