Design and Implementation using IoT based Wireless Sensor in Smart Grid

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***Abstract*— T-smartmeter is a sophisticated energy meter that measured consumption of power providing some further info compared to the traditional energy meter. Integration of good meters into electricity grid involves implementation of a spread of techniques and softwares reckoning on the options that the case demands. style of a sensible meter depends on necessities of the utility company still because the client. This paper discusses varied options and technologies which will be integrated with a sensible meter. Infact readying of good meters desires correct choice and implementation of a communication network satisfying the protection standards of good grid communication. This paper outlines varied problems and challenges concerned in style, deployment, utilization, and maintenance of the good meter infrastructure.**

I. INTRODUCTION

[1] Smart meter is a complicated energy meter that measures the energy consumption of a client and supply accessorial data to the utility company compared to an everyday energy meter. smart meter will browse real time energy consumption data together with the values of voltage, point and therefore the firmly communicates that information. The power of sensible meters for bidirectional communication of data permits the power to gather information relating to the electricity fed back to the facility of grid from client premises A smart meter system includes a sensible meter, communication infrastructure, and management devices. sensible meters will communicate and execute management commands remotely likewise as unambiguously.

The significant increase in energy consumption by the expansion of the population or by the utilization of recent equipment has brought big challenges to the energy security additionally because the environment. there's a desire that buyers can track their daily use and understand consumption standards for better organizing themselves to get financial and energetic efficiency. With the advance of smart networks technology for better energy supply, a wise meter isn't just an easy measurement gadget anymore, but it's additional functions including smart equipment control, bidirectional communication that permits integration of users and networks, and other functionalities. Smart meters are the foremost fundamental components in smart power grids. Besides, the meters used with a management system may be utilized for monitoring and controlling home appliances and other gadgets per the users' need. an answer of an integrated and single system should be more efficient and economical. Smart measurement systems allow monitoring the energy consumption of the ultimate consumers while providing useful information about the energy quality. the data provided by these systems is employed by the operators to reinforce the energy supply, and different techniques is also applied for this end, like charge scheduling, management from the demand side, and non-intrusive load monitoring. the web of Things (IoT) is becoming a good ally within the management of smart distribution and energy consumption in smart systems scenarios. to handle these issues, this paper proposes and demonstrates a replacement smart energy meter following an IoT approach and its associated costs and benefits. The developed device incorporates several communication interfaces. so as to simply integrate with any monitoring software solution, the meter contains a multi-protocol connection. Finally, the provided solution is validated and demonstrated in real-life. Smart meter deployments are underway across the world for several years with many innumerable devices already deployed. Substantial and sustained further growth is predicted as utility companies seek more accurate, granular and timely data to control their businesses more efficiently. By definition, a sensible meter must be connected so it can transmit data and so the connectivity may be a mission critical requirement. With a good range of options available, the connectivity decision is increasingly supported the price, security, coverage, power usage and therefore the potential throughput of the connectivity. Each of those can cause deployments to succeed or fail and thus must be carefully balanced against one another to form an optimal solution.

II. LITERATURE SURVEY

[2] IOT technology was developed for special wireless networks where Bluetooth technologies are not showing much better results. In wireless personal area networks where we need to transmit low data rate information in comparatively large area. It tries to portray the importance ofadvanced sensing systems in our power grid of our near feature. The development and the experimental outputs of a smart energy meter discussed. sensing systems and internet of things in smart grid to monitor efficiently the power flow in power network. The suggested smart energy meter uses the metrics proposed in the IEEE standard 1459-2010 to examine and route voltage and current signals. Information concerning the power consumption and power quality could allow the power grid to route efficiently the energy by means of more suitable results. In future IoT has to increase customer satisfaction and business efficiency and immediately distribute other administrative elements that open opportunities . Another vital a part of the IoT framework is that the adjustment of assorted seasons . The IoT-based framework must have the flexibility to handle and change in response to those changes that may always apply the IoT framework right at that point during art sensor is considered the essential IOT. This way, an essential a part of the IoT- based framework, look after conventional varieties ends. Also, physical parameters from various locales are perfect. this technique consists of two units like director of resources and autonomy. The resources monitored are essential substances, and it consists of sensors and effectors. The sensor detects nature and collects information. Sensor detectors are an interface that's utilized by the intelligent devices to manage the earth. Autonomous heads are more complicated to produce embedded controls and conduct information investigations. Controls collected combine observation and disclosure of data . Observed domains and information collected. The prevailing installation goes through a large transformation. Smart grid technology could be a radical approach for improvisation in prevailing installation. Integration of electrical and communication infrastructure is inevitable for the deployment of Smart grid network. Smart grid technology is characterized by full duplex communication, automatic metering infrastructure, renewable energy integration, distribution automation and complete monitoring and control of entire grid. Wireless sensor networks (WSNs) are small micro electrical mechanical systems that are deployed to gather and communicate the info from surroundings. WSNs is used for monitoring and control of smart grid assets. Security of wireless sensor based communication network may be a major concern for researchers and developers. The limited processing capabilities of wireless sensor networks make them more liable to cyber - attacks. The counter measures against cyber - attacks must be less complex with a capability to supply confidentiality, data readiness and integrity. The address oriented design and development approach for usual communication network requires a paradigm shift to style data oriented WSN architecture. WSN security is an inevitable a part of smart grid cyber security. This paper is anticipated to function a comprehensive assessment and analysis of communication standards, cyber security issues and solutions for WSN.

III. BLOCK DIAGRAM

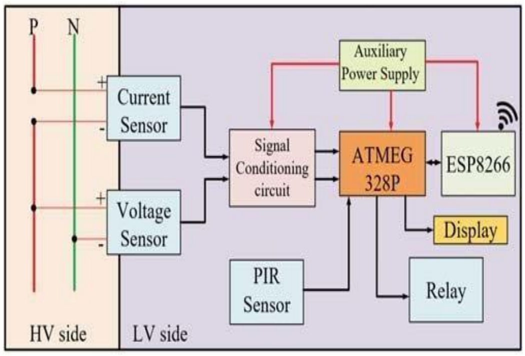

Fig 1. Block Diagram

A. MICROCONTROLLER

Miicrocontroller is an indispensable component when it comes to Electrical and Electronics industry. In this project, we are using ATMEGA 328 microcontroller. The high- performance, low-power Atmel 8-bit AVR RISC-based microcontroller combines 16KB ISP flash memory, 1KB SRAM, 512B EEPROM, an 8-channel/10-bit A/D converter (TQFP and QFN/MLF), and debug WIRE for on chip debugging.

Fig 2. ATMEGA 328

B. CURRENT SENSOR

current sensor may be a device that detects and converts current to an easily measured output voltage, which is proportional to this through the measured path. When a current flows through a wire or in an exceedingly circuit, drop occurs. Also, a field is generated surrounding the present carrying conductor.

Fig 3. Current Sensor

C. DIODE

Diode could be a two-lead conductor that acts as a one-way gate to the electron flow. which means the diode allows current to flow only in one direction. Diodes typically have ablack cylindrical body with white stripe at the top. Anode aregoing to be the side with stripe. Diodes used for safeguardingcircuits from reverse current.

Fig 4. Diode

D. POTENTIAL SENSOR

Voltage sensors are wireless tools that can be attached to any number of assets, machinery or equipment. They provide 24/7 monitoring, constantly watching for voltage data that could indicate a problem. Low voltage may signal a potentialissue, while other assets may be in danger when voltage is toohigh.

Fig 5. Potential Sensor

IV.EXISTING SYSTEM

The consumption of energy in residential buildings is increasing day by day because of increase in urban population and increase in usage of ac appliances. Energy generated isn't sufficient to satisfy energy Demand. Therefore there's have to save energy. the employment of smart energy management system can assist in reducing the energy usage in a very efficient way. Intelligent power management is that the combination of smart sensors and actuators. The design and development of an intelligent monitoring and controlling system for home appliances in real time is presented during this paper.

This system principally monitors the electrical parameters like voltage and current and subsequently calculates the ability consumption of the house appliances that are must bemonitored..

V. PROPOSED SYSTEM

Wireless Sensor Networks(WSN) has a critical part to setup dependable and expensive effective smart electric power grid operations, logs data real time and shows time of use values. Our system measures energy operation, logs data real time and shows time of use values. The system also controls any device connected to Power labors. While powering on and off, Zero cross of Ac signal is detected to Calculate phase shift. The smart candence provides correct power operation and transmit data with Wifi to pc. The stoner monitors the power information and ever controls the system. In this paper wireless sensor home area Network with IOT connived smart cadence is designed and enforced. Because of the adding demands on electricity traditional electric grid needs to be replaced with intelligent, robust, dependable and expensive effective smart meter operations.

VI. CONCLUSION

In this paper wireless sensor home area Network with Zigbee interfaced smart meter is designed ,implemented and tested. Our system measures energy usage, logs data real time and controls any device connected to the power outputs. The power usage was measured by the smart meter prototype and the calculated data was transmitted through wifi communication to PC. With the PC software, scheduling with Tou pricing showed that it creates an economic expenditure for consumer and it's all the same for utility side.

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