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# Advanced Metering Infrastructure Performance Using European Low-Voltage Networks

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***Abstract -***
*In this Paper is an Smart power metering system or issue is captivated by countless profits. In India and other countries prove that smart metering is technically practicable. Main issues are the real value of the payback, the outlay involved, the distribution of overheads and gross settlement of smart metering between markets parties involved. An advanced metering road and rail network put forward the leeway for auxiliary energy allied services such as demand side management and consciousness of virtual power plants. The potential of smart metering relies profoundly on the policy and decisiveness of the legislative bodies mixed up. Energy savings and an improved security of supply are the major drivers and deems in smart metering as huge targets of a nation. The Smart metering system will monitor the consumed power in particular home and transmitted via ZIGBEE . The bill payment section will be take place in home itself. And voltage and current sensor values are shown in LCD. In EB Server Section, Easily we will monitor the home section data and control the load via ZIGBEE then We can Easily to controlling via ZIGBEE modem using Smart Metering system we can avoid Wrong Power Usages and etc.*

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## I. INTRODUCTION

An energy meter is an electronic device that records information such as consumption of electric energy, voltage levels, current and power factor. Smart meters communicate this information to the consumer for greater clarity of consumption behavior and the electricity distributor for system monitoring and customer billing. Smart meters typically record energy consumption in real-time and report regularly at short intervals throughout the day. They also enable two-way communication between the meter and the central system. Such an Advanced Metering Infrastructure (AMI) differs from Automatic Meter Reading (AMR) as it enables two-way communication between the meter and the distributor. Communications from the meter to the network may be wireless, or via fixed wired connections such as Power Line Carrier (PLC). Wireless communication options in common use include cellular communications, Wi-Fi (readily available), Wireless Ad Hoc Networks over Wi-Fi, Wireless Mesh Networks, Low Power Long Range wireless (LoRa) , ZigBee (low power, low data rate wireless), and Wi-SUN (Smart Utility Networks). LoRa devices offered by Semtech have compelling features for IoT applications including long range, low power consumption and secured data transmission. This technology can be utilized by public, private or hybrid networks and provides greater range than Cellular networks. LoRa Technology can easily plug into existing infrastructure and enables low-cost battery-operated IoT applications. Semtech'sLoRa chipsets are integrated into numerous devices that are manufactured by multitude IoT solution providers. They are connected to Lora WAN- based networks around the globe. LoRa connects various devices or all things to the Cloud.

## II. Literature Survey

**1.IoT Based Smart Energy Meter**

We can see a person standing in front of our house from electricity board, whose duty is to read the energy meter and handover the bills to the owner of that house every month. This isnothing but meter reading. According to that reading we hav e to pay the bills. The main drawback of this system is that person has to go area by area and he has to read the meter of every house and handover the bills. Many times errors like extra bill amount, or notification from electric board even though the bills are paid are common errors. To overcome this drawback we have come up with an idea which will eliminate the third party between the consumer and service provider, even the errors will be over come.

## III. Smart Energy Metering and Power Theft Control using Arduino & GSM

Energy theft is a very common problem in countries like India where consumers of energy are increasing consistently as the population increases. Utilities in electricity system are destroying the amounts of revenue each year due to energy theft. The newly designed AMR used for energy measurements reveal the concept and working of new automated power metering system but this increased the Electricity theft forms administrative losses because of not regular interval checkout at the consumer's residence. It is quite impossible to check and solve out theft by going every customer's door to door. In this paper, a new procedure is followed based on MICROCONTROLLER Atmega328P to detect and control the energy meter from power theft and solve it by remotely disconnect and reconnecting the service (line) of a particular consumer. An SMS will be sent automatically to the utility central server through GSM module whenever unauthorized activities detected and a separate message will send back to the microcontroller in order to disconnect the unauthorized supply. A unique method is implemented by interspersed the GSM feature into smart meters with Solid state relay to deal with the non-technical losses, billing difficulties,and voltage fluctuation complication.

## IV. Proposed Methodolog

In this proposed system we going to implement that A ZIGBEE Based Reliable and Efficient Power Metering System for Energy Management and Controlling. Power metering system will monitor the consumed power in particular home and transmitted via ZIGBEE . The bill payment section will be take place in home itself. If balance is below certain level buzzer will be turn on. If balance will reaches zero then automatically load will be turn off. And voltage and current sensor values are shown in lcd. In EB Server Section, Easily we will monitor the home section data and control the load via ZIGBEE then We can Easily to controlling via ZIGBEE modem using Smart Metering system we can avoid Wrong Power Usages and etc.

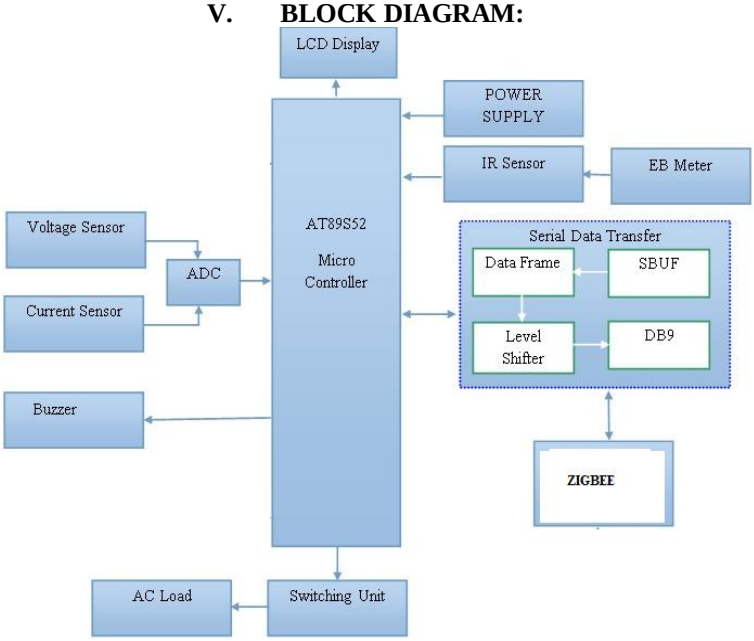
ADVANTAGES OF PROPOSED SYSTEM :

- Prepaid meter prevents the person from heavy billing.
- Easy to implement in smart cities.
- It can be reduce the man power.

APPLICATIONS OF PROPOSED SYSTEM :

- Advanced Metering System
- Safety EB Metering System

## V. BLOCK DIAGRAM:




## VI. ZIGBEE

ZigBee is a specification for a suite of high level communication protocols using small, low-power digital radios based on the IEEE 802.15.4-2003 standard for wireless personal area networks (WPANs), such as wireless headphones connecting with cell phones via short-range radio. The technology defined by the ZigBee specification is intended to be simpler and less expensive than other WPANs, such as Bluetooth. ZigBee is

targeted at radio-frequency (RF) applications that require a low data rate, long battery life, and secure networking.

**Electrically Erasable Programmable ROM(EEPROM)**

The EEPROM is a special type of memory not contained in all microcontrollers. Its contents may be changed during program execution (similar to RAM ), but remains permanently saved even after the loss of power (similar to ROM).It is often used to store values, created and used during operation (such as calibration values, codes, values to count up to etc.), which must be saved after turning the power supply off. A disadvantage of this memory is that the process of programming is relatively slow. It is measured in miliseconds.

**Special Function Registers (SFR):**

Special function registers are part of RAM memory. Their purpose is predefined by the manufacturer and cannot be changed therefore. Since their bits are physically connected to particular circuits within the microcontroller, such as A/D converter, serial communication module etc., any change of their state directly affects the operation of the microcontroller or some of the circuits.For example, writing zero or one to the SFR controlling an input/output port causes the appropriate port pin to be configured as input or output. In other words, each bit of this register controls the function of one single pin.

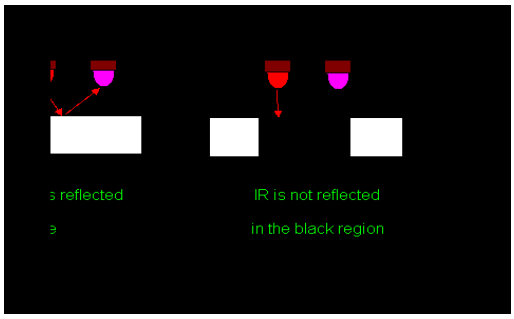
**RELAY**

A relay is an electrically operated switch. Current flowing through the coil of the relay creates a magnetic field which attracts a lever and changes the switch contacts. The coil current can be on or off so relays have two switch positions and they are double throw (changeover) switches. Relays allow one circuit to switch a second circuit which can be completely separate from the first. For example a low voltage battery circuit can use a relay to switch a 230V AC mains circuit. There is no electrical connection inside the relay between the two circuits; the link is magnetic and mechanical. The coil of a relay passes a relatively large current, typically 30mA for a 12V relay, but it can be as much as 100mA for relays designed to operate from lower voltages. Most ICs (chips) cannot provide this current and a transistor is usually used to amplify the small IC current to the larger value required for the relay coil. The maximum output current for the popular 555 timer IC is 200mA so these devices can supply relay coils directly without amplification. Relays are usually SPDT or DPDT but they can have many more sets of switch contacts, for example relays with 4 sets of changeover contacts are readily available. For further information about switch contacts and the terms used to describe them please see the page on switches. Most relays are designed for PCB mounting but you can solder wires directly to the pins providing you take care to avoid melting the plastic case of the relay.

## VII. WORKING:

Now this may seem to be a very special kind of sensor, after all what kind of sensor can see a line?Well, the principles are very simple. It consists of just two components. The first is an Infra-Red (IR) transmitter (usually an LED), while the second is an Infra-Red receiver (usually a transistor). IR is transmitted out of the sensor unit. If the IR is reflected back, it is picked up by the IR receiver transistor.

But how does it follow a line, you ask? Well, IR is basically heat (the heat from the sun is predominantly in the IR part of the spectrum). Black, as you probably know, absorbs heat, which is why it is best not to wear black in the summer months. If black absorbs heat, then it also absorbs IR. And this is the principle. While the sensor is over a black line, no IR is reflected back to the receiver. If the sensor strays away from the line, then IR is reflected back. This is why Cybot 'follows a black line'. For best results the black line is placed on a white background, which will give the extreme two cases - white reflects IR.The diagram below illustrates this, but as you can see it is quite a simple concept.




## VIII. RESULT

LoRaWAN protocol presented in this work can be used as a framework for designing data transfer using radioFrequency. The baseline and the sketch code can also be Used on a different module like CytronLoRa RFM module And GPS Adafruit Ultimate module instead of DraginoLoRa /GPS Shield and LoRaShield.In this work, investigations and observations have beenMade to ensure the successful developments for this Project. A systematic study was used to analyze the effect Of the environment on a radio frequency covered area. It is Suggested for future growth; high gain antenna should be Used instead of the built-in module to achieve higher Performance. For example, an increase from the 3dbi to 5~7dbi can be added to support higher coverage area.It is also suggested to use a smaller module and battery Pack to implement a smaller but compact prototype. It is Also found that the usage of Dragino YUN Shield in this Prototype is not user-friendly since the problem occurred Where the YUN Shield program and the Datalog will be Erased every time the LoRa Gateway reboots. Hence, an Alternative way is to use the SD Card Module for data Logging. Even though the project is lacking materials, skills, and Time, the work showed a positive result for future Development. Next, future work will be performed by usingSimilar LoRaWAN development for other performance Evaluation.

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