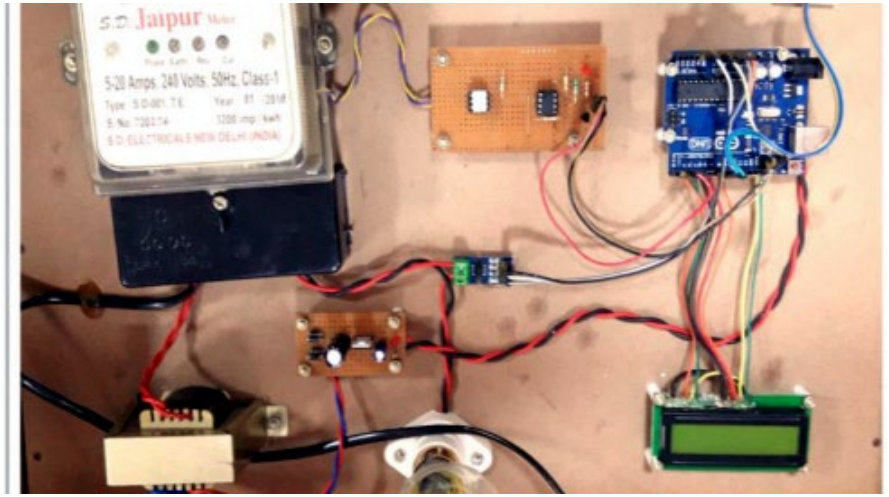
IoT Based Cloud-Enabled Smart Electricity Management System

A presentation-ready overview of the project, methodology, hardware architecture, cloud visualization, and results.

Energy Metering • IoT • Cloud • ThingSpeak



Presented at SSIC-2019 • Springer proceedings context

Problem: manual electricity monitoring is slow

Traditional meter reading creates delay, effort, and reduced transparency for users.

Why a smarter system is needed

01 Manual visits

Users must physically check meters or wait for operator readings.

02 Billing uncertainty

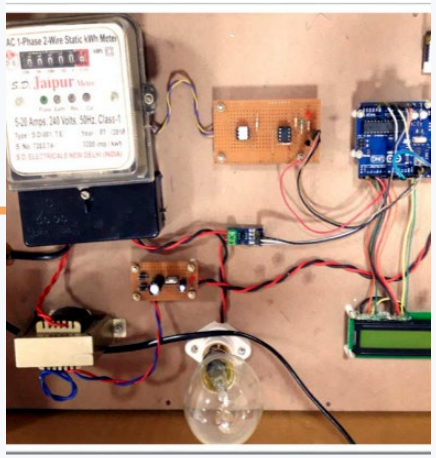
Limited visibility into what was consumed and how cost was calculated.

03 No real-time awareness

Consumption patterns are not visible until after usage has already happened.

04 Energy efficiency gap

Hard to detect waste, misuse, abnormal loads, or device-level consumption.



Move from meter reading to connected monitoring

The project digitizes consumption capture and sends readings to the cloud for remote access and visualization.

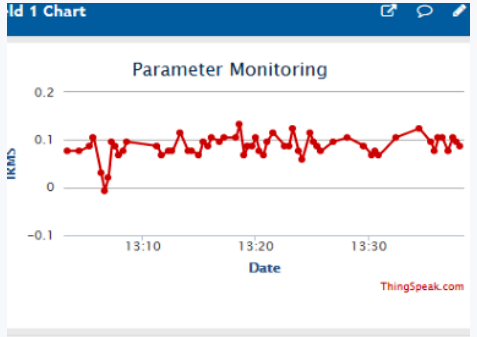
System concept: meter data becomes cloud insight

A connected measurement chain captures readings, processes them, and visualizes them online.

Electric Meter → Current Sensor → Arduino Controller → Wi-Fi Module → ThingSpeak Cloud

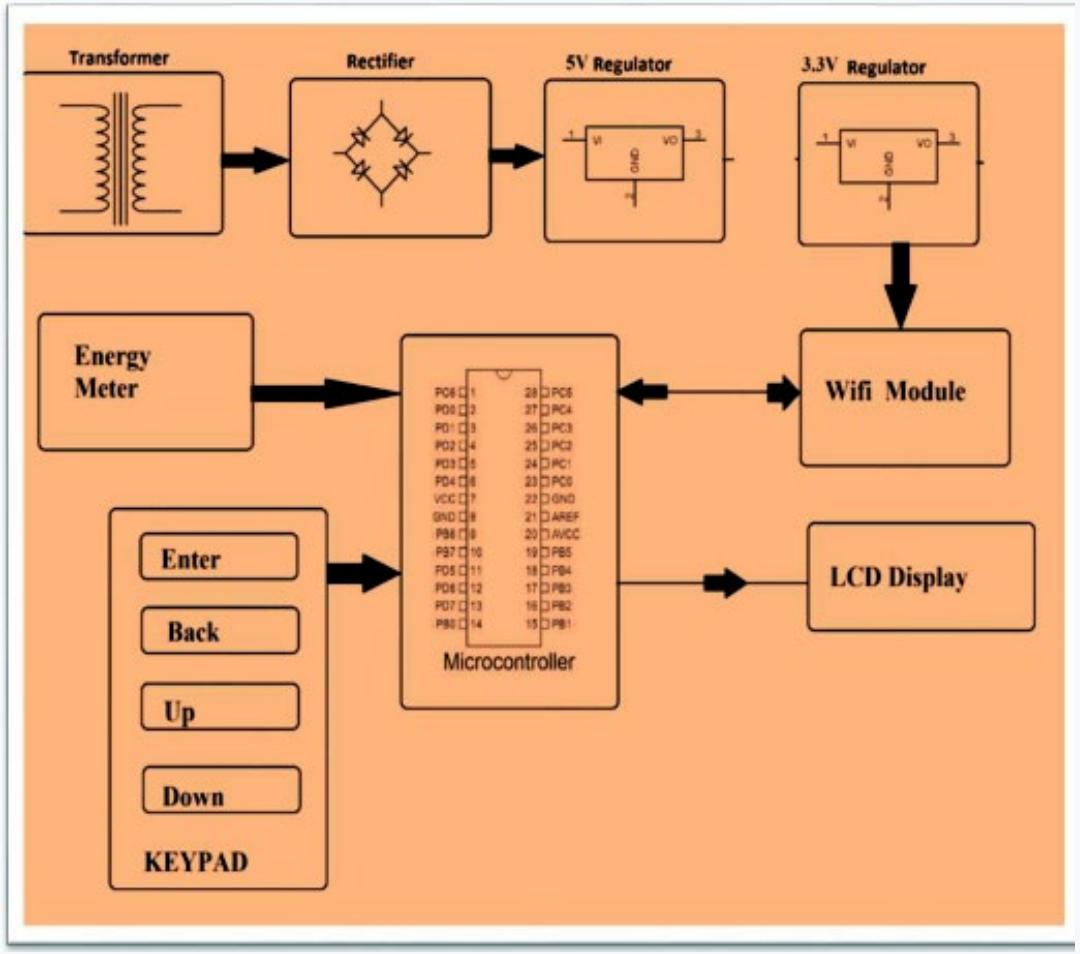
LCD display gives local visibility while cloud graphs enable remote monitoring.

Outputs: units consumed, IRMS, calculated cost, and usage trends.



Prototype architecture

Core components used for E-monitoring of energy meter readings.



Architecture diagram from the project paper

The controller collects meter pulses, calculates readings, displays them locally, and transmits data through Wi-Fi to the cloud.

Controller

Arduino Uno processes sensor readings and controls display/network flow.

Connectivity

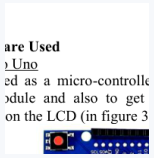
ESP8266 Wi-Fi module enables IoT communication with the cloud.

Cloud layer

ThingSpeak stores and visualizes readings as live charts.

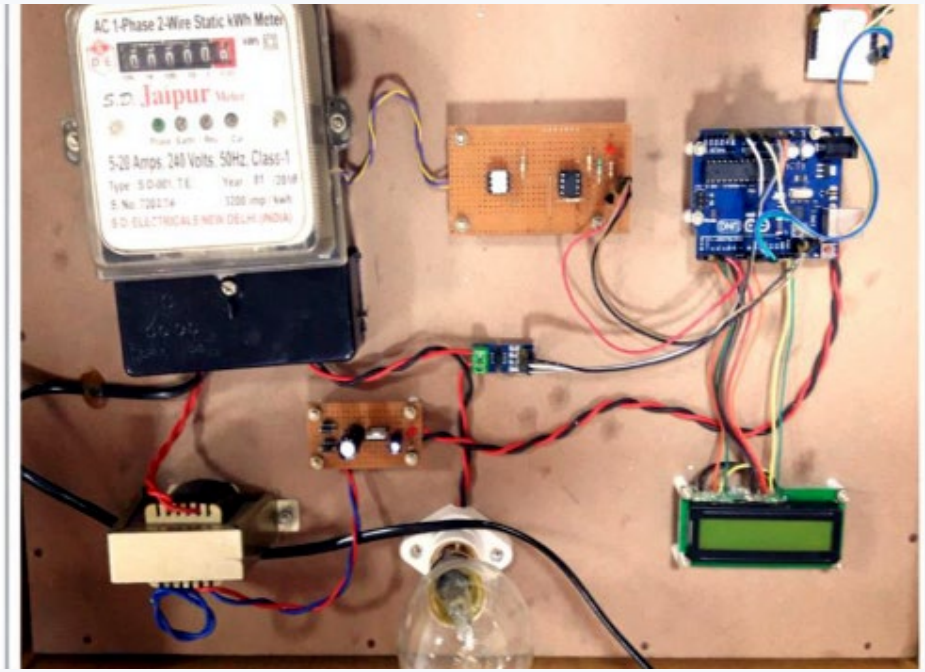
Local output

LCD shows units and cost for immediate user feedback.



Hardware and software stack

The implementation combines metering hardware, embedded control, connectivity, and cloud analytics.



Prototype board with meter, Arduino, LCD, load, and wiring

Hardware

Arduino Uno
ESP8266 Wi-Fi module
LCD panel
Electric meter
Transformer
Bulb/load, jumper wires, breadboard, resistors

Software / platform

Arduino IDE for programming
ThingSpeak API for visualization
ThingSpeak cloud services
Linux/Ubuntu test environment
Wi-Fi local network

Methodology

From circuit assembly to cloud visualization and system testing.

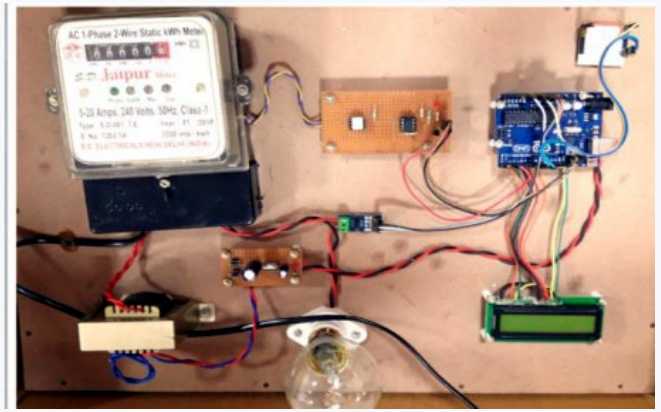
01 Understand Arduino and meter operation

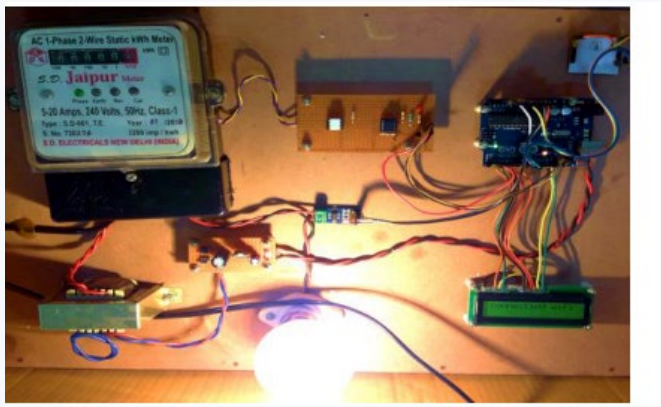
02 Collect components and connect circuit

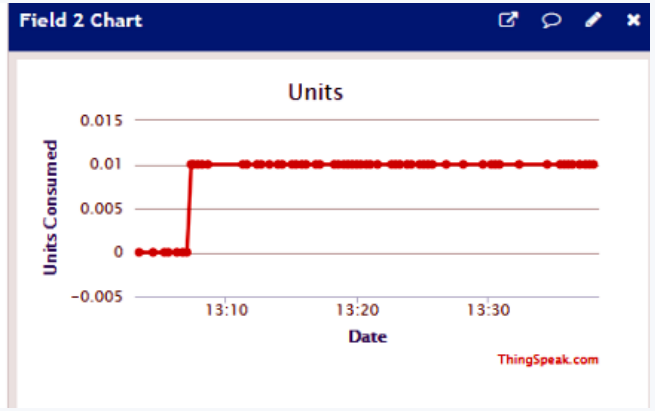
03 Program Arduino and integrate Wi-Fi module

04 Send readings to ThingSpeak cloud

05 Visualize, test, and validate readings



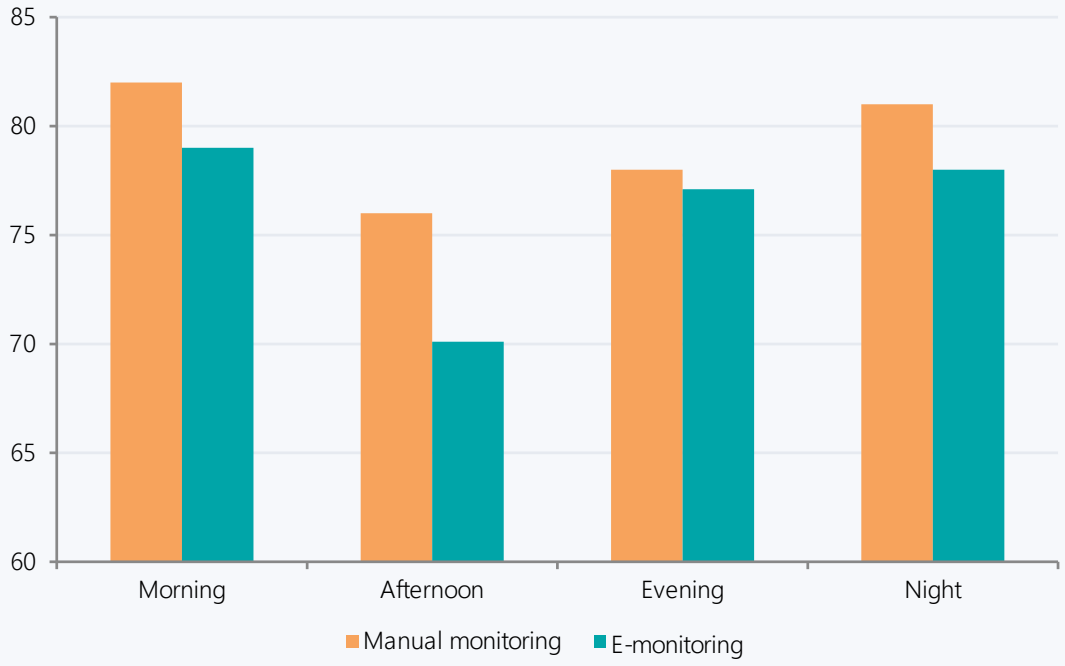




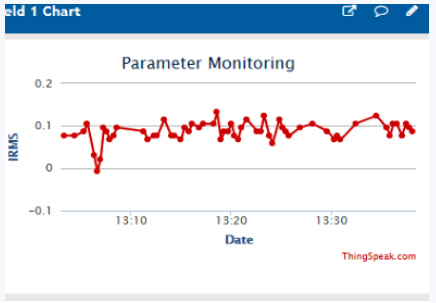
Prototype → Wi-Fi connected load → cloud reading visualization

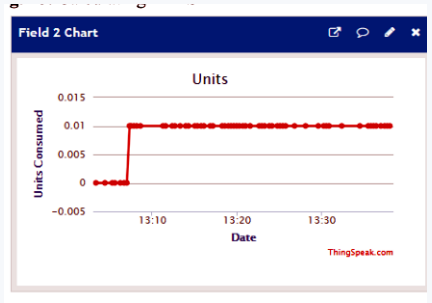
Results: lower consumption and cloud visibility

The project reported successful unit calculation, Wi-Fi transmission, and ThingSpeak analysis.



Reported comparison from project Table 1





Cloud dashboard captures IRMS and units while LCD provides on-device feedback.

Conclusion and presentation certificate

A smart meter prototype that improves access, accountability, and reliability.

Key takeaways

Remote access

Users can monitor readings through cloud visualization.

Better transparency

Units and cost are visible instead of hidden in delayed billing.

Efficient monitoring

IoT reduces manual effort and improves responsiveness.

Extendable design

Applicable to homes, industries, and maintenance monitoring.