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A PATH FOR HORIZING YOUR INNOVATIVE WORK

WISENET (WIRELESS SENSOR NETWORK)

MS. PUNAM P. HARKUT*[1], ANIKET V. DESHMUKH[2], MS. SHRADDHA S.GUPTA[3], DR. H. R. DESHMUKH[4]

1. M.E(Scholar)Computer Science and Engg, I.B.S.S.C.O.E, Amravati.
2. M.E(Scholar)Mechanical Engineering, I.B.S.S.C.O.E, Amravati.
3. M.E(Scholar)Computer Science and Engg, I.B.S.S.C.O.E, Amravati.
4. Head of Department, Computer Science and Engg, I.B.S.S.C.O.E, Amravati

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Abstract: Wisenet is a wireless sensor network that monitors the environmental conditions such as light, temperature, and humidity. This network is comprised of nodes called “motes” that form an ad-hoc network to transmit this data to a computer that function as a server. The server stores the data in a database where it can later be retrieved and analyzed via a web based interface. The network works successfully with an implementation of one sensor mote.

Keywords: Wisenet, client, server, sensor Mote network.

Corresponding Author: MS. PUNAM P. HARKUT

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INTRODUCTION

Higher data rates, there are many existing and new applications that do not require such a high bandwidth, but would strongly benefit from a wireless communication link. Examples of such applications are wireless sensor networks.

In this perspective, the Microelectronics Division has launched a project called WISENET. Its main objective is to develop a low-power wireless ad-hoc network made of many distributed micro sensors that are energetic. The last few years have seen the emergence of numerous new wireless technologies, some of which have reached the market recently. While the general trend is to offer higher and autonomous (usually battery operated) and able to communicate amongst them and with the external world.

The technological drive for smaller devices using less power with greater functionality has created new potential applications in the sensor and data acquisition sectors. Low-power microcontrollers with RF transceivers and various digital and analog sensors allow a wireless, battery-operated network of sensor modules (“motes”) to acquire a wide range of data. The TinyOS is a real-time operating system to address the priorities of such a sensor network using low power, hard real-time constraints, and robust communications. The first goal of WISENET is to create a new hardware platform to take advantage of newer microcontrollers with greater functionality and more features. This involves selecting the hardware, designing the motes, and porting TinyOS. Once the platform is completed and TinyOS was ported to it, the next stage is to use this platform to create a small-scale system of wireless networked sensors[2].

2. MATERIAL AND METHOD

There are two primary subsystems comprised of three major components.

2.1.Data Analysis

This subsystem is software-only (relative to WISENET). It relied on existing Internet and web (HTTP) infrastructure to provide communications between the Client and Server components. The focus of this subsystem was to selectively present the collected environmental data to the end user in a graphical manner.

2.2. Data Acquisition

The purpose of this subsystem is to collect and store environmental data for later processing by the Data Analysis subsystem. This is a mix of PC& embedded system software, as well as embedded system hardware. It is composed of both the Server and Sensor Mote Network components.

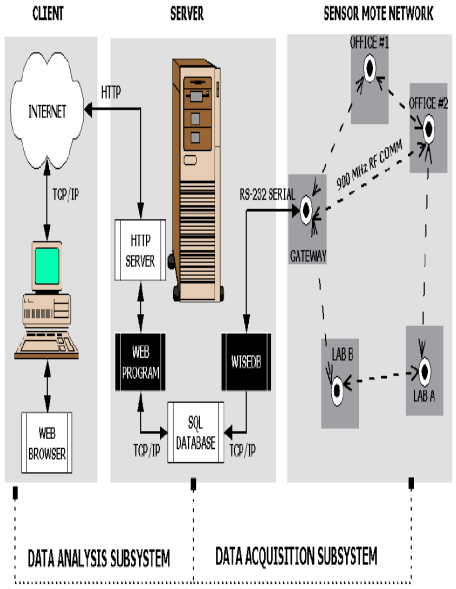

Figure 1: WISENET System Block Diagram

These subsystems consists of three major components as follows.

1.Client

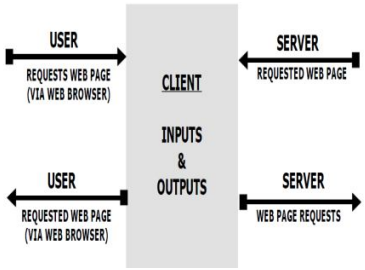

Figure 2: Client Component Inputs/Outputs

The Client component is necessary but external to the development of WISENET. That is, any computer with a web browser and Internet access could be a Client. It served only as a user interface to the Data Analysis subsystem.

2.Server

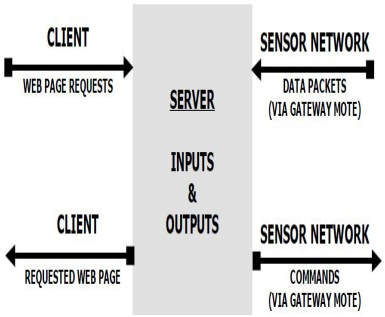

Figure 3: Server Components Inputs/Outputs

The Server is a critical component as the link between the Data Acquisition and Data Analysis subsystems. On the Data Analysis side, an web (HTTP) server hosting a web application. When a page request came in, the web server executes the web application, which retrieved data from the database, processes it, and returns a web page that the web server transmitted to the Client. For the Data Acquisition system there is a daemon (WiseDB) running to facilitate communication with the Sensor Mote Network.

This daemon is responsible for collecting raw data packets from the Sensor Mote Network. These packets are then processed to convert the raw data into meaningful environmental data. This processed data is then inserted into the database. Thus the database is the link between the Data Analysis and Data Acquisition subsystems. The Server also had the potential to send commands to the Sensor Mote Network (via the gateway mote).It should be noted that since the SQL database connections can be made via TCP/IP, only the web server and web-program needed to be located on the same physical machine. The web server, the database, and WiseDB could all be on different physical machines connected via a LAN or the Internet. This allows a flexible Server component implementation that is useful during WISENET development.

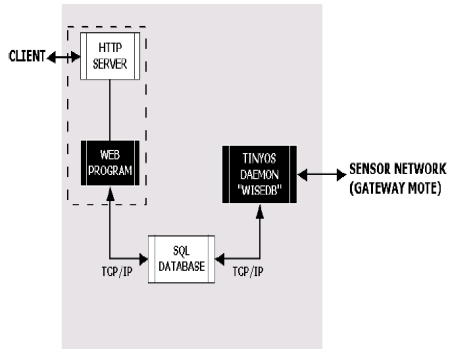

Figure 4: Server Component Block Diagram

3.Sensor Motes

The primary focus of WISENET is the development of the Sensor Mote Network component. It is the component responsible for collecting and transmitting raw environmental data to the Server. There is also the potential for the motes to receive commands from the Server. Uses for this feature would include server-based synchronization and wireless network reprogramming.

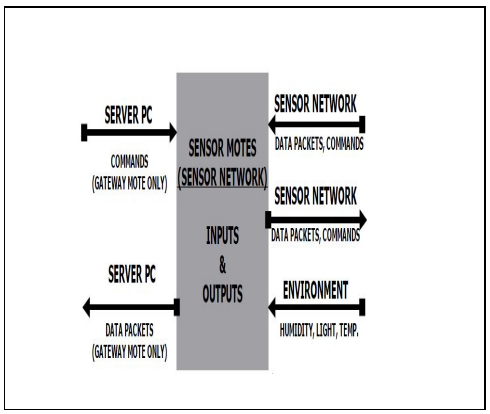

Figure 5: Sensor Mote Component I/O

The following fig shows the block diagram of a sensor mote.

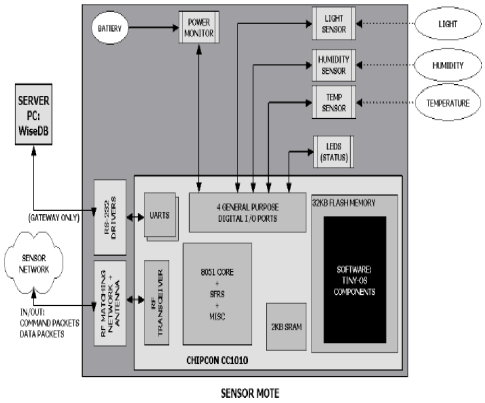

Figure 6: Sensor Mote Block Diagram

This component consists of two parts. The first is the sensor mote. The primary purpose of the sensor mote is to collect and transmit raw environmental data. When not doing this, it went into a low-power idle mode to conserve energy. Another aspect of the sensor motes involved ad-hoc networking and may be for multi-hop routing;

The gateway mote is the second part of the Sensor Mote Network. Its purpose is to serve as the liaison between the Server and the Sensor Mote Network and deliver all the data packets to WiseDB. In theory both standard and gateway motes could be implemented on the same hardware PCB and with the same software[2].

3. FUTURE WORK

There are a number of future extensions for this WISENET. A few are:

We can expand the sensor mote network by adding more motes. This would allow the development and testing of advanced network-layer functions, such as multi-hop routing.

By creating a new PCB design that integrates the CC1010EM design with the sensors and power hardware on a single-board another interesting feature can be developed or adopt a standard expandable plug-in sensor interface in both hardware and software

In researching alternative energy sources to extend mote battery life. Possibilities include solar cells and rechargeable batteries. So by adding the required equipments as demanded by the situation ,we can improve the performance[4].

4. CONCLUSION

Wireless sensor networks are getting smaller and faster, increasing their potential applications in commercial, industrial, and residential environments. WISENET, as implemented, represents one commercial application. However, the limit of applications depends only upon the sensors used and the interpretation of the data obtained. As the technology improves and new low-power digital sensors become more readily available, motes will increase functionality without increasing power consumption and will expand the wireless sensing market.

WISENET demonstrate power of wireless tech power of wireless sensor network technology. This is a field that will see tremendous growth in the near future as microcontrollers and sensors improve their performance while lowering their energy consumption.

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