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INTIMATION SYSTEM IN AN AMBULANCE

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Abstract: In this project, a wireless communication system is designed and developed for continuous monitoring of Patients health when he is carried to hospital in Ambulance. The primary function of this system is to monitor the temperature and heartbeats of a patient's body every two while he is being carried to hospital by GSM module.

When this data is send to Casualty section of hospital, doctors will have a brief idea of patients health and can plan accordingly for treatment. When patient is taken hospital in case of casualties, doctors initially need to check his heartbeat rate and body temperature. If this things are done in Ambulance when patient is on the way ,lot of precious time will be saved no matter how small it is. There will be also additional facility by which Ambulance staff will end a rough situation of patients health like if he is bleeding ,about his critical wounds and fractures.

***Index Terms* - Component,formatting,style,styling,insert.**

I. Introduction

In this project a wireless communication system is designed and developed to intimate the real time situation of the patient to the casualty section of the hospital when he is carried to hospital in Ambulance.

The primary function of this project is to monitor the temperature and heartbeats of the patient for every two minutes and send it to hospital by GSM module. In this project we can track the exact location of the Ambulance by GPS and send it to hospital. When this data is send to Casualty section of hospital, doctors will have a brief idea of patient health and can plan accordingly for treatment. When patient is taken hospital in case of casualties, doctors initially need to check his heartbeat rate and body temperature. If this thing's are done in Ambulance when patient is on the way, lot of precious time will be saved no matter how small it is. There will be also additional facility by which Ambulance staff will send a rough situation of patient's health like if he is bleeding, about his critical wounds and fractures.

This project can be further enhanced by sensing and displaying other vital statistics of a patient like blood pressure, pulse rate etc. Another feature added a warning signal is generated if the parameters cross the safe limit. This is sample paper format only please use this format and follow this structure as per your requirement

II. LITERATURE SURVEY

The time series monthly data is collected on stock prices for sample firmsand relative macroeconomic variables for the period of 5 years. The data collection period is ranging from January 2010 to Dec 2014. Monthly prices of KSE -100 Index is taken from yahoo finance. In paper[1], the author described Remote Monitoring of Patient Health using Wireless Sensor Networks (WSNs).Recent technological advances in wireless communications and wireless sensor networks have enabled the design of low-cost, intelligent, tiny and lightweight medical sensor nodes that can be strategically placed on human body, create a wireless body area network (WBAN) to monitor various physiological vital signs for a long period of time and providing real-time feedback to the user and medical staff via SMS/E-mail. Remote patient monitoring is an alternative to regular homecheck-ups of patients with certain special medical conditions or the elderly who are unable to regularly visit a healthcare facility. In this paper, wireless technologies are used to reduce the number of home visits which are now only required when special attention is needed. In this paper, sensors were used to collect physiological data from patients and transmit it to Intelligent Personal Digital Assistant (IPDA) using ZigBee/IEEE802.15.4 standard

and to medical server using 3G communications. The main advantage of this system is to speed up and extend the communication coverage to improve convenience. Priority scheduling and data compression is introduced into the system to increase transmission rate of physiological critical signals which improve bandwidth utilization. This paper discusses remote monitoring of patients health using wireless sensor network (WSNs).
In paper[2] the author described e-Health monitoring applications: What about Data Quality. Data quality analysis remains a difficult issue on several domains (e.g. geographic, software, databases,etc.). This is particularly the case on e-Health monitoring applications for chronic patients, where the need of data quality to ensure correct decision making is very important. Patients monitoring refers to a continuous observation of patient's condition traditionally performed by one or several body sensors. We underline the necessity of the analysis of data quality on e-Health applications, especially concerning remote monitoring and assistance of patients with chronic diseases.

2.1 Existing system

In all the hospitals the ambulance is used to carry the patients from the accidental spot to the hospital. The conventional method is, when a person mate an accident the ambulance arrives, a patient is carried out to the hospital by ambulance. But when the patient reaches the hospital the doctors need to do some basic checkups like heartbeat measurement and temperature measurement, and lots of precious time is wasted for these checkups, if the patient is in very critical condition this time becomes the most precious time of patients life.
Disadvantages: Lots of precious time is been wasted when patient reaches to the hospital because doctors has to do some basic or initial checkups like heartbeats measurement ,temperature of the patients body etc. doctors are not aware of the criticality of the patient when patient will be on the way to the hospital an ambulance. Doctors or hospital are not aware of the exact location of the ambulance.

III. SPECIFICATIONS

3.1 Temparature Sensor LM35

- Calibrated directly in degree Celsius (Centigrade)
- Linear + 10.0 mV/degree C scale factor
- 0.5C accuracy guarantee able (at +25degreeC)
- Rated for full -55 to +150degree C range
- Suitable for remote applications
- Low cost due to wafer-level trimming
- Operates from 4 to 30 volts
- Less than 60 microAmp current drain
- Low self-heating, 0.08C in still air
- Nonlinearity only +or- ¼ degC typical
- Low impedance output, 0.1 ohm for 1 mA load

3.2 Heart Beat Sensor TCRT 1000

- Sensing Distance 0.157" (4mm)
- Sensing Method Reflective
- Output Type Phototransistor
- Voltage - Collector Emitter Breakdown (Max) 32V
- Current - Collector (Ic) (Max)50mA
- Current - DC Forward (If) 50Ma
- Operating Temperature -40°C ~ 85°C
- Mounting Type Through Hole
- Package / Case PCB Mount
- Packaging Bulk
- Lead Free Status Lead Free
- RoHS Status RoHS Compliant

3.3SIM300 GSM

- RS232 interface for easy connection to computers and other device.
- operating voltage is 7-15 volts.
- low power consumption of 0.25 A.
- comes with an onboard wire antenna for better reception.

3.4ATMEGA 328 Microcontroller

- High performance, low power.
- Advanced RISC architecture.
- 130 powerful instructions.
- Non volatile memory segments

3.5 GPS Module VK162

- C/A code: 1.023MHz
- Receive frequency: L1[1575.42MHz]
- Follow channel: 50
- Support DGPS[WAAS, EGNOS and MSAS
- Support operation system: Windows 8/7/Vista/XP/CE
- Adopts 25*25*4 ceramic antenna

3.6 LCD Display (16*2)

- Intelligent with built-in HD44780 compatible LCD controller and RAM providing simple interfacing
- 61*15.8 mm viewing area
- 5*7 dot matrix format for 2.96*5.56 mm characters, plus cursor line
- Can display 224 different symbols
- Low power consumption(1 mA typical)
- Powerful command set and user-produced characters
- TTL and CMOS compatible
- Connector for standard 0.1-pitch pin

IV. PROPOSED METHODOLOGY

In this architecture, two different sensors are used for monitoring the patient healthcare such as heartbeat sensor and temperature sensor, which can directly communicate with microprocessor, is shown in Figure 1. Here Arduino Uno acts as microprocessor in healthcare monitoring, which is used to control multiple devices such as communication devices and sensor devices. RS232 is used for serial communication which is connected to the devices.

The primary function of this project is to monitor the temperature and heartbeats of the patient for every two minutes and send it to hospital by GSM module.

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This project can be further enhanced by sensing and displaying other vital statistics of a patient like blood pressure, pulse rate etc. Another feature added I am warning signal is generated if the parameters cross the safe limit.

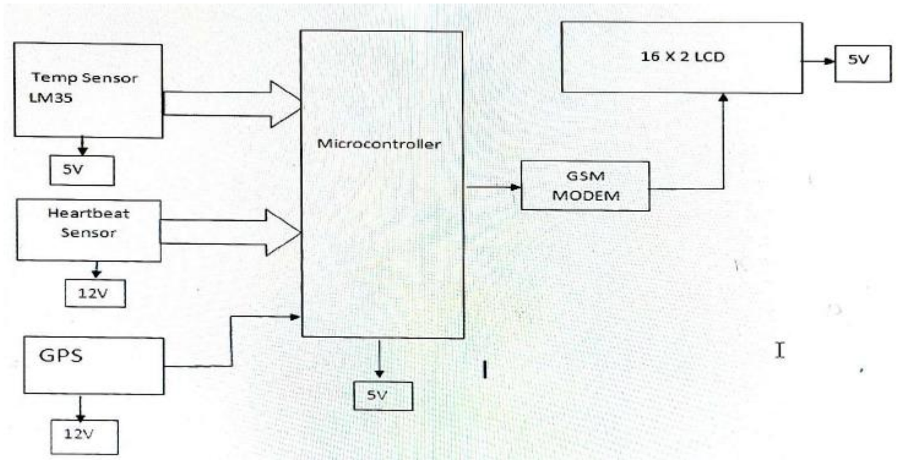


Figure 1

4.1.1Usage of TCRT1000 Reflective Optical Sensor for Photoplethysmography

In this version, the TCRT1000 reflective optical sensor is adopted for photoplethysmography (PPG). This choice streamlines the construction process of the sensor component within the project. The TCRT1000 features both an infrared light emitter diode and a detector positioned side by side in a leaded package. This arrangement effectively blocks surrounding ambient light, which could potentially interfere with the sensor's performance. A dedicated printed circuit board has been designed to accommodate both the sensor and the signal conditioning unit. The sensor's output manifests as a digital pulse, synchronized with the heartbeat. This output can be directed to an analog-to-digital converter (ADC) channel or a digital input pin on a microcontroller for subsequent processing.
The project is rooted in the principle of photoplethysmography (PPG), a non-invasive technique for measuring variations in blood volume in tissues. It employs a light source and a detector to gauge these variations. As blood volume changes align with the heartbeat, PPG can be employed to calculate heart rate. Transmittance and reflectance are two fundamental types of PPG. Transmittance PPG involves emitting light into tissue and measuring the transmitted light on the opposite side. Reflectance PPG places both the light source and the detector on the same side of a body part. The emitted light penetrates the tissue, and the reflected light is measured. Reflectance PPG can be applied to various body parts due to the absence of light penetration requirements. In either case, the detected light's fluctuations are indicative of pulsatile blood flow due to heartbeats.
The PPG signal consists of two components: AC and DC. The AC component stems from pulsatile changes in arterial blood volume, synchronized with the heartbeat. This AC component offers heart rate information. It is superimposed onto a larger DC component linked to the tissues and average blood volume. Removing the DC component is crucial to measure the AC waveform with a high signal-to-noise ratio. Given the minute proportion of the useful AC signal within the entire signal, an effective amplification circuit is necessary for extraction.

TCRT1000 Sensor and Conditioning Circuit:
The TCRT1000 sensor, a reflective optical sensor, features an infrared light emitter and phototransistor in a side-by-side arrangement within a leaded package. An external biasing circuit activates the sensor by turning on the IR emitter LED via the Enable pin. A fingertip positioned over the sensor reflects incident light, with the amount of reflected light monitored. The sensor output (VSENSOR) is a periodic physiological waveform, reflecting minor fluctuations in reflected IR light due to pulsatile tissue blood volume. This waveform is synchronized with the heartbeat.
The signal conditioning process begins with an RC high-pass filter (HPF) to eliminate the DC component, followed by an active low-pass filter (LPF) comprised of an Op-Amp circuit. These stages remove unwanted signals while amplifying the low amplitude pulse signal. A second cascaded stage further filters and amplifies the signal, leading to a total voltage gain of 101*101 = 10201. The resulting output consists of near TTL pulses, synchronous with the heartbeat.

Operational Amplifiers and Implementation:
The operational amplifiers utilized in the circuit are from the MCP6004 IC, offering rail-to-rail input and output within a 1.8 to 6V operating range. The circuit operates on a 3-5.5V supply. After powering the board and activating the IR sensor, placing a fingertip gently over the sensor causes the LED to flash in synchronization with the heartbeat. The output signal (Vout) can be directed to a microcontroller's digital I/O or ADC input pin for heart rate measurement. The output voltage waveform can also be visualized on an oscilloscope.

In summary, the integration of the TCRT1000 reflective optical sensor into this project facilitates precise photoplethysmography for heart rate measurement. The signal conditioning stages enhance the accuracy of the acquired data for subsequent analysis

4.1.2LM35 Precision Centigrade Temperature Sensors

The LM35 series comprises precision integrated-circuit temperature sensors, delivering an output voltage linearly correlated to the Celsius (Centigrade) temperature. This characteristic grants the LM35 an edge over linear temperature sensors calibrated in Kelvin, eliminating the need to subtract a significant constant voltage to achieve convenient Centigrade scaling. Remarkably, the LM35 doesn't necessitate external calibration or trimming to maintain typical accuracies of approximately ±0.25°C at room temperature and ±0.25°C over an extensive -55°C to +150°C temperature range. The wafer-level trimming and calibration assure costeffectiveness. The LM35 boasts a low output impedance, linear output, and precise inherent calibration, simplifying interface integration with readout or control circuitry. It can function with single power supplies or both positive and negative supplies. With a mere 60 mA consumption from the supply, it demonstrates minimal self-heating, less than 0.1°C in stagnant air. While the LM35 is designed to operate within a -55°C to +150°C temperature range, the LM35C variant accommodates -40°C to +110°C temperatures (-10°C with improved accuracy). Packaging options include hermetic TO-46 transistor packages for the LM35 series, and the LM35C, LM35CA, and LM35D are also available in the plastic TO-92 transistor package. The LM35D variant further offers an 8-lead surface mount small outline package and a plastic TO-202 package.

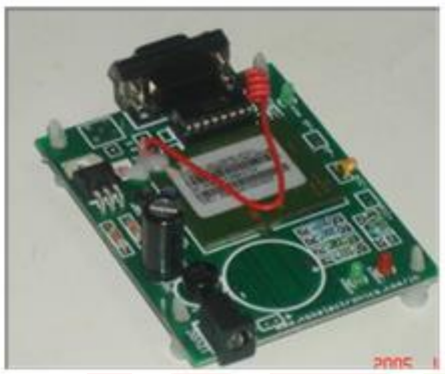
4.1.3GPS Module

VK-162 G-Mouse USB Interface GPS Navigation Module Support Google Earth

4.1.4GSM Module

This is a plug and play GSM Modem with a simple to interface serial interface. Use it to send SMS, make and receive calls, and do other GSM operations by controlling it through simple AT commands from micro controllers and computers. It uses the highly popular SIM300 module for all its operations. It comes with a standard RS232 interface which can be used to easily interface the modem to micro controllers and computers.

The modem consists of all the required external circuitry required to start experimenting with the SIM300 module like the power regulation, external antenna, SIM Holder, etc.



4.1.5 Arduino

Arduino stands as an open-source prototyping platform founded on a harmonious fusion of user-friendly hardware and software elements. These Arduino boards are adept at ingesting various inputs—ranging from light intensity registered by a sensor, button activations, or incoming messages from online sources—and subsequently translating them into corresponding outputs, which could entail actuating motors, triggering LEDs, or even disseminating information online. This translation process is achieved through instructive commands transmitted to the microcontroller embedded within the board. The vehicle for these commands is the Arduino programming language, founded on Wiring, and the corresponding Arduino Software (IDE), which takes its roots from the Processing programming environment.

In the course of its existence, Arduino has burgeoned into a vital cog in numerous projects, spanning from commonplace artifacts to intricate scientific apparatus. A global consortium of makers—encompassing students, hobbyists, artists, programmers, and professionals—has coalesced around this open-source framework. Their pooled insights have cumulated into a treasure trove of accessible knowledge that proves invaluable to both novices and veterans.

The genesis of Arduino can be traced back to the Ivrea Interaction Design Institute, where its conception was as an accessible tool for expedited prototyping. It was envisaged to cater to students devoid of electronics or programming backgrounds. As Arduino's sphere of influence widened, its evolution became evident, adapting to emerging exigencies and challenges. This evolution transitioned Arduino from rudimentary 8-bit boards to products calibrated for Internet of Things (IoT) applications, wearables, 3D printing, and immersive embedded ecosystems. It is imperative to underscore that all Arduino boards operate within the realm of open-source, bestowing upon users the autonomy to engineer and refine them in alignment with bespoke requisites. The software components, too, adhere to the open-source ethos, profiting from the cumulative input of global users.

In virtue of its user-centric and accessible user interface, Arduino has become an integral component in an array of projects and applications. Its software exhibits an affable disposition towards newcomers while accommodating the diverse needs of advanced users. Compatible with diverse operating systems including Mac, Windows, and Linux, Arduino has evolved into a linchpin in numerous educational and creative endeavors. It aids educators and students in constructing budget-conscious scientific instrumentation, showcasing principles in fields like chemistry and physics. Additionally, it serves as a conduit for immersive forays into programming and robotics. Design professionals and architects leverage Arduino to prototype interactive and dynamic design solutions. Musicians and artists partake in sonic experimentation, exploring novel musical instruments. This sentiment is echoed in platforms like Maker Faire, where Arduino-induced projects take center stage. Ultimately, Arduino proffers a pivotal learning instrument that is accessible to all demographics, ranging from children and hobbyists to artists and programmers. Individuals can embark on tinkering escapades either by adhering to step-by-step kit guidelines or by joining the vibrant Arduino online community.

Numerous other microcontrollers and platforms have also surfaced in the domain of physical computing, including Parallax Basic Stamp, Netmedia's BX-24, Phidgets, and MIT's Handyboard. While these counterparts simplify the intricacies inherent in microcontroller programming, Arduino leverages a suite of advantages for educationalists, scholars, and aficionados:

- Cost-Efficiency: Arduino boards are economically viable in comparison to analogous microcontroller platforms. The rudimentary Arduino module can be manually assembled, with pre-assembled alternatives retailing at less than $50.
- Cross-Platform Compatibility: The Arduino Software (IDE) boasts compatibility across Windows, Macintosh OSX, and Linux operating systems, imparting a cross-platform advantage. A multitude of microcontroller systems are confined to the Windows ecosystem.

- Intuitive Programming Environment: The Arduino Software (IDE) is designed to be intuitive, catering to nascent users while maintaining the adaptability to cater to the exigencies of advanced practitioners. This environment leverages the underpinning of the Processing programming milieu, facilitating a seamless transition for those acclimated to it.
- Open-Source and Extensible Software: The Arduino software exists as open-source tools, affording the latitude for augmentation by adept programmers. The language's scope can be broadened through C++ libraries. Those inclined towards delving into technical intricacies can segue from Arduino to the AVR C programming language that underlies it. Equally noteworthy, AVR-C code can be directly assimilated into Arduino programs if deemed necessary.
- Open-Source and Extensible Hardware: The architectural schematics of Arduino boards adhere to the principles of open-source, enabling proficient circuit designers to engineer bespoke iterations of the module. This proclivity for customization caters to amplification and refinement. Even individuals with limited familiarity can assemble the breadboard version of the module to glean insights into its modus operandi, thereby mitigating costs.

V. RESULTS AND DISCUSSION

This project offers the potential to significantly reduce the time a patient spends in transit within an ambulance. It achieves this by efficiently tracking the ambulance's precise location during the transportation of an accident victim.

Utilizing this project enables the accurate monitoring of an ambulance's whereabouts when it transports an injured patient. This capability proves invaluable for promptly coordinating medical teams, ensuring that doctors and the operating theater are fully prepared to receive the patient when they arrive.

In essence, this project holds the potential to streamline emergency medical response by leveraging real-time tracking, thereby optimizing patient care and medical resource allocation.

Modern hospital technology greatly benefits from this project's utility.

- It has the potential to save invaluable time for accident victims, potentially even saving lives.
- This project ensures that doctors and hospitals are fully prepared for immediate treatment upon the ambulance's arrival.
- By accurately tracking the ambulance's location, the project facilitates precise calculation of time required for initial checkups.

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