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SMART LIFEGUARDING VEST USING EMBEDDED SYSTEMS & IOT

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Abstract : The objective of this project is to protect solider life in catastrophic scenarios of battle field using Smart Life-Guarding Vest (SLGV) device. The device constitutes of the following sensors: "temperature sensor", (LDR), heart rate sensor, gas sensor and MEMS accelerometer. The microcontroller monitors the sensors values and consolidates the health condition of solider. Subsequently, in scenarios of abnormal status the intimation to the nearest rescue station is provided using GSM technology. In order to provide redundancy measures in terms of rescue the SLGV device initiates the information to cloud and updates position coordinates through wi-fi module and GSM. The temperature sensor (LM35) is a electronic device that provides readable temperature measurements via an electric signal, that measures the body of temperature. Heart beat sensor (LM358) is used to measure the pulse rate. MEMS (Micro electro mechanical system) indicates the position. This module is mounted inside the vest for communication between solider and base station .Hence, it is possible to implement the low cost mechanism to protect the valuable human life on the battlefield.

Keywords: Arduino uno, LCD Display, MEMS Accelerometer, LDR Sensor, Heart Rate Sensor, Gas Sensor, GPS, GSM, WEB Application, Android application, Embedded C and IOT.

1 INTRODUCTION

soldiers are essential to the army. Their constitutional mandate is to protect our nation and its citizens. Our Nation depends on fighting its enemies, hence troop safety is seen as playing a crucial role in that. several of theWhile performing their duties, troops can become lost or hurt. This project can track the soldier's present location and keep an eye on their health. They carry out their tasks under a variety of harsh climatic situations. Soldiers operating in highly hot conditions have the risk of heart attack and muscle cramps, and those in extremely cold conditions run the risk of hypothermia, frostbite, and cramps. As a result, we have included a number of sensors that provide data on the soldier's temperature, heart rate, oxygen level, and sweating intensity. , his location, and whether or not he is inside the limits. The previous smart soldier vests with the LiFi were slack (Light Fidelity Technology).Soldiers employ Light Fidelity technology and a haptic feedback device to determine if they are in or outside of friendly territory. to make the procedure simpler. We use this gadget to wirelessly upload data on a constant basis to the website, employing a mobile smartphone as a server for the Internet of Things. Therefore, with the aid of these elements, we were able to construct a basic lifeguarding system for soldiers that was both affordable and highly reliable. This system reports on a soldier's health, environmental circumstances, emotional state, and any signs of potential life threats. This paper discusses the materials and technique, descriptions of the hardware and software, and validation. A bulletproof vest and second-generation equipment are the only ones that can save a soldier's life according to the study and project's conclusion. Hindu Army has reduced the use of secondgeneration technology, which is more of a hindrance than a resource. The military soldier has been exposed to critical information gathering and managed resources on the battlefield thanks to the development of the Internet of Battle Things (IOBT).The Indian Army's bulletproof vest is made of Kelvar and does not have full surveillance. Therefore, it is crucial to create a tool that tracks the life of our warriors.This essay promotes the installation of a multi-level function framework on soldiers' vests. This paradigm includes physiology, emotions, weariness, surroundings, and locations in a single knob that encompasses multiple pieces of information. This makes it easier for soldiers to develop strong decision-making abilities and report resilience when faced with resource limitations.

2 NEED OF THE STUDY.

The development of a smart lifeguarding vest for military purposes is a significant area of interest for several reasons. Below are some of the reasons why there is a need for this study:

Ensuring safety in high-risk environments: Military personnel often work in harsh environments where safety is a primary concern. A smart lifeguarding vest can help ensure the safety of military personnel in aquatic environments such as oceans, rivers, and lakes.

Enhancing search and rescue operations: The smart lifeguarding vest can help enhance search and rescue operations by providing real-time tracking of military personnel. This can help locate individuals in distress quickly and improve response times.

Improving situational awareness: Military personnel can benefit from increased situational awareness provided by the smart lifeguarding vest. The vest can provide critical information such as water temperature, weather conditions, and location data, which can help military personnel make informed decisions.

Reducing risk of drowning: Drowning is a significant concern for military personnel working in aquatic environments. The smart lifeguarding vest can help reduce the risk of drowning by providing immediate alerts and assistance in case of an emergency.

Enhancing training and preparation: The smart lifeguarding vest can also be used to enhance training and preparation for military personnel. The vest can simulate emergency scenarios, allowing military personnel to practice and prepare for emergency situations.

2.1 PROBLEMS IN THE EXISTING SYSTEM

In existing system only tracking the location of the solider , there is no message from the soldier to the base station andalso there is no continuous health monitor of the solider ,there is no android application in existing system and also there is no Abnormal GAS detection and panic button in existing system.

2.2 OBJECTIVES OF THE PROPOSED SYSTEM

The objective of this project is to protect solider life in catastrophic scenarios of battle field using Smart Life-Guarding Vest (SLGV) device. The device constitutes of the following sensors: “temperature sensor”, (LDR), heart rate sensor, gas sensor and MEMS accelerometer.

- Continuous health monitoring of the soldier’s health parameters.
- Establishment of communication during emergency between control room and soldier.
- Alerts an emergency message through panic button.
- Identify the abnormal gases over the surroundings of the soldier by using GAS sensors.

3 METHODOLOGY

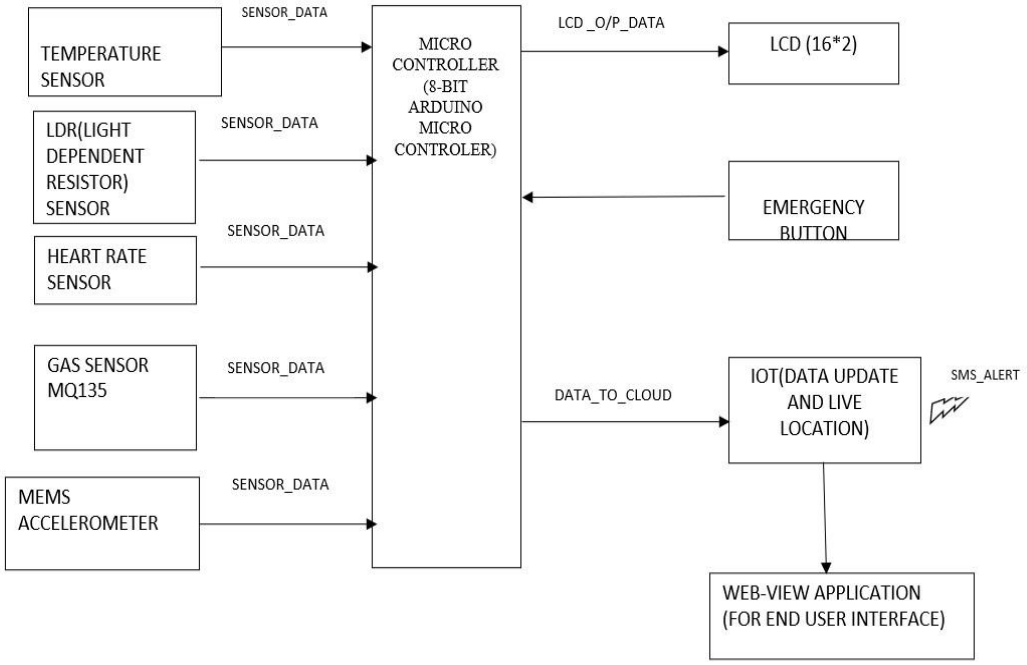

Fig 1: block diagram

3.1 ARDUINO UNO

Arduino Uno is an open source microcontroller board based on the microchip ATmea328p microcontroller and developed by Arduino cc. The board has 14 digital I/O pins (six capable of PWM output), 6 analog I/O pins, and is programmable with the Arduino IDE (Integrated Development Environment), via a type B USB cable.

The input/output current per pin is 20mAIt can be powered by the USB cable or by an external 9volts battery.It has 2KB of SRAM and 1KB of EEPROM.

3.2 LDR

Light dependent resistors, LDRs or photoresistors are electronic components that are often used in electronic circuit designs where it is necessary to detect the presence or the level of light.LDR vary from about 100ohm in the sunlight, to over 10Mega ohm. It indicates the presence or absence of light or to measure the light intensity.

3.3 GAS SENSOR

Gas sensors are devices that can detect the presence and concentration of various hazardous gases and vapours, such as toxic or explosive gases. The Range of MQ-135 is 10ppm to 1000ppm.The MQ-135 gas sensor can detect Amonia(NH3),Sulphur(S) and other harmful gases and smoke.

3.4 TEMPERATURE SENSOR

A temperature sensor is an electronic device that measures the temperature of its environment and converts the input data into electronic data to record, monitor, or signal temperature changes. 3pin NTC Temperature sensor ranges from 20 to 80 degrees Celsius. NTC Thermistor temperature sensor module 3pin is sensitive to the environment temperature its uses temperature sensor.

3.4 HEART RATE SENSOR

An optical heart rate sensor measures pulse waves, which are changes in the volume of a blood vessel that occur when the heart pumps blood. Pulse waves are detected by measuring the change in volume using an optical sensor and green LED.

3.5 MEMS ACCELEROMETER

MEMS is a chip-based technology, known as a Micro Electro-Mechanical System. Sensors are composed of a suspended mass between a pair of capacitive plates.

4 RESULTS AND DISCUSSION

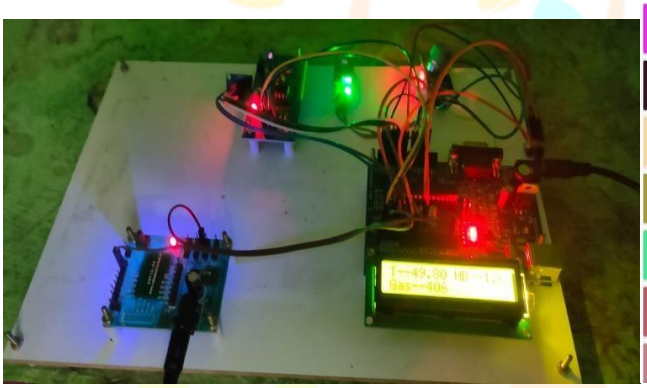

Figure 2: Model

Figure 3: output message of sensors

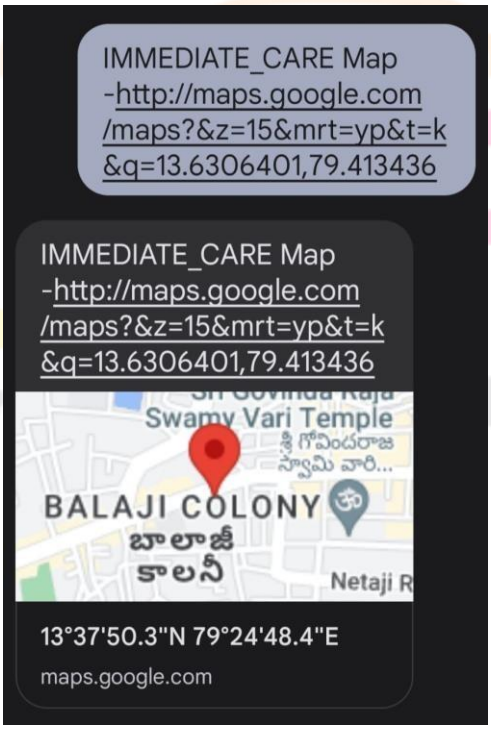

Fig 4: Location update

Table.1 OBSERVATION OF SMART LIFRGUARDING VEST USING EMMBED SYSTEMS AND IOT

S.No	Sensors Name	Out Put Message	Ranges of the Sensors
1	Heart Beat Sensor	Immediate Care	<30 & >120
2	Gas Sensor	Gas Detected	>550ppm
3	LDR Sensor	Light Detected	3.3v – 5v
4	Temperature Sensor	Health Monitor	-55*c to 150*c
5	MEMS Accelorometer	Emergency	<70 & >160

5 FUTURE SCOPE OF THE PROJECT

This will help the soldiers to easily carry this device with them wherever they go.other soldier without any dependency of base station also using IOT technologies it can be more flexible in collecting nearby information automatically in warfare. Sound can be added to the device so that a sound is output each time a pulse is received. Warning or abnormalities (such as very high or very low heart rates) can be displayed on the LCD or indicated by an LED or a buzzer. The Whole health monitoring system, which we have proposed can be integrated into a small compact unit as small as a cell phone or a wrist watch. This will help the soldiers to easily carry this device with them wherever they go.

6 CONCLUSION

When the system is finished, it will be able to assess a soldier's health by monitoring their heart rate and body temperature. With the use of a GPS modem and a GSM modem, it would also assist in locating his location so that any additional necessary action could be taken. Soldier safety and security: GPS allows us to follow a soldier's whereabouts anywhere on the planet as well as their health metrics, ensuring their security and safety. This technology can help to solve the problem of soldiers going missing in action by pinpointing the exact position of a lost soldier who is in a critical state. The addressing method aids in accurate navigation and enhances soldier-to-soldier communication in emergency situations.

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