

# Decentralised Energy Consumption Monitoring using Painless Mesh and ESP-NOW Protocol

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**Abstract:** India is one of the world's largest consumers of electricity. With the growing population and rapid growth in industrialisation, the energy demand is brimming. However, beneath this impressive progress lies a concerning truth - India is not just consuming energy but also wasting it at an alarming rate. Much of the electricity wastage in India is not due to a lack of technology but rather to inefficient usage and behavioural habits, such as leaving appliances on standby, forgetting to turn off lights, or operating energy-intensive devices unnecessarily. In industries, machinery can drastically increase energy consumption, making it essential to monitor specific machines, floors, or zones to identify inefficiencies. By determining the difference between the expected energy consumption, a system is designed to consume and its actual consumption, our project provides a versatile energy monitoring solution. It enables real-time tracking, detects wasteful practices, and optimizes energy usage, helping industries and other applications reduce overall consumption effectively.

**Keywords:** Energy monitoring, ESP NOW, Painless Mesh, Energy Consumption, ESP-32, RS-485

