AN INVISIBLE TRACKNIG SYSTEM DURING NATURAL CALAMITIES

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ABSTRACT: Electricity-operated durable medical equipment (DME), such as ventilators, dialysis machines, and patient monitoring devices, are life-supporting machines used extensively by patients at home. While convenient and economical, at-home use of DME is susceptible to power outages, especially the ones caused by natural disasters that often occur in large area and for a long duration. There is little existing technology allowing hospitals to monitor DME-dependent patients without using the current infrastructure, such as the landlines, the cell towers, Ethernet cable or the Internet. Reported herein is a novel wireless system that utilizes a radio ad hoc network to automatically report the patient's information and location, and the DME information and status to a nearby hospital when a power outage is detected. This system consists of two parts: a hospital-based receiving device, called the Base Station node, and multiple transmitting devices, called User Nodes, each connected to the DME at patients' homes.

I. INTRODUCTION

In the previous existing method PC devices used as data acquisition (DAQ) systems we are able to collect vital information about the patients remotely. Existed system which monitors temperature & pulse rate of different patients and immediate action is taken using Bluetooth technology. Electricity-operated durable medical equipment (DME), such as ventilators, dialysis machines, and patient monitoring devices, are life-supporting machines used extensively by patients at home. While convenient and economical, at-home use of DME is susceptible to power outages, especially the ones caused by natural disasters that often occur in large area and for a long duration. There is little existing technology allowing hospitals to monitor DME-dependent patients without using the current infrastructure, such as the landlines, the cell towers, Ethernet cable or the Internet. Reported here in is a novel wireless system that utilizes a radio ad hoc network to automatically report the patient's information and location, and the DME information and status to a nearby hospital when a power outage is detected. This system consists of two parts: a hospital-based receiving device, called the Base Station node, and multiple transmitting devices, called User Nodes, each connected to the DME at patients' homes.

II. HARDWARE SYSTEM

Micro controller: This section forms the control unit of the whole project. This section basically consists of a Microcontroller with its associated circuitry like Crystal with capacitors, Reset circuitry, Pull up resistors (if needed) and so on. The Microcontroller forms the heart of the project because it controls the devices being interfaced and communicates with the devices according to the program being written.

ARM7TDMI: ARM is the abbreviation of Advanced RISC Machines, it is the name of a class of processors, and is the name of a kind technology too. The RISC instruction set, and related decode mechanism are much simpler than those of Complex Instruction Set Computer (CISC) designs.

Liquid-crystal display (**LCD**) is a flat panel display, electronic visual display that uses the light modulation properties of liquid crystals. Liquid crystals do not emit light directly. LCDs are available to display arbitrary images or fixed images which can be displayed or hidden, such as preset words, digits, and 7-segment displays as in a digital clock.
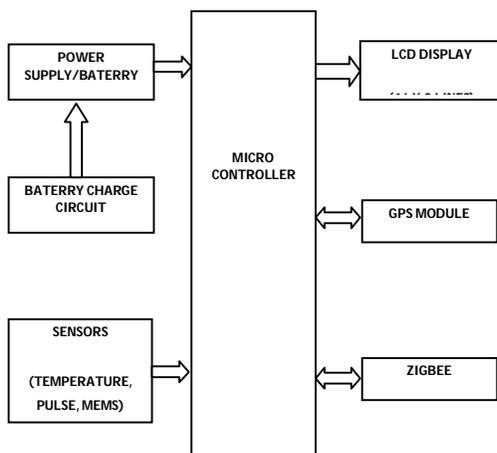

Fig 1: Block diagram

III. BOARD HARDWARE SYSTEM FEATURES

Temperature sensor:

A thermistor is a type of resistor whose resistance is dependent on temperature. Thermistors are widely used as inrush current limiter, temperature sensors (NTC type typically), self-resetting over current protectors, and self-regulating heating elements. The TMP103 is a digital output temperature sensor in a four-ball wafer chip-scale package (WCSP). The TMP103 is capable of reading temperatures to a resolution of 1°C.

Fig 2: Temperature sensor

GPS:

Global Positioning System (GPS) technology is changing the way we work and play. You can use GPS technology when you are driving, flying, fishing, sailing, hiking, running, biking, working, or exploring. With a GPS receiver, you have an amazing amount of information at your fingertips. Here are just a few examples of how you can use GPS technology.

GPS technology requires the following three segments.

- Space segment.
- Control segment.
- User segment

Space Segment

At least 24 GPS satellites orbit the earth twice a day in a specific pattern. They travel at approximately 7,000 miles per hour about 12,000 miles above the earth's surface. These satellites are spaced so that a GPS receiver anywhere in the world can receive signals from at least four of them.

Control Segment

The control segment is responsible for constantly monitoring satellite health, signal integrity, and orbital configuration from the ground control segment includes the following sections: Master control station, Monitor stations, and Ground antennas.

User Segment

The GPS user segment consists of your GPS receiver. Your receiver collects and processes signals from the GPS satellites that are in view and then uses that information to determine and display your location, speed, time, and so forth. Your GPS receiver does not transmit any information back to the satellites.

The following points provide a summary of the technology at work:

• The control segment constantly monitors the GPS constellation and uploads information to satellites to provide maximum user accuracy

• Your GPS receiver collects information from the GPS satellites that are in view.

• Your GPS receiver accounts for errors. For more information, refer to the Sources of Errors.

• Your GPS receiver determines your current location, velocity, and time.

• Your GPS receiver can calculate other information, such as bearing, track, trip distance, and distance to destination, sunrise and sunset time so forth.

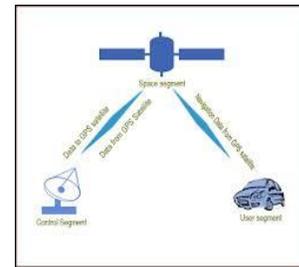• Your GPS receiver displays the applicable information on the screen.

Fig 3: GPS Working

ZIGBEE:

Zigbee modules feature a UART interface, which allows any microcontroller or microprocessor to immediately use the services of the Zigbee protocol. All a Zigbee hardware designer has to do in this case is ensure that the host's serial port logic levels are compatible with the XBee's 2.8- to 3.4-V logic levels. The logic level conversion can be performed using either a standard RS-232 IC or logic level translators such as the 74LVTH125 when the host is directly connected to the XBee UART. The X- Bee RF Modules interface to a host device through a logic-level asynchronous Serial port. Through its serial port, the module can communicate with any logic and voltage Compatible UART; or through a level translator to any serial device.

Data is presented to the X-Bee module through its DIN pin, and it must be in the asynchronous serial format, which consists of a start bit, 8 data bits, and a stop bit. Because the input data goes directly into the input of a UART within the X-Bee module, no bit inversions are necessary within the asynchronous serial data stream. All of the required timing and parity checking is automatically taken care of by the X-Bee's UART.
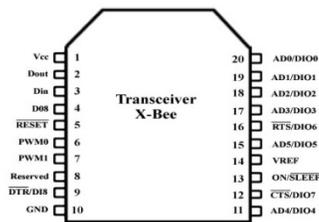
Fig 4: ZIGBEE pin diagram

MEMS:

Micro-Electro-Mechanical Systems (MEMS) is the integration of mechanical elements, sensors, actuators, and electronics on a common silicon substrate through microfabrication technology. While the electronics are fabricated using integrated circuit (IC) process sequences (e.g., CMOS, Bipolar, or BICMOS processes), the micromechanical components are fabricated using compatible "micromachining" processes that selectively etch away parts of the silicon wafer or add new structural layers to form the mechanical and electromechanical devices. MEMS promises to revolutionize nearly every product category by bringing together silicon-based microelectronics with micromachining technology, making possible the realization of complete systems-on-a-chip. MEMS is an enabling technology allowing the development of smart products, augmenting the computational ability of microelectronics with the perception and control capabilities of micro sensors and micro actuators and expanding the space of possible designs and applications.

Microelectronic integrated circuits can be thought of as the "brains" of a system and MEMS augments this decision-making capability with "eyes" and "arms", to allow micro systems to sense and control the environment. Sensors gather information from the environment through measuring mechanical, thermal, biological, chemical, optical, and magnetic phenomena. The electronics then process the information derived from the sensors and through some decision making capability direct the actuators to respond by moving, positioning, regulating, pumping, and filtering, thereby controlling the environment for some desired outcome or purpose. Because MEMS devices are manufactured using batch fabrication techniques similar to those used for integrated circuits, unprecedented levels of functionality, reliability, and sophistication can be placed on a small silicon chip at a relatively low cost.
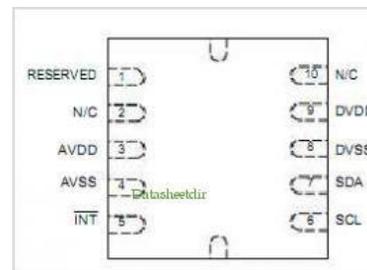

Fig 5: MEMS IC

Pulse sensor:

Attach to finger and get Analog out from the sensor based on heart beat pulse. You can read the analog output with microcontroller ADC and then plot it or calculate readings like heart beat per minute. It is simple to use and accurate results.
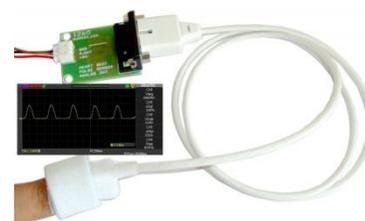
Fig 6: Pulse Sensor

IV. CONCLUSION

Given testing data, it was found that the prototype design of the DME tracking system was feasible to implement and would meet the requirement for securely transmitting patient data, location information, and the status of DME to a nearby hospital during power outages. Although the maximum radio range for the current pilot prototype was found to be 90 m, the advantage of modular design allows this proof-of-concept system to be easily scalable by simply employing more powerful radio modules or having specially placed forwarding nodes to facilitate the forwarding of information from more distant homes. In a medium patient density situation, for instance, a radio with an indirect range could be employed.

V. REFERENCES

[1]Durable medical equipment.

http://en.wikipedia.org/wiki/Durable_medical_equipment

[2] National Coverage Determination (NCD) for Durable Medical Equipment Reference List (280.1).

http://www.cms.gov/medicarecoverage-database/ details/ncddetails

[3] Baseline country survey on medical devices, 2013 update: Medical Equipment−Total density per million population computed tomography.

http://gamapserver.who.int/gho/interactive_charts/health_technologies/ medical_equipment/atlas.html

[4] B. Norman. What Will You Do if the Power Goes Out?*http://alsn.mda.org/article/what-will-you-do-if-power-goes-out.*

[5] HHS Press Office. HHS selects winners in idea challenge for emergency response.

http://www.hhs.gov/news/press/2014pres/02/20140220a.html

[6]GPS Trackers for Today's World.

http://www.pocketfinder.com/

[7] Zoombak Personal GPS Locators. The next generation Zoombak is eZoom.

http://www.securusgps.com/zoombak.aspx

[8]SparkFun Xbee shield.

https://www.sparkfun.com /products/12847

[9]Teensy USB Development Board.

https://www.pjrc.com/ teensy/

[10] ZigBee® Alliance. *http://www.zigbee.org/*

[11] ZigBee. *http://en.wikipedia.org/wiki/ZigBee*