

WIRELESS SENSOR NETWORK (AKA WISENET)

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System and Subsystem Block Diagrams

System Description

The Wisenet system acquires a wide range of environmental data from a wireless sensor network (consisting of “sensor motes”) and stores that information in a database. A web program then accesses the database to display current, historical, or analyzed data to a user through a web browser. The overall system block diagram is shown in figure 1. There are two primary subsystems (Data Analysis and Data Acquisition) and three major components (Sensor Motes, Server, Client). Each is described below.

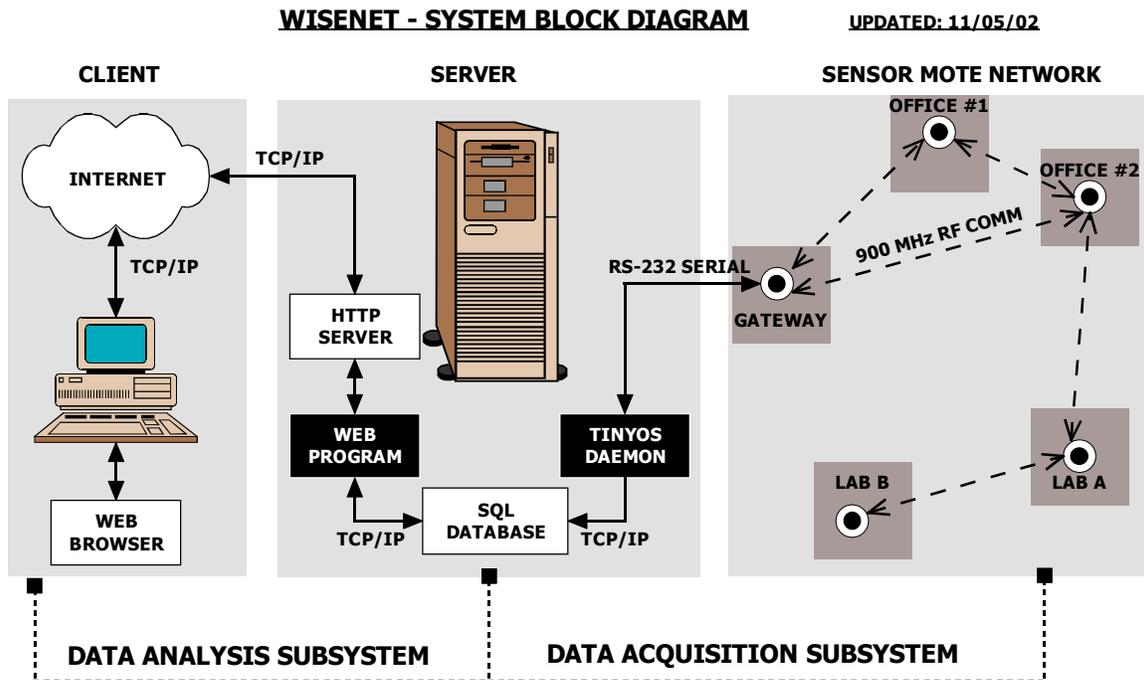


Figure 1: System Block Diagram

System Components

There are three primary system components: Client, Server, and Sensor Mote. Each was discussed in block detail in the Functional Description¹. This document provide subsystem block diagrams.

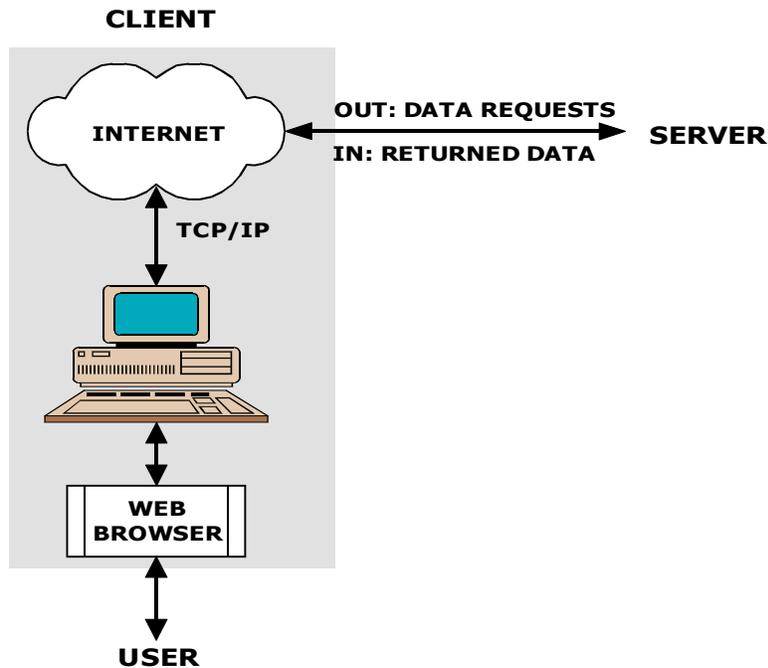


Figure 2: Client Component Subsystem Block Diagram

Client (figure 2): From our project's perspective, the Client component is necessary but external. That is, so long as a Client (any computer with a web browser and Internet access) is available, no more work needs to be done for this component. It serves only as a user interface to the data analysis subsystem.

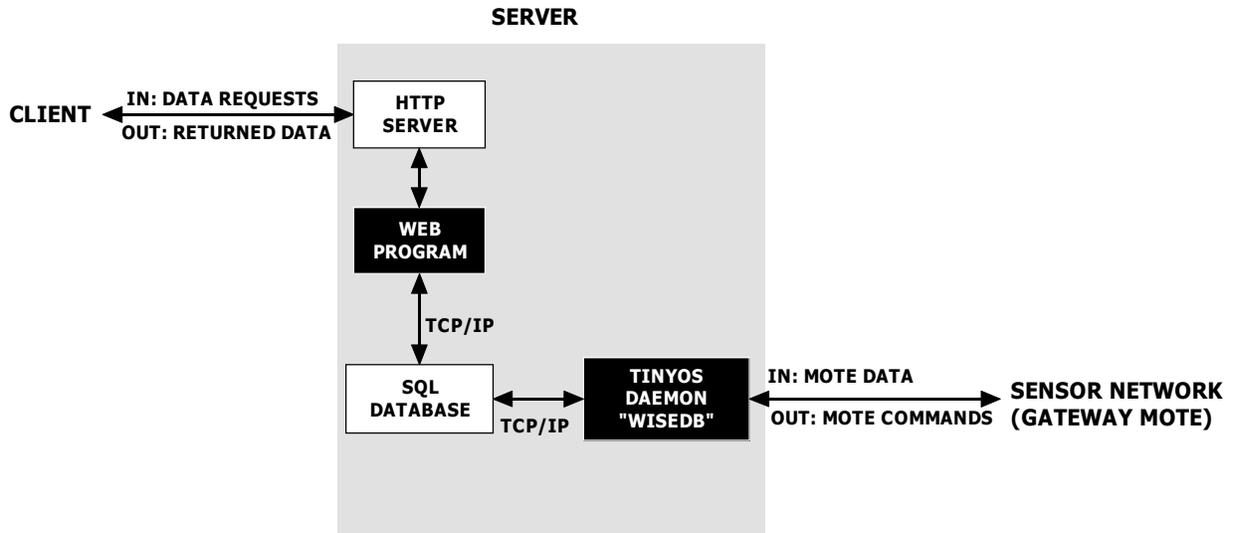


Figure 3: Server Component Subsystem Block Diagram

Server (figure 3): The Server component is comprised of four software systems, two of which are standard, off-the-shelf programs (the HTTP Server and an SQL database). The other two will be developed for this project. The Web Program will consist of a series of scripts the web-server (HTTP server) will parse to retrieve and process mote data from the SQL database. Its general flow is shown in figure 4. The final software component on the server PC is WiseDB which is responsible for sending commands to the motes on the sensor network as well as receiving/storing the data they return. Its flowchart is shown in figure 5.

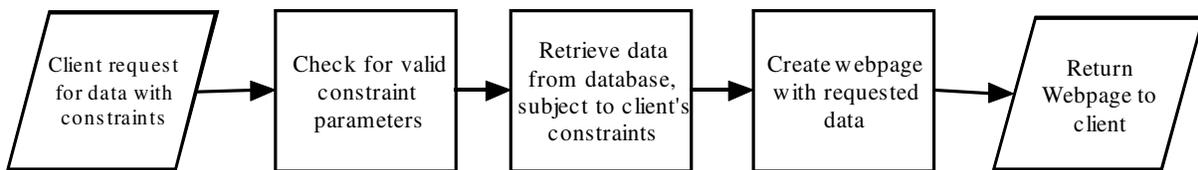


Figure 4: Web Program Flow

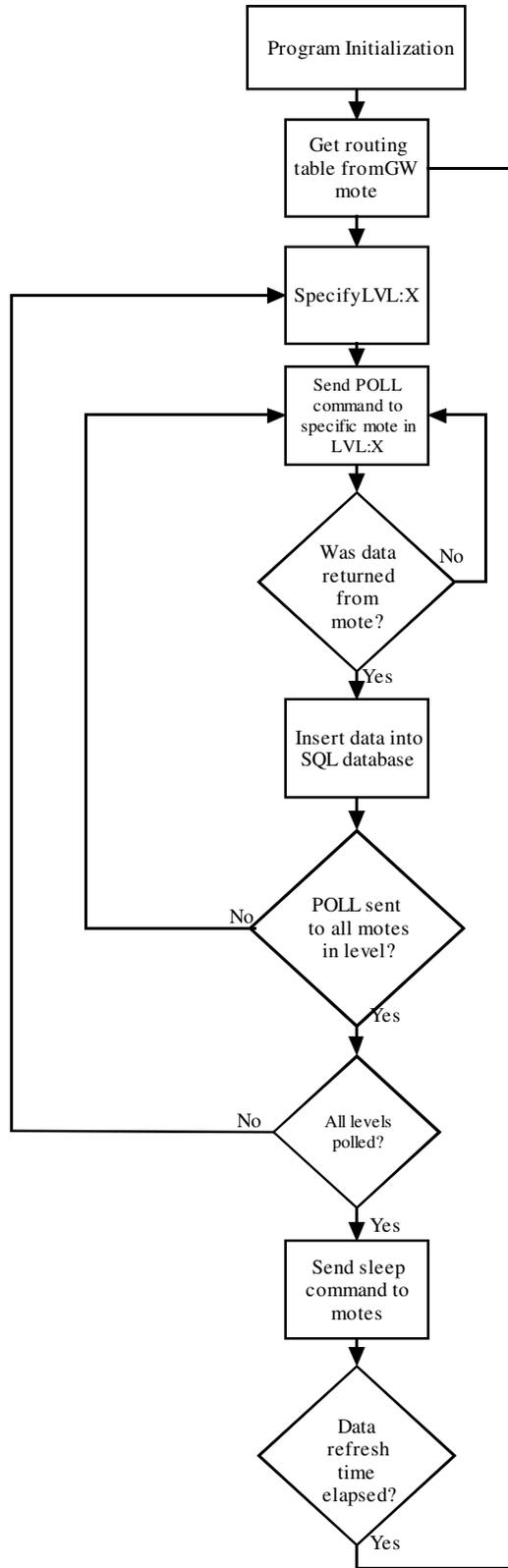


Figure 5: WiseDB Program Flow

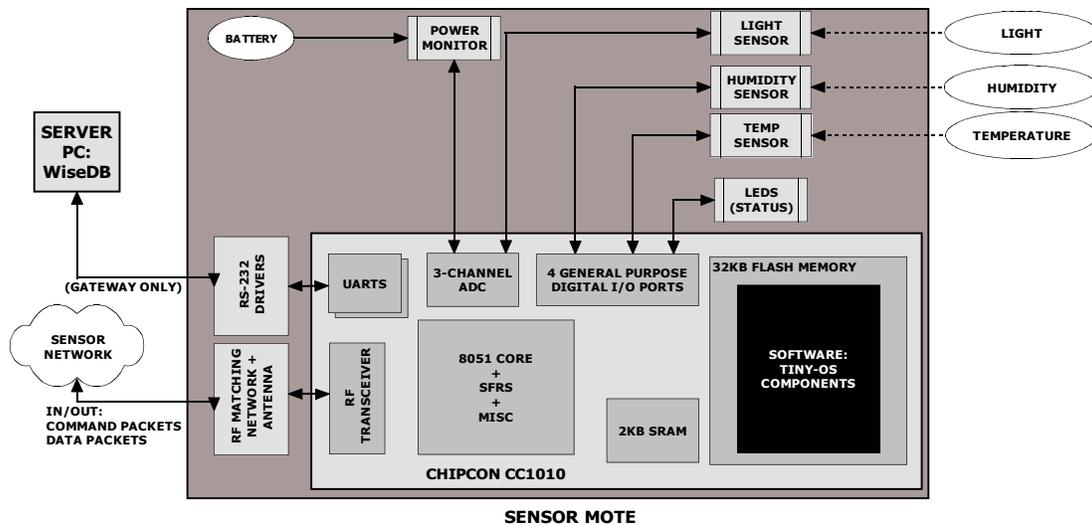


Figure 6: Sensor Mote Block Diagram

Sensor Motes (figure 6): Each mote will be identical in hardware and software. However, the Gateway (“GW”) mote will have an expanded role in the system. All motes will be responsible for receiving and propagating command packets, receiving and routing data packets, and responding to requests for sensor/status information. In addition, the GW mote will be responsible for relaying all commands from the server and forwarding all data to the server. Each mote's hardware will consist of a CC1010 integrated 8051-microcontroller / RF transceiver, sensors (light, temperature, and humidity), status LEDs and power monitoring circuitry. The software on each mote will consist of TinyOSⁱⁱ components customized to this particular system.

References

- i. J. Dunne and D. Patnode. Wireless Sensor Network (WISENET) – A Functional Description. <http://wisenet.sir-draknor.net/>. Nov. 2002
- ii. J. Hill. A Software Architecture Supporting Networked Sensors. http://today.cs.berkeley.edu/tos/papers/TinyOS_Masters.pdf Master's thesis, Dec. 2000.