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A Review On Power Quality, Continuity And Load Monitoring In Industry Over IOT

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Abstract

In conventional systems monitoring of power quality, continuity and load in industry systems based on a number of different devices. These devices are Multimeters, Oscilloscopes, Disturbance analyzers, Harmonic analyzers and Spectrum Analyzers, Flicker meters, wiring and grounding test devices etc. In modern time the instruments utilized in industrial sector are more sensitive to power quality disturbances. Continuity of production may be badly influenced due to disoperation of a central process or breakdown of equipment. That may lead damaging of device. As these devices cannot be enough to monitor for all the time. Need for continues monitoring gives possibility for the development of an IOT device. IOT means Internet of Things. Now-a-days IOT is used to increase the accuracy of power quality, continuity and load monitoring in industry. The process of assembling, evaluating and interpretation of unprocessed measured information into convenient statistics is called as Power Quality Monitoring (PQM). The power quality of system can be enhanced by PQM. Generally PQM measures data about voltage and current but is also open for measurement of other quantities.

Keywords: Internet of things, Energy meter, Gsm module, User interface, Gprs, Cloud computing.

INTRODUCTION

Since long time the consumers are mostly concerned for the continuity in supply of electricity. Nowadays consumers want reliability as well as quality. In many cases, the monitoring system ends up in huge power quality data which makes analysis difficult. Therefore, the development of IOT for measured data is required to understand what is happening in power lines. In order to develop electric power quality, numerous electronic power quality conditioners are invented and fabricated. Electrical systems are useful in Industry, hospitals, malls and other service providers which are tremendously dependent upon electrical and electronic appliances. Power quality monitoring is necessary to preserve appropriate performance of systems, client services and end devices. These end devices are extremely sensitivity to any disturbance in mains power quality. It is thus the necessity of every individuals that to watch their own electrical systems under control of every hours a day. Therefore device is needed to monitor power quality for all the time. Need for continues monitoring lead to develop an IOT device. Use of IOT device helps in taking action to overcome the power problems such as overvoltage, under voltage sags, voltage swells, voltage surge, transients, flickering lights, and harmonics. Monitoring of any sign of poor power quality helps to identify the source of problem through IOT. Thus power quality, continuity and load monitoring in industry over IOT is needed.

Power Quality

The accurate performance capability of device determines the Power quality. Rising financial impacts on the network system operators and their customers increase the current awareness in power quality. Number of factors describes the power quality such as power supply continuity and voltage. The idea of power quality involves grounding and powering of electronic devices in a way that is well-matched with the adjoining wiring system and other coupled devices and fit to the function of that device. Power quality provides system design and voltages so that the consumer can consume power from the distribution system effectively with no hindrance or disturbance.

IOT - Internet of Things

The network connectivity of software devices with electrical & electronic equipment, appliances, automobile, other items that enable to accumulate and swap data is known as Internet of Things (IOT). Without human to computer or human to human interaction the information can be transmitted over a network. Although very few devices, computers, mobiles are linked to internet directly. But redesigning of many embedded system or the devices are required. That can open a ways for other world by interacting through internet. IOT possess the capability to manage more easily through a comfortable GUI over the internet. The linking of electronics, sensor circuits, software programming with physical objects or devices allows the data interaction between the operating personnel and linked devices. The power quality monitoring system over IOT includes: Specialized PQMs, user interfacing computer, interactive network and a web server.

RELATED WORK

Monitoring of Power statistics and evaluation of performance analysis is need of industries in order to save unnecessary energy consumption. Power Quality with reference to Voltage and Current Quality, Continuity of supply, load monitor was studied. The term IOT (internet of things) for industrial power statistics is used by system. It provided platform for remote monitoring systems. The author S. Khalid & Bhatia Dwivedi.[1] presented an inventive skill organization through dangerous analyzing around control value difficulties, productions, interrelated global criteria also their influence in life cycle also the discoursed which be able to remedying to control value difficulties produced in dissimilar equipments. Management through current manufacturing observers as well as global vocal criteria are too measured in this pepar. This pepar help investigation labours, consumers also dealers of electrical control toward improvement a guide around the control value.

S. H. Laskar, Mohibullah. [2] carried out a comprehensive assessment on different problems concerned with power quality as experienced by consumers in different countries. PQ costs summery are presented. Consequently Poor PQ caused large financial impacts on a country's economy. Therefore additional initiatives are projected from the apprehensive parties and regulating organization to take remedial measures for maintaining better power quality from utility and at end users**.** Also provides insight on worldwide economical fatalities due to poor PQ. The commercial risk created by PQ problems is a genuine. For future power system, Smart grid is the most important vision.

Chengen Wang, Zhuming Bi and Li DaXu. [3] developed an initiative systems (ES) in industrial uses relies on IT. The improvement of Decentralization, modularization, and then computerization of an ES. They focused on IOT that can be useful to care decision-makings at all of fields and stages of ESs. They suggested that powers of IOT can be completely utilized. IOT and cloud computing can be planned to support a conventional assembly modelling scheme automatically. To achieve this objective, modelling scheme is automated. The scheme contains the next improvement: 1) the modularized construction to produce the scheme vigorous, trustworthy, supple, and stretchy; 2) the collective object-oriented form to aid interfaces and recycles of system workings; and 3) the automatic schemes to recuperate interactive assembly standard on behalf of assembly development.

Qingping Chi, Chuan Zhang and Li Da Xu.[4] illustrated for industrial WSN in IoT environment- a reconfigurable smart sensor interface. The method can gather sensor information smartly. It is very appropriate for synchronized and efficient needs of the high-speed data acquisition system in IoT environment. Different types of sensors can be connected to the system. Central design process of the reconfigurable smart sensor interface device is highlighted in this paper. Ultimately, they conducted research by doing actual time monitoring of water environment in IoT.

Xianrong Zheng.[5] carried study regarding IOT and cloud computingthat complement each other. Unlimited capabilities and resources of cloud computing can be utilised efficiently IoT. Also, when cloud computing united with IoT, it can handle with real world things in a more widen and vibrant manner. To accomplish something in a realistic market, cloud supplier need to recommend higher services that fullfil consumers potential. However, cloud supplier and cloud customers have diverse and sometimes contradictory QoS inclinations. If such a divergence occurs, a contract cannot be attained, without negotiation. A trade off advance can surpassed a allowance one in conditions of utility, but may invite more disappointment if information is unfinished. To balance utility and achievement rate, he proposed a mixed approach for cloud service negotiation.

Yunqiang Zhu, Jiaerheng Ahati, Huan Pei, Jianwu Yan, and Zhihui Liu.[6] introduces a innovative that unites Internet of Things. They carried out a case study on regional climate change and its ecological effects by making use of e-Science for environmental monitoring and management. They effectively made use of Geoinformatics such as remote sensing, geographical information system and global positioning system. They collected data and other information for the perception layer by using Multi-sensors and web services. Both community networks and personal networks were used to access and transfer accumulated statistics and other data in the network layer. The effects presented that water source accessibility is the vital element with respect to the principal production of the global environment in the area. The incorporated approach brought in this attempt would serve as a concept for resource and environment management in the near prospect.

Fei Tao, Ying Zuo, Li Da Xu, Lin Lv, and Lin Zhang.[7] focused on topic concerning about management and reduction of the energy consumption and GHG emission in the entire process including plan, fabrication, transportation, trade, utilization, reprocess of a product based on IoT and BOM. Demanding dilemma featured by current manufacturing industry. They projected a new method for ESER evaluation based on the new technology of IoT. Study implement the projected method, a four-layered structure insight admittance layer, information layer, service layer, and function layer. ESER LCA system based on IoT.

Stefan Gheorghe, Nicolae Golovanov.[8] Gabriel Gheorghe, authenticated the opportunity from the possibility study in the intend stage of PQMS and endorsed the authors to glance at some development guidelines of the system. Two kinds of Power Quality Monitoring Systems (PQMSs) –TSO and other DSOs, were published. The integration of

PQMS with other systems – DMS, SCADA, DFR has been already solved in DSO and a superior efficiency has been achieved. The entire dimensioned chain in power distribution.

PROPOSED SYSTEM

Block Diagram

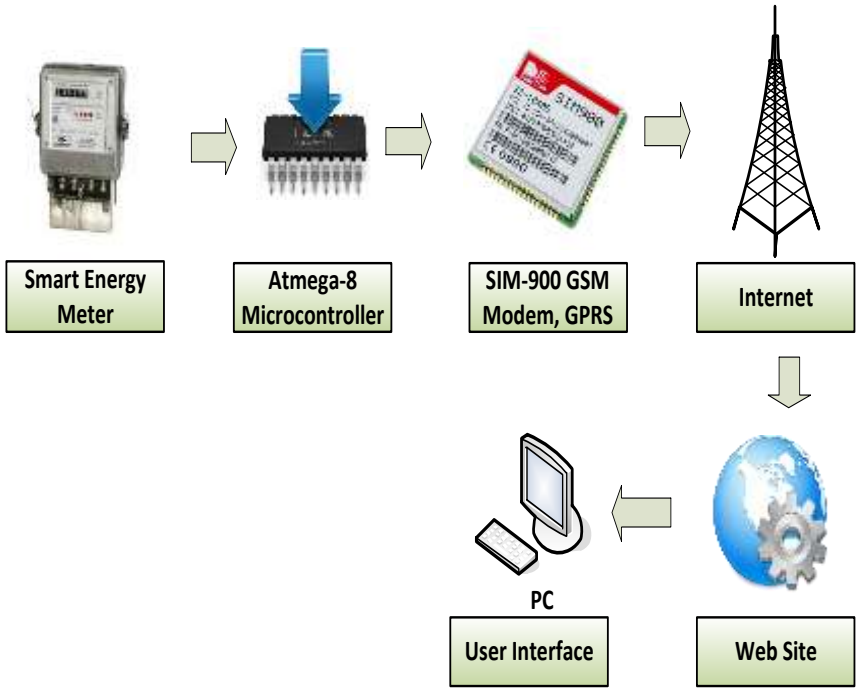

Figure 1. Block Diagram

Smart energy meter

The main objective is to acquire meter data remotely without human intervention and to store it in a common (central) repository for further analysis and utilization with other integrated systems such as billing, energy audit etc. Smart energy meter RS485 is used to observe significant distribution factors. Creation of exception and MIS-statement for appropriate scheduling, decision and taking remedial conduct on the commercial deeds can be possible by the management. Regulated power supply board is utilized and Smart Energy Meter is used to monitor the power supply. Smart energy meter supports Modbus protocol based communication with host system like computer, PLCs or the microcontroller. The smart energy meter RS485 is TTL communication based. The meter transferred different voltage and current information into the communication media.

Serial Convertor

As the energy meter communicate over serial interface like RS485. The data remains unreadable for microcontroller. Hence in order to make it readable to microcontroller system needs to convert the signals in TTL format. That is achieved using max 485 serial convertor boards.

Atmega-8 Microcontrollers

ATmega-8 Micro controller is made to use as an embedded system for computing data. The AVR RISC architecture is used for designing the ATmega8. The ATmega8 is a low-power CMOS 8-bit microcontroller. The ATmega8 executes the powerful instructions in a single clock cycle to get throughputs by attaining 1MIPS per MHz, for optimizing power consumption against processing speed.

SIM-900 GSM Modem, GPRS

SIM 900 Module with required component is used for internet connectivity and Interfacing the Modem to microcontroller. It is a communicator module useful in monitoring of energy meter. The product is divided in to multiple module including software and hardware building. Main concept of communicator is to work with existing supportable meter and transmit it's reading over the serial protocol at desired location. The details are updated in the web server through IOT module connected to the controller. So that any disturbance can be identified easily and necessary measures can be taken immediately to avoid further loss.

Interfacing The GSM Modem

The Modem is directly interfaced with 5V microcontrollers like PIC. Modem uses two connections. The TX pin of microcontroller is connected to RX pin of the modem and RX pin of microcontroller is connected to TX pin of the modem.

FUTURE WORK

This paper is proposed to design a microcontroller based iot to develop remote monitoring system for power quality, continuity & load in industry at real time. Also develop a web service for interaction between web application and iot. To avoid the human intervention in meter reading process and to make fully automated.

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