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Soldier Healthcare Parameters Monitoring System Using IoT

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ABSTRACT

The globe is currently experiencing an unpredictable and insecure environment, which implies that the potential for conflict exists at all times. At the same time, the number of people willing to enlist in the army is quite low. Given the circumstances, we must take measures to preserve or extend the life of the soldier. We have a solution in the form of an embedded device that can lengthen the soldier's life. Within the scope of this project, we will be supplying the members of the armed forces with a sophisticated and specialized technological suit. During the course of a conflict, a number of service members are lost; at the moment, the military base is unsure if the soldier is still alive or has passed away. We came up with this solution in order to circumvent the issue. This suite may be used for a variety of purposes. Through the use of the IOT database, it is reporting the location of the soldiers as well as the injuries they have sustained. The Internet of Things (IoT) is a technology that is utilized for the purpose of security. These technologies are used to protect the connected devices and the networks that are included inside them. Additionally, IOT incorporates the internet-based connection of computer devices. Every object will have its own distinct identity and will be able to autonomously communicate data over the internet. We propose an autonomous temperature management system as a solution to the issue that sometimes the soldiers have to remain stationed in very windy and hot conditions. When the temperature becomes too high, it lowers the body temperature, and when the temperature goes too low, it raises the body temperature. This helps to keep the bodily health of the soldiers from deteriorating. Therefore, if a soldier is having any kind of health problem, it is possible to identify them with the assistance of a sensor, and the IOT will continue to keep a close eye on them while their suits do the reversible temperature action.

Keywords- Heartbeat Sensor, Temperature Sensor, NodeMCU and LCD.

I. INTRODUCTION

In the modern-day world state of affairs, the protection of the state is the maximum essential issue for us. protection of the nation relies upon military pressure. it's miles impossible to protect the kingdom without a soldier. The soldiers suffer hundreds of trouble because of the unavailability of statistics. The soldiers dying can be minimized if the real-time statistics are available at the base station approximately the health and region of the soldier. encouraged from the above issues, an advocate device has developed. This system will eliminate all troubles. inside the proposed machine, there are websites. One is the soldier website and the other is a server internet site. The soldier will measure the temperatures, blood stress, and heartbeats. And server internet site will get admission to the statistics from the soldier website through using IoT. And assessments of the modern-day-day area of soldiers the use of GPS. in this proposed system laptop hardware isn't obligatory. on this proposed gadget the real-time place and fitness parameter of the soldier are right now despatched to the base station. The IoT makes the monitoring manner speedy and choices may be taken in less amount time.

aside from the dominion's protection, the soldier ought to want protection via defensive himself with superior guns, and additionally, the navy control unit must show the fitness fame of the soldier. To serve this reason, in this paper bio clinical sensors and monitoring devices are integrated with the squaddies. The integrated additives should be a lightweight bundle and have to provide favoured results without requiring a great deal of energy. one of the essential stressful situations in army operations lies that the squaddies aren't capable of talk with manipulating units. further, the proper navigation amongst soldiers plays a vital function for cautious making plans and coordination. So, the proposed artwork specializes in monitoring the vicinity of soldiers which is useful for the control room station to realize the precise region of soldiers and therefore they will guide them. manage unit gets region of soldier the use of GPS. it's miles essential for the lowest station to manual the soldier in an accurate direction if he lost on the battlefield. This paper can be useful for the squaddies, who comprise in unique operations or missions. clever Bio scientific sensors alongside Heartbeat sensor, ECG module, Temperature & Humidity sensor, Vibration sensor, bomb detector, and so forth are connected to the jacket of soldiers. those are implanted with the soldier for entire mobility. This system will offer connectivity to the server at the lowest station with the use of a Wi-Fi connection.

II. RELATED WORK

Nike Patil and Brijesh Iyer [2017] have proposed devices that now not best monitoring the fitness but moreover the tracking area of soldiers the usage of IoT. They've not explained how the conversation is established among the customer side and server-aspect, for the reason that Arduino is connection orientated, i.e it comes with a USB port.

R. Shaikh and et. al. [2012] have proposed an actual-time, ARM processor-based totally technique for the monitoring and series of temperature, heartbeat, ECG parameters of patients. ZigBee and GSM wi-fi technology were used to ship modern-day updates of sufferers to the medical doctor and then doctors can take immediately movement against that affected person. A wi-fi frame region sensor network (WBASNs) generation the use of ZigBee to continuously display screen human health and its location.

G. Raj et. al. [2014] have proposed an RF-based totally module to build up the statistics of soldiers at the battlefield.

V. Ashok [2016] has proposed a one-time password (OTP) primarily based system to comfortable and authenticate the information processing.

Jassas et. al. [2015] have proposed a concept of integration of wireless sensor community and cloud computing for information processing in a real-time and fast way.

S. Dixit and A. Joshi [2014] have proposed a google map-based completely method to track the place of the soldiers. But, most of those systems are stuck-up by using one or greater reasons like high-priced implementation, postpone in reaction, and bulky nature.

S. Rajeswari and R. Kalaiselvi [2017] have proposed an LM35 temperature sensor, Pulse fee sensor, and oxygen diploma detector sensor for continuously tracking the health reputation of soldiers. GPS is used to determine real-time function and orientation. Records originating from sensors and GPS receiver is processed and accumulated the usage of Arduino (ATmega328P) a wrist multi-sensor device for non-stop monitoring of health popularity and alert integrating biomedical sensors for coronary heart price, 1-lead ECG, blood strain, oxygen blood saturation, and pores and skin temperature size. One such reference is using GSM with GPS in a device to help to inform the discern s and university to monitoring gadget approximately the vicinity of the kid thru quick messaging provider.

III. Project Introduction

AIM

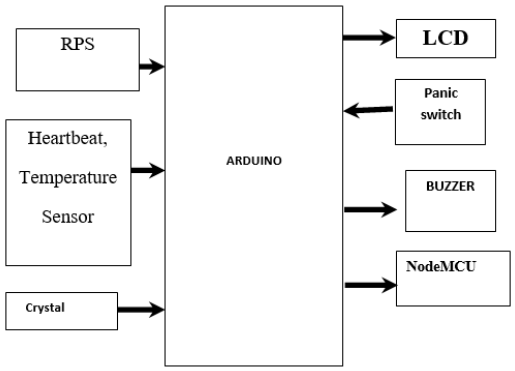
The principle aspect of this mission is to devise the controlling and tracking of the infantrymen's health through the use of IoT.

IMPLEMENTATION

This mission is actualized Arduino Uno, NodeMcu, and advanced domestically to be had regulators for commercial programs.

DESCRIPTION:

Soldiers are a very vital part of any kingdom's safety system. Inside the route of, wars and searching for operations infantrymen get injured and lots of them turn out to be misplaced. As, squaddies health is vital because they're the savior of our USA who protects us from enemy assaults, terrorist sports and from many suspicious activities which can harm us in addition to our u. s. a. too. This mission gives the capability to music the region and displays the fitness of the infantrymen in real-time who emerge as lost and get injured inside the battlefield. It helps to lower the time, search and rescue operation efforts of army manage unit. This device allows the military base station to song the location and reveals the health of infantrymen the use of IoT module and wireless frame location sensor networks (WBASNs), which includes a temperature sensor, coronary heartbeat sensor, and so forth. The records coming from sensors are transmitted wirelessly through the usage of the ZigBee module. Additionally, a soldier can ask for help from the control room and may speak with different fellow soldier present inside the wireless transmission and reception range.



Hardware:

Arduino Uno, NodeMcu, Temperature, and Heartbeat Sensor, Power supply Ethernet.

Software:

ARDUINO IDE, OS: Embedded Linux, **Language:** C/ C++, **IDE:** Qt Creator.

ARDUINO DEVELOPMENT BOARD

1) Overview:

The Arduino Uno is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converter.

The Uno board has a resistor pulling the 8U2 HWB line to ground, making it easier to put into DFU mode.

The board has the following new features:

1.0 pinout: added SDA and SCL pins that are near to the AREF pin and two other new pins placed near to the RESET pin, the IOREF that allow the shields to adapt to the voltage provided from the board. In future, shields will be compatible with both the board that uses the AVR, which operates with 5V and with the Arduino Due that operates with 3.3V. The second one is a not connected pin, that is reserved for future purposes.

- Stronger RESET circuit.
- Atmega 16U2 replace the 8U2.

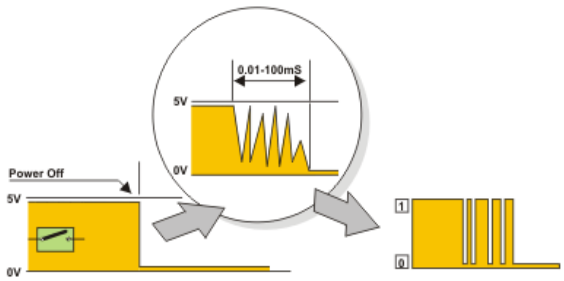
"Uno" means one in Italian and is named to mark the upcoming release of Arduino 1.0. The Uno and version 1.0 will be the reference versions of Arduino, moving forward. The Uno is the latest in a series of USB Arduino boards, and the reference model for the Arduino platform; for a comparison with previous versions, see the index of Arduino boards.

2) Summary

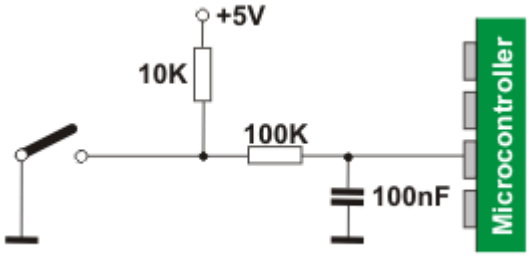
Microcontroller	ATmega328
Operating Voltage	5V
InputVoltage (recommended)	7-12V
Input Voltage (limits)	6-20V
Digital I/O Pins	14 (of which 6 provide PWM output)
Analog Input Pins	6
DC Current per I/O Pin	40 mA
DC Current for 3.3V Pin	50 mA
Flash Memory	32 KB (ATmega328) of which 0.5 KB used by bootloader
SRAM	2 KB (ATmega328)
EEPROM	1 KB (ATmega328)
Clock Speed	16 MHz
Length	68.6 mm
Width	53.4 mm
Weight	25 g

IV. SWITCHES AND PUSHBUTTONS

There is nothing simpler than this! This is the simplest way of controlling appearance of some voltage on microcontroller's input pin. There is also no need for additional explanation of how these components operate.



Nevertheless, it is not so simple in practice... This is about something commonly unnoticeable when using these components in everyday life. It is about contact bounce- a common problem with mechanical switches. If contact switching does not happen so quickly, several consecutive bounces can be noticed prior to maintain stable state. The reasons for this are: vibrations, slight rough spots and dirt. Anyway, whole this process does not last long (a few micro- or miliseconds), but long enough to be registered by the microcontroller. Concerning pulse counter, error occurs in almost 100% of cases!



Embedded C language

Embedded C is a set of language extensions for the C Programming language by the C Standards committee to address commonality issues that exist between C extensions for different embedded systems. Historically, embedded C programming requires nonstandard extensions to the C language in order to support exotic features such as fixed-point arithmetic, multiple distinct memory banks, and basic I/O operations.

The C programming language is perhaps the most popular programming language for programming embedded systems. We mentioned other popular programming languages).

Most C programmers are spoiled because they program in environments where not only there is a standard library implementation, but there are frequently a number of other libraries available for use. The cold fact is, that in embedded systems, there rarely are many of the libraries that programmers have grown used to, but occasionally an embedded system might not have a complete standard library, if there is a standard library at all. Few embedded systems have capability for dynamic linking, so if standard library functions are to be available at all, they often need to be directly linked into the executable. Oftentimes, because of space concerns, it is not possible to link in an entire library file, and programmers are often forced to "brew their own" standard c library implementations if they want to use them at all. While some libraries are bulky and not well suited for use on microcontrollers, many development systems still include the standard libraries which are the most common for C programmers.

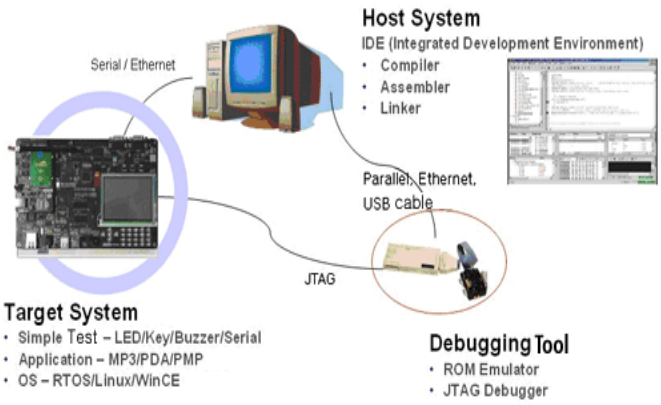
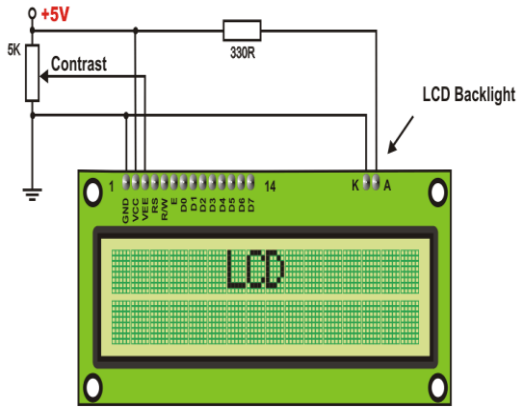


Figure Embedded System Development Environment

LCD screen:

LCD screen consists of two lines with 16 characters each. Each character consists of 5x7 dot matrix. Contrast on display depends on the power supply voltage and whether messages are displayed in one or two lines. For that reason, variable voltage 0-Vdd is applied on pin marked as Vee. Trimmer potentiometer is usually used for that purpose. Some versions of displays have built in backlight (blue or green diodes). When used during operating, a resistor for current limitation should be used (like with any LE diode).



LCD Basic Commands

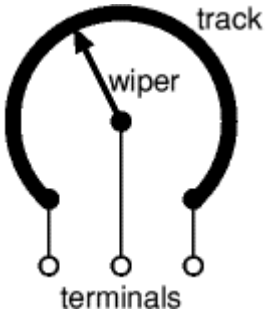
All data transferred to LCD through outputs D0-D7 will be interpreted as commands or as data, which depends on logic state on pin RS:

RS = 1 - Bits D0 - D7 are addresses of characters that should be displayed. Built in processor addresses built in "map of characters" and displays corresponding symbols. Displaying position is determined by DDRAM address. This address is either previously defined or the address of previously transferred character is automatically incremented.

RS = 0 - Bits D0 - D7 are commands which determine display mode. List of commands which LCD recognizes are given in the table below:

ONTRAST CONTROL:

To have a clear view of the characters on the LCD, contrast should be adjusted. To adjust the contrast, the



voltage should be varied. For this, a preset is used which can behave like a variable voltage device. As the voltage of this preset is varied, the contrast of the LCD can be adjusted.

Fig: Variable resistor

Potentiometer

Variable resistors used as potentiometers have all **three terminals** connected.

This arrangement is normally used to **vary voltage**, for example to set the switching point of a circuit with a sensor, or control the volume (loudness) in an amplifier circuit. If the terminals at the ends of the track are connected across the power supply, then the wiper terminal will provide a voltage which can be varied from zero up to the maximum of the supply.

SOFTWARE

Arduino software

The Arduino Uno can be programmed with the Arduino software. Select "Arduino Uno from the Tools > Board menu (according to the microcontroller on your board).For details, see the reference and tutorials. The ATmega328 on the Arduino Uno comes preburned with a boot loader that allows you to upload new code to it without the use of an external hardware programmer. It communicates using the original

STK500 protocol (reference, C header files).We can also bypass the boot loader and programs the microcontroller through the ICSP (In-Circuit Serial Programming) header; see these instructions for details. The ATmega16U2 (or 8U2 in the rev1 and rev2 boards) firmware source code is available. The ATmega16U2/8U2 is loaded with a DFU boot loader, which can be activated by:

•On Rev1 boards: connecting the solder jumper on the back of the board (near the map of Italy) and then resetting the 8U2.

•On Rev2 or later boards: there is a resistor that pulling the 8U2/16U2 HWB line to ground, making it easier to put into DFU mode.

The Arduino Uno has a number of facilities for communicating with a computer, another Arduino, or other microcontrollers. The ATmega328 provides UART TTL (5V) serial communication, which is available on digital pins 0 (RX) and 1 (TX). An ATmega16U2 on the board channels this serial communication over USB and appears as a virtual com port to software on the computer. The '16U2 firmware uses the standard USB COM drivers, and no external driver is needed. However, on Windows, an .information file is required. The Arduino software includes a serial monitor which allows simple textual data to be sent to and from the Arduino board. The RX and TX LEDs on the board will flash when data is being transmitted via the USB-to-serial chip and USB connection to the computer (but not for serial communication on pins 0 and 1). A Software Serial library allows for serial communication on any of the Uno's digital pins. The ATmega328 also supports I2C (TWI) and SPI communication. The Arduino software includes aWire library to simplify use of the I2C bus.

V. Conclusion

It is obvious that a variety of methods are used to monitor the health of the people in order to protect them at the appropriate moment, and it is also obvious that a variety of communication methods are employed in order to convey the data to them. We have a number of distinct methods for the soldier health monitoring system developed by diverse academics. The problem that is occurring in the army field is described in this project, and the soldiers are safeguarded by employing sensors, buzzers, and technology based on the internet of things. We will be able to simply monitor the health state of the soldier and automatically modify the temperature of their suit if we implement this project.

VI. Future Scope

To be of assistance to the soldiers in the future, it is possible that a portable handheld sensor device with more sensing possibilities and GPS tracking will be developed.

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