Gathering Information From Wireless Sensor Network To Cloud and Accessing It Using Smartphone Application

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ABSTRACT

The field of wireless sensor networks has produced a range of supporting hardware and software technologies that facilitate the creation of sensor network applications. Despite these advances, the implementation of wireless sensor network applications remains a complex task that requires domain experts and a significant investment of time and money. This level of investment is often infeasible for single applications, especially for those applications with a short life-cycle. With the increase in Wireless Sensor application's it helps in detection of natural calamities like flood detection, fire detection and various other applications. But still it fails to provide dynamism in detection of sensing data. Cloud Computing is a commercial extension of computing resources which provides scalable resources and economic benefits to its users over the internet. It acts as software and provides data access and storage services which don't need the knowledge of the end users physical location and the systems configuration that provides the computing resources. In Cloud computing, the users use the web browsers as an interface, while the software and data are stored on the remote servers and hence it is device independent. With dynamism provided in cloud computing, wireless sensor network integrate with cloud. As smart phone application with android platform is in revolution nowadays, integration of all this technologies makes the availability of data dynamically at mobile phone. The paper discusses about the integration of all this technologies to get right amount of data instantly as smart phone application.

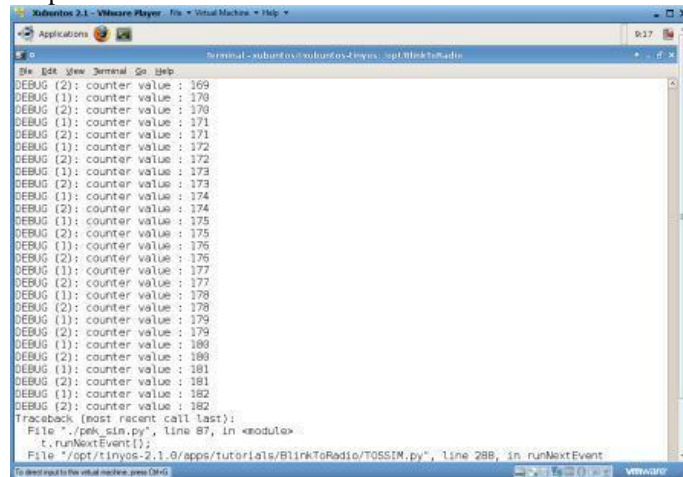**KEYWORD:** *Wireless Sensor Network, Cloud Computing, Android Application.*

1. INTRODUCTION

Existing processes for gathering data require a great deal of work that requires large amount laborious and manual work. Gathering information requires dealing with hard complexity of network in wireless sensor network. **Wireless sensor network** are applied to field where a human cannot reach like in dense forest to detect fire, flood sensitive where a person cannot sit for long to determine the level of water. So, deployment of sensors in such places makes it easier to get data from such remote places which are unreachable from human. The topology of the WSNs can vary from a simple star network to an advanced multi-hop wireless mesh network. The propagation technique between the hops of the network can be routing or flooding. **Cloud computing** is the delivery of computing and storage capacity as to a community of end-recipients. The name comes from the use of a cloud-shaped symbol as an abstraction for the complex infrastructure it contains in system diagrams. Cloud computing allow you to access data or application from other than your computer or internet connected device most often it will be a distant datacenter. Beauty of cloud is other companies can host your application. This means that they handle the cost if servers, they manage the software updates, and depending on how you craft your contract. **Android** is a mobile operating system that is based on a modified version of Linux. It was originally developed by a startup of the same name, Android, Inc. In 2005, as part of its strategy to enter the mobile space, Google purchased Android and took over its development work (as well as its development team). Google wanted Android to be open and free; hence, most of the Android code was released under the open-source Apache License, which means that anyone who wants to use Android can do so by downloading the full Android source code. Moreover, vendors (typically hardware manufacturers) can add their own proprietary extensions to Android and customize Android to differentiate their products from others.

2. WIRELESS SENSOR NETWORK, CLOUD COMPUTING AND ANDROID APPLICATION

2.1 Deployment of Sensor Network

Wireless sensor is made by adding motes to the network for gathering information from the outside world. Sensors get the environment readings where they got deployed. Once the readings have been taken it is transferred to the base station. The BlinkToRadio and Rssi demo application gives the sample readings for the communication between sensor motes and motes to pc.Mote connected is act as the base station for the motes deployed in the sensor networks. All the readings gathered transfer to the base station mote and from base station it will goes to pc.

Fig1 showing the readings from the mote to mote communication

2.2 Cloud Computing

Cloud computing provides an easy way of storing information from one platform to cloud platform. In cloud computing resources are provided by the cloud vendors like providing memory for the work of end users, managing software's,updation of software are all done by the cloud vendors. Once you are in cloud you need not have to worry about your work. Cloud computing provides three basic attributes PaaS (Platform as a Service), SaaS (Software as a Service) and IaaS (Infrastructure as a Service).

2.3 Android Application

Android application in present day is a big revolution in mobile computing. Mobile computing includes development of operating systems and also the application framework for the mobile handheld systems. Google android is one of the revolutions in this field. Application development in android platform is easy those who are in touch with the eclipse environment and also good in java. Eclipse provide environment for the development of the android based application.

2.4 Overall Architecture

The overall architecture consists of transferring of data from sensor network to cloud platform and transfer the readings from cloud platform to android application. The idea proposed in this paper designs the application for android mobile phone for monitoring the sensors at distant places. Places like fire sensitive forests where the probability of fire is more can be very keenly observable by the android application.

3. APPLICATION FRAMEWORK

This section discusses the main features of the application which combines all the three technologies together. Firstly wireless sensor network gets the information from the field where sensor motes get deployed. Suppose sensors were deployed in the fire sensitive places, so by collecting the temperature

readings from the sensors we can get the actual condition of the place. For this we are using TinyOs for programming sensor motes into nesC language and install compiled program into motes. Cloud storage will provide a large amount of memory space for storing and retrieving the data. There are plenty of vendors providing storage space for your documents into their space. Google drive, Drop Box is some of the vendors providing free space over the cloud environment. In our application we are using Drop Box for storing sensor readings and also for retrieving the information.

4. PROPOSED SYSTEM ARCHTECTURE AND IMPLEMENTATION DETAILS

The overall architecture of the application combines the wireless sensor network with the cloud and android for retrieving values from the cloud. The architecture is shown in the figure
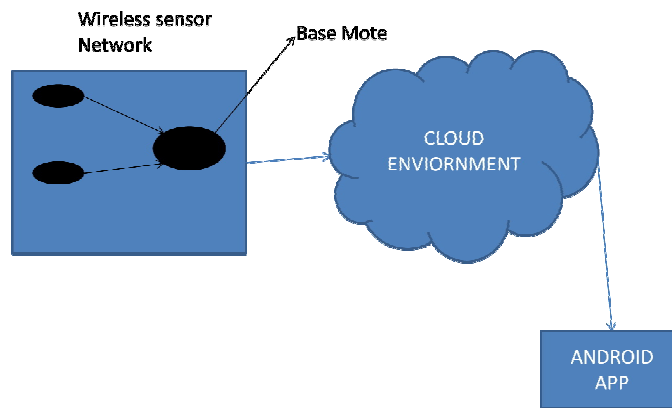

Fig2 Simplified overall architecture

Above architecture consist of wireless sensor network with sensor motes. Motes are get installed with programs for doing the work in the place specified.Nesc coding is compiled and installed in the motes. For this we have to first install Tinyos platform for the sensors. With help of VMplayer we can install TinyOs inside the Windows. For simulation purpose we are using two most basic applications to show outputs. Sensors motes are get installed by typing the command *make telosb 1* where 1 mote id and telosb is the name of the sensor mote. For simulation purpose we are using TOSSIM simulator on TinyOs. For TOSSIM we have to import tossim library in our program and also we have to add a command to show the output to the screen. Once we got the output, we can save it by getting the output reading inside a text file. After getting the output in the text file store this text file into the cloud environment. By installing Drop Box we can store the readings over the cloud. For that first we have to make an account into Drop Box site. Drop Box will provide user with the 2GB of free space. For simulation purpose we are using such a small size of memory. For android application we have to first install Eclipse IDE for the development. After installation connect it with the android latest Android SDK version. After development run the application as android application. The Application retrieves the data coming from the sensor by accessing the cloud; also it will give the alert message to user when the data reading goes beyond the threshold value.

5. CONCLUSION

This small application manages to monitor places which are very sensitive to some kind of natural calamities and also it can be easily modifiable for using in other application like for example we can use it for household purpose also.

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