International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 09 Issue: 04 | April - 2025 SJIF Rating: 8.586 ISSN: 2582-3930

Design of an Intilligent SMS Based Electricity Metering and Billing System

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ABSTRACT

The system's goal is to create a low-cost automated energy meter billing system gadget that will standardize people's lives and stop the loss of electricity use. The proposed technology replaces a conventional meter reading method and permits remote access to an existing energy meter. The system includes an embedded controller and GSM modem to transmit data such as consumed energy, generated bills and security services over the GSM mobile network. This data can then be fed into and integrated into pre-existing energy management systems

KEYWORDS-

Smart energy meter, Arduino Uno, Global system for mobile communication (GSM), Short Message Service (SMS).

I. INTRODUCTION

Using GSM (Global System for Mobile Communications) technology, a remote power billing system enables both consumers and service providers to monitor and bill electricity consumption remotely. The system is made up of a smart meter that is installed on the consumer's property, a GSM module that is connected to the meter, and a microcontroller for data processing and invoicing.

A remote power billing system based on GSM technology aims to make it possible for electricity providers to track and bill electricity consumption remotely using the GSM network. Utilizing a smart meter with a GSM module, the system transmits consumption data to a central computer for processing and billing. This system's main objective is to make power billing more timely, accurate, and efficient while minimizing the need for manual meter reading. Customers can also use it to track their electricity usage in real-time and decide how much they use by doing so. Additionally, the remote GSM based electricity billing system has the potential to lower operational expenses related to manual meter reading and enhance revenue collection for electricity suppliers. The project's goal is to create, develop, and put into use a dependable, secure, and economical system.

II. PROBLEM STATEMENT

,Intelligent SMS-Based Electricity Metering and Billing SystemTraditional electricity metering and billing systems face several challenges, including manual meter reading errors, delays in bill generation, and difficulties in providing real-time consumption data to consumers.

These issues lead to billing disputes, inefficiencies in revenue collection, and inconvenience for both consumers and electricity providers.An intelligent SMS-based electricity metering and billing system is required to automate meter reading, provide real-time electricity consumption data, and generate accurate billing information. This system will enable two-way communication between consumers and utility providers through SMS, allowing users to check their electricity usage, receive billing updates, and make inquiries. Additionally, the system will help utility companies reduce operational costs and improve efficiency by eliminating the need for manual meter readings.The proposed solution should integrate smart meters with GSM-based communication to automatically send usage data to a central server. Consumers should be able to receive timely notifications about their consumption patterns, due payments, and alerts in case of anomalies. This approach will enhance transparency, ensure accurate billing, and improve the overall electricity management system.

III. METHODOLOGY

The first step before implementation was to review the project scope and research area. Then the next task was to design hardware structure for the electricity billing system and the final step was programming part and implementation of system. This model has the Arduino UNO as CPU. The entire system is interfaced with Arduino UNO. The GSM modem is serially connected with the Arduino Uno which is used as communication module between user and provider. The GSM uses its own network for the transfer of data. Special coding in Arduino IDE is used for programming ATmega328 micro controller.

The relay is used as switching device to cut off and restore power supply. The LCD is interfaced to micro controller used in parallel connection. In this project the micro controller based system continuously measures the reading and the current meter reading can be sent to the electricity department on request. This system also can be used to cut off the power supply to the house in the case of non-payment of electricity bills.

IV. BLOCK DIAGRAM

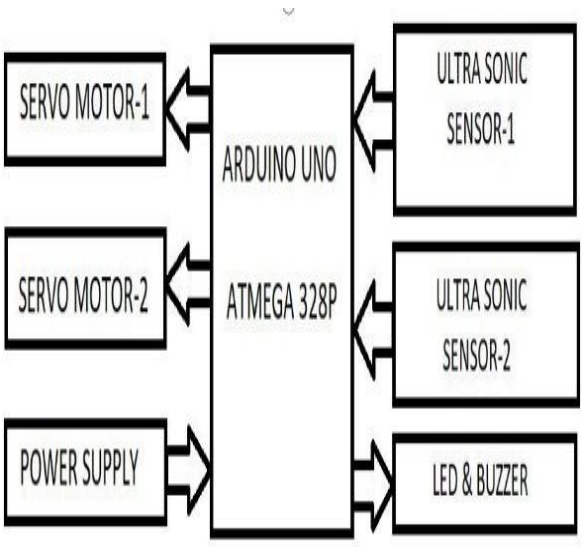

Fig: **Block Diagram**

V. COMPONENTS USED

1. ARDUINO UNO

The Arduino UNO is a widely used open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino. The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits The board features 14 Digital pins and 6 Analog pins. It is programmable with the Arduino IDE (Integrated Development Environment) via a type B USB cable.

It can be powered by a USB cable or by an external 9-volt battery, though it accepts voltages between 7 and 20 volts.

Fig: ARDUINO UNO

2. ULTRASONIC SENSOR

Ultrasonic sensors [2] are widely used in robotics, automation, and security systems for distance measurement. They use sound waves to determine the distance between the sensor and an object. The most common ultrasonic sensor used with Arduino is the **HC-SR04.**

Fig: ULTRASINIC SENSOR

3. SERVO MOTOR

Lightweight, and cost-effective servo motor widely used in robotics, automation [1], and hobby projects. It is a 9g micro servo motor that provides precise angular movement within a limited range

4.LCD MODULE

To display interactive messages we are using LCD Module. We examine an intelligent LCD display of two lines,16 characters per line that is interfaced to the controllers. The protocol (handshaking) for the display is as shown. Whereas D0 to D7th bit is the Data lines, RS, RW and EN pins are the control pins and remaining pins are +5V, -5V and GND to provide supply. Where RS is the Register Select, RW is the Read Write and EN is the Enable pin.

Fig: LCD MODULE

RESULT:

CONCLUSION:

It allows for real-time remote monitoring and billing of electricity usage. It provides an efficient and cost effective method of regulating power use and invoicing for both the electricity provider and the consumer. It enables consumers to better manage their energy consumption and monitor their electricity usage. It also minimizes the cost and time associated with manual meter reading and billing. It assists power suppliers in improving billing accuracy, reducing revenue loss due to theft, and increasing customer satisfaction.

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