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Rakshak - Smart & Intelligent Army Jacket

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ABSTRACT: The Indian army is the land-based branch and it is the largest component of Indian Army. It will be beneficial for our country's safety if we try to provide them better advanced technology equipment. In this paper we have explained how to track the location of the soldier with the help of GPS and also, we will be able to monitor health parameters such as heartbeat and body temperature. The measured parameters will be sent to the control room with the help of GSM module to know the condition of the soldier. If the soldier is injured the fluctuations with the heart beat will be measured and will inform the military base station through GSM module and from GPS, we can locate the wounded soldiers. From this information we can strategize the future war plan with the actual number of unharmed soldiers and also, we can provide the needed medication for the harmed one with the location provided by the GPS. The proposed system will be consisting of wearable physiological equipment's, sensors and transmission modules which are mounted inside the jacket for communication between soldier and base station or between soldier and soldier. Hence, it is possible to implement a low-cost mechanism to protect the valuable human life on the battlefield.

KEYWORDS*: Lifejacket, Raspberry Pi Pico, GPS, GSM, LM35 Temperature sensor, Heartbeat sensor, Battery.

I.INTRODUCTION

The soldier must be integrated with advanced visual, voice and data communications to receive information from the control station or from the superiority. For that Soldier might need wireless networks such as displaying maps and real time Li ion/Li po only to communicate with control room but also with side-by-side military personnel. Apart from the nation's security, the soldier must need safety by protecting himself with advanced weapons and also it is necessary for the army base station to monitor the health status of the soldier.

II.LITERATURE REVIEW

This section provides a summary of the studies that used Deep Learning (DL) and numerous other efficient and creative techniques to control the temperature, heating purpose. To monitoring health of respective person the sensors are implemented. To know the location the GPS tracking system is used. Using IOT, the status of the solder can be transferred from one place to another over the network. The health status of the soldier is monitored using bio medical sensors such as temperature sensor and heart beat sensor.This paper proposes a new idea based on Peltier effect and a Peltier plate with heat sinks and small Dc fans is used inside the jacket and the current of the Peltier module is controlled by lily pad controller. Additionally, a temperature sensor is used inside the jacket and this sensor has capability to measure both the humidity and temperature. Output of this sensor is attached with lily pad controller and an LCD is also connected with lily pad to display the results. The whole circuit is powered up using solar strip attached on the upper layer (back side) of the jacket and the amount of sunlight is directly proportional to the cooling inside the jacket as the power from the solar strip increases by increasing the amount of sunlight. While Peltier plate is not commonly used in applications like cooling a room or in large size refrigerators due its inefficiency, very small amount of power input is used for cooling purpose when current is too high. Whereas from results discussed in this paper one can use Peltier plate for cooling small size areas like a jacket.

III.SYSTEM ARCHITECTURE

The system consists of the highly powerful rechargeable battery power supply. The circuitry of the system into the smart & intelligent army jacket is been connected through wires and are placed in such a way that the circuitry could be
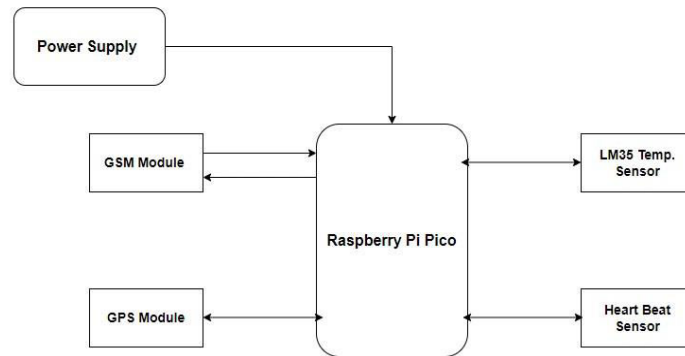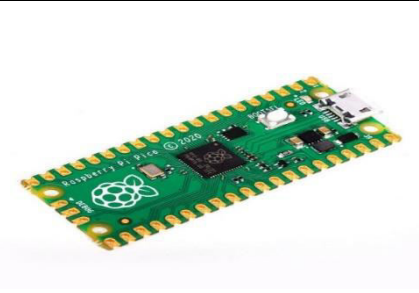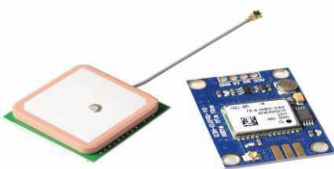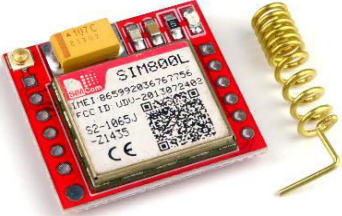

Fig.1 Block diagram of model

removed and placed again according to the soldiers convenient.as a jacket is been designed as waterproof and inflammable the circuitry inside is placed according the same manner seeing all the worst conditions. Hence the circuitry includes the blocks of at Raspberry Pi Pico, LM35 temperature sensor, health monitoring sensor, GPS, GSM systems.

As shown in above fig.1 the jacket itself have some additional sensors to operateintelligentlytemperature sensors monitors' temperature of atmosphere & soldier body and send it to controller. We decided depending on data gather from temperature Sensor the internal heating of jacket is required or not, if it's required then it will automatically switch ON the supply for heating system.Jacket also has a heartbeat rate sensor,with the help of these sensors the soldier heart rate was continuously monitor. Also, it's having a small GPRS module which will help to track an exact location of soldier from base station. The gather data from temperature Sensor, heart rate sensor & GPS will directly send to base station/monitoring station for particular soldier via.

IV.HARDWARE REQURIMENTS AND IT'S SPECIFICATIONS

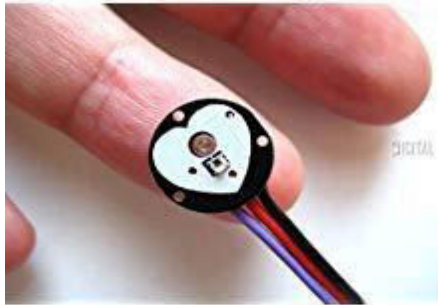| S/N	NAME	FIGURE	SPECIFICATIONS
1.	Raspberry Pi Pico		21 mm × 51 mm form factor - Dual-core Arm Cortex-M0+ processor, the flexible clock running up to 133 MHz 264KB on-chip SRAM 2MB onboard QSPI Flash 26 multifunction GPIO pins, including 3 analog inputs. 2 × SPI controllers, 2 × UART, 16 × PWM channels, 2 × I2C controllers 1 × USB 1.1 controller and PHY, with host and device support. 8 × Programmable I/O (PIO) state machines for custom peripheral support - Supported input power 1.8–5.5V DC - Operating temperature -20°C to +85°C - Drag-and-drop programming using mass storage over USB - Low-power sleep and dormant modes.
2.	GPS Module		5Hz position update rate. - Operating temperature range: -40 TO 85°CUART TTL socket. - EEPROM to save configuration settings. - Rechargeable battery for Backup. - The cold start time of 38 s and Hot start time of 1s. - Supply voltage: 3.3 V. - Configurable from 4800 Baud to 115200 Baud rates. - Support SBAS (WAAS, EGNOS, MSAS, GAGAN). - Separated 18X18mm GPS antenna.
3.	GSM Module		- Quad-band 850/900/1800/1900MHz - Make and receive voice calls using a headset or an external 8 speaker and electret microphone - Send and receive SMS messages - Send and receive GPRS data (TCP/IP, HTTP, etc.) - Scan and receive FM radio broadcasts

			• AT command interface with "auto baud" detection • Lead out buzzer and vibrational motor control port • Input Voltage :DC 3.7-4.2V.
4.	HeartbeatSensor		• Operating Voltage: 3 to 5VDC • Operating Current: 4Ma • Sensor Output: Digital • Senor Diameter: 30mm
5.	TemperatureSensor		• Based on the semiconductor LM35 temperature sensor • Useful in detecting ambient air temperature • Calibrated directly in ° Celsius (Centigrade) • Linear + 10 mV/°C Scale Factor • 0.5°C Ensure accuracy (at +25°C) • Low power consumption, less than 60uA • Low output impedance, 1mA current through only 0.1Ω • With screw holes for easy installation and fixed. Aperture 2.6mm

Table.1

V. SOFTWARE DESCRIPTION

Thonny is an integrated development environment (IDE) for Python programming language. It is designed to be simple and easy to use, particularly for beginners who are just starting to learn how to code in Python.

Some of the key features of Thonny include:

1. Code highlighting and auto completion.

2. Simple debugger for step-by-step code execution.

3. Built-in Python shell for interactive programming.

4. Virtual environment management.

5. Support for multiple platforms, including Windows, macOS, and Linux.

Thonny also has a number of educational features that make it ideal for use in schools and universities. For example, it includes a "code coach" tool that can provide hints and tips to help students improve their coding skills, as well as an "assistant" feature that can suggest corrections for common coding errors. Overall, Thonny is a great choice for anyone who is just starting out with Python programming, as well as more experienced developers who want a lightweight, user-friendly IDE for their Python projects.

VI.WORKING

Wearable technologies are now pervading many applications in several fields. The aim of this review paper is to collect and summarize the actual smart clothing in the space and military field where conditions could be critical for health and safety, and outline the innovation trend for innovative services to police and soldiers. In this project we have developed a jacket including various sensors and modules.so that it will be helpful for avoiding the problems which could be face by army people. First thing is by using the temperature sensor we can sense the outer temperature and so that we can adjust the heating temperature of coils which are placed inside of the jacket. From which we can prevent ourselves from the environmental conditions.Secondly health monitoring sensorwill be helpful for monitoring the health status of human being. And as well the heartrate will be providing to the main station due to which the person seating inside main station will get to know about the health status of soldier. GPS and GSM systems are used for conveying message that is if the soldier is in danger, he can send the emergency message as well the exact location of the soldier so that main station can know the exact position of the man and they can find him and can offer him.

VII.FUTURESCOPE

In Future, we can add the gas detective sensors so that it can detect the gases which are harmful for the human beings in forest area specially. Combat soldiers can be dressed in high-tech uniforms, fitted with everything, and water purifying systems to climate control.

VIII. CONCLUSION

This paper tries to summarize the main the proposed system is an effective security and safety system which is made by integrating the advancements in wireless and embedded technology. It helps for a successful secret mission. This system can be used in critical conditions. Security and safety for soldiers: GPS tracks position of soldier anywhere on globe and also health system monitors soldier's vital health parameters which provides security and safety for soldiers.

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