Design And Implementation Of A Smart Meter

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ABSTRACT

This paper presents smart system design and smart electricity meter design using global system Arduino microcontroller mobile communication (GSM) module and liquid crystal display (LCD).

Keywords: Smart meter, GSM module, Arduino microcontroller

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Smart electricity meters are more reliable and accurate than traditional electricity meters. Smart electricity meters monitor energy consumption, automatically prepay. These systems are existing systems without human interaction, that is, they solve the problem electronically by reducing the role of humans. Many projects have been implemented to increase the capabilities of smart electric meters. These projects include topping up meter credit and semi-automatic feedback to users using wired or wireless communication.

These systems typically top up the meter by communicating with the utility company using text messages sent through a cell phone to communicate.

Software. The architecture of a conventional electricity meter is shown in Figure 1. It consists of six components: an energy measurement and calculation unit, a processing module, a request violation detection and processing module, a power management and real-time clock (RTC) module, a display and switch module, and a universal asynchronous transceiver (UART).) interface and communication module.

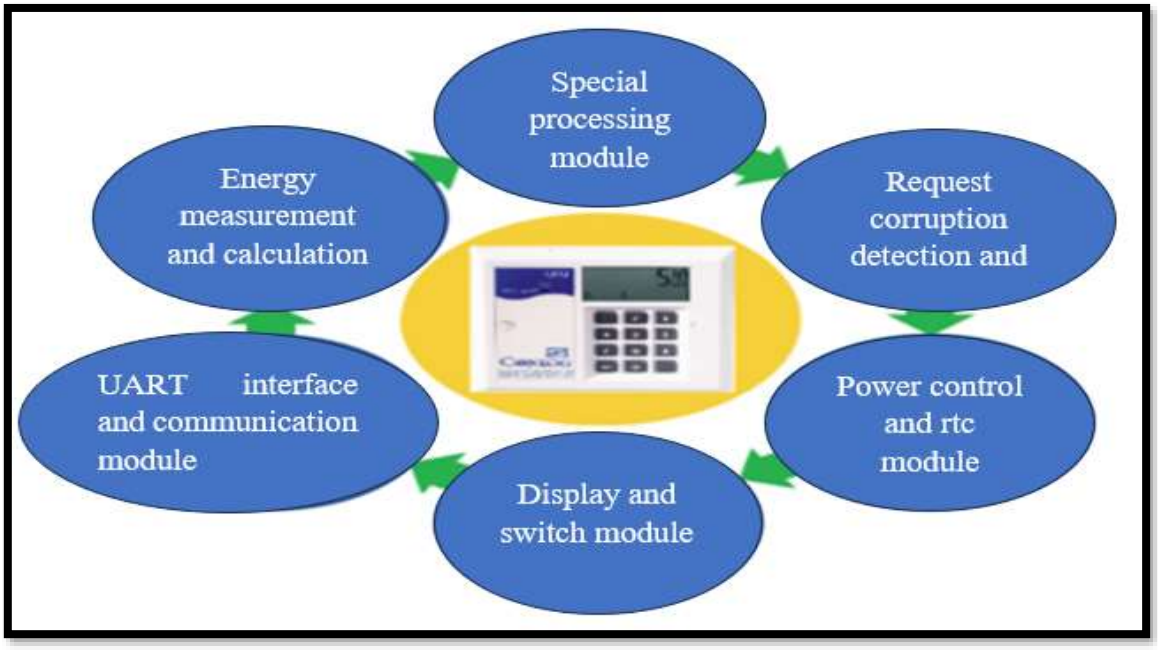

Figure 1. Show communication with the software architecture of a traditional electricity meter and meter components.

Smart electric meter design. The smart electric meter is a common peripheral and memory interface built into a 32-bit microprocessor, which forms the basis of the system. Smart meters are optimized for resource usage reliability. A smart electric meter has two main components: communication and processing. The communication component manages the internal communication, which is the exchange of information between the communication meter and the user. Uses a processing component.

Requirements and challenges in design and implementation

There are a number of requirements and challenges in design and implementation

These include:

- Communication Security: Secure communication requires routine security.
- Interoperability: Communication and command sets must be interoperable with existing advanced measurement infrastructure.
- Communication ports: Port specifications should be based on a common standard to enable long-term performance, upgradeability and interoperability.
- I/O Capacity: Sufficient number of interfaces should be available.
- Limitations in network coverage, data capacity and distribution can be a problem for a utility company.

Design of the proposed system

The main objective of this project work is to design and implement a smart meter. Development of a system that interacts with users of utilities and meters.

The meter is activated via the telecommunications company's GSM infrastructure to monitor remaining power and communicate directly with the utility. The system requires only human intervention in the charging process. The proposed system consists of microcontroller, GSM module, push button circuit and LCD developed by integrating electronic devices.

These components communicate using electricity. The control and communication mechanisms are assisted by a software component developed by programming the microcontroller. The communication processes of these smart electric meters are based on the schematic and block diagram in Figure 2.

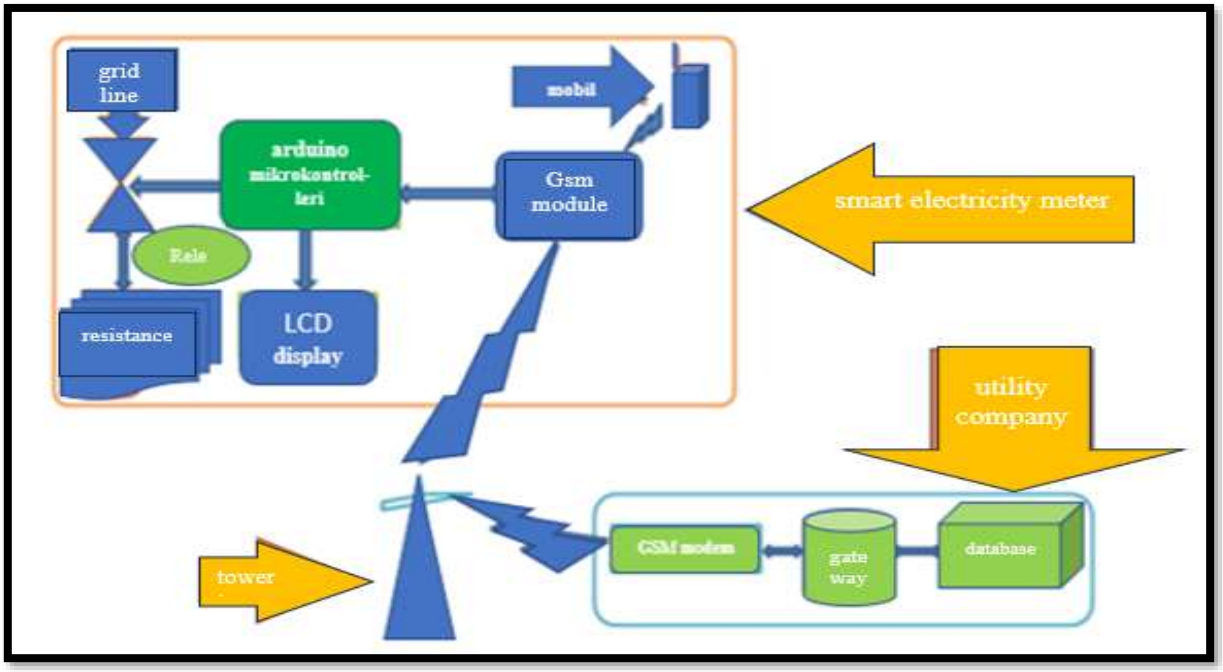

Figure 2. System block diagram of a smart electric meter showing all parts of the meter.

As shown in Figure 2, the circuit design has a programmable microcontroller that controls the overall system operation. It reads the input signal as a current and uses a built-in software amplifier to provide the desired output. An exit action connects or disconnects a network and enables or disables some. It also instructs the GSM module to send the message to the user.

Display system. Our metering system uses a 16 2 LCD display as an output device to display the electricity balance. This system can receive and display. It can also respond to all microcontroller signals and perform display actions as requested.

Communication system. The communication system consists of wired and wireless systems. SIM900A is based on the interface between GSM module and Arduino microcontroller. The GSM module acts as a link between the user and the smart meter circuit. It receives a power-up message from the utility company and sends it. It also receives and communicates signals from the microcontroller. The owner of the meter receives the data from the meter as an SMS using this GSM. To the token created by the server auxiliary database, a message from the GSM module to the client is sent through the MODEM and the telephone line.

Circuit Design and Implementation. The circuit design details the connection of the meter components and is shown in Figure 3 below

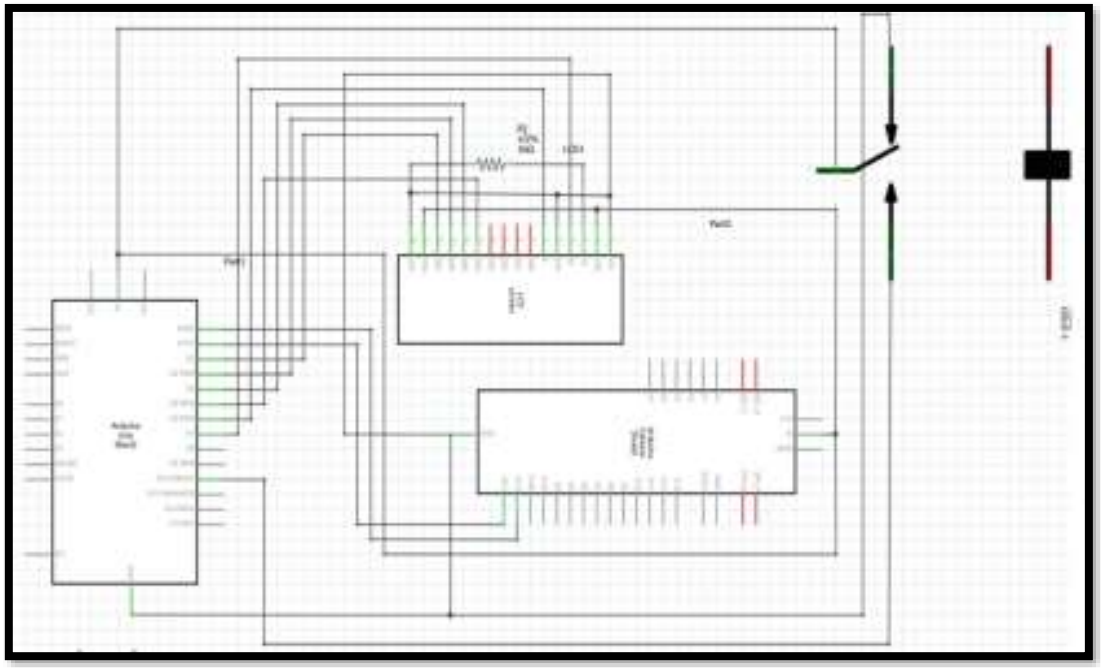

Figure 3. Schematic diagram of a smart electric meter showing all internal connections.

A Software Taminot Application for Shutdown We have implemented a software Taminot that allows the user to visualize the amount of electricity remaining in the meter using the Arduino Integrated Development Environment (IDE) platform. This is done by activating the LCD display that shows the initial or preset amount of electrical units on the meter. In order to receive messages about the amount of initial or preconfigured electric units in the meter, the current system receives a message from the utility company to load the meter,

It is possible to establish a connection with an external mobile device using the GSM module installed SIM card. Since this SIM card belongs to a telecommunication company, there must be an agreement between the telecom and the utility company.

The number of units is shown on the display on the screen of the smart electricity meter.

meter, meter number, name of its user, SIM card with meter phone number installed, user's phone number, address, used token number and number of units.

Summary

This paper proposes a smart electricity meter that allows users to remotely load prepaid electricity using their phones and receive notifications about their status.

The proposed meter provides users with updated information. Utility companies can also use real-time electricity demand data to set tariffs on a case-by-case basis.

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