REVIEW ON - IOT BASED ENVIRONMENT MONITORING SYSTEM

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ABSTRACT

This paper reviews on IOT based environment monitoring system. The main objective of proposed system is to provide environmental parameters at remote location using internet. The proposed system provides a viable and straightforward solution for environmental and ambient monitoring applications. The system represents the environmental and ambient parameter monitoring using low-power wireless sensors connected to the Internet, which send their measurements to a central server. Finally, data from all over the world, stored on the base station, can be remotely visualized from every device connected to the Internet. The development of a cyber physical system that monitors the environmental conditions or the ambient conditions at remote locations. The resulted solution provides the possibility of logging measurements from locations all over the world and of visualizing and analyzing the gathered data from any device connected to the Internet. This work encompasses the complete solution, a cyber-physical system, starting from the physical level, consisting of sensors and the communication protocol, and reaching data management and storage at the cyber level. It overcomes the problem of system integration and interoperability, providing a well-defined architecture that simplifies the transmission of data from sensors with different measurement capabilities and increases supervisory efficiency.

Key words: Cyber physical system, Internet of Things, Internet, remote location, Wireless Sensors.

1. INTRODUCTION
The importance of weather monitoring is existed in many aspects. The weather conditions are required to be monitored to maintain the healthy growth in crops and to ensure the safe working environment in industries, etc. Due to technological growth, the process of reading the environmental parameters became easier compared to the past days. The sensors are the miniaturized electronic devices used to measure the physical and environmental parameters. By using the sensors for monitoring the weather conditions, the results will be accurate and the entire system will be faster and less power consuming. The importance of environmental monitoring is undoubted in our age. This is the field where wireless sensor networks (WSNs) have been first used, their primary purpose consisting in the observation of the physical world and the recording of physical quantities characterizing it. WSNs are large networks of resource-constrained sensors with processing and wireless communication capabilities, which implement different application objectives within a specific sensing field. The IEEE 802.11 standard has established itself as one of the most popular wireless technologies offering connectivity. As modern devices and sensors continue to grow in power and functionality and to reduce in their cost, internet of things (IoT) emerges as a common platform and service for consumer electronics. IoT enables to be connected to virtually unlimited devices over the internet. It thus has a great potential of communicating and interacting with them. Environment monitoring is one of the major application of wireless sensor network. WSN consist of different sensors which are widely distributed to monitor different environment parameters like temperature, humidity, gases, pressure, wind speed etc. The use of wireless ambient sensors can lead to more energy-efficient buildings. WSN consists of sensor nodes which are low cost devices with limited power. Energy efficiency is the biggest problem when these sensors are used for large scale environment monitoring.

2. LITERATURE SURVEY
Bluetooth wireless technology is inexpensive, short-range radio technologies that eliminates the need for proprietary cabling between devices such as notebook PCs, handheld PCs, PDAs, cameras, and printers and effective range of 10 - 100 meters and generally communicate at less than 1 Mbps. Bluetooth uses specification of IEEE 802.15.1 standard. ZigBee is one of the protocols developed for enhancing the features of wireless sensor networks. Characteristics of ZigBee are low cost, low data rate, relatively short transmission range, scalability, reliability, flexible protocol design. It is a low power wireless network protocol based on the IEEE 802.15.4 standard. ZigBee has range of around 100 meters and a bandwidth of 250 kbps. Traditionally ZigBee and other IEEE 802.15.4 based protocols have been considered for sensor network applications due to their energy-efficient design. However, recently developed power-efficient Wi-Fi components, with appropriate system design and usage model, have become a strong candidate in this domain. Other technologies like Bluetooth, zigbee, RFID has limitations of transmission range. Radio Frequency Identification (RFID) is a system that transmits the identity of an object or person wirelessly using radio waves in the form of a serial number. RFID technology plays an important role in IoT for solving identification issues of objects around us in a cost effective manner. The other communication technologies like ZigBee, RF Link can make the communication nearly in the same range of Wi-Fi but they can’t broadcast the information as they can only communicate peer to peer.
Table 1 Comparison between different technologies

<table>
<thead>
<tr>
<th>Specifications</th>
<th>NFC</th>
<th>RFID</th>
<th>Bluetooth</th>
<th>wifi</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum coverage range</td>
<td>10 cm</td>
<td>3 meter</td>
<td>10-100 meter</td>
<td>100 meter</td>
</tr>
<tr>
<td>Frequency of operation</td>
<td>13.56 MHz</td>
<td>Varies</td>
<td>2.4 GHz</td>
<td>2.4 GHz,5GHz</td>
</tr>
<tr>
<td>Communication</td>
<td>2-way</td>
<td>1-way</td>
<td>2-way</td>
<td>2-way</td>
</tr>
<tr>
<td>Data rate</td>
<td>106,212,424 kbps</td>
<td>varies</td>
<td>22 Mbps</td>
<td>144 Mbps</td>
</tr>
<tr>
<td>Applications</td>
<td>Credit card related payments-ticket booking</td>
<td>EZ-Pass tracking items</td>
<td>Communication between phone and peripherals</td>
<td>Wireless internet</td>
</tr>
</tbody>
</table>

Low-power Wi-Fi promises multiple years of battery lifetime while providing easy integration to existing infrastructure with built-in IP-network compatibility. Wireless Fidelity (Wi-Fi) is a networking technology that allows computers and other devices to communicate over a wireless signal.

2.1. Internet of Things (IOT)

The term “Internet of Things” (IoT) refers to the possibility of connecting sensors, actuators or any device to the Internet. It can lead to a significant change in our daily lives in the way we live and interact with the devices such as home appliances, smart meters, security sensors, HVAC systems, etc. The vision of Internet of Things calls for connectivity not only to consumer electronics and home appliances, but also to small battery powered devices which cannot be recharged. Such small devices, often various types of sensors and actuators, are required to sustain reliable operation for years on batteries even in the presence of heavy interference. The IoT is a technological revolution that represents the future of computing and communications.

3. PROPOSED SYSTEM

The proposed system consists of a microcontroller as a main processing unit for the entire system and all the sensor and devices can be connected with the microcontroller. The sensors can be operated by the microcontroller to retrieve the data from them and it processes the analysis with the sensor data and updates it to the internet through Wi-Fi module connected to it.

3.1. LPC1768

The microcontroller used in this system LPC1768 is an effective choice for the implemented system. As our proposed system is a low power consumable solution, the microcontroller should be also low power consuming. The LPC1768 is an ARM Cortex-M3 based microcontroller for embedded applications requiring a high level of integration and low power dissipation. The ARM Cortex-M3 CPU incorporates a 3-stage pipeline and uses Harvard architecture with separate local instruction and data buses as well as a third bus for peripherals.
3.2. Wi-Fi Module

ESP8266 Wi-Fi module which is having TCP/IP protocol stack integrated on chip. So that it can provide any microcontroller to get connected with Wi-Fi network. ESP8266 is a preprogrammed SOC and any microcontroller has to communicate with it through UART interface. It works with a supply voltage of 3.3v. The module is configured with AT commands and the microcontroller should be programmed to send the AT commands in a required sequence to configure the module in client mode. The module can be used in both client and server modes. Once it gets connected in a Wi-Fi network, we’ll get one IP address which is accessible in its local network. The module is additionally having 2 GPIO pins alongside UART pins. It is also having inbuilt SPI protocol by using the two pins of UART as data lines and by configuring the two GPIO pins as control lines and clock signal. It is also having 1MB on-chip flash memory. Internally it is having power management unit with all regulators and PLLs.

3.3. Sensors

The system consists of temperature sensor, humidity sensor, LDR and pressure sensor. These 4 sensors will measure the primary environmental factors like light intensity, temperature, pressure and relative humidity respectively. All these sensors will give the analog voltage representing one particular weather factor. The microcontroller will convert these analog voltages into digital data.
4. CONCLUSION
The system eliminates bulky solutions, provides the possibility of logging data where Wi-Fi network coverage exists and can be used in a wide range of monitoring applications. It employs sensors measuring the ambient or the environment which sends messages to an IoT platform. The development of a CPS, which monitors environmental parameters based on the existent IEEE 802.11 infrastructure, was presented. The communication protocol and the design of the nodes help in achieving low power consumption, offering battery lifetimes of several years intends to enhance the reliability and security of the proposed system.

REFERENCES


