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Power Grid monitoring and Control System By using IOT

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Abstract *- There is a rapid growth in Smart Grid and Internet of Things (IOT) technologies in the recent days. IOT is a connection of network of physical objects with the internet through sensors and other technologies using any service. Smart Grid is a data communication network which is incorporated with the power grid to assemble and study data that are gathered from transmission lines, distribution substations, and consumers. IOT is widely used in smart energy monitoring and controlling, automation in industries, and a variety of applications. IOT devices are used to monitor and control grid parameters for steady and useful power delivery at various stages of smart grid. These technologies, when used in combination offer energy optimization and user friendliness in terms of monitoring and controlling of electronic devices. Although IOT incorporation in the Smart grid domain contributes lots of service, the threats needs to be solved for the efficient use of the grid. An extensive survey of IOT based Smart Grid environments to provide effective solutions to these threats is done in this paper. The software solutions, challenges such as stability in connection, communication, cost and information privacy and security is also discussed broadly.*

Keywords:- *IOT, Smart Grid, Monitoring, Sensors.*

1.INTRODUCTION

The energy consumption can be monitored by using an electric device called energy meter. The cost and the regular usage of Power consumption are informed to the user to overcome high bill usage. The Energy meter shows the amount of units consumed and transfers the data to both the customer and to the electrical board so this helps in reducing man-power. The user can check their Power usage from anywhere and at any time interval. The IoT is used to Turn on/off the household appliances using relay and Arduino interfacing. The objective of this system is to monitor the amount of electricity consumed. The distributer and the consumer both will be benefitted by eventually reducing the total Power consumption.

2.LITERATURE SURVEY

Olufemi Babaji de Ordained John Junior Aidan, Obasi, Chijioke Chukwuemeka, Victor Onyedikachi Ibiam1 Ubadike, Chiedu Yoshinaka [1]A work on the design, construction and implementation of a conversion system for power supplies is presented. The purpose of this item is to reduce maintenance costs and limit the use of generators for utilities such as fuel when outages are extended. In the design and construction of the system, a modular approach of parts and buttons was used. The AT89S52 microcontroller is used for this implementation in the, which runs the control program in its memory. For selection of the various modes and functions of the, a four-button pushbutton switch is used. This automation technology will also automatically add some intelligence to the power conversion by allowing the user to select the mode in which they want their automation system to operate. The proposed system upgrades the existing automated and manual power conversion. M Gouzman,D. Gavrilov, S Luryi[2] A job concurrency function is proposed to estimate the operation of the grid. This paper focuses on real-time monitoring of the smart grid, where comprehensive information about power flows in the grid is required. Here, a dense network of sensors is implemented to collect and process large-scale real-time data, which facilitates the construction of grid maps. The proposed network monitoring uses a dense network of sensors at low cost installed at each branch point of the power lines. The RMS current is measured periodically and the phase shift between current and voltage is obtained in the conductor using a sensor. To achieve global time synchronization by monitoring anomalies in the electromagnetic fields around conductors to estimate all required parameters, each sensor is equipped with a GPS receiver Ali Azizi, Saeed Peyghami, Hossein Mokhtari, Frede Blaabjerg [3]A work is presented on independent and distributed styles of power sharing and energy operation for DC microgrids without the use of communication systems. This document presents a steady state operation and a cost-effective result for DC micro grids. thus, the generation and the cargo must work rightly. support and power consumption (ESC) precedence is introduced then to ameliorate the system performance of the. In addition, power inflow from a full battery to an empty battery is avoided and SOC (state of charge) of battery is meetly acclimated as anticipated by control action. therefore, the cycle life of the battery and the overall performance of the system can be bettered. The system provides draw- and- play functionality for the to use amicro-grid for each battery cell grounded on its control system and voltage information.

3. PROPOSED METHODOLOGY

The smart energy meter monitoring system is shown in figure 1. The block diagram consists of Arduino, energy meter, WIFI module and IoT, Relay and transformer.

4.DESCRIPTION OF THE PROJECT

In this design the hardware components that we use are:

- Microcontroller ATMEGA328
- Wi-Fi Module
- LCD 16x2
- Relay
- LM35 Temperature Sensor
- Current Sensor
- Voltage Sensor
- Lamp load
- Buzzer
- Arduino Compiler

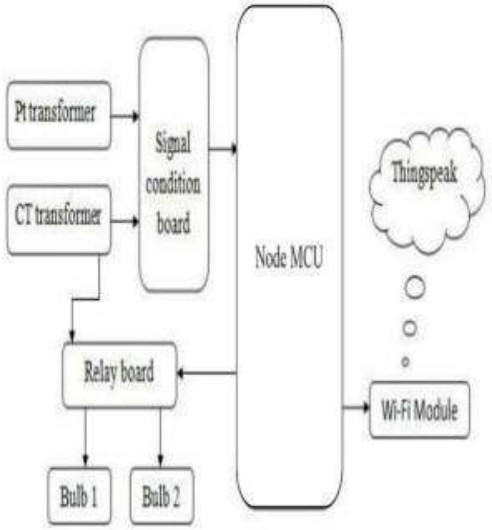


Fig: system block diagram

4.1 Microcontroller ATMEGA328 Features:

- 28 pin IC with 20 GPIO pins
- Inbuilt 6 channel ADC
- 2kb SRAM, 1kb EEPROM
- 32 General purpose registers
- Works on 5V • Low power Sleep mode
- Multiple software tool support

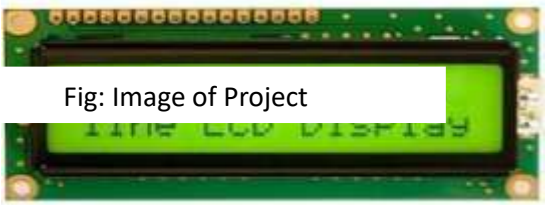
4.2 WI-FI Module :

Features:

- Power Supply: +3.3V
- Current Consumption: 100mA
- Built-in low power 32-bit MCU
- Supports Deep sleep (<10uA)
- Works on serial communication protocol
- Can be used as Station or Access Point or both combined
- Programmed using AT-commands

Fig: Image of Project

4.3 LCD 16x2 :



Features:
This is a high quality 16 character by 2 line intelligent display module, with back lighting, Works with almost any microcontroller. This is a popular 16x2 LCD display. It is based on the hd44870 display controller hence it is easy to interface with most micro controllers. It works of 5v and has a green back light.

4.4 Current Sensor:

Features:
▪ Low-noise analog signal path
▪ Device bandwidth is set via the new FILTER pin
▪ 5 µs output rise time in response to step input current ▪ 80 kHz bandwidth
▪ Total output error 1.5% at TA = 25°C
▪ Small footprint, low-profile SOIC8 package
▪ 1.2 mΩ internal conductor resistance
▪ 2.1 kVRMS minimum isolation voltage from pins 1-4 to pins 5-8
▪ 5.0 V, single supply operation
▪ 66 to 185 mV/A output sensitivity
▪ Output voltage proportional to AC or DC currents
▪ Factory-trimmed for accuracy
▪ Extremely stable output offset voltage
▪ Nearly zero magnetic hysteresis

5. FEATURES & ADVANTAGES:
• Realtime monitoring.
• Automated outage management and faster restoration
• Dynamic pricing mechanisms.
• Incentivize consumers to alter usage during different times of day based on pricing signals.
• Better energy management.
• In-house displays.
• Web portals and mobile apps.
• Track and manage energy usage.

6. RESULT:

Firstly, we have to switch on the mains. Current sensor senses the power utilized by the load. Which gives output in analog form. The output of the sensor is supplied as input to the analog input part in the Node MCU Nano Board. Node MCU board has inbuilt analog to digital convertor which converts analog input of power to digital output.
The Node MCU is used to connect internet with the monitoring hardware system. The power utilized by the load is displayed in the cloud viz, Thing Speak cloud in graphical format as shown in the Chart - 1 and Chart -2 below. It shows time to time power utilization of the load/loads connected to the system

7.CONCLUSIONS

control home appliances remotely over the cloud Energy Monitoring using IOT is an innovative from anywhere in the world. In the proposed application of internet of things developed to project current sensor is used to sense the current and display it on internet using IoT. The system updates the information in every 1 to 2 seconds on the internet using public cloud THINGSPEAK. In the present system, energy load consumption is accessed using Wi-Fi and it will help consumers to avoid unwanted use of electricity. IoT system where a user can monitor energy consumption and pay the bill Online can be made. Also, a system where a user can receive SMS, when he/she crosses threshold of electricity usage slab can be equipped. We can make a system which can send SMS to the concerned meter reading man of that area when theft is detected at consumer end. Also using cloud analytics we can predict future energy consumptions.
The model design in such a way to solve the problems faced by consumer. By using such method, we can easily detect the fault and resolve it. It is highly reliable and locates the fault in three phase transmission line and also supposed to data storage. It works on real time so we maintain all data sheet and avoid the future problem in transmission line. Here we can monitor any time through IOT webpage. The system provides good flexibility. IoT based proposed system can also be used to detect fault in real time from any location, any device connected to Internet. According to this proposed system, accuracy and automatic system for the transmission line is used using the IOT technology from where if there is any shot circuit automatically the system the change in voltage and current will be

detected and automatically the system will indicate the problem.

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