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# Iot Based Icu Patient Monitoring System

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***Abstract***
*The current healthcare environment has been left with a very strong effect of implementing the use of the Internet of Things (IoT) technology which has become very central in improving customer care as well as monitoring. In this paper, the researcher develops a new IoT-based ICU Patient Monitoring System that can monitor key physiological parameters, such as temperature, body humidity, pulse rate and blood pressure in real-time fashion. Arduino microcontrollers are used to obtain in situ data and pre-process data computationally whereas thing-speak cloud-based platform acts to obtain central data storage and further processing. ThingSpeak advanced analytics facilities allow healthcare professionals to visualize and question the real-time data concerning the patients. Moreover, there are customizable alerts and messaging that is used to warn the medical staff about abnormalities or dangerous fluctuations in the proper physiological values. The system will have a user-based interface where the service can be accessed through web or mobile and hence enable the tracking effectively remotely and also increasing the efficiency of delivering care.*
***Keywords:*** *Lpc2148, Wifi, Dht11& Ecg sensor.*

## I.INTRODUCTION

The rapidly changing landscape in the modern healthcare sphere makes systematic inclusion in new technologies inevitable in an effort to provide more intensive and personalized care to a patient. Among the most notable innovations in that regard stands the Internet of Things (IoT), the usefulness of which in medical tracking has already been proven quite high. The current contribution outlines a novel IoT-Based ICU Patient Monitoring System that allows a thorough, real-time analysis of important physiological factors by making use of Arduino microcontrollers as well as the cloud-based platform ThingSpeak.

Since patients supported in the Intensive Care Units (ICU) need to be monitored under close observation with great precision, the system fulfils this need in a comprehensive approach. Even integrated sensors provide continuous readings of the main vivil indicators: temperature, humidity of the body, pulse rate, and pressure. Arduino microcontrollers measure and process these data, and enable efficient acquisition and analysis and foster scalability and cost effectiveness of the platform.

## II. LITERATURE REVIEW

**Hock Beng Lim, Di Ma, Bang Wang, Zbigniew Kalbarczyk, Ravishankar K. Iyer, Kenneth L. Watkin** More recent developments in wearable and portative sensing technologies have made it possible to integrate portable devices that are small-scale and lightweight but have the ability of making continuous measurements with correlations to various physiological parameters. A Body Sensor Network (BSN) consists of a set of biomedical and physiological sensors, which includes blood pressure sensor, electrocardiogram (ECG) sensor and electrodermal activity (EDA) sensor. This discussion aims to describe the architecture of such a system, the system of real time health monitoring of military personnel, where a network of interconnected BSNs could be used. The idea of the underlying prototype is outlined and an example of usage is orthogonal localization of blast sources.

**P.S. Kurhe, S.S. Agrawal [4]** This has been proposed as a system that would be able to track the military personnel in real time and further allow the soldiers to indicate their distress to the control room by providing information on the coordinates. Usefulness of location based systems in warfare has been identified since the Second World War where the military proved to be useful in navigation, positioning, targeting and fleet management. These requirements were met reliably and with lowered energy expenditure by the current system, especially in the case of remote health surveillance. The awareness of relevant physiological parameters like heart rate and body temperature is done in real-time and passed through GSM links to control room and thus supports the timely intervention.

**Shruti Nikam, Supriya Patil, Prajkta Powar, V. S. Bendre** [5] The work stipulates a multiphase system of protecting military personnel. There is a series of gear created to track the physiological parameters as well as the munition status. This bio sensor, manufactured in collaboration with miniaturised elements of physiological sensing, signal processing, and a high-performance transmission module, provides a low cost wearable platform that can monitor patients continuously.

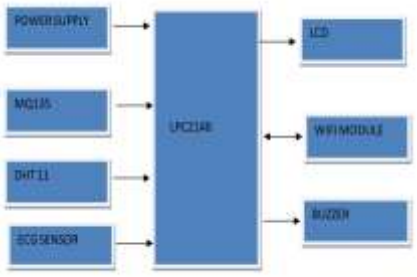
## III.EXISTING METHOD

Often in modern security and military, the staff members may find themselves in disoriented and traumatized situations. A set of technological solutions has been created which allows constant tracking of the position of soldiers and their physiology. Existing systems utilize Bluetooth, radio-frequency (RF) and GSM channels to relay instant corrections of position coordinates and the biometric information obtained by the sensors.

## IV.PROPOSED METHOD

The current research paper is centered on body area sensor networks, which consist of temperature sensors, heart-beat sensors, which are used to monitor physiological data of the military service members. Soldier body temperature is being measured by the use of a temperature sensor which sends the received analog signal to a microcontroller. At the same time, a heart-beat sensor checks pulse rate in beats per minute (BPM) and transmits the values to the same microcontroller. Analog input signals are then translated to digital information with an analog-to-digital converter and then are compared with baseline digital information of normal conditions. Any difference between the sensed signal and the desired signal means a medical emergency, which implies the immediate intervention.

## V.BLOCK DIAGRAM




## ARDUINO

## ECG SENSOR

A low-noise ECG local differential triode design serves to allow quick set up and non-obtrusive single-lead ECG data mining, although in a custom-electrode cable context. Its analog frontend is cutting edge, purpose-designed to pick up and hold on to small data edges and hence produce raw sensor data that is medical grade. The device may, therefore, also be used in the extraction of heart-rate information and other clinically

interesting ECG measurements making the utility of the device relevant to various biomedical, biofeedback, psychophysiological and sport-science studies.

**MQ135 - AIR QUALITY GAS SENSOR**

A chemo sensor that is able to scan a wide range of gasses such as NH3, NOx, alcohol, benzene, smoke, and CO2has been established. The device is efficient especially in office or factory settings, where the environment is likely to be surrounded by a myriad number of contaminants. The MQ135 gas sensor has strong sensitivity to ammonia, sulfide and benzene steam, and it reacts to smoke and other harmful gases. It provides a viable and inexpensive method to keep an eye on air-quality.

**PULSE SENSOR**


Pulse/Heart beat sensors work in an easy way. Every device consists of two physically separated parts (a) circuitry side which integrates amplification and noise rejection circuit components, and (b) the illumination side where a light-emitting diode (LED) is placed in the proximity of an ambient light sensor. The LED applied to a human venous structure; it is appropriate to make use of the tip of the finger or the ear lobe. The former is commonly used in the wristbands attached to the users, whereas the latter is used in wearable ear-based devices.

**DHT11 Sensor**

The amount of water vapour per unit volume of air is termed humidity. This parameter has a significant effect on physical, chemical and biological phenomena. The humidity, when present within an industrial setting, regulates the direct costs of goods as well as the health of staff members. Therefore, getting an accurate measurement of humidity is essential in the production of semiconductors and in the operations of control systems. The analysing detection method defines the moisture content in a mixture of gases that consist of water vapour, nitrogen, argon or even pure gas components. The representation of the output of humidity sensors gives a way of classifying it as relative-humidity sensors and absolute-humidity sensors. DHT 11 demonstrates the instance of a digital sensor that can provide both data on temperature and humidity.

**WIFI MODULE ESP8266**

The ESP8266 WiFi Module presents a self-contained system-on-a-chip (SoC) with TCP/IP protocol stack that integrates into most microcontrollers and allows access to a WiFi network. The module may be used as a stand-alone application host, or as an offload of all Wi-Fi networking functions to an external application processor. Each ESP8266 device comes with an AT command-set firmware, meaning its tie to an Arduino

device can give WiFi effectively equal to an off-the-shelf WiFi Shield. The ESP8266 is very price friendly and enjoys a growing trend of community support.
It has processing capabilities built in, making it easily integrate with sensors and other application-specific peripherals through its GPIOs with little development requirement and low processing overhead at run time. The large on-chip integration makes it have very little external circuitry and use of a thin PCB. It also features APSD allowing VoIP applications and integrated interfaces to support Bluetooth coexistence; it takes up less space and a self-calibrated RF design allows it to self-calibrate and operate correctly under all conditions without external RF components.

**BUZZER**

Buzzers are compact and yet efficient parts used in the addition of an audio reading operation into electronic devices. This makes their small, dual-pin characteristics easily useable on printed circuit boards (PCBs), breadboards and perf boards, which simplifies their widespread use in electronic projects.
There are two types of buzzer generally sold. The former, demonstrated in the figure below, can be installed as a mere buzzer and a prolonged tone of Beeeep appears on powering. The second type, the readymade buzzer, generally looks more voluminous and introduces an internal oscillator circuit, giving Beep. Beep. Beep output. Although the simpler version comes in more common use, it can be combined with other circuits to meet a wide variety of design needs.

## VI.RESULT

Physiological data of patients obtained in real time is transmitted into a central database through a cloud-based system. The authorized clinicians can then access these data using a tailor-made Internet-of-Things application platform. The sensor readings of the patient are presented in the form of Fig.

## VII.ADVANTAGDES

Such type of safety will be used to offer holistic safety to military personnel. It is to be used within a wide range of climatic, operational and extreme weather conditions such as: extreme temperatures, turbulent weather conditions and small spaces. By saving information in a continuous logging method, the system is able to log evidence that is necessary in multiple domain analysis performance of individual users. The system is also characterized by the aspects of diminutive size, lesser complexity as well as economic costs, hence increasing its compatibility to forces with limited logistical limitations. It is able to meet the changing technology needs of current military operations by integrating the modern technologies and the latest hardware.

## VIII.CONCLUSION

This paper is based on the implementation and analysis of a smart soldier health-monitoring system that can be quite valuable in terms of its contribution to operational support of the military. Gathering information concerning health of the soldiers in a combat zone and identifying biohazards using advanced algorithms, the system allows commands to make quick evidence-based decisions, and consequently keeps casualties of the personnel at the minimum. Based on this, one can state that smart soldier health-monitoring system is a significant improvement as compared to the traditional methods of military implementation.

## IX. FUTURE SCOPE

Situational awareness incorporation of supplemental sensory awareness-infused soldier surveillance regimes through the incorporation of enhanced capabilities facilitated by functioning modalities, namely electrodermal activity (EDA), electroencephalography (EEG) and biochemical sensing presents novel considerations of situational awareness. Flexible electronics can be used to integrate such sensors into wearable attire, and this increases operational convenience of the soldier.

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