A Survey on Energy Saving Through Smart Home Automation System

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Abstract

As home energy use is increasing and renewable energy systems are deployed,home energy management system (HEMS) needs to consider both energy consumption and generation simultaneously to minimize the energy cost.This paper proposes a smart HEMS architecture that considers both energy consumption and generation simultaneously. The home server gathers the energy consumption and generation data, analyzes them for energy estimation, and controls the home energy use schedule to minimize the energy cost. The remote energy management server aggregates the energy data from nu-merous home servers, compares them, and creates useful statistical analysis information. By considering both energy consumption and generation, the proposed HEMS architecture is expected to optimize home energy use and result in home energy cost saving.

Keywords: ***Home energy saving system,IOT,Android app ,Arduino controller,Electrical equipment***.

1.Introduction:

Internet of Things or (IoT) is the internetworking of physical devices, vehicles (also referred to as "connected devices" and "smart devices"), buildings andotheritemsembedded with electronics, software, sensors, actuators, and network connectivity that enable these objects to collect and exchange data When IoT is augmented with sensors and actuators, the technology becomes an instance of the more general class of cyber-physical systems, which also encompasses technologies such as smart grids, smart homes, intelligent transportation and smart cities
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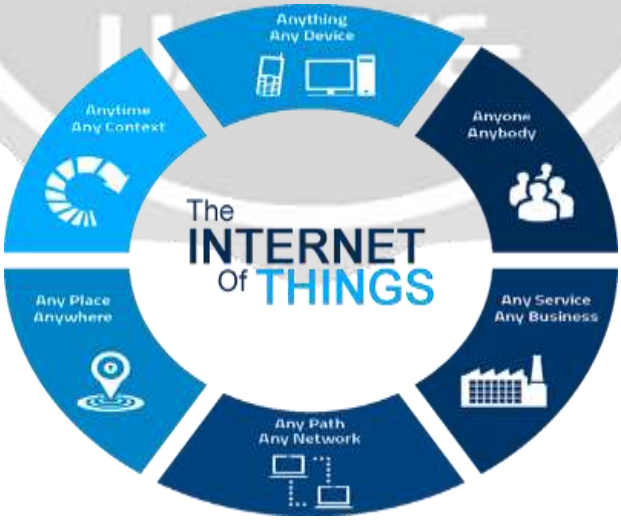

Figure 1. IOT

2)IOT ELEMENTS-

1. Sensing

The first step in IOT workflow is gathering information at a "point of activity." This can be information captured by an appliance, a wearable device, a wall mounted control or any number of commonly found devices. The sensing can be biometric, biological, environmental, visual or audible (or all the above). The unique thing in the context of IOT is that the device doing the sensing is not one that typically gathered information in this way. Sensing technology specific to this purpose is required.

2. Communication

This is where things start to get interesting. Many of the new IOT devices we are seeing today are not designed for optimal communication with cloud services. IOT devices require a means for transmitting the information sensed at the device level to a Cloud-based service for subsequent processing. This is where the great value inherent in IOT is created. This requires either WiFi (wireless LAN based communications) or WAN (wide area network… i.e. cellular) communications.

3. Cloud Based Capture

Gathered data is transmitted to a cloud based service where the information coming in from the IOT device is aggregated with other cloud based data to provide useful information for the end user. The data being consolidated can be information from other internet sources as well as from others subscribing with similar IOT devices.

4. Delivery of Information

The last step is delivery of useful information to the end user. That may be a consumer, a commercial or an industrial user. It may also be another device in the M2M workflow. The goal in a consumer use case is to provide the information in as simple and transparent a method as possible.

4. Semantics

Semantic in the IOT refers to the ability to extract knowledge smartly by different machines to provide the required services. Knowledge extraction includes discovering and using resources and modeling information

3)PROTOCOLS IN IOT-

we have broken the protocols into the following layers to provide some level of organization:

- **Infrastructure** (IPv4/IPv6)
- **Identification** (IPv6, URIs)
- **Transport** (ex: Wifi, Bluetooth,)
- **Discovery** (ex: Physical Web, DNS-SD)
- **Data Protocols** (ex: MQTT, CoAP,)

- **Semantic** (ex: JSON-LD, Web Thing Model)
- **Multi-layer Frameworks** (ex: Homekit).

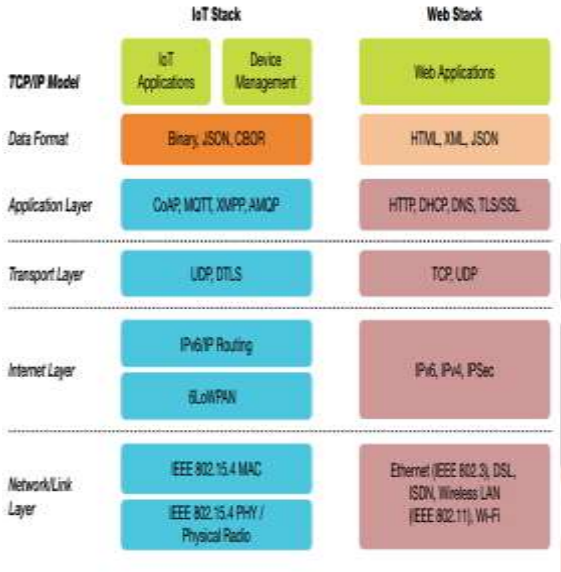

Figure 2. IOT PROTOCOL STACK

4) IOT CHALLENGES-

A. Availability

Availability of the IOT must be realized in the hardware and software levels to provide anywhere and anytime services for customers. Availability of software refers to the ability of the IOT applications to provide services for everyone at different places simultaneously.

B. Security Concerns

If the IOT devices are poorly secured, cyber attackers will use them as entry points to cause harm to other devices in the network. This will lead to loss of personal data out into the public.

C. Privacy issues

These devices collect user data without their permission, analyze them for purposes only known to the parent company. The social embrace of the IOT devices leads people to trust these devices with collection of their personal data without understanding the future implications.

D. Inter-operatability standard issues –

In an ideal environment, information exchange should take place between all the interconnected IOT devices. But the actual scenario is inherently more complex and depends on various levels of communication protocols stacks between such devices.

5)APPLICATIONS OF IOT-

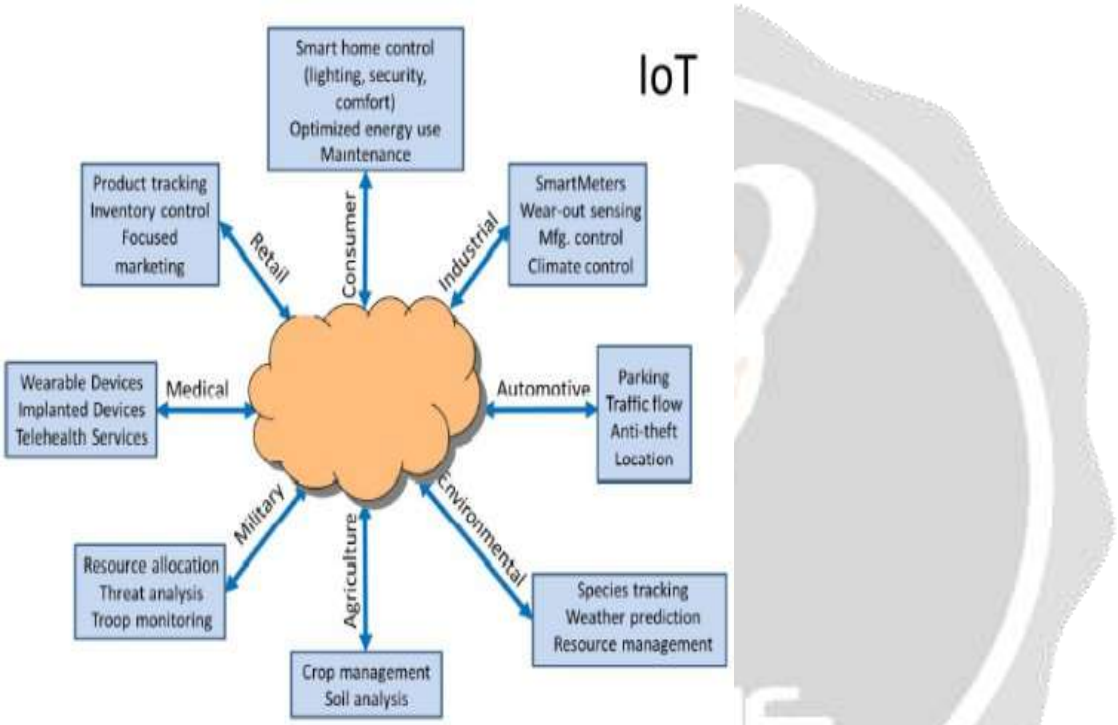

Figure 3. APPLICATIONS OF IOT-

- **Smart parking-**

The new Smart Parking sensor's or switch to be buried in parking spaces to detect the arrival and departure of vehicles. The Smart parking provides extensive parking management solutions which helps motorists save time and fuel.

- **Smart Home-**

Smart Home clearly stands out, ranking as highest Internet of Things application on all measured channels. We are surrounded by various electronic gadgets around us such as microwave ovens, refrigerators, heaters, air conditioners, fan and lights. Actuators and sensors can be installed in these devices in order to utilize the energy sufficiently and also to add more comfort in life. These sensors can measure the outside temperature.

- **Smart City-**

Smart city spans a wide variety of use cases, from traffic management to water distribution, to waste management, urban security and environmental monitoring. Its popularity is fueled by the fact that many Smart City solutions promise to alleviate real pains of people living in cities these days. IOT solutions in the area of Smart City solve traffic congestion problems, reduce noise and pollution and help make cities safer.

- **Health-**

It can gather information about health and send the collective data to health monitoring center. These centers can, therefore, analyze health and provide the valuable report and information to the individual.

- **Smart Cars-**

Machine to machine (M2M) communications, and especially Smart Cars, could help to improve accident prevention. These driverless cars will provide functioning more than just safety such as they can save valuable time, reduce stress of driving etc.

- **Smart Water Supply-**

Smart cities must monitor water supply to ensure that there is adequate access for resident and business need. Wireless Sensor Networks provide the technology for cities to monitor their water piping systems more accurately and discover their greatest water loss risks. Cities that are addressing water leakage problem with sensor technology are producing high savings from their investment.

6). Summary of Papers :

PAPER NAME	DISCRUPTION	YEAR	Methos/Tools	Achivement
SmartEnergy.Kom:An Intillegient Syste for Energy Saving in Smart Home.	Our framework for realizing energy efficient smart home based on based on human activity detection & WSN	2015	Intelligent system for saving electrical energy.	framework for realizing energy efficient smart home
Energy Efficient Smart Home Automation System.	This framework only work when people present in home & it leave the room automatically switch off all equipment.	2013	Efficient Smart Home Automation System.	This framework only work when people present in home & it leave the room automatically
ZIGBEE based Home Automation and Energy Conservation using Wireless Sensor Network	Wireless home automation networks comprise wireless embedded sensors and actuators that enable monitoring and control applications for home user comfort and efficient management using ZIGBEE.	2015	ZIGBEE based Home Automation and Energy Conservation using Wireless Sensor Network	sensors and actuators that enable monitoring and control applications for home user comfort and efficient management using ZIGBEE

Home Automation Systems -	This paper is based on Bluetooth device and also use GSM network for conn.	2014	Bluetooth system is used to control electrical energy.	successfully saves the electrical energy.
A voice-controlled multi-functional Smart Home Automation System	The voice command recognition is achieved using a dedicated hardware module and an Arduino micro-controller board for commands processing and control. Performance evaluation is carried out by developing a multi-functional miniature prototype of the SHAS.	2015	voice based arcitecture is used to saves the energy.	Arduino micro-controller board for commands processing and control. Performance evaluation is carried out by developing a multi-functional
Smart homes automation using Z-wave protocol	The whole world starts to pay more attention to exploiting the communications between computers and to exchange data between many computers.	2015	Z-wave protocol is used.	successfully energy saving is done.
IoT based smart security and home automation system	Internet of Things (IoT) conceptualizes the idea of remotely connecting and mon- itoring real world objects (things) through the Internet	2016	IOT is used for controlling the electrical equipments.	IOT is used while controlling the electrical energy.

7). Conclusions:

In this paper, we presented the technologies and its specification that can be used to make Internet of Things a reality. After that, we state some good examples where Internet of Things is of great use, and at last we discuss some open issues which are still to be solved before the wide acceptance of this technology.

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