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WIRELESS COMMUNICATION SYSTEM AND HEALTH MONITORING SYSTEM FOR MINE AREAS

DR. Rajaram M[1], Devadharsheni P[2], Kishore Kumar S[3], Padaiyappa M[4], Sathyanarayana R P[5]

[1]Professor, Head of the Department, Department of Electronics and Communication Engineering,
[2-4]Students, Department of Electronics and Communication Engineering,
PARK COLLEGE OF ENGINEERING AND TECHNOLOGY, KANIYUR, COIMBATORE-641659

***Abstract*—**Due to lack of proper health monitoring, Mine workers suffer from serious health issues. Now a days a lot of device are there to monitor the health of patient over internet. With tons of healthcare technology start-ups, the healthcare industry is rapidly revolutionizing by IOT. Here in this project, we will make an ZigBee based wireless communication system and health monitoring system for mine workers, which records the workers heart beat rate, blood pressure, blood oxygenation, prediction of earth quake and live GPS location of workers. These sensor values are transferred to the cloud from where the worker health can be monitored from anywhere in the world over internet.

***Keywords*—**ZigBee, Sensors, GPS.

1. INTRODUCTION:

The aim of this project is to develop a ZigBee based wireless communication system and health monitoring system for mine workers. People who are working in mine areas they don't know the disaster like earth quake, our device predict the earth quake using seismic sensor and convey it to the workers using IOT. GPS tracker also included in our device because if the construction of the building is collapsed the mine workers will stuck inside. With the help of GPS tracker and heart beat detection sensor we can able find the alive workers location.

2. EXISTED SYSTEM:

In existed system, a wireless technology using NRF24L01 (transceiver IC) is designed for advanced health monitoring. This model identifies the individual's data rate. For monitoring different parameters and switches for emergency purpose, various sensors are used. The wireless communication between devices such as master and slave uses thenRF24L01 SPI interface protocol. The slave tends to send the data after receiving acknowledgement from the master. Data transfer between master and slave is fast, efficient, low cost and low power consumption. An advanced wireless communication device has been proposed for underground coal mine workers. Some worker's health are monitored by sensors and controllers. The nRF24L01 acts as a transreceiver IC for device to device communication using SPI protocol. Pulse sensor monitors the worker's pulse rate, the leakage of poisonous gases such as natural gases, hydrogen sulphide especially firedamp or methane are detected by gas sensor. The underground water in urban areas are detected by the water sensors. For monitoring the environment and measuring human body temperature, two temperature sensors are used. Switches are used forintimating the emergency need and to update some predefined messages. For sending the data to the control unit NRF24L01 plays a role.

3. PROPOSED SYSTEM

In the proposed system, the system is developed using IOT technology. The health parameters such as pulse rate, temperature and blood oxygenation level is monitored using different sensors. In addition with, Earth quake detection sensor that is included in our device to alert the people who are working in mine areas. The earthquake can be detected by seismic sensor and it will give an alert message to the worker through ZigBee communication and the current GPS location of workers are also monitored. The monitored data are transferred to the cloud using IOT module which also includes live monitoring. These sensor values are transferred to the cloud from where the patient's health can be monitored from anywhere in the world over internet with live GPS locatio**n.**

4. BLOCK DIAGRAM

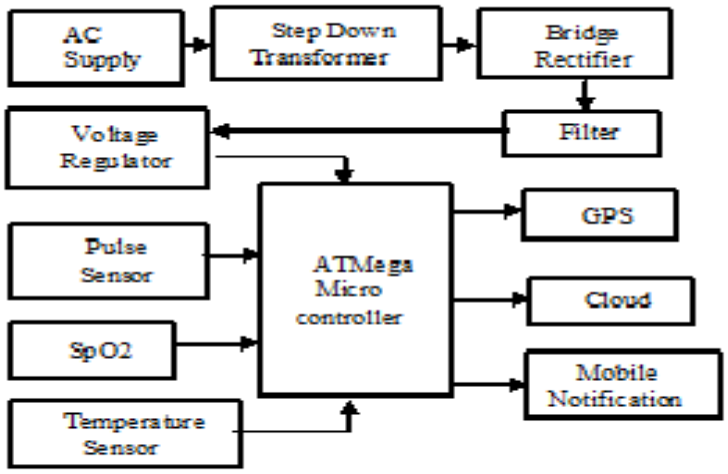

Fig 4.1: Block Diagram

5. HARDWARE COMPONENTS

5.1 ATMEGA MICROCONTROLLER

Atmel Corporation manufactures ATMega microcontroller and it belongs to AVR family. It is based on Harvard Architecture and an**8-bit microcontroller** with Reduced Instruction Set (**RISC**).The standard features on ATMega microcontroller are data EEPROM, on-chip ROM, Data RAM, Serial Interface Ports, Timers and Input / Output Ports, along with extra peripherals like Analog to Digital Converters (ADC). It has more number of instruction set and the program memory ranges from 4K to 256K Bytes.

Fig 5.1: ATMega Microcontroller

5.2 PULSE SENSOR

Pulse Sensor could also be a well-designed plug-and-play heart-rate sensor for Arduino. Theathletes, students, artists, makerscan use the pulse sensors and the live heartbeat rate data can be easily incorporated into their projects database by mobile developers. The sensor can be placed on the fingertip or earlobe and with some jumper cables it is plugged with the Arduino. It is an open-source monitoring app that can able to graph the persons pulse in real time.

Fig 5.2: Pulse sensor

5.3 TEMPERATURE SENSOR

LM35 Temperature Sensor which may be a semiconductor based sensor. Integrated analog temperature sensor which is based on LM35 and its electrical output is proportional to degree Centigrade. They're utilized in your daily household devices from Microwave, fridges, AC to all or any fields of engineering.

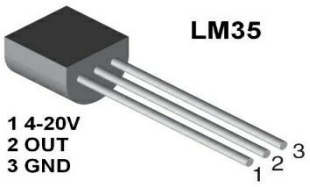

Fig 5.3: Temperature sensor

5.4 SPO_2

Pulse oximeters are wont to noninvasively measure oxygen saturation in blood (SaO2). Although arterial oxygen saturation measured by pulse oximeter (SpO2) is sometimes indicated in 1% increments, the worth of SaO2 from blood gas analysis isn't an integer. We've developed areplacement pulseoximeter which will measure SpO2 to 1 digit after the percentage point.

5.5 ZIGBEE

ZigBee is supposed for devices which require simple wireless networking and don't need high data transfer rate. These devices may be for example sensor network, information displays, home- and industrial automatic systems, etc. Main benefit compared with Bluetooth is lower power demand, quick respond from sleep to awake and price. ZigBee works in most cases at 2.4 GHz radio band frequency with data transmission rates from 20 to 900 kb/s. ZigBee protocol supports different types of network like star, tree and generic mesh. Network nodes can have different roles like coordinator, router or end device.

Fig5.5: ZIGBEE Module

5.6 GPS MODULE

The Global Positioning System (GPS), is a satellite-based radio navigation system. The transmission of any data from user is not required by GPS and telephonic or internet reception is operated independently, though it enhance the useful information. This system is created and maintained by United States government and makes it freely accessible to anyone with a GPS receiver.

Fig 5.3: GPS Module

6. REFERENCES

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