SMART ELECTRIC METER USING LORA PROTOCOLS AND IOT APPLICATION

AIM:

Design and Development of Smart Electric Meter Using LoRa protocols and IOT application.

PURPOSE:

Internet brings lot of things to our life. Like IOTs, Apps, Voice assistance, connected car features, cloud applications and many more. By adding electronic technology to internet gives lot of applications. It is nothing but Internet of things. Currently, we are paying power consumption bills through apps or manual. But we haven't found much more smart electric meters that can provide bill without electricity department involvement. Here we proposed new project concept that can update electricity bill to cloud. GSM based smart electric meters available in the market, but need recharge of SIMS periodically. We want to develop electric meter using LoRa and it has LoRa module. Each energy meter has LoRa module and one LoRa Gateway can communicate with multiple LoRa transmitters (Electric Meters) and update information to IOT cloud. Project title is Smart electric meter using LoRa protocols and IOT application using Arduino and ESP32 nodemcu.

DESCRIPTION:

Electric meter consists of Arduino and LoRa(SX1278). LoRa module and Arduino connected each other through SPI communication. LoRa gate way consists of ESP32 nodemcu and LoRa module.

WORKING:

Based on power consumption of load, Energy meter (Electric Meter) generates pulses and these pulses read by Arduino. Each pulse considered as one unit for demonstration purpose. When one unit increased then two rupees amount fair will be added. This information will transmitted to LoRa

receiver which is at gateway. This data will be handled by ESP32 nodemcu and uploading to IOT cloud server. Electricity department people and users can monitor billing information through this Cloud server.

TECHNICAL SPECIFICATIONS:

HARDWARE:

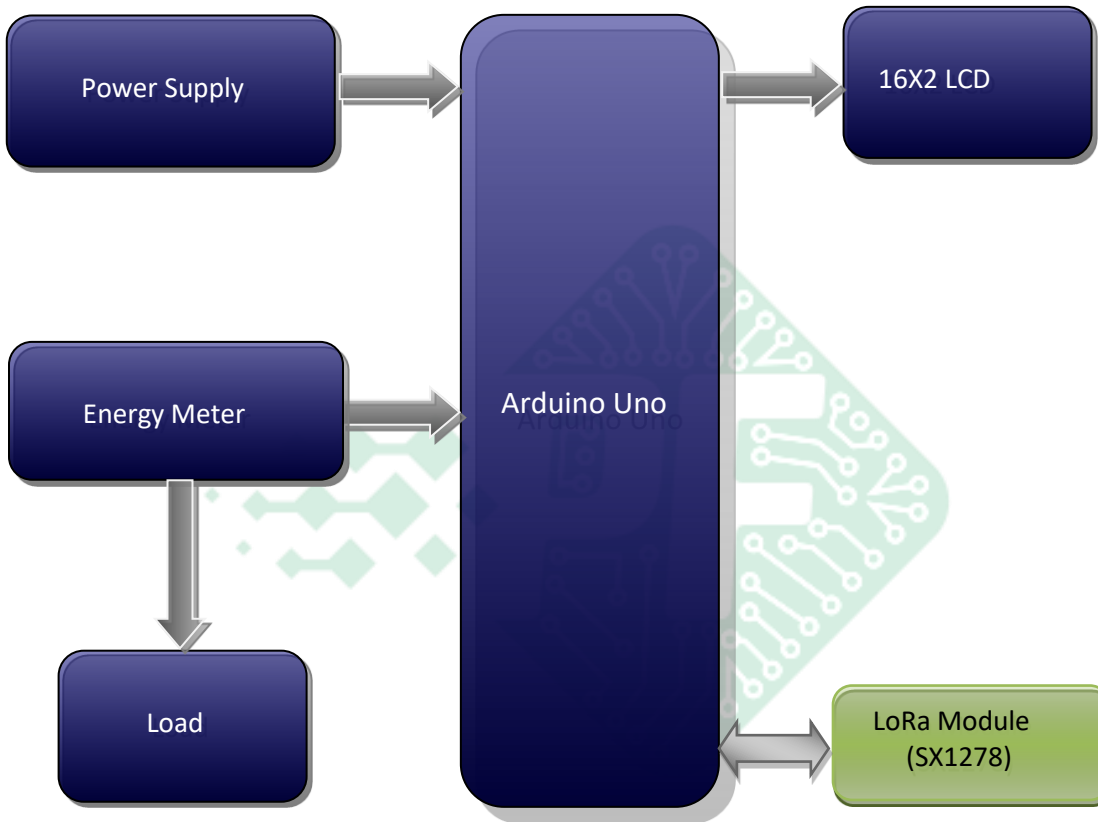|		
Microcontrollers	:	Arduino Uno and ESP32 Nodemcu
Crystal	:	16 MHz
LCD	:	16X2 LCD
LoRa Module	:	SX1278
Energy Meter	:	Pulse based
Power Source	:	12VDC adaptor

SOFTWARE:

Arduino IDE

Proteus based circuit diagram

APPLICATIONS:
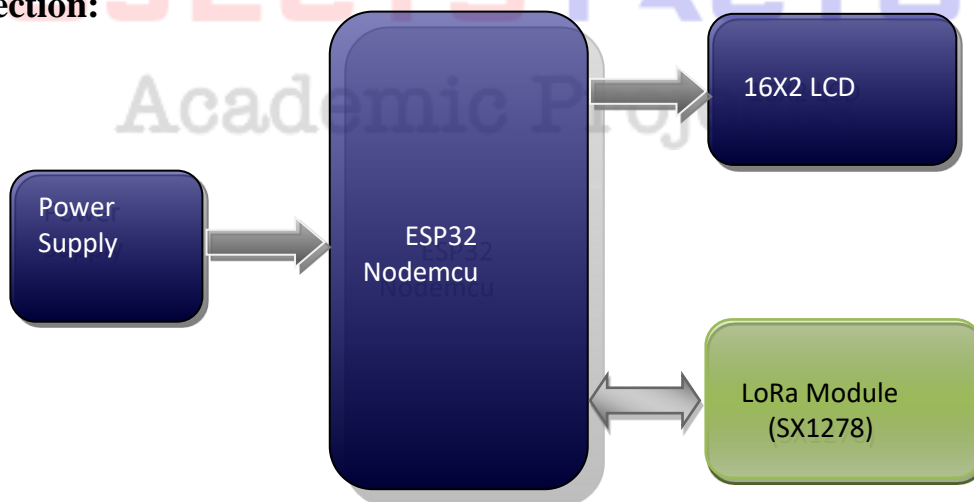
- ➢ Power Measuring applications
- ➢ Smart Power Meters with LoRa
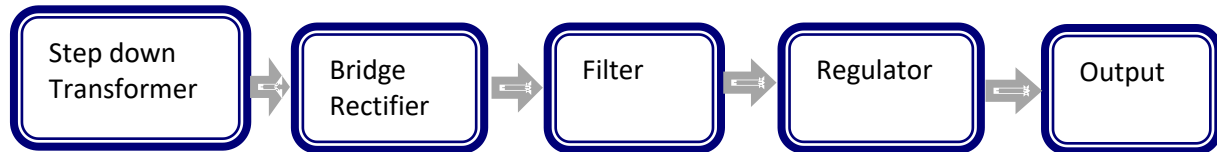- ➢ Smart electric Meters with LoRa

BLOCK DIAGRAM:

Transmitter Section:

```
Power Supply ────►┐
                  │
                  ├──► Arduino Uno ──► 16X2 LCD
Energy Meter ────►┤
     │            │
     ▼            └──► LoRa Module (SX1278)
   Load
```

Power Supply → Arduino Uno

Energy Meter → Arduino Uno

Energy Meter → Load

Arduino Uno → 16X2 LCD

Arduino Uno → LoRa Module (SX1278)

Receiver Section:

Power Supply → ESP32 Nodemcu

ESP32 Nodemcu → 16X2 LCD

ESP32 Nodemcu → LoRa Module (SX1278)

POWER SUPPLY BLOCKDIAGRAM:

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

INTERFACES COVERD:

- We have covered LoRa module interface
- Energy meter with load