

DEVELOPMENT OF IOT HEARTBEAT AND BODY TEMPERATURE MONITORING SYSTEM FOR COMMUNITY HEALTH VOLUNTEER

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ABSTRACT:

In order to reduce the need for doctors and nurses, Thailand has established community-based support groups in every province. When they make regular house calls for medical checkups, an Internet of Things (IOT) heartbeat and body temperature monitoring system is developed for them. There are two components to this system: a portable measurement tool and an app for Android devices. The portable thermometer and heart rate monitor may be used anywhere. The heart rate monitor and temperature sensor are linked to an Arduino board. It has an LCD display that indicates the heart rate and temperature, and it also wirelessly transmits that data to the Thing Speak IOT platform in real time. Both readings must be out of the

ordinary for the system to generate an alert to the Line app. The Firebase database allows the android app to keep track of all neighborhood members and determining devices.

***Keywords:** Arduino Uno, Arduino IDE, GPS/GSM Module, C Programmes Already Installed, Ultrasonic Sensors.*

INTRODUCTION

There has been an increase in the world's elderly population in several countries. In 2016, there were 929 million persons aged 60 and above, or 12.5% of the world's total population of 7,433 million. Thailand entered an ageing society in 2005, and it will become fully an ageing culture in 2021, when the percentage of the population over 65 is

projected to reach 20. More annual government-designated budget plans for elder care will have an impact on the country's economic growth. In addition, it is causing a crisis in the availability of medical transport. Volunteers in public health and wellness who work in the local community may assist address unmet needs by providing information and services. This study aims to assist local wellness volunteers in their work with older citizens by developing a method to monitor vital signs such as heart rate and temperature. One cutting-edge technology that may aid with a health monitoring system is the Internet of Things (IoT). Blood pressure, heart rate, temperature, and respiration rate are the four primary vital signs that are routinely monitored. In this study, we present a low-cost, Internet of Things (IoT)-based system for monitoring heart rate and temperature levels. IoT enables the system to monitor vitals like heart rate and temperature from anywhere, as well as provide instantaneous alerts to carers. Regular contraction and relaxation of the heart constitute a heartbeat. The cardiac cycle is evaluated in order to provide a heart value. The heart's rhythmic contraction and relaxation is known as the "heart cycle" [2]. Electrocardiography (ECG) and photoplethysmography (PPG) are the two

most used methods for measuring heart rate [3]. Electrodes attached to the skin are used in an electrocardiogram to record the heart's electrical activity.

FAILURE TO OBSERVE

In the proposed system, the user is notified of the result's value through text message and also shown with the value on an LCD screen. Using the LCD with an Arduino is a breeze, and the code for the screen is sent back to the controller so that you can see the sensor readings. The majority of the proposed system makes use of a 16 by 2 LCD display, where 16 indicates the number of characters per line and 2 indicates the number of rows; however, a 20 by 4 display is also commercially available, where 20 indicates the number of characters per line and 4 indicates the number of rows. From the LCD's total of 14, '8' are data pins, '2' are power pins, and '3' are control pins. The LCD display has one pin for adjusting the contrast.

LITERATURE SURVEY

The E-health sensor shield set interface set proposed by Ananda Mohan Ghosh et al. [1] would enable family members and specialised physicians to remotely monitor a patient's health and wellbeing status through the internet. However, it does not immediately

notify the relevant family members or doctors through email or text message.

Patients' vital signs (heart rate, respiration rate, temperature, and body movement) are monitored by a Raspberry Pi-controlled system, with data gathered via sensing units and displayed via putty software. This system was proposed by P. Kumar et al. However, our proposed alternative includes an alarm signal to prompt family members or doctors to give the patient their medication.

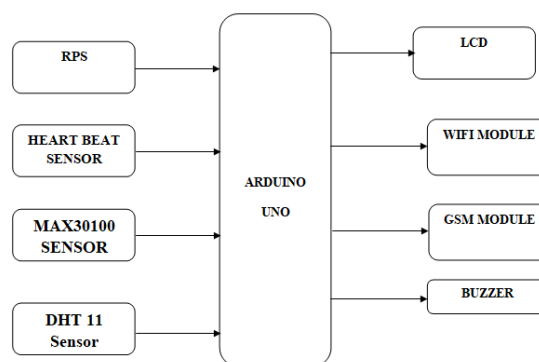
Sarfraz Fayaz Khan [3] has shown how IoT and RFID tags may be used to create a practical healthcare monitoring system for an individual. However, our document includes preventative strategies to address client health issues, such as limiting equipment and providing the person with prescribed medications.

Only monitoring the individual's health and notifying the appropriate parties (doctors, loved ones) has been considered by Freddy Jimenez et al. [4]. Not only does it not include the device control that is part of our job, but it is instead narrowly focused on surveillance and the immediate alerting of selected persons.

S.Siva [5] et al. has proved that the smart health centre system may be used to diagnose

a patient's condition. The client's health and wellbeing issues may be tracked using the spark kit. It takes the user's temperature and heart rate and sends a jarring alert if one of those values goes beyond a user-specified limit.

Block diagram



POWER SUPPLY

Influence supply is the one source of electrical strength. A tool and otherwise process so here supplies electrical or even other different kinds of energy some kind load and otherwise gathering anyway sudden load is known as an influence source unit or. A descriptor is also most generally utilized complete electrical power provides, less now physical only one 's, and barely toward others. A authority procurement could include an influence distribution network and also major or minor forms of energy production that kind of as

I. Transfer about one form of an electrical electricity to the next factors that are required but also dc, often using converting ac line amperage to something like a well-regulated lower-voltage dc for electrical equipment. Reduced voltage, reduced power connect the power supply modules were indeed most often melded with both the systems they provide, of this kind as computers but also houses microelectronic.

ii. Battery packs.

iii. Chemical fuel cells but also both these types of energy storage systems.

iv. Solar panel.

v. Diesel generator or alternators.

The components mainly used in above figure are

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- ✓ 230V AC MAINS
- ✓ TRANSFORMER
- ✓ BRIDGE RECTIFIER(DIODES)
- ✓ CAPACITOR
- ✓ VOLTAGE REGULATOR(IC 7805)
- ✓ RESISTOR
- ✓ LED(LIGHT EMITTING DIODE)

Voltage supervisory

A power supply (also termed one 'regulator') with just queue does seem to just be a small device, but that is in actually one very complex cycle. Something that needs to convert of one various different voltage outputs into such a perpetual 'regulated' voltage output Power supplies can be found inside a style of output signals by output, quick, power supply, volt as well as 15v. That whole related to the new sequence like power converters have been intended regarding current or voltage. Such as applications bad marks, it and lm79xx succession will be used. But use a set sure 'voltage-divider' passive components could increase the data wattage of both a commentator controller.

HEART BEAT SENSOR

Rhythmic Heart Rate Detector

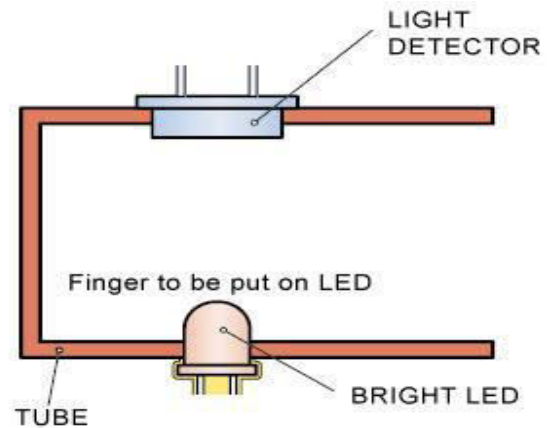
When a finger is placed inside, this heart rate sensor provides an electrical output of the user's warm heart rate. The topmost LED flashes in time with each heartbeat while the heart rate monitor is active. This digital output may be connected straight to a micro controller, allowing you to calculate the BPM rate. The mechanism of light modulation by pulses of blood via the finger is discussed.

Working

The sensor has a light detector and an extremely bright red LED. Due to the need for the LED's light to go through the user's finger and emerge from the other side, it must be very powerful. At the present time, the pulse of blood pumped by the heart via the capillary causes the finger to become somewhat less transparent, resulting in less light reaching the detector. The detector signal changes with each heartbeat. An electrical pulse is generated from this variation. An amplifier takes this signal and boosts it, setting off a +5 V logic level signal. A heartbeat-triggered blinking LED on top also serves as a result indication. The following numbers lead to a graphical representation of the sensor signal outcomes and heart rate signals.



Sensor construction

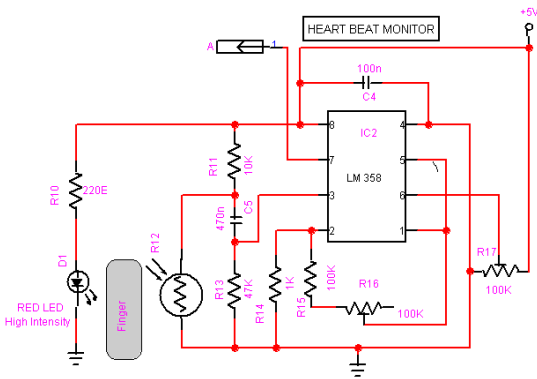


AMPLIFIER CIRCUIT

We use LM 358 integrated circuit for amplification. In order to measure the pulse rate, a high-intensity LED and an LDR are used. The finger is placed within the probe, and red light from a powerful LED is allowed to fall on it. The amount of red light absorbed by a finger varies with the rhythm of the finger's blood flow. Therefore, the amount of light transmitted varies with the rate of blood flow.

Transmitted light is detected by an LDR mounted on the opposite side of the LED. The more light it transmits, the less resistance it has, and vice versa. To get a voltage signal that is proportional to the LDR's resistance, a voltage divider panel circuit is employed. There is both alternating current and direct

current in this voltage signal. Blood arteries, veins, bones, soft cells, and non-pulsating blood are all examples of non-moving structures that take in a constant quantity of light and hence contribute to the DC component of the voltage signal. Since it reveals nothing specific about the blood pulses, there is no need for DC components. The fluctuating light absorption caused by the blood's beating adds a cooling component to the voltage signal. We need a signal that involves air conditioning components.



Circuit Description:

The simplistic layout is clearly shown above. The LCD panel's Enable and Register Select buttons connect through the Control Port. The Control Port's output is an open collector/open drainpipe, giving you a lot of leeway. While the vast majority of identical ports have pull-up resistors, a small number do not. Including the two 10K external pull up

resistors makes the circuit more portable for a wider range of computers, since certain computers may not have internal pull up resistors. There is zero attempt on our part to reverse the flow of data on the information highway. By connecting the R/W line directly, we may force the LCD panel into composition mode. As a consequence, there won't be any squabbles over the data line bus. The LCD's internal Busy Flag cannot be retrieved, which indicates whether or not the LCD has received and begun processing the most recent instruction. To address this issue, we included deliberate pauses within the programmer. You may modify the brightness of the LCD display by using the 10k Potentiometer. Nothing can be accounted for. In fact, the power source has been left out of every single illustration. We have the option of using the board's +5v regulator or a bench power supply with a 5v setting.

Buzzer

In a piezoelectric stereo, the piezoelectric diaphragm is the main sound generator. A piezoelectric diaphragm consists of four layers: two layers of steel (brass, stainless steel, etc.) and two layers of piezoelectric ceramic. A metal plate is joined to a piezoelectric ceramic plate using adhesives. When direct current (DC) voltage is applied

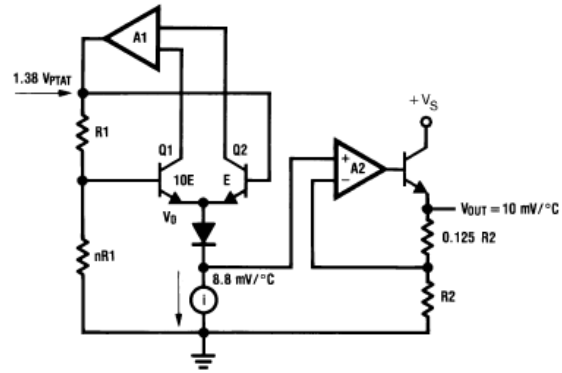
between a piezoelectric diaphragm's electrodes, the result is mechanical distortion. Deformation of a piezoelectric feature tends to intensify towards the periphery. The piezoelectric diaphragm is also angled in that direction. A larger home plate is not triggered by the piezoelectric device attached to the metal plate. However, the piezoelectric diaphragm spreads outward in the opposite direction when the piezoelectric component is weakened. Thus, the bending happens once again, resulting to the production of airborne sound waves, when alternating existing (A/C) voltage is delivered between electrodes. The buzzer is interfaced using a standard transistor interfacing circuit. If you need to use another power source for the buzzer, you must connect the 0V rails of both sources to create a common ground.



LM35 MODULE

This same thermistor meter probe succession were also accuracy unified temperature measurement, whom the terminal voltage was

indeed demonstrated in figure 2 toward the degrees centigrade (centigrade) max temp.

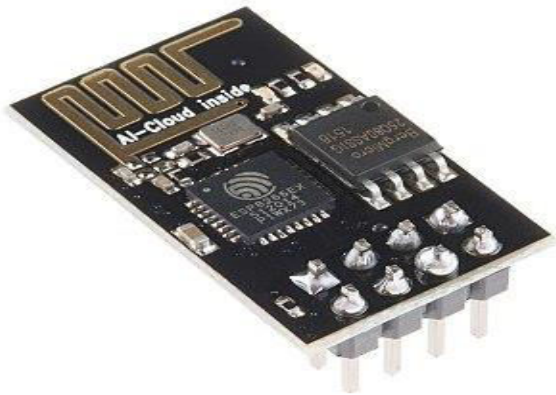


WIFI MODULE

ESP8266:

The esp8266 is some one low-cost Wi-Fi microchip, with the a full tcp/ip stack and micro controller capability, generated by espressif systems through shenzhen, guangzhou. This same smart card primary got the attention sure western makers throughout 2015 as both the esp-01 component, crafted by either a forth producer ai-thinker. One such slight component permits micro - controller to connect with positive yoo community and make simplistic tcp/ip interconnection using Hayes-style directs. However, at and then there was so little esl documentary evidence on it microcontroller and indeed the instructions everything just acknowledged. that whole veeery price point and also the undeniable fact that there were a few exterior elements on it unit, whom they tried to

suggest it could inevitably be quite cheap out output, captivated countless hacking of between start exploring an unit, a processor, and or the apps on this, as well as complete try translating that whole mandarin evidence. The esp8285 is the commonly associated as both 1 mib anyway designed flicker, permitting its constructing sure single-chip devices that are capable after all going to connect ing yoo.



OPERATIONS

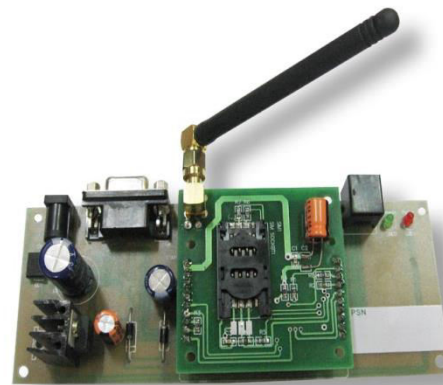
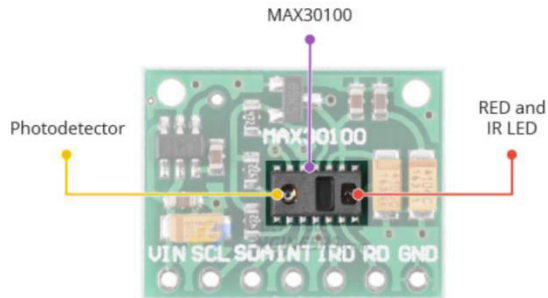
In order to eliminate the need for a separate microcontroller, Espressif Solutions released an SDK in October 2014 enabling direct chip configuration. Since then, Espressif has released a plethora of official SDKs; the company now maintains two versions of the SDK, one based on FreeRTOS and the other on callbacks. Max Filippov's open-source ESP-Open-SDK [8] is an alternative to Espressif's official SDK; it is built on the GNU Compiler Collection (GCC) toolchain.

[10] The "Unofficial Development Set" written by Mikhail Grigorev is an alternative. [11] [12] Some other SDKs worth mentioning are: Firmware written in C++, used by Arduino. The ESP8266's central processing unit (CPU) and Wi-Fi components are fully Arduino-programmable using this core. Access to the ESP8266 Arduino Core is simple thanks to hosting on GitHub.

SPO2 SENSOR:

The MAX30100 is an I2C-based, low-power, plug-and-play pulse oximeter and heart rate sensor. It's useful for anybody who needs real-time heart rate data, including students, enthusiasts, engineers, manufacturers, and video game and mobile app creators. MAX30100 Hardware Module

The MAX30100 from Analogue Devices is used in the module; it is a state-of-the-art combined pulse oximeter and heart rate sensor. It uses low-noise analogue signal processing in conjunction with two LEDs, an optimised optical design, and signal detection for pulse oximetry (SpO₂) and heart rate (HR).



GSM MODULE

Global System for Mobile Communication (GSM)

Gprs that continues to stand just that universal mobile telecommunications messaging, throne (important) as even the worlds most generally were using cellular telephone tech. Smartphones need a cell phone coverage carrier's gsm mobile through it looking for phone lines inside the nearby village. Gsm interactions (gsm) are still a widely recognized form of digital mobile communications. Gsm has been the signature of either an uniformity group was established such as t& c versus build a shared colonial mobile phone basic which would construct specs for such a wok digital mobile communication system going to operate ongc gsm. This is expected that while many governments even outside country might very well enter that whole gprs relationship.

GSM SIM900:

Sim900 was indeed gsm quick fix that is in the one dsp interface where that is capable of something that engrained inside any file. It also has the responsibility to produce speaker, messaging, hard copy as well as information whereas the going to consume low wattage. It's tiny size is useful such as circumstance at which a task had already square footage since it can probably fit. To have the ability to used it unit, everything just must be glued either to a circuit boards or just a loop. Along humans instance, humans said it in humans loop as an advancement anyway with us construction. It really works in a rather sense that it would be ready to transfer text messaging as well as the google actual location of both the consumer.

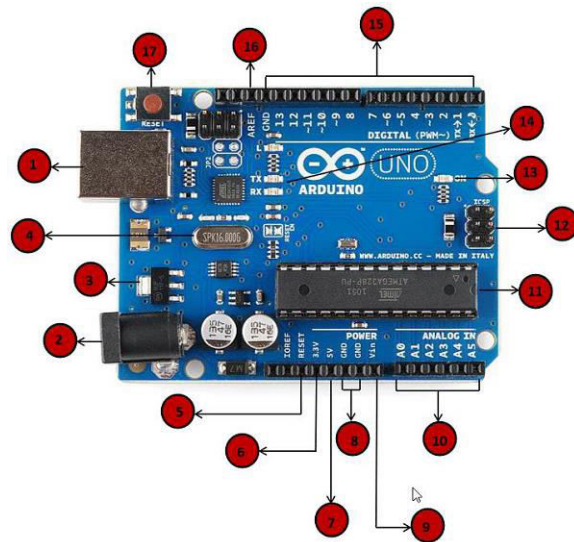


ARDUINO CONTROLLER

Arduino is an open-deliver software and hardware organization, mission and moreover man or woman network that makes and makes single-board microcontrollers and microcontroller gadgets for growing virtual gadget as well as interactive objects which can take a look at and moreover modify each simply and digitally. Its gadgets are licensed below the GNU Lesser Public Certificate (LGPL) or the GNU Public Permit (GPL), permitting the manufacture of Arduino forums and software program software flow via way of all of us. Arduino forums are to be had surely in preassembled kind or as day (DIY) sets. Arduino board layouts use various microprocessors further to controllers. The forums are equipped with devices of digital and analog enter/output (I/O) pins that might be interfaced to 1-of-a-type growth forums or breadboards (guards) and also particular circuits. The boards feature serial interactions individual interfaces, which encompass Universal Serial Bus (USB) on some

variations, which can be likewise used for loading programs from personal computer structures. The microcontrollers are commonly set the use of a dialect of attributes from the programs languages C and C++. Along with using conventional compiler tool chains, the Arduino process gives a protected development placing (IDE) based absolutely upon the Handling language assignment.

Arduino board



Software

The following applications were used in the development of this project:

Express PCB—for circuit design
 Arduino IDE—for the coding portion

For the simulation phase, use Proteus 7 (Embedded C).

The User-Interface

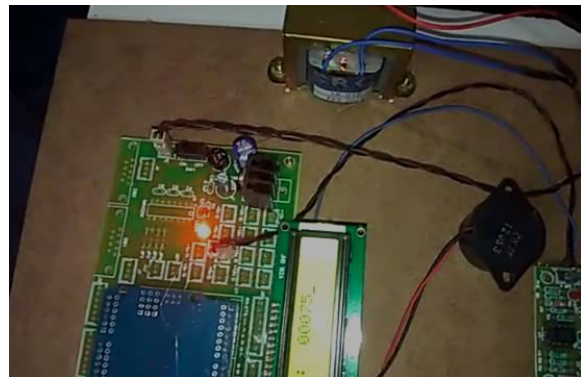
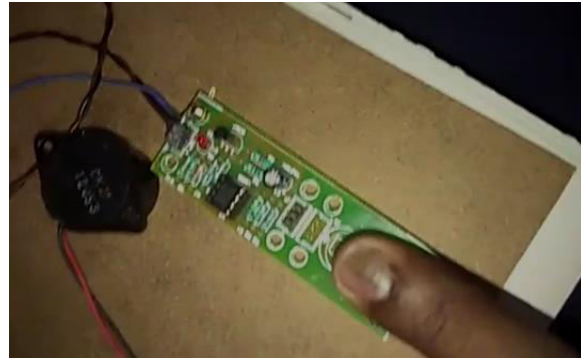
When a new project is created, a yellow

outline will appear. The PCB's dimensions are shown by the yellow contour. Components and traces are often shifted into their final positions before the PCB is trimmed to size. If you need to construct a board that fits inside certain dimensions, you'll need to crop the PCB to that size first.

PROBLEM STATEMENT

EXPLANATION

The value of the sensing unit's output is shown on an LCD by the arduino controller. A picture diode and an infrared (IR) sensor make up the heart rate detecting unit; the latter sends IR to the user's finger on one side, while the former receives the signal and uses it to calculate the user's pulse and blood volume over the course of 30 seconds. Blood pressure drops and rises in relation to heart rate, making it simple to ascertain whether or not the heart is functioning normally. The value measured by the sensor is converted to a DC voltage and then sent to the controller using the op-amp's voltage-variation function. The Buzzer module is used for communication in this cardiac assessment system; it relays data to the user through their mobile device within the 850MHz to 1900MHz frequency range.



CONCLUSION:

The model project is meant to monitor an individual's health, and if any significant changes are detected in the sensing unit, the controller will relay the information through the Buzzer. The suggested system measures the client's vitals in real time and stores the information permanently, eliminating the need for the client to make repeated trips to the hospital. When cardiovascular illness develops on the patient's side, the alerting system notifies the doctor by comparing the value of the sensing unit to a predetermined threshold; if a deviation is detected, the user is notified. Additionally, the proposed method provides accurate value and speedier

operation, and individual monitoring is available everywhere, which is very useful for customers in remote regions. The regulation of client health is expected to become more reliant on video camera components and other wire-free controlling methods in the not-too-distant future.

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