INTERNET OF THINGS AS FOREFRONT OF RENEWABLE ENERGY

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Abstract:A efficient, reliable and smart power supply helps in the smooth functioning of smart metropolitan cities. The use of IoT in renewable energy production will help meet the energy demands of these smart cities efficiently and proficiency. This paper introduces the new way and advance idea of using the Internet of Things in renewable energy resources in smart cities having smart buildings, smart hospital, smart factories, smart traffic including smart transportations with advanced features. All of above smart services are expected to run without any disruptions by using help of smart energy and electrical power web .To maintain the services of smart cities run without disruptions Internet of Things and cloud computing are very important in such assignments. The paper presents the role of Internet of Things (IoT)in renewable energy resources association in electricity web**.**

key words: Internet of Things IoT, Smart web, Cloud Computing, HAN, BAN, IAN

INTRODUCTION: The traditional host of World Wide Web text, pictures, audio, and video are including to the physical divices and host that providing user to control physical objects lensed with many sensors. Home Things, remote CCTV cameras, floors of factory are monitored and also controlled suing the Internet of Things as media of communication even from remote location. Thus nowadays the concept of physical web is adapting everywhere in every fields. For example, to control energy in buildings an internet of Things are use. This paper in introduce the IoT based experimental example which save the energy and provide the positive impact. For communication between consumers and utility command points to exchanges energy and electrical consumption, smart meters are use. This paper extended to smart gas meters and smart water meters. In this paper we provide the guideline for utilization of smart meters in smart energy monitoring and control systems. Figure 1 shows the wide image of how power and energy from an essential part of smart cities.As demonstrates in real time operation data from different objects like smart electricity, water and gas meters, smart investigation, smart transportation, smart waste management and smart environment systems are collected. After it the data is provided to a smart cluster Head(SCH) and then transmits this data to local smart fusion nodes (SFN). As a result, IoT based smart decision is taken and control enabler center collects and interchange the data for monitoring and controlling this architecture.

A smart grid having mainly three layers, which are system of systems, communication network sand applications, layers. Many literatures illustrate the popular renewable energy resources and several ways of it's uses are solar energy, wind energy and hydroelectric energy and it's sources.
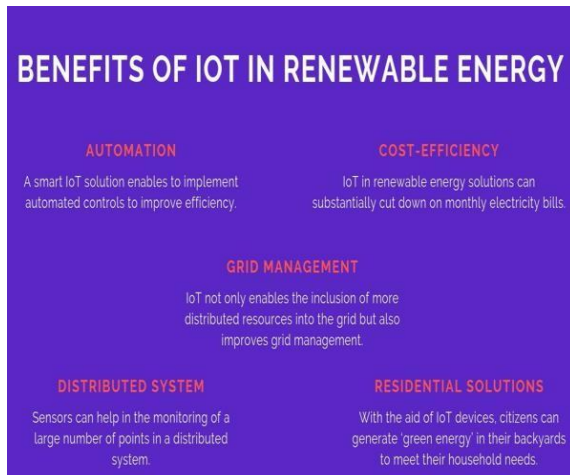
Fig.1. Benifits of IoT as in Renewable energy.

our cities smarter and more intelligent. Traditional web technology is empowered by IoT to connect physical objects such as home appliances and smart grid Things with a unique address form each device. This has been possible by using the IPV6 protocol which have 2^{128} IP address as compared to IPv4 protocol which contains 2^{32}IP address. By using IPV6 billions of Things are connected, monitored and controlled at the same time.

Due to popularity of IoT concept today professional of industrial and academics are divided it into two part or categories one is Consumer Internet of Things and another is Industrial Internet of Things. The most popular application are smart phones, wearable, TVs and appliances and most popular IIoT applications are smart factories, grids, machines, cities and cars.

Fig.2. The implementation concept of architecture in smart city.

Mechanism of Internet of Things

Nowadays this world is moving to more interconnectivity and more conductivity. It has become an integrated global community using multiple technologies and various area of applications and services. IoT concepts are moving to a word where real, digital and imaginary thing are converging to makes

Propose Protocol

Consumption Domain is one of the major domains of National Institute of Standard and Technology (NIST) for Smart grid conceptual model. For this Consumption domain is essential part and primary candidate for agglomeration also installation of renewable energy resources. Mainly three types of consumers are considerd in this sector which are residential, commercial and industrial. For this all type of consumer renewable energy resources such as solar, wind and hydro energy source are installed. The consumption domain is divided into three different type of networks as : Home Area Network (HAN) , Business Area Network (BAN) and Industrial area Network (IAN).

The concept of IoT in renewal energy can be understand as that the resources of renewable energy are considered as an object and each object is the smart grid network having unique IP is assigned. To monitor each object, bidirectional communication is uses as control is done via its unique IP address. This proposes protocol that eliminates the need of multiple communication protocol in the same grid.

Communication protocol 6LowPAN is use to utilize IP protocol, which is based on IPv6. This communication protocol has 127 bytes frame size which proved more space for a payload of 65-75 bytes [14]. The use of 6LowPAN communication protocol, make the network faster and scalable. Scalable feature enable the networks to connect more devices and appliances such as general local batteries, smart

meters and home appliance in the existing network as an object and each object have unique IP address. With this unique IP address of each object we control and monitor remotely using the internet.

Furthermore, same can be extended to adding more other devices such as circuit breaker, capacitor banks, relays and phase measurements units of electricity grid.
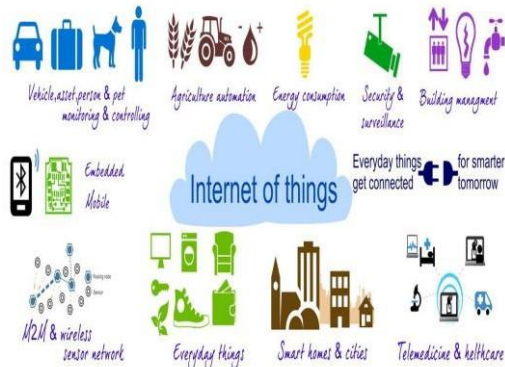

Fig.3. Various applications and sectors of IoT.

CHALLENGES FACED IN IMPLEMENTING IOT IN RENEWABLE ENERGY

Although the use of IoT in renewable energy provides a variety of benefits, it is not without its challenges and obstacles. One of the major issues faced in implementing IoT in renewable energy is the initial investment cost. Although their prices have dropped significantly over the recent years, the equipment for harnessing renewable energy still prove to be costly. Upgrading the grid with multiple IoT sensors along with data storage and monitoring devices adds to the primary investment costs involved in renewable energy-dependent processes. Going by the current trend, if prices fall substantially in the future, IoT enabled energy production.

 devices can see adoption on a large scale.Another challenge faced in utilizing IoT devices is that they are vulnerable to hacking. Since the devices are connected to a network, there is a possibility of a cyberattack if the network is not secured properly. This can lead to hazardous and unfavorable conditions to utility companies as well as for residents. A secure system must be adopted to thwart any potential

attack on the grid.Renewable energy sources are the future of electricity production. Technologies like computer vision, AI, and smart energy provides for efficient working and managing the city's assets. Providing clean energy to these smart cities proves to be an important factor. The US, China, and India are the leading markets in the implementation of renewable energy power generation. These markets provide huge business opportunities for companies dealing with IoT services. The implementation of IoT in renewable energy production will play an important role in improving the dynamics for a clean energy source.

CONCLUSIONS

This paper proposes an IoT conceptual model to integrate renewable energy resources with one common network protocol instead of using the multiple protocol. Different from the use of multiple communication protocol in the consumer communication network this paper introduce the use of single communication protocol by assigning the unique IP address to each electric grid devices as an object based on IoT. Using of single protocol is providing more reliable and scalable network which can control and manage remotely with the help of Internet.

FUTURE WORK

The propose prototype is work on consumption domain and for renewal source to future generation but it is also extends on distribution and generations domains of energy.

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