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IoT Enabled Power Theft Identification using Arduino

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ABSTRACT: Utility companies in India estimate that electricity theft costs them over billions of rupees. The purpose of this project is to provide design of electricity theft monitoring system which allows violators to be detected at a remote location. In India the power theft is major problem which causes the loss of electricity in Billions of rupees in all the sector collectively. 80% power loss of energy is occurred in the rural areas. In rural areas people use mostly the high rated motors and other instruments. Theft of electricity can be detected with the help of our system and can be implemented on the major scale in rural areas. This system will minimize the power theft to minimum.

Power theft is a major problem in distribution side, all over the world. This is illegal and should be strictly prohibited. Power theft can be defined as the usage of the electrical power without having any contract with the supplier. Nowadays the most common type of power theft is done by hooking directly from the distribution lines. This project focuses on the prevention of unofficial power consumption. The circuit consists of Node MCU, Current sensor, Relay, LCD, IOT platform. In this project a current sensor is used at actual load side for reading the value of current. Through the IOT platform, the value of current is sent to the Node MCU. The Node MCU is programmed for a certain value of current. If the value of current is exceeded, then there is an occurrence of power theft, it will be shown in the LCD display. Through the IOT, the data is sent to cloud platform. If power theft occurs, then the information is passed to the PC of the control room.

KEYWORDS: IoT (Internet of Things), Power Theft, Identification, Arduino

I. INTRODUCTION

India is the power theft hub especially in rural areas and the area which have the population moderate to high. This causes the Indian power distribution sector more losses and electricity board to compensate the losses of electricity increases the prices of the electricity. There are two types of power theft which are meter tampering and direct hooking on cables. Meter tampering is done in the residential area by using magnets on meter and by short circuiting the connection. Mostly direct hooking on cables is done. Electricity theft is a very common problem in countries like India, where the population is very high and the users of electricity are ultimately tremendous. In India, every year there is a very increasing number of electricity thefts across domestic electricity connections as well as industrial electricity supply, which results in loss of electricity companies energy and because of which we are facing the frequent problems of load shedding in urban as well as a rural area so as to overcome the need of electricity for the whole country.

II. LITERATURE SURVEY

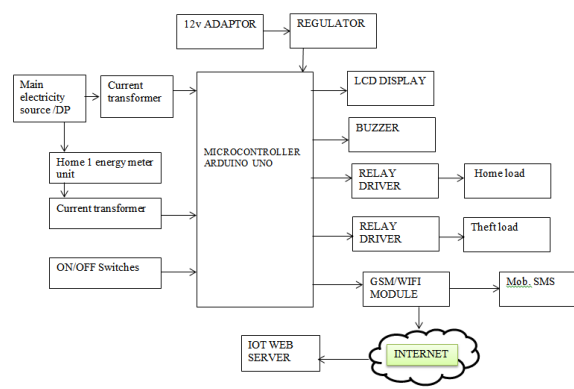
1. Power Quality observing is vital particularly for high recurrence nonlinear burdens, rapid movable drivers.
2. Advancement in the field of electrical designing is fast and excellent.
3. Despite the fact that the nonlinear power electronic types of gear present power quality issues, their utilization is unavoidable.
4. The current remote correspondence arrangement of energy meter has been finished using ZIGBEE and GPRS.

III. OBJECTIVE

1. To allow the user/EB to monitor the meter reading online from anywhere.
2. Theft of electricity can be detected by measure difference between DP load and home meter load.
3. In this proposed system IoT and GSM technology is implemented for transmitting the information about power theft to the EB and prevents the current scenario.
4. The current system gives solution for the existing problems like power theft, wastage of energy and transmission line fault that are faced by the authorized power suppliers.

IV. PROPOSED METHODOLOGY AND DISCUSSION

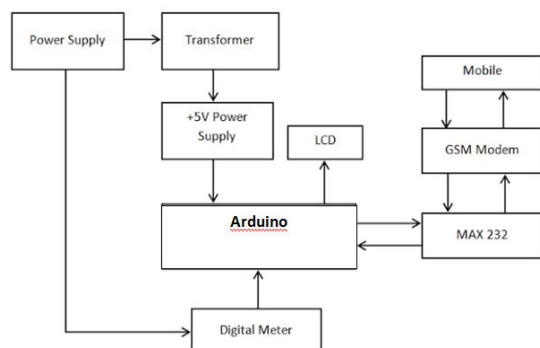
Block Diagram:



Working System:

One of the current sensors is connected to the energy meter and main supply connections. This current sensor measures incoming current or actual load current near energy meter. Second current sensor is interfaced with secondary Arduino unit which is placed at power sending utility. Both Arduino units send these current value data to web application where both sending end and receiving end load current will be compared. The load current data at IoT server can be further used to analyze and load management by power generation and distribution companies. To convert 230-volt strength supply into 12-volt we used 12-volt step down transformer so now the electricity delivered might be 12 volts. Now our device requires five volts so we used voltage regulator 7805 so we get five-volt power delivered which is given to our system.

FLOW CHART:



ALGORITHM:

STEP 1: START

STEP 2: Measure Control Flow Information from Smart Meter

STEP 3: Connect to IoT Server Using APIs

STEP 4: Send Power Flow Information To IoT Server

STEP 5: Run Theft Detection
Algorithm In Server

STEP 6(a): IF THEFT IS NOT DETECTED,
Update the Meters Data in the Database

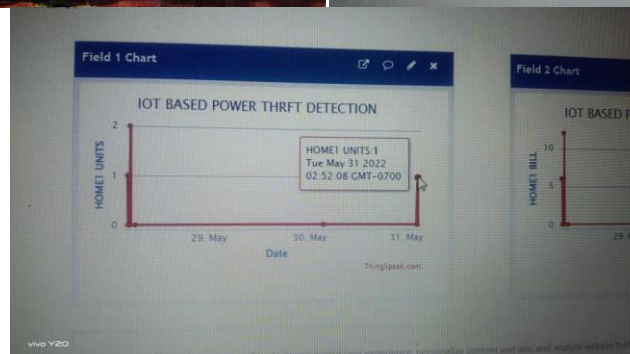
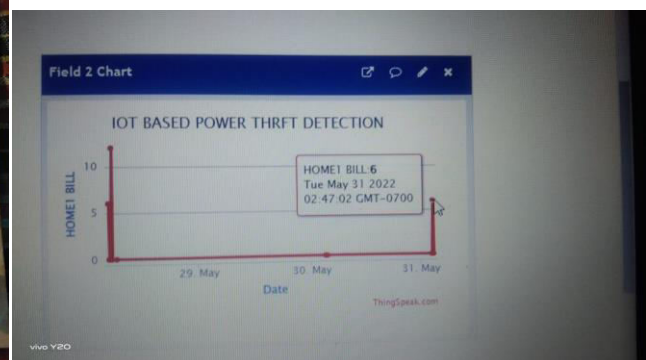
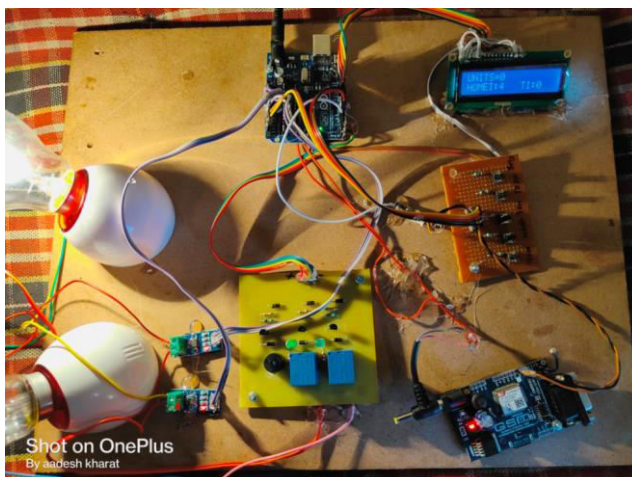
STEP 6(b): IF THEFT IS DETECTED,
STEP (i): Check Meter Tampering Flags

STEP(ii): Inform Authorities About Theft

STEP(iii): Update the Meters Data In the Database

EXPERIMENTAL RESULTS WITH FIGURES:

V. RESULT AND DISCUSSION



The programming is done in the Arduino IDE app for the Current Sensor and the LCD display. For the application to be



developed the Arduino is programmed for the functioning of the LCD display and the current sensor that is connected to it. If there is no power theft occurs, then the data will be sent to the Arduino through the current sensor. The message "No power theft occurred" will be shown in both the LCD display and personal computer in TNEB through cloud storage. If there is a power theft then the data will be sent to the Arduino. The message "Power theft occurred" will be shown in both the LCD display and Personal computer in TNEB. The Arduino programming is done in the Arduino IDE app for the Current Sensor and the LCD display. Here the hardware connections are made.

VI. CONCLUSIONS

The performance of the project is discussed. Thus our project on power theft detection and alert system using IOT is successfully implemented.

A Wireless Electricity Theft Detection and monitoring system has been designed and developed with proper integration of both the hardware and the software. Without any human interface this system provides an effective and easy way to detect electrical theft. The use of IoT helps in achieving the numerous advantages of wireless network communications. Power theft is actually bypassing the energy meter but in our project we have indicated the theft by increasing the load also and this method is cost efficient.

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