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Green Industrial Automation Based On IOT: A Survey

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Abstract
Due to advancement in technologies it led to an increase in the carbon footprint. Over the last couple of years lot of researchers and designers are attracted towards energy efficiency in the internet of things(IOT) and this new area is named as green Iot . To enable green IOT environment there are various aspects of IOT where efficient utilization of energy is needed. Different related works on the concept of green industrial automation based on IOT are given and for different sectors automation is also described in brief along with its green environment . emerging challenges are explained for green IOT.
Keywords- Cloud Computing, Green Internet Of Things, Smart Phone, Android Application, Wireless Sensor Networks**.**

1. Introduction

Computers are monitoring and controlling various aspects of the physical world. Computers are needed to make different types of electronic devices all of those computers consume substantial amounts of energy to operate. The energy consumption issue has been receiving increasing attention and it is leading to more efficient and sustainable use of resources to avoid global warming and higher energy costs. ICT is not a major contributor to greenhouse emissions but still produces around 2% of the global carbon footprint. Due to recent advancement in ICT and their demands, it is proposed that the green house emissions would increase and will be around 6%–8% .As ICT is becoming more important in the different sectors of society, the need for green ICT also increases .If we fail to consider the green perspective of IoT, we may face energy demands that can never be fulfilled. The main objective of this work is to provide the reader with an understanding of what has been done to enable green IoT ecosystems what still remains to be addressed and identify the various factors that are enabling this evolutionary process along with their weaknesses and challenges .Green IoT either reduces the green house effect of existing application or it reduces the impact of green house effect on IOT .. The entire life cycle of green IoT should focus on green design, green utilization, green production and finally green disposal recycling to have no or very small impact on the environment.

2. Related Work

In [1] the major challenges and its different solutions for efficient use of energy and carbon footprints in the IoT network have been discussed. Also a detailed taxonomy of methods to achieve Green IoT has been explained in this paper. The need of research for a generic architecture, recyclable material and policy making to achieve Green IoT has been highlighted. Green IoT can change the course of technological advancements if smart and dedicated work is put in the right direction.

In [2] IOT is nowadays adopted to protect industry plants via control and surveillance, which in turn will introduce critical energy consumption issues. From the perspective of energy saving in industry, we adopted an architecture which is composed of sense entities domain, service hosted networks, a cloud server, and user applications. Also we presented a three-layer architecture that includes a

sense layer(SN), a gateway layer(GN), and a control layer(CN). regarding the nodes, a sleep scheduling and wake up protocol has been proposed. By calculating the sleep interval of SNs, the GN can change the state of SNs for the purpose of efficient energy utilization. Meanwhile, the CN decides the allocation of SNs to GNs. It evaluates the effectiveness of our architecture in improving resource utilization and energy consumption.

In [3] Now a days air pollution is increased due to carbon dioxide generated by vehicles, factory etc. In this paper they have proposed wireless sensor network concept. There is n number of node which contains sensor related to air pollution. Sensor generating analog output and given to the transmitter here we use zigbee module. They can transmit the analog value over the medium the receiver side there is receiver which can receive this information. Then this information is uploaded over cloud, and this process is continue until air pollution is controlled.

In [4] A wireless sensor networks installation in factories is the key resourse so that information in machine stations is collected continuously and efficiently and instant decisions can be made. a production assembly line introduces the way to incorporate deployment and sleep scheduling time to achieve greenness. Since the number of sensors in GIWSNs is generally large, the theory of symmetries is employed to transform multiple groups into one group and another medium-size group. Simulation results show that the proposed method with joint consideration performs better, and performance of the case with more sensor nodes is more obvious. Aside from extending the network lifetime and achieving effective communications for monitoring industrial conditions, energy-efficient deployment and sleep scheduling in GIWSNs by the proposed method can decrease the frequency of replacing failed sensors and further decrease environmental pollution due to discarded sensors and facilities, achieving the purpose of sustainability.

In [5] To enhance safety in buildings and city and to reduce energy consumption IOT/CPS systems should be well designed.

the challenging issues are how to federate computing services in different computation models. 1 Service impedance: public and private services 2 Federating public and private services.

In the last few years, the research communities and industrial partners started to study and investigate these two use scenarios Although many works have been conducted on these two applications, many challenges remain open.

In [6] In this paper various technologies and issues with respect to green IoT are discussed which plays a significant role in achieving a practical smart world. Especially , the overview regarding IoT and green IoT has been performed. with the summary of general green ICT principles. In addition, developments about sensor cloud have been shown along with future sensor cloud is also described .open problems regarding green IOT is explained.

In [7] This article provides deep insights into design and implementation of end-to-end power-saving mechanisms covering both backend and frontend network segments. As energy efficiency is one of the primary hurdles for widespread adoption of IoT, The article then proposes power-saving modes to jointly deal with the M2M coexistence for two typical deployment scenarios. The obtained results show that more than 95 percent of energy can be saved by employing TDMA-based scheduling, whereas up to 5 years of battery life can be achieved in the large-scale LTE-based IoT scenario by employing the proposed DRX mechanism.

In [8] This paper proposed a new quality-optimized sky camera multimedia information gathering scheme for IoTs based smart grid solar power estimation. In the proposed scheme, the transmission power control and relay node selection strategies were jointly optimized based on multimedia packet distortion reduction. Energy neutrality was also considered as an important constraint in the optimization problem. The simulation results showed that the joint control of power and relay selection strategy provided higher multimedia transmission quality in IoTs.

In [9] This paper added new contributions besides summarizing our previous work regarding the IoT framework for smart energy in buildings. The work includes: 1) energy consumption data analysis of the green building 2) new smart location-based automated energy control framework designs and 3) experimental prototype that applies IoT networking and computing technologies to improve the energy efficiency in buildings. We put them into a complete three-step research and added significant new contributions. Aim is to enable not only multiscale energy proportionality, but also create an intelligent home space, which is an important part of the future smart world. We envision that the idea will provide not only significant economic benefits but also huge social benefits.

In [10] Developing green deployment schemes for IoT plays a vital role in its massive implementation. this paper have investigated the problem of cost effectively arranging network objects to form a green IoT and proposed a novel deployment scheme. Finally, to solve the optimization problem we have devised an MECA leveraging the clustering principle and a Steiner tree algorithm . we show that the proposed scheme can achieve much longer network lifetime compared to the typical WSN deployment scheme thus is suitable for green deployment of IoT. .As future work, we will consider applying the compressed sensing technique, in the proposed hierarchical framework and address the other energy consumption models to achieve a more energy efficient IoT. .In [11] Applying the network coding in Internet of things could save energy and contribute to the `green IoT networking'.. We propose an adaptive network coding (ANC) scheme in the IoT core network with software defined wireless network (SDWN).

We also conduct simulations to show that the OSA scheme can greatly improve the storage reliability. we introduce the optimal storage allocation problem for the distributed cloud storage that utilizes network coding, which stores the data generated by the IoT core network.

In [12] In this paper augmented information from the cloud analysis of IoT data. IoT-Cloud networks reduce the distance between end users and cloud resources using edge cloud nodes distributed across the network. We proposed a comprehensive optimization framework to enhance the efficiency of IoT services in next generation smart environments. We solved the IoT-CSDP for the optimization of IoT services in multiple smart environments. Result shows that the IoT-CSDP solution captures the critical tradeoffs that appear in IoT-Cloud platforms due to the heterogeneity of IoT services, cloud network technologies, and end user devices. When compared to current solutions, smart IoT services optimized over a fully virtualized IoT-Cloud platform are shown to guarantee stringent QoS requirements in terms of reliability, battery lifetime, and end-to-end latency, while reducing overall power consumption by more than 80% .

In [13] One of the main purposes of constructing a smart house is to automatically control those equipments in the house to achieve the goals of energy saving and smart living. In this paper, the energy consumption in a residence through IoT and smart sockets. The RECoS provides four control modes to control the on/off state of home appliances connected to smart sockets. A simple IoT structure which integrates smart sockets, home gateway, energy controller, ZigBee, and Internet is proposed. Most importantly, the RECoS is sensor less and can be applied to outdated appliances, i.e., those without providing network connections. By using the neural network algorithm for smart learning, the RECoS can save unnecessary energy consumed by a house, and the experimental results show that up to 43.4% of energy can be reduced for a water dispenser in a weekday. Furthermore, security is an important issue in safely protecting the RECoS, e.g., encrypting the control commands sent to smart sockets to avoid hackers turning on/off the sockets that need to be turned off/on. These constitute the future studies.

In [14] Future smart systems will include Smart Cities, Smart Manufacturing, Smart Transportation systems, Smart Healthcare systems, and the Smart Power Grid. Cyber-security remains an outstanding challenge in the design of the future IoT.

millions of distinct Secure Deterministic Virtual Networks in layer 2 has been presented has been embedded by The design of a Secure Deterministic Industrial IOT core network .today's BE-IoT did not secure deterministic Industrial-Tactile Internet of Things core network can enable Big Data green cloud computing with exascale performance levels within a decade.

In [15] In this paper, we provide an overview to show that the TR technique is an ideal paradigm for IoT. , the TR system has a potential of over an order of magnitude of reduction in power consumption and interference alleviation, which means that TR system can provide better battery life and support multiple concurrent active users Because of the inherent nature to fully harvest energy from the surrounding environment by exploiting the multi-path propagation to recollect all the signal energy. The unique asymmetric architecture given here can significantly reduce the computational complexity and thus the cost of the terminal devices, the total number of which is typically very large for IoT. Moreover, through adjusting the waveform and rate backoff factor, TR system can provide additional physical-layer security and thus can enhance the privacy and security of customers in IoT.

In [16] this paper presents an integrated framework with detailed implementation of an IoT platform that aids in creating actionable knowledge. BME based spatio-temporal estimation and hyper ellipsoid based anomaly detection algorithm were used as backbone in our framework to address the three main challenges in urban microclimate

analysis.Our experimental results on IoT data reveal that, even using the measurements of a few low-cost sensors and a high precision sensor (weather station), the BME based estimation method can achieve reasonably good estimation accuracy. Therefore, a mix of several inexpensive low-cost sensors with a few high precision sensors can be used From a Smart City perspective. To achieve this goal, we designed our visualization to enable casual exploration by allowing public to interact with the environment data via a touch function on high resolution screen placed in Docklands Library, Melbourne. In the future, we aim to utilize the cloud platform to perform large scale processing on historic data and combine with the real time data to perform emerging pattern detection and render the results using our visualization framework.

In [17] For the development of smart world Various technologies like ICT helps us to overcome the issues with respect to green IoT. The sensors with AI works intelligently and serves human kind. The troublesome with the green Iot can be overcome by : (1)Design of green Iot , (2)Characteristics of different Iot applications and their service requirements, (3) Realistic energy consumption models of different parts of Iot system, (4) with pervasive development of sensors, (5) within the context of SNaaS. So the use their virtually private Iot.

In [18] This research adopts the concept of the "Internet of Things" to construct the green campus which will realize the idea of energy-saving. The objects of our work include the computers and air conditioners. RFIDs and the ZigBee device with temperature module are used to build up the wireless sensor network.

The contributions delivered by this research include:

1) The computer labs can be managed efficiently.

2) The use of the computers will be monitored at all times.

3) The air conditioners will be turned on only when the temperatures reach a preset level.

In [19] This paper monitors the weather conditions in the greenhouse and make the information visible anywhere in the world. The technology behind this is Internet of Things (IoT), which is an advanced and efficient solution for connecting the things to the internet and to connect the entire world of things in a network. we can bring the environment into real life i.e. it can interact with other objects through the network. Then the collected data and analysis results will be available to the end user through the Wi-Fi. The smart way to monitor parameters and an efficient, low cost embedded system is presented with different models in this paper. The temperature and humidity monitoring system with Internet of Things (IoT) concept experimentally tested for monitoring two parameters. It also sent the sensor parameters to the cloud (Google Spread Sheets). This data is helpful for future analysis and it can be easily shared to other end users.

3 Methodology

Green IOT:

Green Internet of Things basically focuses on the energy efficiency in the IoT principles. Green IoT is defined as the energy efficient ways in IoT either to reduce the greenhouse effect caused by existing applications or to eradicate the same in IoT itself In the first case, IoT will help in eliminating or reducing the greenhouse effect but in the second scenario, the IoT will be further optimized to stop the greenhouse effect. Every step in IoT, from design to implementation should be made green.

In order to implement the Green IoT, a number of strategies should be adopted.For implementation of Green IoT a framework was proposed for the energy efficient optimization of IoT objects. Furthermore, Green IoT may be implemented by using Green RFIDs, Green Data centers ,Green Sensor Networks, Green Cloud Computing. IoT is an emerging technology that is changing the way we see the IT industry. IoT is going to have a huge impact on how we deal with certain problems in our daily life and it is certainly going to make our lives easier and better but with ease come the challenges. We have to deal with the large scale consumption of energy resources by IoT and the earlier we tackle this problem, the more efficient will be the IoT.

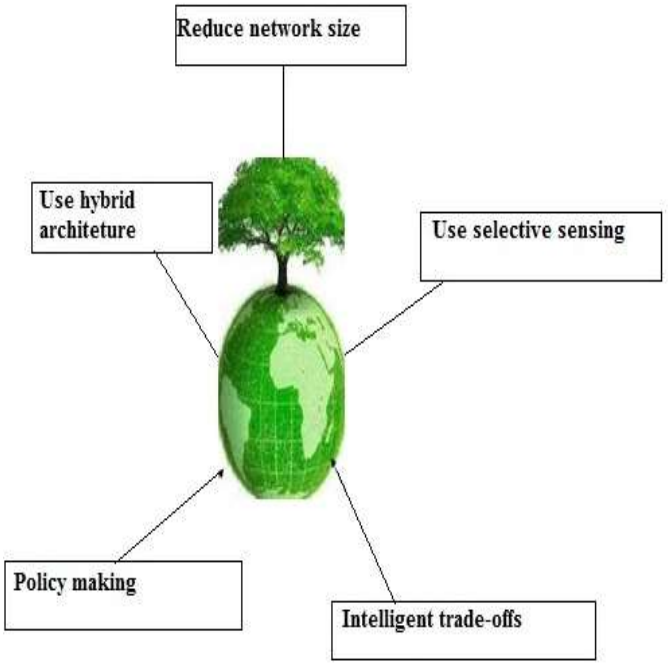

Fig. 1 Green IOT overview

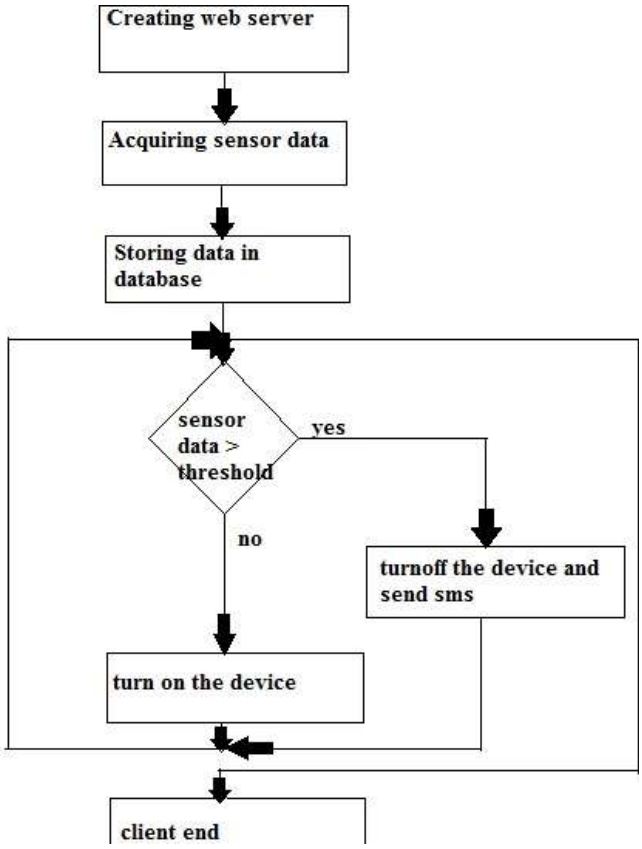

Fig. 2 Design implementation flowchart for web server.

Above flowchart shows design and implementation of web server. The first step is creating the web server address. We acquire the sensory data using that web server address. The data that we have acquired, stored in database. If output of sensor goes above threshold level then control action take place. That is the device will turn off and it will send SMS. If output of sensor does not go above threshold level then it again turn on the device.

4 Conclusion

Green Industrial automation using IOT explains the importance of industrial automation in today's era . making the industrial automation IOT ,makes it more practical and flexible. As maximum devices are used in this it leads to energy wastage and causes pollution so measures are taken to reduce it by using concept of green iot which is explained in detailed in the related papers. In Industrial automation fault is detected and corrected in machines online i.e with help of IOT, temperature of industry can also be maintained, along with its switching control to avoid shot circuit .

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