

College	R.V. College of Engineering		
Department	Computer Science & Engg		
Semester and Section	7th sem,'C' sec	Date of Submission	13-09-2019
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Self-Study Title	SMART ELECTRIC METER		
Broad Area	INTERNET OF THINGS		

INTRODUCTION

Smart Electric Metering System is an embedded application designed using IOT and cloud Technology. The project provides a system that allows to read and analysis electricity consumption in units (Khwh) and send that data to cloud.The system provides a two way reading. One on TFT display and the second on Android Application.

The advantages these electric metering system offers make is a more accurate measuring device than the conventional electromechanical meter reading system.

OBJECTIVES

The main objective of the project is to atomize the traditional billing system, reduce the manual work, to ensure there is no bill tampering and to manage the data in cloud.

The service provider for energy still uses conventional methods for getting the energy consumed by visiting each individual customer, which is time consuming and requires lot of work. The bill slip generated maybe misplaced and leads to risk for paying bill.

The proposed project can lead to error free secure, reliable and fast system. It can assist the user to concentrate on their other activities rather to concentrate on the record. The system automatically reads the energy consumed and sends it to the service provider, then the service providers can send the bill to customer and can control the billing tampering.

METHODOLOGY:

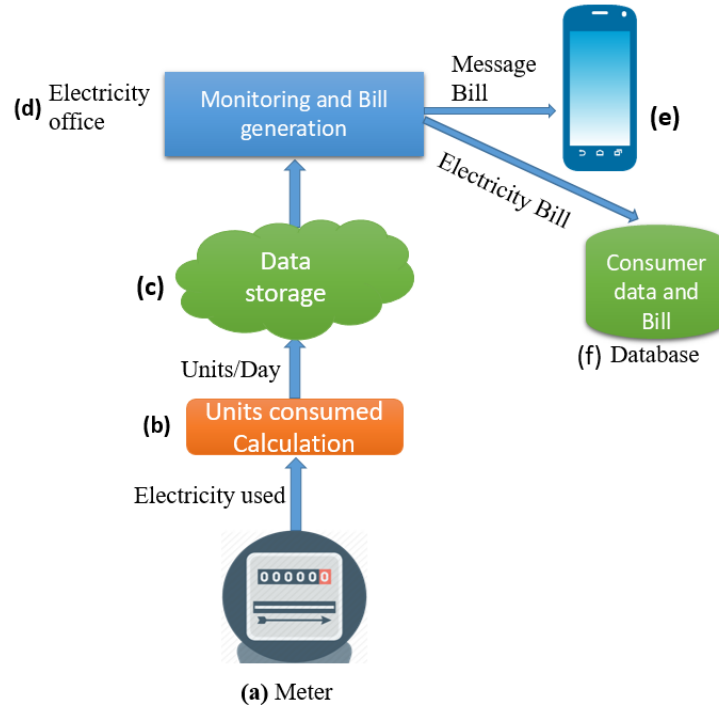


Fig1: Framework

The working principle of the proposed model is

- a) Usage of electricity estimation is done through sensing Cal LED count.
- b) Calculate units consumed per day and send data to TFT display using Arduino mc for user monitoring.
- c) Upload units consumed per day to cloud using nodemcu module.
- d) Android application is designed to view data.
- e) Extract energy consumption data of particular meter from cloud and plot graph.
- f) Store and Maintain Electricity details and monthly bills in database.

The following features are considered during implementation.

- **Usage Calculation:** Electricity usage by various household appliances is calculated by reading Impressions per kWh (Cal LED) of meter.

$$\text{Unit} = 3200 \text{ Imp/kWh}$$

BLOCK DIAGRAM

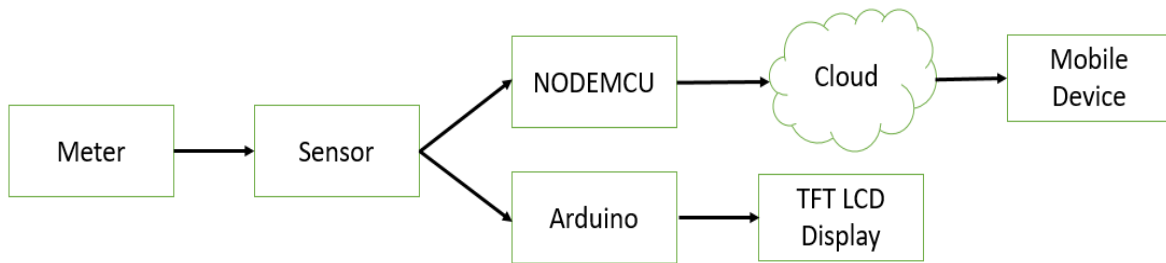


Fig2: Electricity Monitoring System Block Diagram

- Voltage near the Cal (Impressions per kWh) led of meter is recorded and sent to both microcontroller (Arduino) and nodemcu which functions as data acquisition and calculation node.
- Units of electricity consumed per day is calculated in microcontroller. Calculated data is sent to cloud (IOT web service) using a Wi-Fi interface module connected to the microcontroller.
- Data is also sent to TFT display using microcontroller interface module for user monitoring of units consumed.
- Data present in the cloud is extracted and graph is shown in user application.

REQUIREMENTS

Hardware Specifications

- Arduino UNO
- NodeMcu
- Energy Meter
- TFT LCD Display
- Current Transformer
- Transformer/Adapter

Software Specifications

- Arduino IDE
- Programming Language: Embedded C
- Protocol : MQTT(Message Queuing Telemetry Transport)
- Cloud: IBM (IOT Platform and Cloudant)