Iot Based Detection Of Soldier Navigation And Border Security System Through Interfacing Of Arduino With Biomedical Sensors

[1]Valarmathi, N[2]M.Vengateshwaran[3]Dr.Kalaimani[4]R.Sudha

[1,2,4]Assistant Professor, [3] Professor
[1]Department of IT, [2,3,4] Department of CSE
[1]M.Kumarasamy College of Engineering, [2]Agni College of Technology, [3,4]Arasu Engineering College
[1]Karur, [2]Chennai, [3,4]Kumbakonam
Tamilnadu, India
mathinatarajan@gmai.com

Abstract
Discovery of intercession is a first issue in strategic fringe. It is a lot of hard to recognize the intercession in huge or dry zones since it is hard to men to investigate those regions frequently. In this venture the gatecrasher is identified and arranged whether it is vehicle or human or vehicle in gatherings. This is finished utilizing the sensor bits which are remote called as shrewd residue. Keen residue contains a controller, on board sensors which has the ability, to recognize the mediation of adversaries over the war zones. These hubs are the get together of controllers and sensors. With the assistance of a couple of men itself a large number of shrewd residue bits can be introduced in not many hours in the outskirt. These bits are small measured and structures the system all alone and gives the data to outside world by means of IOT association. A typical bit correspondence plot utilizes radio recurrence signs to impart over moderately short separations. This permits creators to limit bit estimate and diminish power utilization. When conveying, the gadgets pass each message to a neighboring hub, which, thusly, passes the message onto a neighboring hub, etc, until the message arrives at the goal I. e the focal checking bit. The systems of hubs keep on performing regardless of whether a portion of its correspondence ways neglect to work. What's more, when a bit is set in a current system, it adjusts to mix in with different hubs to shape a bigger system; and when a bit comes up short, different gadgets in the system assume control over its heap The equipment contains different sensors like warm sensor, PIR sensor, metal indicator, vibration sensor and a microcontroller for controlling every one of these
sensors esteems and furthermore a handset for the correspondence over a remote system. The bit which comprise s of this equipment is known as the residue bit. A controlling hub called the parent bit dwells of a design show and a controller by means of which the perspective on following.

Key Words: Arduino, IOT, BorderSecurity System, PIR Sensor, Metal Sensor, Temperature sensor, Vibration sensor

I. INTRODUCTION

The consolidated unit of Hardware and programming comprise an "Inserted System" which is likewise incorporated together to manufacture a framework which helps in plan objectives like speed and effectiveness. The fundamental favorable position of inserted frameworks is the adaptability to pick wanted equipment and programming segments to plan the ideal framework which plays out the ideal assignment. This task depends on the previously mentioned benefits of the inserted framework. There is a need to build up a wearable innovation which isn't cumbersome and scatters next to no

power in the resistance part with the goal that the area and indispensable Border Security parameters of the fighters can be followed progressively when he is on the front line. Utilizing this Soldier Navigation framework the base station can manage the warrior to arrive at the ideal goal. The principle pith of this venture is that it is an Internet of Things (IOT) based task. IOT frameworks are frameworks that comprise of interrelated machines(mechanical or computerized), figuring gadgets, creatures, people groups and different articles which have one of a kind functionalities and utilizing the IOT their information can be moved starting with one spot then onto the next over the system without the PC to PC and human to PC intercession. The significance of IOT in Soldier Navigation and Border Security framework is that the ongoing area and Border Security parameters of the trooper on the war zone are immediately sent to the base station without the officer contributing anything. The IOT makes the whole observing procedure quick, productive and the choices can be taken in less measure of time. The Arduino Mega is utilized as a passage for showing the sensor esteems over a server known as Thing talk. Likewise, Arduino Mega gives better security and separation from stray interruption.

II. Related Work

Shruti Nikam and Supriya Patil explain in this paper the tracking of the location of the soldiers when they enter the enemy land. For tracking their location GPS (SR87 series) module was used which is highly sensitive and it can track up to 20 satellites at a time that helps in finding the accurate position of the soldier. Along with tracking the paper also incorporates the soldier safety and security aspects such as monitoring the blood pressure and temperature of the soldier. LM35 sensor and pulse rate sensor was used that are not very complex and can be easily fitted in a tiny device. ARM processor (LPC2138) which follows the principles and basic theory of on a 32bit ARM7 TDMI-S CPU and which gives a very high-speed communication. ARM processor is interfaced with graphical LCDs to display various parameters like height, speed, body temperature and pulse rate [1]. Richard B. Marth and et.al have introduces an integrated navigation system for the soldiers. DRM (Dead Reckoning Modules) and GPS constitute the main components of this integrated system. For decades, the soldiers have used all the conventional basic tools such as compass and other navigation tools while they are on their mission. DRM replaces the need for a compass as it allows reliable and hands-free navigation. DRM consists of an analog circuit and a digital circuit. Analog board has magnetometers, accelerometer, temperature sensor and a barometric altimeter. These components are useful to determine the horizontal component of magnetic field, number of steps taken by soldiers, temperature etc. RS232 serial interface ports are used by DRM for communication. Kalman filter is used in integration mode that makes use of both GPS and DRM. This filter can adjust the step size, body offset as well as spurious jumps in GPS position. Thus, the integrated navigation system allows soldiers to focus on the mission because of automatic pace count and indication of the direction and distance to waypoints which helps soldiers to avoid obstacles in their path [2]. Xinfeng BA and et.al have presented a system that monitors the Border Security status of soldiers, soldier tracking and Beidou satellite navigation system which is also a wired communication system is used for two-way short message communication signs acquisition and soldier positioning. The hardware system has two ports: Handheld devices and Wireless Pulse Acquisition system. Handheld device consists of S3C2410 embedded processor, Bluetooth modules, peripheral circuit and communication terminal module. Msp430 single chip microcomputer, pulse signal amplification circuit, pulse sensor and Bluetooth module are components of Wireless Pulse Acquisition System. Specified soldiers are sent short messages via the Beidou navigation system [3]. VongsagonBoonsawant and et.al have proposed a basic prototype system based on wireless sensor networks for monitoring temperature in a building. Xbee wireless communication module which is based on the IEEE 802.15.4 standard was proposed for that kind of a system. WSNs are combination of wireless communication and embedded system allowing transmission of data among various sensor networks. The prototype system was developed for temperature monitoring remotely in each classroom of SIIT. Arduino board that comes with ATMEGA168 is easily interfaced with Zigbee modules. This system consists of two types of nodes coordinator and end devices that were deployed within SIIT building which collected temperature readings everyone hour [4]. R. Archana and et.al have presented an idea of tracking the location of soldiers and their Border Security status to ensure safety of soldiers when they are in the battlefield. For implementing the project, they used PIC microcontroller (PIC 16F877A) whose function is to

collect data from various sensors (heart rate sensor, temperature sensor) bomb detection unit, GPS unit. All the information sent to the base unit (control room). Paper sensor is used to detect bombs and this sensor has inbuilt communication system. At the base unit, GSM modem is used to receive information which is sent by the main army station. Video camera was also used in this project to display real time videos to base unit [5]. Harshavardhan B. Patil and et.al have presented the design and implementation of biomedical parameter monitoring system of patients. The different Border Security parameters measured include ECG monitoring, pulse rate, blood pressure and body temperature. The system consists of two sections: transmitter section (patient's side) and receiver section (doctor's side). The patient is wirelessly monitored and all the data from biomedical sensors are transmitted to microcontroller unit Arduino Uno and then Zigbee module is used to transmit this data to receiver section which is present in the doctor's cabin. LCD is used at both the sections i.e. transmitter and receiver sections to display all the output values from biomedical sensors. This project proves to be very helpful for doctors, as they can analyze the Border Security condition of patients and provide necessary diagnosis and cure the patients quickly [6].

III. Motivation

The necessity for the military base station to distinguish the state of security of the warrior's borders and its environmental factors is an indisputable requirement for the combatants behind the enemy lines. Following the combatant's area can support him if he is out of action and has visual problems to explore. The verification of border security parameters confirms the well-being and condition of the combatant. Together, they can help save the activities and leadership of an injured soldier. The written study revealed that most of the frames used require a lot of space and that some are bulky because they depend on the different microcontrollers or the advances used. There were hardly any frameworks that used the intensity of managing cooler frameworks like Raspberry Pi and Arduino, which are also simpler to program and more focused on executing thoughts instead of taking over the equipment.

3.1. Proposed Work

We offer a successful framework with an application to follow warriors' areas and fringe security settings during war, which additionally conjures military or military officials to design war systems. The base station acquires the situation of the GPS officer and correspondence happens through the Arduino modules. A significant assistance of the base station is to direct the trooper progressing nicely on the off chance that he gets lost on the war zone. The base station can get to the officer status showed on the PC and this framework utilizes IOT. In this way, quick move is made by sending help and help to the officer or by sending a reinforcement duplicate of the foreseen danger to what is to come. Utilizing different biomedical sensors, the fighters' outskirt security parameters are watched, the officer's position and direction are caught by GPS.

3.2.System Architecture

This project uses the master-slave technique for communication. The Raspberry pi acts as the master and the nodes with the soldier act as slaves constantly their Border Security status and location using a Zigbee module.

The hardware components requirement for this project are:

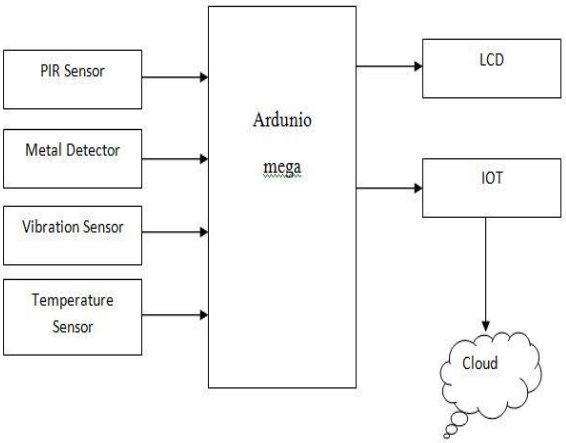
- Arduino Controller
- PIR Sensor
- Metal detector sensor
- Vibration
- Temperature and humidity sensor
- IOT board

The software requirements of this project are:

- Knowledge of programming embedded C (for Arduino Mega).
- Sensor network basics

- Cloud computing basics
- IOT Wi-Fi interfacing

Fig 1: Block diagram of the proposed system



3.CIRCUIT DIAGRAM

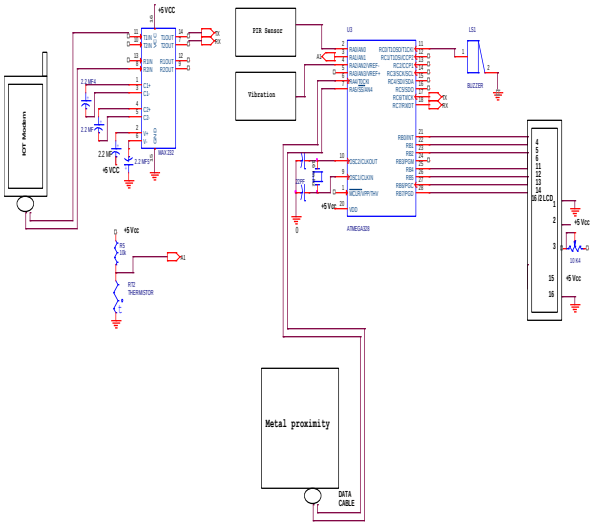


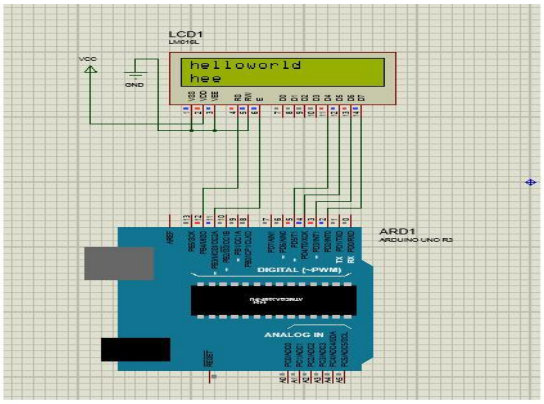
Fig 2: Circuit Diagram of the proposed system

The Arduino Mega board (1) is associated with sensors, DHT11 (dampness and temperature sensor) and SEN 11574 (beat sensor), both good with Arduino. The Arduino Mega board is additionally interconnected with a 16x2 LCD screen which works in 4-piece mode which is utilized to store the association pins. The 16x2 LCD screen can be associated in 8-piece mode to speed up the procedure. The LCD screen is utilized to show the sensor perusing, the GPS position and to show the messages sent from the base station. The L80 GPS module is associated with the Arduino Mega board (1) and furnishes us with the area. The significant last part interconnected with the Arduino Mega board (1) is the Zigbee S2 module which is utilized to send esteems to another Arduino Mega board (2).The second Arduino Mega board (2) is interconnected with the RaspberryPi 3 over the Universal Asynchronous Receiver Transmitter (UART) to send the values received from Arduino Mega(1) to the server. The Arduino Mega is necessary as it provides better isolation and fault identification if at all it occurs. The Arduino Mega is connected over the inbuilt Wi-Fi to an IOT server-Thingspeak which is used for monitoring of sensors values and sending messages.

IV.EXPERIMENTAL IMPLEMENTATIONS

4.1.Interfacing Of Arduino Mega With 16x2 Lcd

Simulation is a feasible technique to check the interfacing of components before its hardware implementation. Proteus 8 software is an excellent platform to check all the interfacing and simulation. The 16X2 LCD interfacing with the Arduino Mega(1) was done using this software to obtain the appropriate results. After the programming the LCD, the hex file created by Arduino Mega (1) was put on Proteus model of Arduino and the 16X2 LCD displayed the “Hello world” message.



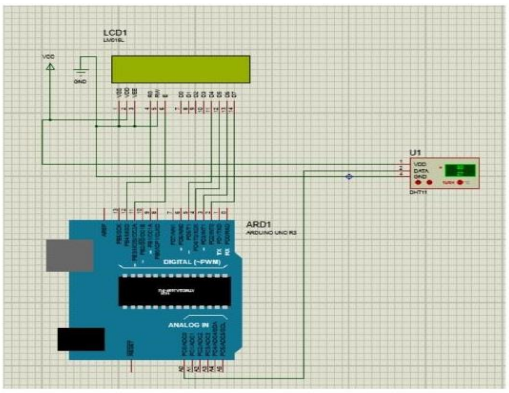


Fig 3: Interfacing of Arduino mega with 16X2 LCDFig 4: Interfacing of Arduino with DHT11 and 16X2 LCD

4.2.INTERFACING OF ARDUINO WITH DHT11 AND 16x2 LCD

Once the simulation of LCD was done, DHT11 sensor was interfaced with Arduino. Arduino was programmed to display the temperature and humidity sensed by the DHT11 Sensor on the 16*2 LCD. The hex file created by Arduino was put on Proteus model of Arduino. The Arduino Board was programmed to display temperature and humidity. 16*2 LCD displayed Temperature as 28 degree Celsius and humidity as 64. When humidity was increased the DHT11 sensor sensed the change and accordingly the LCD displayed the change in humidity as 65.

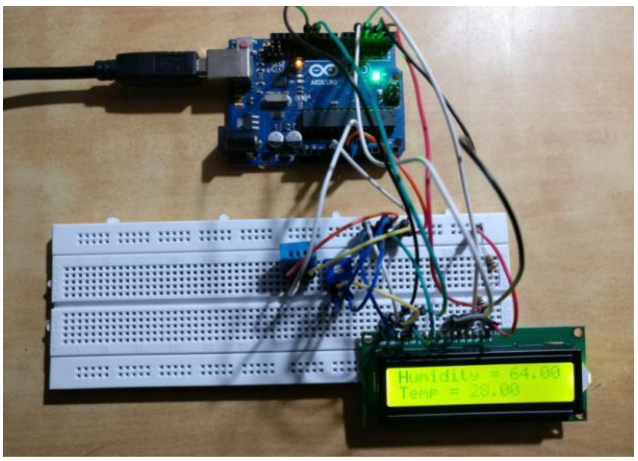


Fig 5: Mapping of Arduino with DHT11 and 16X2 LCD

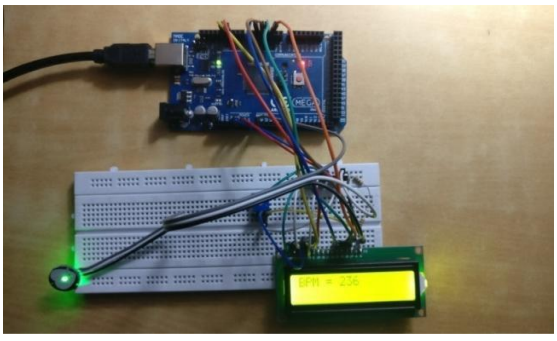


Fig 6: Mapping of Arduino with SEN11574(when finger is on the sensor

4.3.Interfacing Of Arduino With Sen11574

The pulse sensor has three pins: power supply, ground, and signal. The Vcc pin is connected to 5V pin on Arduino2560, ground pin to gnd the sensor pin is given to A0(analog pin). The pulse sensor is programmed in such a way so that whenever a pulse is detected, an interrupt is raised for calculating all the pulse related parameters. A 16x2 lcd was used to display the BPM which was refreshed every 2ms. A method of running average was used to calculate BPM so that error was accounted for. When the tip of the finger was placed on the pulse sensor, accurate reading was shown on the LCD display.

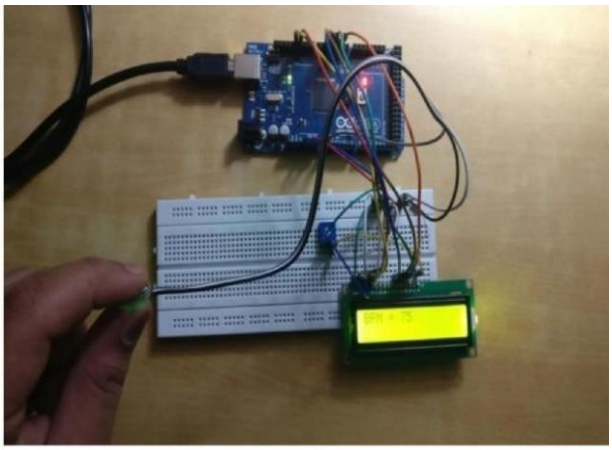


Fig 7: Mapping of Arduino with SEN11574(when finger is not on the sensor)

V. Future Enhancement

In addition to the brilliant use of Soldier Navigation and Border Security, this system can be used by professional hikers who travel a lot in remote areas and have no means of communication. With this system, hikers can be monitored, and, in the event of a crisis, help can be sent to them as soon as possible. In addition, this system can be used by professionals such as wildlife photographers and veterinarians who must enter the jungle. This system is also useful for miners as they work in deep caves and may experience border security issues.

VI. CONCLUSION

DHT11 gives near accurate reading of humidity and temperature when displayed on LCD as well as the serial monitor. Due to the ease of programming in Arduino, another sensor SEN1154 i.e. the pulse sensor was implemented which gave the Beats per Minutes (BPM) reading.

VII.REFERENCES

[1] Shruti Nikam, Supriya Patil, PrajktaPowar,.S.Bendre, “GPS BASED SOLDIERTRACKING AND HEALTH INDICATIONSYSTEM”, Innternational Journal of AdvancedResearch in Electrical, Electronics andInstrumentation Engineering, Vol. 2,Issues 3, March 2013.

[2] Richard B. Marth, Robert Levi, Dr. I. NewtonDurboraw, Kenneth Beam, “The IntegratedNavigation Capability for the Force XXI L andWarrior”.

[3] Ping Wang, Xinfeng BA, “Design of SoldierStatus Monitoring and Command and ControlSystem Based on Beidou System”, 2012 2nd International Conference on Computer Science

and Network Technology.

[4] VongsagonBoonsawat, Jurarat Patil KulwadeeBumrungkhet,andSomsakKittipiyakul, Monitoring", Sirindhorn International Institute of Technology, Thammasat University, Pathum-Thani, Thailand 12000.

[5] R. Archana, S. Indira, "Soldier Monitoring and Border Security Indication System", International Journal of Science and Research (IJSR) ISSN (Online): 2319-7064, 2013.

[6] Harshavardhan ,B.Patil, Prof.V.M.Umale, "Arduino Based Wireless Biomedical Parameter Monitoring System Using Zigbee", International

Journal of Engineering Trends and Technology (IJETT) – Volume 28 Number 7 - October 2015.

[7] Hublikar, Shivaraj, Arun L. Kakhandki, and Anil M.Kabbur. OPNET:a Solution for Software,and Hardware Networking. Journal of Engineering EducationTtransformations,2016.

[8] Gao, Heng and Li."An OPNET-based simulation approach for the deployment of Wireless HART." Fuzzy Systems and Knowledge Discovery,9th International Conference on IEEE,2012

Image processing, IOT