ANDROID APPLICATION DEVELOPMENT FOR ENVIRONMENT MONITORING USING SMART PHONES

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ABSTRACT

Mobile devices (in particular smart phones and tablets) can be used to monitor quality of life parameters. Today mobile devices use embedded sensors such as accelerometers, compasses, GPSs, microphones, and cameras without considering, for example, the air quality or the pollutants of the environment. This paper presents the possibility to use the smart phones capabilities to gather data from other phones or sensors. The environment condition's parameters such as temperature and humidity should be monitored. This point can be obtained by using distributed devices in different environments that containing high-resolution sensors and a wireless transmission apparatus for transferring data to smart phones. The Bluetooth was chosen as a transmission tool since it is embedded in all smart phones.

KEYWORDS

Wireless sensor Networks, Bluetooth Sensors, Environment sensing, Smart phones.

1. INTRODUCTION

The cell phones are one of the inseperable parts of the people life for contacting each other via text and voice. Inside Personal Digital Assistant (PDA) has more facilities such as check mail, play game, and receive file etc., that allows the user to have more services. The combination of abilities of these two mentioned devices brought up the new devices called smart phone, that can work with different kind of application depending of their operating system. Today smart phones are the equipped devices that are used in many different sectors such as business, healthcare, social networks, environment monitoring safety and transport. For enabling related application to consider different domains, a set of embedded sensors such as accelerometer, compass, gyroscope, Gps, microphone and camera are directly included to smart phones. The orchestration of the computing communications and sensing capabilities of the smart type of mobile phone enables participatory or opportunistic operations. In case of moving, there are two types of sensors : first the wearable sensors that are wore by people. Some devices are capable to connect and transfer data as an IP based system ,with devices via Bluetooth such as PDA'S and cellphone also in some projects. The use of memory cards as a data storage are considered. Their cellular phone send periodically the data sensed on their own condition to a central data base. Bluetooth based system are not also reliable to have a continuously connectivity in this scenario, Second mobile phone to web using mobile phone for personal reflection on environment impact. The phone records and uploads location every few seconds to a secure server. Based on these location-time traces and also tagging the activities (such as walking, biking, driving, etc).The system can give to the users environmental information. In

some cases there is no possibility to use camera or text messages for gathering information, for example in moving situation (such as bicycling or driving). In the case of phone mobile to web, there is another option for monitoring changes, for instance the participants use their mobile to take a picture from certain locations and the upload these picture to the web portal. Moreover, mobile phone and web cam can use to provide information about family and doctors . Sensing and recording will be accomplished automatically.   Environment sensors ,such as temperature, humidity, solar radiation, pressure and so on can be placed both in outdoor and indoor sites. There are environmental sensors that monitor some specific elements such as CO_2, O_2, H_2 and so on. In most cases the kind of sensor network is organized as a short distance transmitter of data. Low power and low cost are the main characteristic of these sensors .The following parameters will be affected on the sensors structures and subsequently their platforms

- Deployment(activities)
- Location tracker(indoor/outdoor)
- The application
- Data(that should be processing and inferring)

The different scenarios to monitor the environment using wireless sensor networks can be accomplished via, personal group and community. It is worth to know that the mixed of the following approaches is possible having environment information is simpler today with above scenarios in the case of moving. Monitoring temperature and humidity of an environment of some fields such as medical social services and agriculture are useful for controlling and consequently alarming .The authors proposed a temperature sensing mobile robot as a solution for temperature measurement that applied in airport and hospital. It is also suggested to use the robot for the heat temperature detecting fore fire fighting. A wireless communication platform of distributed temperature sensors for transmitting data to an immobile client is proposed. Receiving data from both pre planned or robot sensors can be accomplished via mobile devices, montoring temperature in vehicles refrigerator is another sample to provide information.

 Applying Bluetooth as a transceiver enables the mobility of the receiver. Today, the Bluetooth is embedded to all smart phones. A part from the mobility and a Embedded Bluetooth to all smart phones, according to their operating system, their programmable ability makes them capable to have application. The potency active the smart phones to role as a client to gather analyze and verify data. A novel approach to acquire temperature and humidity using low cost and low power components is studied in this paper, using Bluetooth communication for the transmission of the acquired data to the transmission of the Acquired data to the android based smart phone. In existing system, there is no reliable wireless communication to monitor the environmental parameters through wired or wireless need an additional device to display that. The parameters can be monitored in control center but that cannot be monitored with remote access. Mobile devices can be used to monitor quality of life parameters. Today mobile devices use embedded sensors such as accelerometers, compasses, Gps, microphones and cameras with out considering ,for example the air quality or the pollutants of environment. The paper presents the possibility to use smart phones capabilities to gather climate conditions parameters such as temperature and humidity is a prominent factor to control the changes of the environmental condition of living or working places for the human being .This point can be obtained by using distributed devices in different environment that containing high resolution sensors and wireless transmission for transferring data to smart phones. The Bluetooth was chosen as transmission tool since it is embedded ,since it is embedded to all smart phones and it can work in the absence of wi-fi connection. Smart phones are the programmable tools to have different kind application that allows communication with other devices and also gathering, analyzing and verifying data. In this paper a novel interface by applying a Bluetooth based sensor to sense temperature and humidity

for monitoring of the environmental conditions using android based smart phone is introduced. In this paper, a novel interface by applying a Bluetooth-based sensor to sense *Temperature* and *humidity* for monitoring of the environmental conditions using the android-based smart phone is introduced.
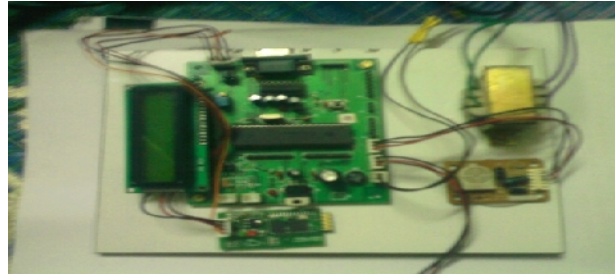

Figure 1. Hardware Kit

2. ALGORITHM

Step 1:.Start
Step 2.Initialize Analog to digital values to pic Microcontroller
Step 3.Initialize UART to pic microcontroller.
Step 4.Initialize LCD screen
Step   5.Sample Humidity sensor and get digital value.
Step   6. Sample Temperature sensor and get digital value.
Step 7.Display Temperature and Humidity value in Lcd.
Step 8.Send Humidty value via UART to Bluetooth
Step 9. Send Temperature value via UART to Bluetooth
Step 10.Repeat the process until both the temperature and humidity values on the LCD.

3. FLOW CHART
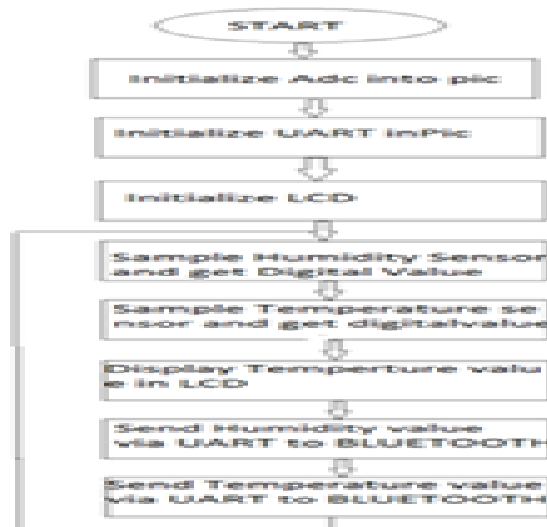
4. BLUETOOTH BASED TEMPERATURE AND HUMIDITY ACQUISITION SYSTEM

The Bluetooth-based temperature and humidity acquisition system consists of a device comprising a sensor and a microcontroller that wirelessly transmits these climatic parameters to a receiver using the Bluetooth communication system. For the realization of this system, a very precise temperature and humidity sensor (SHT11 from Sensirion, temperature range from -40 to +125°C and accuracy of 0.4°C, humidity range from 0 to 100% and accuracy of 3%) was inserted to the board. The sensor was chosen for its very low power consumption (about 80µW) and high accuracy. It communicates using the IC protocol the environmental parameters to a microcontroller (C8051F314 from Silicon Labs Inc), which was selected for its low power consumption as well (about 1mW for 1MHz operation) and its internal characteristics that fits the requirements of the device. The microcontroller acquired temperature and humidity values from the sensor each 10 second, and it is connected to a Bluetooth module using its embedded UART (Universal Asynchronous Receiver-Transmitter).

5. SMART PHONE APPLICATIONS

There are a number of smart phone platforms for developers, such as iOS, Symbian, Android, and Windows Mobile. The iPhone with the iOS operating system was the first choose of this research but rejected because of limitation of the Apple on using hardware for programming specially with the ports related to the Bluetooth. The Apple just allows to the commercial program to communicate via Bluetooth with non Apple devices based On an agreement. The Android has been Chosen in this paper since it is easy to customize and open to Work with different hardware specially Bluetooth. The Android Software development kit (SDK) Version 13 with the ADT Plug-in for Eclipse was Applied for this research. The android SDK's emulator Was helpful to test the UIs (UserInterfaces) before installing on the mobile phone. An application called a BluSen was developed to acquire data from the Bluetooth-based temperature and humidity Acquisition system that has described before.

6. RESULTS

The heart of this system is PIC Microcontroller which has temperature and humidity sensor. The data are sampled from the insole sensors by the microcontroller. The PIC microcontroller is in turn connected to the Bluetooth module (AUBTM-20). This module is capable of wireless serial data transmission and receipt when paired with feedback application with smart phone. The collection data is said to be done in the smart phone and it is analyzed with the general data of a person. That can be monitored from control station, and also gather the results simply through smart phone using android application. Bluetooth device is the interface between both hardware and software. when PIC microcontroller sends the data via UART to LCD , then both temperature and humidity values are sensed and monitored . From Pic microcontroller ,android phone receives the temperature and humidity values via Bluetooth and generates or plotting has done for temperature and humidity

Figure 2. Humidity Graph

Figure 3. Temperature Graph

7. CONCLUSION

In this paper we have implemented ANDROID APPLICATION DEVELOPMENT by using different protocols like Bluetooth, in order to provide wireless communication we have used Bluetooth and to transfer data from hardware system to our Android Mobiles. Here the main module is PIC Controller that is PIC18F4480 controls the entire system. And by using android mobile we can pass the commands so after receiving those commands it will operate the nodes. Here we have monitor two sensors temperature and humidity sensors as said before and respective graphs are plotted.

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