AUTOMATIC ELECTRIC POWER CONSUMPTION WITH A SMART ELECTRICITY METER

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Abstract:- The development of radio electronics in the 21st century is associated with the automation of human activities and the monitoring and measurement of production process parameters. Using wireless communication systems facilitates the remote monitoring of parameters and provides opportunities for real time control. The efficiency of Internet of Things device scan be achieved through the rational distribution of loads, thus providing a design potential for energy-efficient smart city or smart house systems. The monitoring of power consumption is an important step toward the efficient usage of energy resources. It helps increase the operational reliability, environmental performance, and safety of electronic devices. This article discusses the usage of wireless and cloud technology for the optimization and monitoring of power consumption by smart house and smart city systems. The authors analysed the key integration areas for the technical solution based on the Internet of Things concept. They developed a smart meter module and data processing algorithms that provide power consumption recommendations. The smart meter consists of a regular electricity meter and an extension module with a wireless connection. The data is processed with the SmartThings platform. The experimental data obtained on the laboratory setup showed the efficiency of the algorithms used and the efficiency of integrating the meter into the existing systems, as well as the economic feasibility of the solution

1. INTRODUCTION

1.1 GENERAL

In the early phase of household technology, delivery of electricity is completely dependedon traditional energy meters. These meters play a key role in measuring the consumptionof electrical energy in individual households. The usage of these meters has been slowly declining with the advancement in technology as rapid changes has been made to encounter the problems occurred by the traditional meters. The major problem arises when habitants are unaware of their daily behavior. Monthly feedback given to the consumers is not sufficient as the consumers will not have knowledge on how much energy does the individual appliances consume. To overcome the problems of traditional electricitymeters, Smart Meters have been upgraded and developed. With the use of Smart Meter data, energy alerts will be provided to the consumers based on hourly utilization of energy. Theprimary objective of the Smart Meters is to reduce the energy consumptioninthehouseholds. Our thesis utilizes real time Smart Meter data sets obtained froma Swedishelectricity company. A case study is performed on hourly measurement dataof 16households to determine consumption patterns. With its growing attention in the market the behavior of the consumers can be studied and analyzed. The energy consumption patterns can be facilitated in improving the behavior of users. The electricity market can be restructured with the installation of these meters, as it not only preserves the energy, but also reduces carbon dioxide emissions [4]. Trust and credibility of these meters is established only when the consumers have positive quality of experience. Timely consumption of consumers can be reduced as Smart Meters are connected to online billing..

2. LITERATURE SURVEY

2.1 EXISTING SYSTEM

The existing solar panel monitoring systems generally use standalone controllers and sensors to track performance, but they often lack real-time remote monitoring, data analysis, and automated alerts. These systems usually require manual inspection and limited integration with external devices or platforms.

2.2 PROPOSED SYSTEM

The proposed system integrates IoT (Internet of Things) technology with solar panel controllers to enable real-time monitoring, data collection, and remote access. The system will allow users to track performance,

receive automatic alerts, and analyze data through a web or mobile application, improving efficiency and reducing the need for manual intervention.

3. BLOCK DIAGRAM

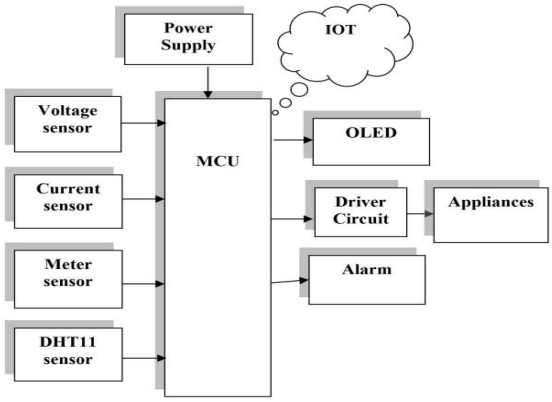

FIG: 1 Block diagram

3.1. HARDWARE COMPONENTS

- Regulated power supply.
- Micro controller.
- Voltage sensor
- Current sensor
- DHT11 sensor

3.2. SOFTWARE REQUIREMENTS:

- Embedded C

4. IMPLEMENTATION

The monitoring of power consumption is an important step toward the efficient usage of energy resources. It helps increase the operational reliability, environmental performance, and safety of electronic devices. This article discusses the usage of wireless and cloud technology for the optimization and monitoring of power consumption by smart house and smart city systems. The authors analysed the key integration areas for the technical solution based on the Internet of Things concept. They developed a smart meter module and data processing algorithms that provide power consumption recommendations. The smart meter consists of a regular electricity meter and an extension module with a wireless connection. The data is processed with the SmartThings platform.

5. CIRCUIT DIAGRAM

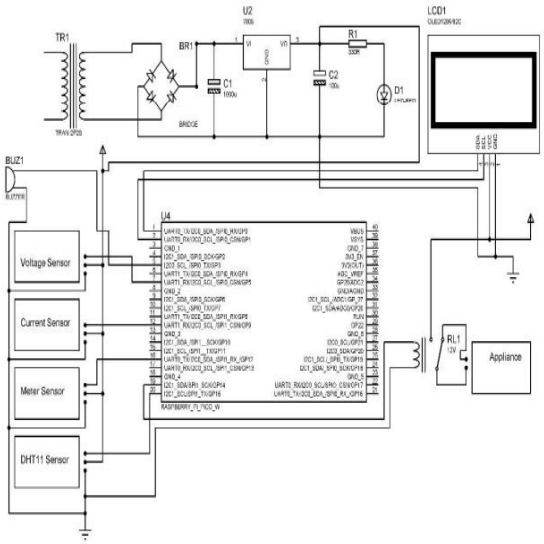

Fig circuit diagram

6. RESULT

This project is well prepared and acting accordingly as per the initia specifications and requirements of our project. Because of the creative nature and design the id of applying this project is very new, the opportunities for this project are immense. The practical representation of an experimental board is shown below:

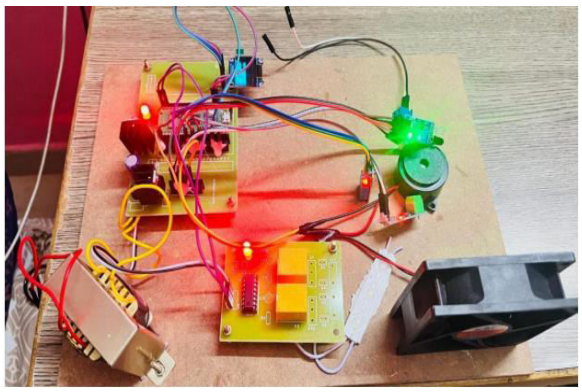

Fig:3. Project Model

6. CONCLUSION

In conclusion, the integration of smart electricity meters into power consumption systems marks a significant advancement in energy management. These devices offer numerous benefits, including accurate billing, real-time energy monitoring, enhanced energy efficiency, and improved grid management . By providing consumers with detailed insights into their energy usage, smart meters empower them to make informed decisions, potentially leading to cost savings and reduced environmental impact . However, the deployment of smart meters also presents challenges. Concerns regarding data privacy, cybersecurity threats, and the initial costs of implementation need to be addressed to ensure consumer trust and widespread adoption . Moreover, the effectiveness of smart meters in reducing energy consumption largely depends on consumer engagement and behavioural changes . Overall, while smart electricity meters are not a panacea, they play a crucial role in modernizing energy infrastructure and promoting sustainable energy practices. Their successful integration requires a balanced approach that considers technological capabilities, consumer education, and robust policy frameworks. .

7. REFERENCES

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