WIRELESS SENSOR NETOWRKS FOR GREEN IoT and Enhancement.

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Abstract: -

Wireless Sensor Networks (WSN) is rapidly getting more and more important today. Since the WSN require being battery powered. Power consumption is one of the most crucial design issues in WSN nodes. Increasing the WSN nodes lifetime depends on the efficient management of available energy. In this thesis, a low power WSN node with new approach for energy management is introduced. In the proposed WSN node, to achieve energy conservation, the amount of data transmitted was reduced through data compression by lowering the transceiver duty cycle and frequency of data transmissions using an event-driven transmission strategy. In an event-driven transmission strategy data is transmitted only when the data sensed by the sensor is above a particular threshold value, which is identified as event occurs. Power reduction strategies for the different components of WSN node were also applied like gating off power supply of the components. It is gated on only when the components are used.

Keywords:

Green Wireless Sensor Networks, Green RFID, Internet of Things, Green Internet of Things.

I. Introduction

Tests of the WSN node have been performed and the results have shown that the designed node works very well and fulfills all of the requirements. Furthermore the power consumption is reduced significantly prolonging the life of WSN node. Further an attempt was made to design and simulate a customized processing unit –an event processor for optimizing the power consumption of the WSN node. Designing such a processing unit is a highly challenging task that requires new approaches in many different aspects of the whole system design and even the design methodology itself. The results were very good and all components of customized processing unit –an event processor were working as planned. This thesis has produced a very good platform to use as a base for further development of a low

power WSN node. Wireless Sensor Network technology offers significant potential in numerous applications. However, there are significant amount of technical challenges and design issues those needs to be addressed.

Commonly measured parameters are temperature, humidity, pressure, wind direction and speed, illumination intensity, vibration intensity, sound intensity, power-line voltage, chemical concentrations, pollutant levels and vital body functions. Wireless Sensor Networks made it possible to use in monitoring and control the parameter pollution in agriculture. All sensor detected the pollution factor and given the information in which condition will be modified to increase the agriculture crops.

A sensor network consists of multiple detection stations called sensor nodes, each of which is small, lightweight and portable. Every sensor node is equipped with a transducer, MICROCOMPUTER, TRANSCEIVER and power source. The transducer generates electrical signals based on sensed physical effects and phenomena. The microcomputer processes and stores the sensor output. The transceiver receives commands from a central computer and transmits data to that computer. The power for each sensor node is derived from a battery. Sensor network also help to set the condition for a particular crop. In last ten years there have been prodigious improvements in technology for agriculture and growth of final yield. Due to unbalanced natural distribution of rain water it is very crucial for farmers to monitor and control the equal distribution of water to all crops in the whole farm or as per the requirement of the crop. So water Sensor recorded the information of the water level of the field to fulfill the need of the crop. This is one information about a crop in agriculture.

WSNs typically have low volumes of data, hence only a low bitrate is required. Communication needs to be reliable so that only correct data is received by the end user. The most important aspect of a WSN protocol is that it needs to be energy efficient. Nodes have very limited power and hence cannot afford to waste it on unneccessary data transmissions. This leads to a tradeoff between reliability and energy efficiency

For the protocol to be completely reliable, the node would need to be able to retransmit repeatedly (worst case) and this would quickly consume energy. On the other hand, for an energy efficient protocol, we

could not retransmit and hence communication would not be reliable. A compromise needs to be made between reliability and energy efficiency, such as that used in the concept of directed diffusion**.**

Due to many act we not able to control the environment pollution in agriculture field so the farmer need the advance technology to improve the quality of the crop and also this technique (WSN) is environment friendly. So we invent the new technique known as wireless sensor network .it is more familiar in communication, robotic system, and industrial areas.WSN system also used in planetary system.

All the parameters of environment require a detailed analysis in order to choose the correct method. It is observed that farmers have to bear huge financial loss because of wrong prediction of weather and incorrect irrigation method, improper use of pesticides in crops.

II. Overview of Green IoT

Sensor sense the physical information from the crop and convert into the electric signal. Electric signal transfer to the analog to digital converter and receive the digital signal that digital information is the input of the microprocessor. Microprocessor process the data which is receive from ADC and also store it. RF trans receiver amplify the data and transmitted to the antenna which is recorded by the microprocessor. Antenna transmitted the data into the space.

A system consisting of sensor hubs associated by remote innovation as communication channel is known as Wireless Sensor Networks (WSN). Remote sensor system may require many times to work in a performance and bandwidth restricted remote communications medium. These remote communications links operate in the radio, infrared, or optical range. Many low power remote sensor arrange hubs use RF transceiver operating at 916 MHz while many others utilize a 2.4-GHz transceiver working at Bluetooth or 2.4 GHz IEEE 802.11b innovation, 5.0 GHz IEEE 802.11a innovation, or other bands defined by the IEEE 802.15.4/IEEE 802.16 . For appropriate operation of these hubs in remote condition, the transmission channel must be selected carefully according to the prerequisite of application.

Deploying and managing a high number of hubs in a domain require special techniques. Hundreds to thousands of sensors in nearness may be sent in a sensor field. Hub injected in theidually sensor. g., they could fieldbedeployed in div by dropping them from a helicopter, scattered by an artillery shell or rocket,

or sent individually by a human or a robot. Any time after organization changes in sensor hub position, battery drain, dropouts, malfunctioning, reachability impairments, jamming, and so forth may occur. At some future time, additional sensor hubs may need to be sent to replace malfunctioning hubs. Some sensor hubs may fail or be obstructed because of lack of intensity or have physical damage or environmental interference, this failure ought not to affect the overall mission of the sensor arrange.

WSN is gaining increasing popularity with advancements in innovation. WSN hubs have started finding use in various applications of day to day life. These sensor systems utilize hubs which are small in size and able to detect, process, and communicate data with each other, over a RF (radio recurrence) channel. A hub is intended to distinguish occasions or phenomena, Gather and process data, and transmit detected information to interested clients through WSN.

IoT is a global, invisible, immersive, ambient communication network and computing environment built based on cameras, smart sensors, databases, software, and data centers in a world-spanning information fabric system. The study adopted the idea of IoT for constructing a green campus environment aimed at energy saving.

Fig.1 Green IoT

Green IoT focuses on reducing IoT energy usage, a necessity for fulfilling the smart world with the sustainability of intelligent everything and reducing CO2 emissions. Green IoT consists of designing and leveraging aspects. As shown in Fig.3, design elements of green IoT refer to developing computing devices, communication protocols, energy efficiency, and networking architectures.

Leveraging IoT element is to reduce or eliminate emissions of CO2, reduce the pollutions and enhance the energy efficiency. Since M2M is equipped with sensors and communication add-ons, it can communicate with each other and sense the world. However, sensors will consume high power for performing the tasks. In networking, green IoT aims to identify the location of the relay and number of nodes which satisfy energy saving and budget constraints.

Green IoT has three concepts, namely, design technologies, leverage technologies and enabling technologies. Design technologies refer to the energy efficiency of devices, communications protocols, network architectures, and interconnections. Leverage technologies refer to cutting carbon emissions and enhancing the energy efficiency. Due to green ICT technologies, green IoT becomes more efficient through reducing energy, reducing hazardous emissions, reducing resources consumption and reducing pollution. Consequently, Green IoT leads to preserving natural resources, minimizing the technology impact on the environment and human health and reducing the cost significantly.

Therefore, green IoT is indeed focusing on green manufacturing, green utilization, green design, and green disposal.

1. Green use: minimizing power consumption of computers and other information systems as well as using them in an environmentally sound manner.

2. Green disposal: refurbishing and reusing old computers and recycling unwanted computers and other electronic equipment.

3. Green design: designing energy efficient for green IoT sound components, computers, and servers and cooling equipment.

4. Green manufacturing: producing electronic components and computers and other associated subsystems with minimal or no impact on the environment.

IV. Application of Green IoT

Significant changes in our environments have occurred, and some changes will occur soon because of the developments in IoT. However, the cost of the developments is potentially significant due to the increase in e-waste, hazardous emissions, and energy usage. Green IoT is estimated to make substantial changes to our future life and would lead to a green environment. In the nearest future, we will see in our daily life a lot of devices, machines, sensors, drones, and things that work and communicate with each other to accomplish their tasks intelligently for green environment. Therefore, green IoT applications have been focused on saving energy, reducing CO2 emission and pollution hazardous. Not only green IoT is helping other industries reduce the greenhouse effect but also reducing the impact of IoT itself on the environment.

Green IoT benefits IoT in exploring different energy sources, eco-friendly, minimize the harm of IoT done to the environment. Thus, the numerous applications of green IoT are meaningful, economically, environmentally and social sustainability, and preserving natural resources and improving human health.

Smart home: A green IoT enables home equipped heating, lighting, and electronic devices to be controlled remotely by a computer/smartphone. The central mobile/computer in-house accepts voice commands. It distinguishes between residents for personalized actions and responses, Television, computer, and phone merge into one device, etc. The life cycle of green IoT should be taken into consideration that consists of the green design, green utilization, green production, and finally green disposal/recycling; to decrease the impact on the environment.

Industrial automation: industries have been automated with machines which can do the work thoroughly automatically without or with little manual intervention based on the internet.

Smart healthcare: refers to the implementation of different biometric actuators and sensors in patients for capturing, monitoring and tracking the body of a human. Introducing new and advanced sensors connected to the internet for producing essential data in real-time is the IoT revolution in the healthcare industry. The resulting achievements of efficient health care services are enhancing the care quality, improving access to care, decreasing care costs.

Smart grid: the efficiency of the smart grid is about fairness, much like the IoT. It refers to the capability of the grid dynamically adjusting and re-adjusting to deliver energy at the high quality and lowest cost optimally. A smart grid offers consumers the ability to participate in the solution.

Smart cities: represents one of the most promising and prominent IoT application. IoT can be characterized by efficient energy utilization to enable a sustainable smart world. Hence, the machines are proposed to be equipped with additional sensory and communication add-ons to make the world smarter. Machines can sense the things surround and communicate with each other in a city. Summarized the key to novel technology and Big data accomplishment in smart cities, where the quality of life will be improved alongside reduced pollution. Smart and connected communities have evolved from the concept of smart cities.

Smart agriculture: it will enable the farmers to contend with the enormous challenges which they face. The industry should take into consideration the ways and strategies for dealing with water shortages, managing the cost, and limited land availability.

V. Conclusion

The tremendous technology development in the 21st century has many advantages. However, the growth of the technology demands for high energy accompanied with intention e-waste and hazardous emissions. In this paper, we survey and identify the most critical technologies used for green IoT and keeping our environment and society smarter and green. ICT revolution (i.e., FRID, WSN, M2M, communication network, Internet, DC, and CC) has qualitatively augmented the capability for greening IoT.

Based on the critical factors of ICT technologies, the things around us will become smarter to perform specific tasks autonomously, rendering of the new type of green communication between human and things and also among things themselves, where bandwidth utilization is maximized and hazardous emission mitigated, and power consumption is reduced optimally. Future suggestions have been touched upon for efficiently and effectively improving the green IoT based applications. This research provides

effectively insight for anyone wishes to find out research in the field of green IoT. The trends and prospective future of green IoT are provided.

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