

WEARABLE PROTECTION JACKET

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ABSTRACT: In any nation, officers are consistently the cutting edge guard. By and by, they generally give their best by protecting the country by taking a chance with their lives. It is consistently the situation that a warrior is harmed on a war zone uncouthly. The things that ensure the fighter's life are just an impenetrable coat and second-age gadgets. What the Indian Army has are restricted second-age gadgets, which on occasion are to a greater extent an impediment than a benefit. The impenetrable coats utilized by our Indian fighters is comprised of a material known as Kevlar which doesn't give 100% security in demonstrating that the shot can't go through it. Consequently, it gets imperative to consider making sure about the lives of our fighters and create methods for giving 100% security to their lives. The objective of our venture is to create intends to give security to the fighters' lives by making a projectile discovery coat alongside the area of the warriors. The slug discovery system, which is executed in a vest, will discover the situation of the projectile quicker while looking for clinical assistance in crisis. The vest was figured to redress those issues, improve the warrior's condition and in the end decline the quantity of the passing of the fighters.

KEYWORDS: Base station, Bullet detection system, Global Positioning System (GPS), Vest.

I. INTRODUCTION

India remains in the fourth position of having the most remarkable military on the planet. The weaponries and gadgets utilized by the Indian Army is present day. Be that as it may, with regards to the garments concerning the protecting and wellbeing checking, it doesn't end up being defensive enough. At present, our Indian warriors utilize impenetrable coats, head protectors for protecting. The material utilized in making the impenetrable coats is called Kevlar. Despite the fact that Kevlar is believed to be impenetrable, it doesn't guarantee 100% insurance. In view of this explanation, our soldiers should bargain about the security of their lives. At present, the Ministry of Defense spends around Rs.1.5 Lakhs on a solitary impenetrable coat, imported from USA that the warriors from military powers use.

Along these lines, the Ministry of Defense spends up to Rs. 20,000 Crore every year. In any case, the disadvantage of this coat is that it weighs around 15-16 kilograms. Because of this explanation, these coats are to a greater extent a prevention than an advantage. Also, the warriors are confronting a great deal of issues regarding the food, non-agreeable territories, negative climatic conditions, below zero temperature locales just as attire. The military despite everything wears the dress that was structured as expected high height attire when they need to battle against fear based oppressors in wildernesses and mountains, which are extremely massive and boisterous. Lamentably, they can't dispose of it, as they should bargain with the glow in the below zero temperature locales. Every one of these variables are intense in light of the fact that it involves life and demise[1]–[3]. This commendable existence of a soldier is unusual.

The reasons are various, however can in any case be diminished. In spite of the fact that the warriors are prepared to conquer all the obstacles in the front line, their condition is more pathetic than a non-military personnel can envision. No insurance agency can ensure the life of an officer. The United States being the most remarkable country on the planet has just actualized creative innovations in the military subsequent to having done a great deal of research on the body shield suits that would secure, upgrade and support the soldiers' lives. So also, All Indians can remain by our officers while they remain by us for our security. The issues of the fighters referenced

above can be overwhelmed by giving security by observing the warriors' wellbeing parameters by building up a vest, which has different wellbeing checking parameters and a slug discovery system structured in it.

Principle objective of this device is to distinguish the situation of the projectile shot in the reinforcement suit, give wellbeing security and the soldiers' area recognizable proof and report all the information to the base station at the same time. Along these lines, the warriors are continually checked by the base station. This will assist with giving security and ensure the officers' lives in the event that they can be effectively followed and checked. For the most part, the Army camp sets out salvage groups looking for the soldiers who disappear[4], [5]. This procedure takes almost a time of over a half year. In this way, the GPS just as the accelerometer in the vest can enable the salvage to group to find the soldier's position a lot quicker and can spare them as right on time as could be expected under the circumstances.

II. LITERATURE SURVEY

Researchers considered different materials utilized in projectile confirmation coats and distinguished the best one dependent on directional twisting, complete distortion, shear stresses and chief anxieties when it is exposed to slug sway. He utilized composite material in light of its high explicit quality and explicit solidness, great consumption obstruction and great exhaustion opposition. Bogdan Muset et al., portray a system to gauge the separation went by an individual inside a structure, which is option in contrast to GPS. A calculation was built up that quantifies the separation went by checking the quantity of steps. The points of interest in utilizing this technique are minimal effort and transportability sensor circuit.

M.V.N.R. Pavan Kumar et al., has composed the paper which has following the soldier and route between warriors to officer by knowing their speed, separation, stature just as their wellbeing status during the war, which empowers the military staff to design the war methodologies. He proposed wristwatch to show position, heading, encompassing temperature and it goes about as an altimeter. R. Archana et al., depicted a system, which can screen the wellbeing parameters, area and ongoing video transmission, wound and bomb discovery to the base station from fighter unit. The soldier unit comprises of heartbeat rate sensor to detect the heartbeat, bomb sensor identifies the nearness of hazardous synthetic substances around the warrior, vibration sensor, made up of piezoelectric sensors, recognizes any injuries brought about by weapon shot or blast, camera, to transmit the constant video of the officer's crucial RF transmitter, temperature sensor to detect the temperature of the environmental factors. GSM is utilized for the correspondence and transmitting the wellbeing and different parameters of the officers to the base station. GPS gives the situation of fighter to the base station.

Rosarium Pila et al., portrayed an inventive and hearty approach to tally human advances utilizing accelerometer and nearness sensor. The nearness pay system alongside movement recognition by accelerometer guarantees to forestall bogus advance location. At the point when legitimate movement is perceived by accelerometer, the hour of flight sensor, on nearness to the ground will identify a genuine stride[6]–[8]. The possibility of this paper is a unique one, however different individual wellbeing checking thoughts for the warriors has just been proposed. Subsequently, all the thoughts of these papers were assembled alongside an effective shot location system to construct one productive vest which attempts to keep away from the serious issues looked by the soldiers.

III. PROPOSED METHODOLOGY

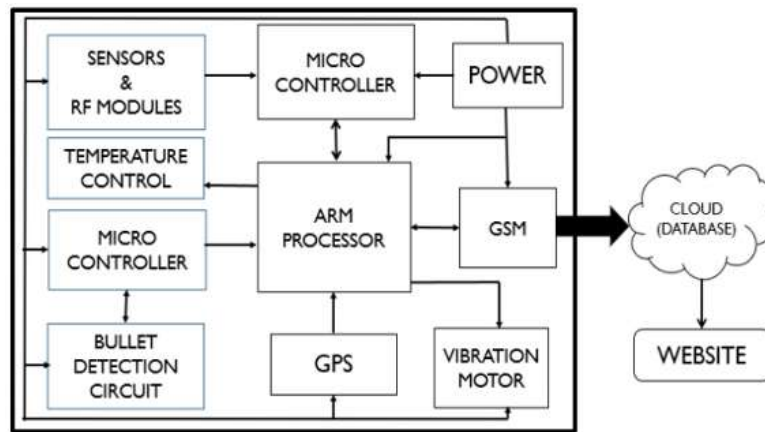


Fig.1. Functional Block Diagram

The proposed system is on a vest, which comprises of different wellbeing checking parameters and a projectile discovery system. The wellbeing checking parameters incorporate sensors, for example, temperature sensors (for both body and natural temperature estimation), beat rate, movement sensor, and accelerometer. The shot discovery system is formulated from the technique for network keypad. Fig.1. shows the practical square graph of the strategy. All the sensor information alongside the shot discovery information will be prepared and transmitted through GSM (Global System for Mobiles), where it will store all the qualities in the databases at the server side. Since the server side has high-speed processors, all the preparing will be done at the server side as it were. Because of this, the restrictions of the battery power expended at the customer side will be decreased. An effective calculation is created and edge esteems are set dependent on the prerequisites. With the assistance of a MCU, a GSM/GPRS module and a Server, the officer is proficiently observed.

IV. IMPLEMENTATION

Hardware Implementation

Sensors- The sensors utilized in this undertaking alongside their objectives are recorded in the table. The sensor is to be put with exactness and care. At whatever point the warrior is in the war zone, the sensors begin detecting his wellbeing parameters. The wellbeing checking sensors in the vest incorporate heartbeat sensor, used to gauge the pulse of the fighter. The edge esteems is as low as 60bpm and as high as 120bpm. The heart rate of the warrior is refreshed to the base station in the event that it drops or surpasses the base or most extreme limit esteem individually. There are two temperature sensors utilized, one for internal heat level and another for ecological temperature and moistness figuring. The limit for the natural temperature is set for 10 degree Celsius. On the off chance that the temperature goes beneath this edge, warming procedure inside the vest is initiated to give warmth. The warrior is followed by means of GPS (Global Positioning System) which requires satellite, however accelerometer is utilized as a choice to ascertain the quantity of strides to decide the development of the fighter. At whatever point, the soldier is very still, the movement sensor distinguishes the gatecrasher and causes the vibration engine to alarm[1], [6], [7].

Microcontroller Unit- Everyone use lily pad ATmega328V and Adafruit Feather nRF52832 Bluefruit in our Micro Controller Unit (MCU). The lily pad is controlled by a gracefully voltage of 2.7-5.5V and the Adafruit is given a flexibly voltage of 1.7-3.3V. One of the lily pad is modified for shot identification and the other for all the sensors. The Sensors are wired and associated with the MCU through its information ports. The Micro Controller Unit performs relating activity forgot sensor esteem. The Micro Controller Unit is interfaced with GSM to transmit the information to the base station.

The GPS module is interfaced with Adafruit to find the officer's position dependent on scope and longitude. On the off chance that the GSM comes up short, RF modules are utilized as an option for correspondence. All the gadgets are driven by a high explicit vitality Lithium-particle polymer battery.

Bullet Detection System

The proposed system is conceived from the technique for grid keypad. As the keypad system is organized like a work, the shot recognition system is additionally planned like a work on a vest. The network technique for projectile location system is a circuit comprised of a DEMUX-MUX mix. Circuit chart of shot recognition system the vest goes about as a benefit as it involves the Bullet Detection system. The Bullet Detection tells the specific area of the slugs in the warrior's protective layer to the base station right away. The working rule is like the lattice keypad where the relating an incentive at the line and segment can be controlled by knowing the adjustment in the switch positions.

The work is made by expanding single-strand wires from the DEMUX yield to the contribution of the MUX. The circuit can be planned by utilizing a lot of DE multiplexers (IC74HC4514) and multiplexers (IC74150N) each for lines and sections separately. These two IC's are 1:16 DE multiplexer and 16:1 multiplexer. Subsequently, this makes up a 32x32 slug discovery work. The even and vertical wires speak to the lines and segments individually. The select lines of all the demux and mux must be shorted. From the controller a low information given to the demux ICs, which will create a low yield. The yield from the demux is given as a contribution to the mux ICs. From the tests directed with the assistance of the IC Trainer Kit, it is seen that the mux will deliver a high yield if there is availability and low yield if the association has been broken. The usage of this system on a vest makes it a wearable gadget that can recognize the situation of the slug in the covering by the base station are continually checking the officers.

Communication- GSM/GPRS module is utilized for correspondence between a processor and base station. Worldwide Packet Radio Service (GPRS) empowers higher information transmission rate by sending information in bundles in a GSM arrange. It requires a SIM (Subscriber Identity Module) card simply like cell phones to initiate correspondence with the system. GSM module, SIM 800I is used in this device. It has highlights, for example, SMS Control, information move, remote control and logging. SIM 800I takes a shot at the force flexibly of 3.4-4.4V and has a most extreme transfer and download speed of 85.6 kbps[2], [3], [5].

Software Implementation

Client side Programming- Microcontroller Unit that utilizes Adafruit and Lilypad is modified by utilizing Embedded C programming. Arduino IDE is utilized for programming the Micro Controller Unit, which is basic and increasingly effective open-source programming, which empowers clients to alter and consume the program to the Lilypad and Adafruit. There are distinctive open source libraries accessible which makes the coding significantly simpler. The Micro Controller Unit is modified so that it gets the yields of the sensors from its simple and computerized ports. These qualities are taken as factors in the code and subbed in the code to get the ideal yield from Micro Controller Unit. The MCU is modified so that it does some particular activity for a particular worth got from every one of the sensors, as written in the code.

The edge esteems like least pulse and ecological temperature are put away in the Micro Controller Unit and if pulse and the temperature dip under that, it will refresh the base station for crisis, likewise for the projectile shot. The vibration engine is initiated if the interloper draws near the nearness run. Thusly, Micro Controller Unit comprehends what activity must be performed for the specific worth acquired from various sensor. A GSM module and a GPS module is interfaced with the MCU unit to move the information to the database or base station and to find the warrior's position separately.

Server side Programming- The sensor information acquired from the fighter's vest is pushed to the server through the http (hypertext move convention) post demands. The whole figuring happens in the server side as opposed to the customer side as the server PC has high speed RAM limit. MySQL database is running on the server end which stores the detected information for example beat rate, internal heat level, natural temperature and dampness, vicinity, accelerometer esteems, the lines and segments of the projectile shot, which is utilized for additional examination. The backend is planned utilizing PHP (Hyper Text Preprocessor) and JS (JavaScript) and the front end utilizing CSS (Cascading Style Sheets) and HTML (Hyper Text Markup Language).

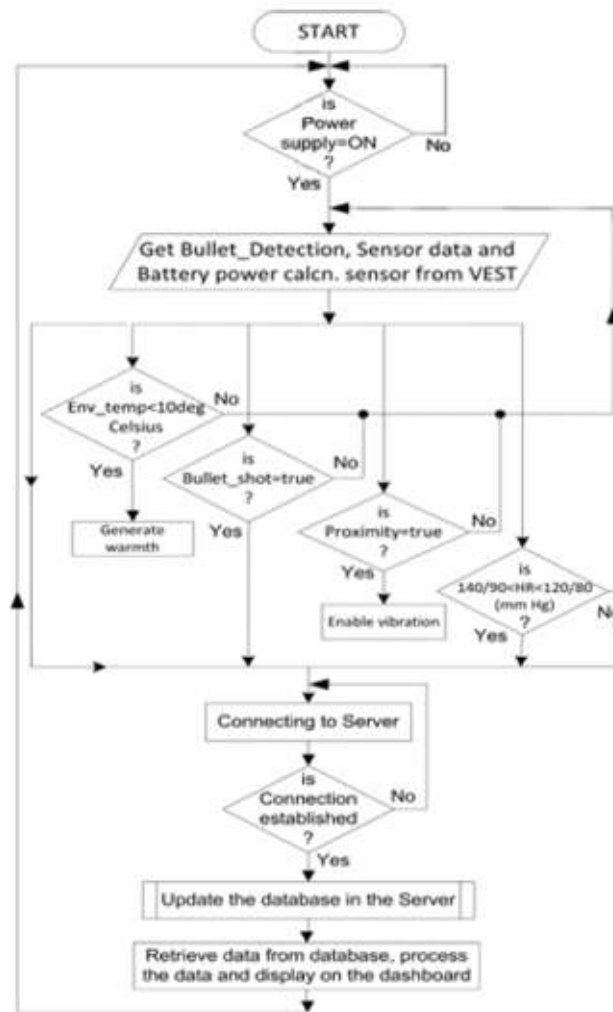


Fig 2. Flowchart Explaining the Basic Operation of the Service Sense Technology for Single Sensor

V. BASIC ALGORITHM

The algorithm is as follows which is explained through flowchart in Fig. 2. At the point when the fighter enters the Warfield, the vest begins detecting the wellbeing parameters. It likewise begins detecting the slug shots in the upper portion of his body, just as the qualities for heart rate. After all the parameters are looked at, they are checked with the limit esteems set. Here, the edge for the natural temperature is set for 10 degree Celsius. On the off chance that the temperature of the locale where the soldier is found dips under it, the vest enacts the warming instrument to give warmth.

The equivalent goes with the heartbeat rate sensor. The vicinity sensor recognizes whether a foe is near the soldier, on the off chance that it is agreed, at that point the vibrator engine empowers vibration to caution any sub-cognizant fighter. The vest is continually checked for any slug shots. Every one of these parameters are continually observed and the checked information alongside the other information, for example, position, and battery power are refreshed to the databases in the server[9]–[13]. The base station can recover the information from the databases and show it on the dashboard. The front finish of the site page is structured so that all the parameters are shown that can be effortlessly examined and recorded. This calculation fills in as an endless circle to continually screen the officers.

VI. BENEFITS

- Soldier's area can be handily followed the assistance of GSM module.
- Monitoring heart rate for earlier clinical assistance.

- Measuring the internal heat level, natural temperature and stickiness to create warmth for basic conditions.
- Calculation of number of strides as a choice to follow the soldiers.
- Alerts the sub-cognizant officer by actuating the vibration engine when an adversary is nearer.
- Detection of the slug shot in the fighter's upper portion of the body for quicker clinical assistance.
- Lightweight and adaptable.
- Feasible for the base station to screen each fighter as a result of the away from of the page.
- Reduces the serious issues looked by the officers to the enormous degree.

VII. RESULTS

A model of the undertaking has been created and tried which works as per the planned calculation with good outcomes. The sensors work proficiently as coded and give exact yields. The projectile identification system is a 32x32 work for a model however the quantity of lines and sections can be expanded for progressively precise assurance of the slug shot. The webserver for the model has been structured that has all the databases of each soldier estimating all the parameters. The base station can successfully screen and track each warrior as the front finish of the site page is planned such a way along these lines, that it makes everything understood. From the review, the downsides of the impenetrable coats that our soldiers use and its cost adequacy is now known to us. As this is an interesting innovation with less cost than the prior ones, this can give best endeavors to take care of the serious issues looked by our fighters.

VIII. CONCLUSION

The smart vest gives security and wellbeing to the fighters. GPS and the RF modules track the situation of the soldiers anyplace on the globe and the wellbeing checking system screens fighter's crucial wellbeing parameters. Warriors can have a nonstop correspondence with the base station. The dress will stay lighter and tough. Body protective layer suits of things to come for the military comprise of lightweight materials, having incorporated sensors and wearable gadgets that are intended to oppose foe assaults. This task, whenever actualized, would assist the officer with surviving serious fight and may assist with sparing the lives of injured warriors. Subsequently, every one of these advancements may inevitably move numerous to join the Indian Army.

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