Chapter 3

Customizable Multipurpose Nodes Based on Internet of Things for Various Applications

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ABSTRACT

It is a common saying that science is just a philosophy without precise engineering. Available monitoring systems for real-time monitoring of space, goods, or life stocks are either too complex or too costly for the majority of the population to operate so users have to revert back to visual inspection, which results in increased human effort. The proposed model works on internet of things-based technology for more accurate and secure real-time-based monitoring made accessible to the general public. Each node primarily contains an entire network of electronic sensors to measure the environmental parameter. Due to its compact size, this device is capable of deployment over remote areas. Older modules were mostly manual and could only be engaged for a singular task, but the proposed network of nodes is fully customizable and with minor changes can be used for a task that is entirely different from the other.

INTRODUCTION

Wireless sensor network is the main part of any IoT based research. They are the most effective way to fetch and transmit data on real time basis, in accurate manner. Due to their ubiquity, the data obtained on the cloud can be very useful for research and census purposes. Network used here for transmission is secured. Various other ways of fetching data and transmission can be used. Zigbee and Bluetooth
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connectivity is the most common for such purposes. With the help of this technology, we can monitor and visualize the conditions of any of the remote areas which could prove to a great boon for human society. The secured data transmission also reduces the chances of stealing and misuse of data to the lowest possible level (Chakrabarty, 2016). This concept of data collection through the sensor based embedded system, can also be used for other useful purposes, such as water treatment. In USA, in the last few decades, with the help of such sensor and SCADA based system, the authorities have proper analysis of data. The sensors are placed at a multiple locations and form a network which is useful for determining the condition of water in real time basis at multiple locations. Without this system, this task would require manual sample collection and manual comparison with nominal values of water from time to time. Due to such systems, water related diseases and problems in the USA have been decreased and complete analysis of data is possible (Koo, 2015). Role of IoT based systems is also very crucial in other applications such as home automation systems. The system could reduce the human effort and is ideal for a coffee making world. From basic light, fan automation to more complex appliances like heating or cooling can all be controlled using an IoT based system. They can be efficiently used for multiple applications, which require real time attention. For home related uses, these systems can be effectively use normal Wi-Fi connectivity. The result of the process can be readily accessed through online servers or Android based applications. Customizable feature of the system makes them to be used at any place like the Gardening, intruder detection, fire alarm, Gas detection etc (Pirbhulal, 2017). These kind of reliable systems are also very useful and efficient regarding the safety angle. Such IoT systems are capable to recognize the unknown intruders, with the help of their infrared sensors, and unique Radio Frequency identity distribution. The presence of unwanted element would be recorded by such elements with respective methods. This information will then be transferred accurately and instantly to servers and notifications to the user and local authorities can also be generated by the system. The size and cost of the system would be so small that it can be used by anyone, even without the prior knowledge of IoT or technical knowledge. This can be used as an anti-theft system, in the house. Due to its customizable characteristics, it can be installed anywhere, and can be put in any shape and size according to the requirements of the user (Kodali, 2016). Due to the secured network and protocols, we can also connect these systems through our Smartphone. If Wi-Fi is not providing good network, then we can also provide the ZigBee connectivity. The ZigBee network can be in star or delta formation and one end of the network could access the Internet. Every other nodes would then record their individual parameters and transfer the data accordingly to this last node where it could be uploaded on the net. This advantage of system makes it ideal for a conditions like forests, mountainous regions or villages (Pavithra, 2015). To connect the appliances and the automation system to the main Web, many options are useful and feasible. In case of network failure of Wi-Fi or Zigbee, LTE network can be used. With the help of the GSM Module, effective networking can be provided to the system. 5G connectivity nowadays can play good role to handle multiple IoT nodes and other electronic appliances. Due to presence of one of these readily available methods the overall implementation of the system is much easier so that it can be accessed and implemented from any part of the world. The overall system would require only a little bandwidth for data uploading which would not hinder other uses of the internet connection. The data uploaded on the servers can be accessed from anywhere from time to time, this could also be replaced by other methods like instant notification when the system detects some unusual data parameter (Mandula, 2015). Strong security is an important factor to operate a network. In case of some Malware or virus in the network, whole working and dependency on the home appliances and home security can fail. There are many kind of approaches to infiltrate a Wireless Sensor Network. Therefore avoiding such situations and