International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 07 Issue: 02 | February - 2023 Impact Factor: 7.185 ISSN: 2582-3930

Smart E-Meter

Nakshatra Neema[1], Hussain Kagiwala[2], Jay Khavadia[3], Rushik Patel[4], Prof. Tejal Patel [5]

[1]*Parul University, Gujarat, India*
[2]*Parul University, Gujarat, India*
[3]*Parul University, Gujarat, India*
[4]*Parul University, Gujarat, India*
[5]*Professor, Dept. of Information Technology, Parul University, Gujarat, India*

Abstract - *Nowadays, as the demand for power rises, so do thefts, particularly direct tapping over main lines. Due to the fact that electricity has become a necessity for all people, it is necessary to control electricity consumption and monitor day-to-day electricity consumption. However, there is a lack of user-friendly interfaces that can provide users with daily live electricity readings and acknowledge their daily and monthly electricity consumption.*

Key Words: NodeMCU, ESP-32, CAM

1.INTRODUCTION

The biggest issue that arises with an increase in electricity demand is how to control both electricity use and electricity theft. As the demand for electricity rises, causing the Electricity Board to suffer economic losses, Direct Tapping Theft is primarily occurring in rural areas. Additionally, because the metre reader often enters awkward readings and the electricity bill can occasionally be expensively generated, people worry about the live readings of their electricity metres. There is currently no user-friendly interface available from which a consumer can obtain daily live metre readings and check their electricity consumption. If the consumer understands how much electricity they use, they can conserve energy if they are using more electricity. Furthermore, they worry that someone might directly tap into their main electricity line and use their electricity without them knowing. And if the consumer is directly tapping the main line coming from the pole, the electricity board will be acknowledged. But no appropriate work has been done up to this point.

2. Existing System

The current system can monitor energy consumption in real-time by converting an existing metre to an AMR, but consumers won't receive readings immediately; instead, they will receive readings upon request [3]. The existing system suggested using a GSM network to transmit the SMS. The most popular ways to steal electricity are to cut off the neutral line, bypass the entire metre, and alter the energy metre. However, there is no real-time energy monitoring system in place [8]. The current system locates power theft by estimating the voltage drop and increased current flow in the distribution line as a result of power theft, but neither the Electricity Board nor the Consumer receive acknowledgement [4].

3. Methodology

We completed the following tasks in the manner described below in order to complete this project:

- Literature Review: In this stage, we go through a number of publications on this subject to learn about the present electricity-related problems that are occurring all over the world.
- Identify Problem: We do this by highlighting any problems we discovered after reading the papers.
- System Design: In this step, we create the user interface for consumers and officials of the electricity board so that they may access information about theft and electricity consumption.
- Simulation and analysis: We run the program and examine the results in this step.
- Solution: We design the smart e-meter with consumption monitor in this step.

4. Proposed System

A waterfall model is used to construct the system, and it goes through the stages of requirement analysis, planning, design, coding, and implementation. In order for Consumer and Electricity Board Officials to obtain the electricity readings sensed by hardware, one hardware module is coupled to a software module. Every interval, users of our system can obtain a continuous energy reading from their electric meters. Officials will be notified whenever a consumer engages in meter tampering, allowing them to take the appropriate action as quickly as possible. Consumer has to Registered on Web Application using their Name, Email, Contact No. and Address.

- After Registration User Will Receive a Unique Id on their Email.
- they can Login on Consumer Dashboard in which Consumer can get their Required Data Such as Live Reading, Monthly Consumption and they can Set Limit for Electricity Usage.
- Officials will Login to Their Pannel, they get the details of all Consumer Registered.
- Get the Information of Thefts (Meter Tampering and Direct Tapping to Main Lines).

Users can establish a monthly cap in our system from which they can maintain their electricity consumption. Many consumers are worried that their upcoming electricity bill will be extremely high. Therefore, this feature might assist them in maintaining their electricity consumption. In our proposed system, we'll be using an ESP-32 CAM with nodeMCU that will be installed next to the electricity meter, from which it will be able to take pictures of the readings and scan them in order to provide Electricity Readings at regular intervals.

5. Result

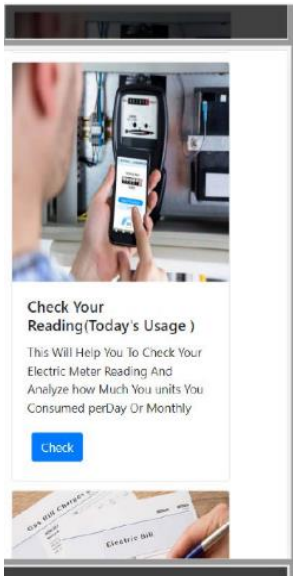

Fig -1: Reading Request

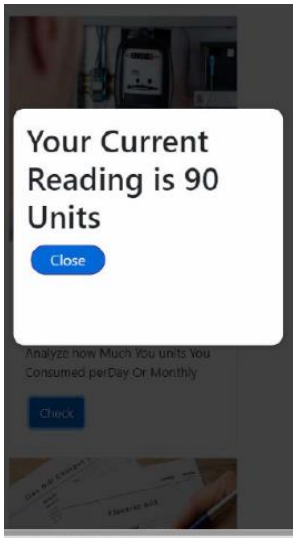

Fig -2: Reading Acknowledgement

Fig -3: Bill Check Access

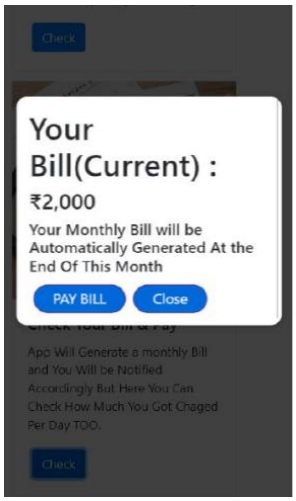

Fig -4: Bill Acknowledgement

Fig -5: Limit Set

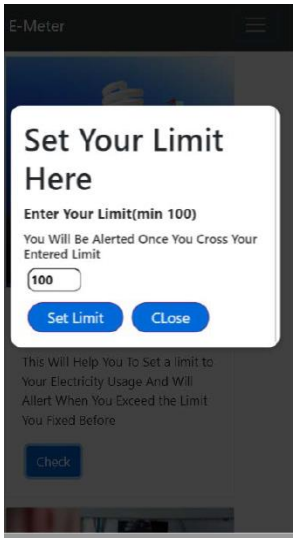

Fig -6: Setting Monthly Limit

5. Conclusion

The "SMART E-METER " is our proposed system, which would provide customers with features like theft alerts on their registered devices as well as an alert on the energy board panel so that board authorities may respond as quickly as feasible. In order for Electricity Board staff to obtain readings at their office and avoid having to travel for physical readings, consumers can continuously monitor their electricity metre reading, which will also be sent to the Electricity Board. In order for the Electricity Board to receive timely bill payments, consumers will also be notified of the Electricity Bill Payment Date. Additionally, consumers will have the choice to establish their average monthly electricity use so that they can be informed and the electricity consumption can be completed at a later time.

REFERENCES

[1] Praveen Kallukalam Sebastian, Deepa K "*Internet of Things Based Smart Energy Meter with Fault Detection Feature and Theft Detection*", Institute of Electrical and Electronics Engineer IEEE, 2022.

[2] V. Sandhya, S. Kousalya, S. Rohini, S. Usha Kiran, K. Varshini "*IoT Based Electric Meter Reading, Billing, Theft Detection and Control*", International Journal of Research in Engineering Science and Management (IJRESM), 2020

[3] Sheeba R, Naufal N, Nadera Beevi S, Ajith R Nair, Amal S, Anoop S Kumar, Anusree Mohan, Arunjith PM, Aswin U, Aswanth T, Joys Joseph, Joseph Jose "*Real-time Monitoring of Energy Meters Using Cloud Storage*", Institute of Electrical and Electronics Engineer (IEEE), 2020.

[4] Mohd. Uvais "*Controller Based Power Theft Location Detection System*", Institute of Electrical and Electronics Engineer (IEEE), 2020

[5] Bibek Kanti Barman, Shiv Nath Yadav, Shivam Kumar, Sadhan Gope "*IOT Based Smart Energy Meter for Efficient Energy Utilization in Smart Grid*", Institute of Electrical and Electronics Engineer (IEEE), 2018.

[6] Darteh, Charity Oseiwah Adjei, Raphael Anaadumba, Sajib Sarker, Goma T.F.J. Christian "*Design of Internet of Things based Electricity Theft Detection using Raspberry PI*" International Journal of Research of Engineering and Technology (IJERT), 2021.

[7] Gouri Doiphode, Pooja Kadam, Nikita Adsure, Swapnali Damare, Dr. Nikhil Karande "IOT *Based Smart Electric Meter*" International Journal of Advance Scientific Research and Engineering Trends (IJASRET, 2021.

[8] Vivek Kumar Jaiswal, Hritik Kumar Singh, Kuldeep Singh "*Arduino GSM based Power Theft Detection and Energy Metering System*" Institute of Electrical and Electronics Engineer (IEEE) ,2020.

[9] Md. Abrarul Alam, Mohammad Zeyad "*Smart Cities and Buildings: GSM Based Smart Electric Energy Meter Billing System*" Institute of Electrical and Electronics Engineer (IEEE) ,2019.

[10] Supriya Jaiswal, Makarand S. Ballal "*Fuzzy Inference Based Electricity Theft Prevention System to Restrict Direct Tapping Over Distribution Line*" Journal of Electrical Engineering and Technology (Springer) ,2020.