REAL TIME WIRELESS SYSTEM FOR SOLIDER SECURITY

[1]Karpurapu Samyuktha[2]Addanki Kanaka Chandrika[3]Banala BabySravani[4]Alluri Manisha[5]R Prashanthi[6] P Sreenivasula Reddy

[1]UG Scholar, [2] UG Scholar, [3] UG Scholar,[4] UG Scholar, [5]Assistant Professor, [6]Assistant Professor
ECE Department, Narayana Engineering College, Nellore, India

Abstract: *The paper describes the design, construction and working of the Real Time Wireless system for Solider security. One of the important and vital roles in a country's defense is played by the army soldiers. Every year Soldiers get strayed or injured and it is time consuming to do search and rescue operations. In this paper, we present a WSN-based environmental and health monitoring approach in which sensor data is processed using robust and stable algorithm implemented in controller. These processed data are then sent to the base station via low-cost, low power and secure communication links provided by a RF network infrastructure instead of cellular networks, since, they are either absent or doesn't allow data transmission in warzone or remote areas.*

We focus on monitoring environmental factors such as temperature, humidity, air pressure, air quality; physical factors such as motion, position, geographic location and health parameters like ECG (electro cardiograph), blood oxygen level, body temperature. Moreover, camera and microphone are used to monitor any undesirable situation of soldier. The aim of the system is to reduce the response time for any emergencies with the use of embedded system and WBASN, while being power efficient.

Keywords: ***NODEMCU-ESP8266,WSN,ECG,DHT11***

I. INTRODUCTION

The nation's security is monitored and kept by army, navy and air-force. There are many concerns regarding the safety of the soldier. Soldiers in battlefield often lose their lives due to lack of connectivity, it is very vital for the army base station to known the location as well as health status of all soldiers. To avoid life-threatening situations, it is helpful to continuously monitor soldiers suffering from harsh conditions. The Wireless Sensor Network (WSN) plays a crucial role in health monitoring, since it enables us to connect sensors to collect soldiers' health and environmental data and process it to prevent critical events. Major research is being done by some of the world's largest militaries like Russian and U.S. Army to build wearable embedded device which could monitor the physical and environmental factors of soldiers, like in TALOS Exoskeleton (Tactical Assault Light Operator Suit) project which involves 56 corporations, 16 governments agencies, 13 universities, and 10 national laboratory for research and development purpose . In-depth analysis regarding smart wearable clothing has been provided by Scatagliniet , about the application and importance of smart wearable clothing in the Army.

II. FUNCTIONAL OVERVIEW

In countries where the economic status is poor, it becomes crucial for those concerned with developmental policies to adopt appropriate strategies which will ensure that every single unit of money available is used to develop the country in those fields to facilitate a conductive environment for economic development in [1].

Road traffic accidents have been recognized as one of the adverse elements which contribute to the suffocation of economic growth in the developing countries, dueto the high cost related to them, hence causing social and economic concern [2]. So, Traffic safety is an important key and plays an integral role in sustainable transportationdevelopment.

Now days, the main negative impacts of modern road transportation systems are injuries and deaths in road accidents. The success of traffic safety and highway improvement programs hinges on the analysis of accurate and reliable traffic accident data presented in [5].

III.DESIGN

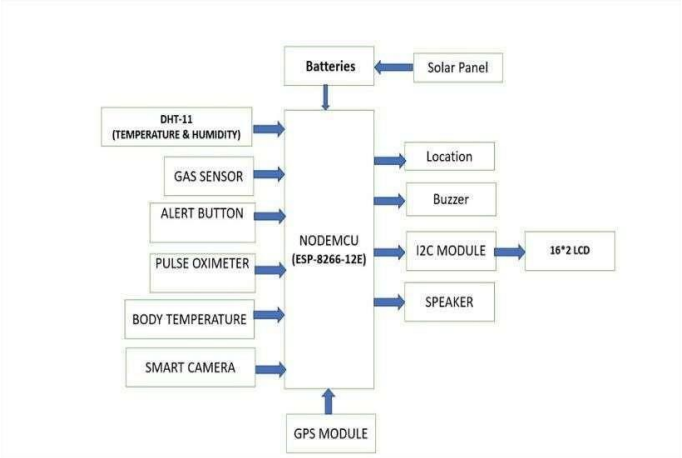

Fig.1 Block diagram of Real Time Wireless System for Soldier Security

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A. NODEMCU (ESP-8266 12E) Wi-Fi Module

ESP-8266 12E Wi-Fi module is developed by Ai- thinker Team. core processor ESP8266 in smaller sizes of the module encapsulates Ten silica L106 integrates industry- leading ultra-low power 32-bit MCU micro, with the 16-bit short mode, Clock speed support 80 MHz, 160 MHz, supports the RTOS, integrated Wi-Fi MAC/BB/RF/PA/LNA, on- board antenna. The module supports standard IEEE802.11 b/g/n agreement, complete TCP/IP protocol stack. Users can use the add modules to an existing device networking, or building a separate network controller. ESP8266 is high integration wireless SOCs, designed for space and power constrained mobile platform designers. It provides unsurpassed ability to embed Wi-Fi capabilities within other systems, or to function as a standalone application, with the lowest cost, and minimal space requirement.

B. Temperature and Humidity Module DHT11

DHT11 digital temperature and humidity sensor is a calibrated digital signal output of the temperature and humidity combined sensor. It uses dedicated digital modules capture technology and the temperature and humidity sensor technology to ensure that products with high reliability and excellent long-term stability. Sensor includes a resistive element and a sense of wet NTC temperature measurement devices and with a high-performance 8-bit microcontroller connected.

C. DS18B20 TEMPERATURE SENSOR

The DS18B20 Digital Thermometer provides 9 to 12-bit (configurable) temperature readings which indicate the temperature of the device. Information is sent to/from the DS18B20 over a 1-Wire interface, so that only one wire (and ground) needs to be connected from a central microprocessor to a DS18B20. Power for reading, writing, and performing temperature conversions can be derived from the data line itself with no need for an external power source. Because each DS18B20 contains a unique silicon serial number, multiple DS18B20s can exist on the same 1-Wire bus. This allows for placing temperature sensors in many different places. Applications where this feature is useful include HVAC environmental controls, sensing temperatures inside buildings, equipment or machinery, and process monitoring and control.

D. MQ2 GAS SENSOR MODULE

MQ2 gas sensor can be used to detect the presence of LPG, Propane and Hydrogen, also could be used to detect Methane and other combustible steam, it is low cost and suitable for different application. Sensor is sensitive to flammable gas and smoke. Smoke sensor is given 5 volts to

E. LCD (Liquid Crystal Display)

A liquid crystal display or LCD draws its definition from its name itself. It is combination of two states of matter, the solid and the liquid. LCD uses a liquid crystal to produce a visible image. Liquid crystal displays are super-thin technology display screen that are generally used in laptop computer screen, TVs, cell phones and portable video games. LCD's technologies allow displays to be much thinner when compared to cathode ray tube (CRT) technology

F. BUZZER

The electric buzzer was invented in 1831 by Joseph Henry. They were mainly used in early doorbells until they were phased out in the early 1930s in favor of musical chimes, which had a softer tone.

F.1. Piezoelectric Buzzer

Piezoelectric buzzers, or piezo buzzers, as they are sometimes called, were invented by Japanese manufacturers, and fitted into a wide array of products during the 1970s to 1980s. This advancement mainly came about because of cooperative efforts by Japanese manufacturing companies. In 1951, they established the Barium Titanate Application Research Committee, which allowed the companies to be "competitively cooperative" and bring about several piezoelectric innovations and inventions.

F.2. Electromechanical

Early devices were based on an electromechanical system identical to an electric bell without the metal gong. Similarly, a relay may be connected to interrupt its own actuating current, causing the contacts to buzz. Often these units were anchored to a wall or ceiling to use it as a sounding board. The word "buzzer" comes from the rasping noise that electromechanical buzzers made.

G. SMART CAMERA

This is the most advanced technology for V380 Indoor Security IP Camera, integrated with various features of HD 1080P 60fps, POE(Power Over Ethernet), P2P and Auto HD IR-CUT and so on, which bring you a very clear and vivid image and also offers a immersive illusion. Besides, with 360-degree globe panoramic IP Camera, viewing what is in range of the camera, you can also have a video surveillance in every corner of your house as well. Built-in microphone and speaker, there is no problem for talking with someone wherever the IP Camera is set up directly from your mobile device. V380 Camera also will be provided with cloud service, all of you will not worry about the loss of video and you can record all playback what you want. Moreover, V380 IP camera is for surveillance and monitoring, truly achieves family's protection, it can be regard as a baby monitor when you are on business, also can use for pets in the daily life, which you can enjoy the happiness even when you are abroad. Never lose such a household artifact.

H. Pulse Sensor

Pulse Sensor is a well-designed plug-and-play heart- rate sensor for Arduino. It can be used by students, artists, athletes, makers, and game & mobile developers who want to easily incorporate live heart rate data into their projects. The sensor clips onto a fingertip or earlobe and plugs right into Arduino. It also includes an open-source monitoring app that graphs your pulse in real time.

Figure 1 : Here are the connections within the NODEMCU and difference typre of sensors

IV.INSTALLATION

After learning about the main parts of the Arduino UNO board, we are ready to learn how to set up the Arduino IDE. Once we learn this, we will be ready to upload ourprogram on the Arduino board. In this section, we will learn in easy steps, how to set upthe Arduino IDE on our computer and prepare the board to receive the program via USBcable**.**

Step 1

First you must have your Arduino board (you can choose your favorite board) anda USB cable. In case you use Arduino UNO, Arduino Duemilanove, Nano, Arduino Mega2560, or Diecimila, you will need a standard USB cable (A plug to B plug), the kind youwould connect to a USB printer as shown in the following image.

Step 2: Download Arduino IDE Software

You can get different versions of Arduino IDE from the Download page on the Arduino Official website. You must select your software, which is compatible with your

operating system (Windows, IOS, or Linux). After your file download is complete, unzipthe file.

Step 3: Power up your board.

The Arduino Uno, Mega, Duemilanove and Arduino Nano automatically draw power from either, the USB connection to the computer or an external power supply. If you are using an Arduino Diecimila, you have to make sure that the board is configured to draw power from the USB connection.

The power source is selected with a jumper, a small piece of plastic that fits ontotwo of the three pins between the USB and power jacks. Check that it is on the two pins closest to the USB port. Connect the Arduino board to your computer using the USB cable. The green power LED (labeled PWR) should glow.

Step 4: Launch Arduino IDE

After your Arduino IDE software is downloaded, you need to unzip the folder. Inside the folder, you can find the application icon with an infinity label (application.exe). Double-click the icon to start the IDE.

Step 5: Open your first project.

Once the software starts, you have two options:

- Create a new project.
- Open an existing project example.

To create a new project, select File --> New.

Step 6: Select your Arduino board.

To avoid any error while uploading your program to the board, you must select the correct Arduino board name, which matches with the board connected to your computer. Go to Tools -> Board and select your board

Step 7: Select your serial port.

Select the serial device of the Arduino board. Go to Tools -> Serial Port menu. This is likely to be COM3 or higher (COM1 and COM2 are usually reserved for hardwareserial ports). To find out, you can disconnect your Arduino board and re-open the menu,the entry that disappears should be of the Arduino board. Reconnect the board and selectthat serial port.

Step 8: Upload the program to your board

Before explaining how we can upload our program to the board, we must demonstrate the function of each symbol appearing in the ArduinoIDE toolbar

BLYNK APP

Blynk was designed for the Internet of Things. It can control hardware remotely, it can

display sensor data, it can store data, visualize it and do many other cool things.

Blynk is a platform with iOS and Android apps to control Arduino, Raspberry Pi and the likes over the Internet. It's a digital dashboard where you can build a graphic interface foryour project by simply dragging and dropping widgets. It's really simple to set everything up and you'll start tinkering in less than 5 mins. Blynk is not tied to some specific board or shield. Instead, it's supporting hardware of your choice. Whether your Arduino or Raspberry Pi is linked to the Internet over Wi-Fi, Ethernet or this new ESP8266 chip, Blynk will get you online and ready for the Internet Of Your Things.

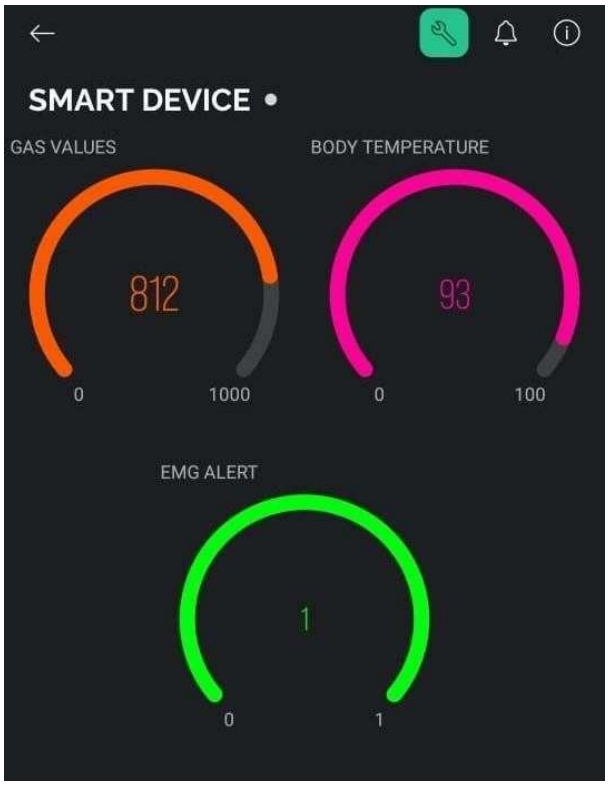

Figure 2:This Figure shows the Environmental condition the body temperature of solidier and the sign for the Emergency Alert

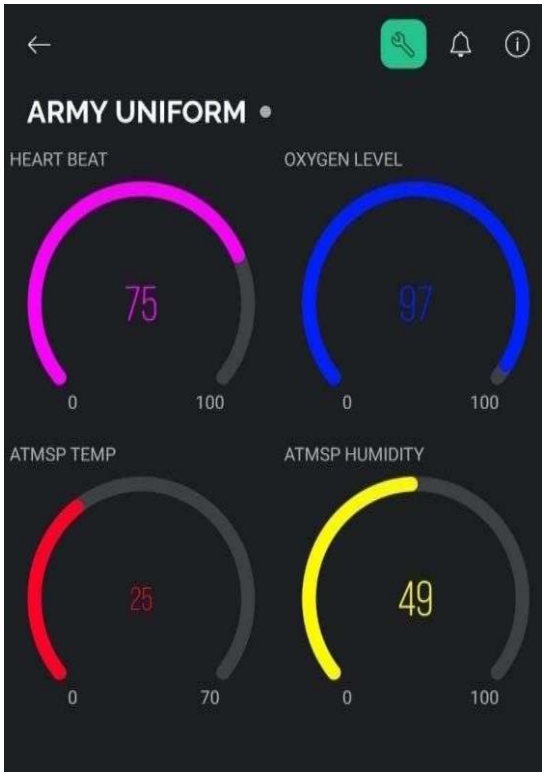

Figure 3: This figure shows the heart beat ,Oxygen level,Atmospheric temperature and Atmospheric

V.CONCLUSION

This project presents a successfully implemented real time wireless for solider security which has the potential to improve the military operations substantially. It helps to acquire the information from the warzone about each soldier's health condition and could detect biohazards with the help of vigorous algorithm. This helps to take swift decisions and can prevent causalities by providing backup or further assistance. Besides that, energy consumption of the system is only 3.2watt which is much less, due to the use of esp module for data transmission instead of high-power consuming GSM/GPRS modules.

VI. REFERENCES

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