Power Theft Monitoring System and Line Breaker with Gsm Modules

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***Abstract*—Stealing electricity presents a major hurdle for power delivery companies, causing substantial monetary damage, lower grid reliability, and possible safety dangers. This document describes the making and deployment of a Power Theft Monitoring System employing a Line Breaker and GSM Module, functioning as an automatic way for quick spotting and stopping of illegal power consumption. The device continuously observes voltage and current measurements using sensors linked to a microcontroller. After sensing strange changes that point to unapproved hookups, the device instantly cuts the electrical flow through a relay-controlled line breaker and sends an alert to the utility company using the GSM module. Compared with older methods relying on human checks, this suggested fix offers ongoing oversight, fast reaction speeds, better safety precautions, and smaller running costs. Furthermore, the device is reasonably priced, can be simply expanded for smaller setups, and suits integration within smart grid frameworks**

I. INTRODUCTION

Electric power is a vital infrastructure resource, and using it effectively remains crucial for societal and economic progress. Yet, power theft—which means using electricity without permission or tapping into lines illegally— continues to be a common problem globally. This causes money loss for the companies that supply power, higher bills for regular customers, and possible dangers from electricity. Older ways of watching usage depend a lot on people physically checking things and reading meters now and then. These methods tend to respond after the fact and usually find theft only after significant amounts of money have already been lost. Given the progress in small electronic systems, sending data wirelessly, and IoT tools, setting up automated tracking has become possible. The suggested Power Theft Monitoring System featuring a Line Breaker and GSM Module intends to offer a solution that acts ahead of time by: Keeping a constant watch on the levels of voltage and current Spotting unusual changes as they happen Automatically disconnecting the power line that is affected Immediately sending text messages about problems to the right people This setup makes operations run better, cuts down on money lost from theft, and makes the whole power network more dependable

II. LITERATURE SURVEY

[1] Smart Meter-Based Real-Time Detection

S. S. Rao and colleagues (2019), within the IEEE Transactions on Industrial Informatics, developed a way for spotting theft immediately using smart meters plus central oversight. This framework looked at how much power was used to find any differences. Even though it successfully lowered losses from non-technical causes, it needed an advanced metering infrastructure (AMI) and main data storage units, which increased the price to put it in place.

[2] IoT-Based Theft Monitoring with Machine Learning

A. K. Singh and team (2020), as shown in the IEEE Sensors Journal, brought forth a monitoring setup based on IoT that used current transformers along with machine learning methods. The setup flagged usage trends that were out of the ordinary and sent information to cloud platforms. While it offered clever detection and ability to access from afar, its reliance was high on steady internet links and cloud computing capabilities.

[3] Deep Learning-Based Detection in Smart Grids
Y. Zhang and associates (2021), reported in IEEE Transactions on Neural Networks and Learning Systems, put forward deep learning approaches for assessing large amounts of smart grid information. Their setup reached a high degree of finding accuracy by means of
neural networks taught using past information sets. Still, it required substantial processing power, massive collections of data, and a link to smart grid environments.

[4] Blockchain-Based Secure Energy Monitoring
J. Liu and co-authors (2021), in the IEEE Transactions on Industrial Informatics, suggested a theft finding method driven by blockchain and connected with IoT gadgets. This approach ensured transaction records were safe and could not be changed. While improving openness and safety, the system placed big demands on computing power and difficulties during setup.

[5] Synchro phasor Measurement-Based Detection
H. Li and colleagues (2021), in the IEEE Transactions on Smart Grid, set up a theft spotting method relying on synchro phasor technology that used Phasor Measurement Units (PMUs). This system provided accurate locating and spotting of where theft happened. On the other hand, it needed expensive hardware and complex grid arrangements.

[6] AI-Based Smart Meter Analytics
New approaches using AI highlight finding unusual events via forecasting methods and recognizing trends. These setups improve how accurately things are found but need strong computer power and structured information collections. They work best for very large service providers that have advanced digital structures

III. COMPARITIVE ANALYSIS OF LITERATURE

[1] S. S. Rao et al., 2019 – Smart Meter- Based Detection
It uses Advanced Metering Infrastructure plus central data processing for fast theft finding. It provides dependable watching and clearer views of the power grid. The large infrastructure costs and dependence on central setups limit usage in country areas.

[2] A. K. Singh et al., 2020 – IoT & ML- Based Monitoring
This joins Internet of Things sensors with machine learning to spot things that are not normal. It allows for checking from afar and presents a structure that can grow. It needs the internet and cloud tools; putting it into practice is quite involved.

[3] Y. Zhang et al., 2021 – Deep Learning-Based Smart Grid Detection
It uses neural networks to get very accurate anomaly spotting. This works well for big smart grid setups that already have collected data. It demands large computing power and needs advanced underlying structures.

[4] D J. Liu et al., 2021 – Blockchain & IoT-Based Monitoring
This offers permanent logs of energy trades and better openness. It includes strong safety measures. The high processing costs and difficult
setup cause growth problems for smaller power companies.

[5] Li et al., 2021 – Synchrophasor-Based Detection
It uses data from Phasor Measurement Unit to correctly find theft and do checks right away. This boosts how dependable the power grid is. It calls for expensive equipment and smart grid setups. Proposed System – GSM with Line Breaker (2026)
A setup built on an embedded microcontroller that measures voltage and current flow. It finds strange current changes, turns off power automatically using a relay, and sends text alerts using GSM. This option saves money, is easy to set up, and runs by itself without needing cloud services or smart grid parts. It fits best for local and budget-focused deployments

IV. CONCLUSION

Unlawful electricity consumption continues to be a major element in the non-technical losses observed throughout power transmission grids. Even with the presence of sophisticated tools such as AI, IoT, blockchain, and synchrophasor based systems that improve finding capabilities, their intricacy and related costs impede their implementation within smaller grids.The presented Power Theft Monitoring System employing a Line Breaker and GSM

Module offers a practical and reasonably priced alternative. This setup merges monitoring through sensors, handling by a microcontroller, automated line disconnection, and notifications sent through GSM, guaranteeing fast discovery and rapid protective actions. This system proves especially useful for: Electrical distribution setups in rural and town fringe areas smaller utility organizations Deployment situations where budgets are tight Future improvements might incorporate linking with IoT cloud platforms, enabling support for mobile phone apps, GPS location tracking for finding theft, and future pattern forecasting driven by AI. To sum up, the recommended system successfully bridges cutting edge study techniques with real world uses, boosting income protection, bettering operational functioning, and guaranteeing electrical security.

REFERENCES

[1] Zulu, C.L., & Dzobo, O. (2021). Design of electric meter with double connected data capture system for energy theft monitoring. IEEE AFRICON.
[2] Kumar, AS., Sharma, B., & Patel, C. (2020). Smart power theft detection using IoT & GSM. International Journal of Smart Grid Technology.
[3] Mehta, R., Gupta, S., & Verma, T. (2021). AI-based power theft monitoring with smart meters. International Journal of Artificial Intelligence in Energy Systems.
[4] Singh, P., Rao, A., & Das, M. (2022). Blockchain-enabled theft preventing system. International Journal of Smart Grid and Blockchain Technology.
[5] Foudeh, H.A., & Mokhtar, A.S. (2015). Automated meter reading and advanced metering infrastructure projects. Jordanian International Electrical and Electronics Engineering Conference