IOT BASED HEART RATE MONITORING SYSTEM

A Project and Thesis submitted in partial fulfillment of the requirements for the Award of Degree of Bachelor of Science in Electrical and Electronic Engineering

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Certification

This is to certify that this project and thesis entitled "**IOT Based Heart Rate Monitoring System"** is done by the following students under my direct supervision and this work has been carried out by them in the laboratories of the Department of Electrical and Electronic Engineering under the Faculty of Engineering of Daffodil International University in partial fulfillment of the requirements for the degree of Bachelor of Science in Electrical and Electronic Engineering. The presentation of the work was held on 29 November 2017.

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Dedicated to

Our Parents

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LIST OF ABBREVIATIONS

LED	Light Emitting Diodes
LCD	Liquid Crystal Display
IR	Infrared
IC	Integrated circuit
DC	Direct Current
OP-Amp	Operational Amplifier
CMOS	Complementary Metal Oxide Semiconductor
MIPS	Microprocessor without Interlocked Pipeline Stages
PWM	Pulse wide Modulation
ADC	Analog to Digital Converter
USART	Universal Synchronous/Asynchronous Receiver/Transmitter
ALU	Arithmetic logic Unit
TTL	Transistor transistor Logic
USB	Universal Serial Bus
VCC	Voltage Common Collector
EEPROM	Electrically Erasable Programmable Read-Only Memory

List of Symbols

R	Resistance
C	Capacitance
V	Voltage
Y	Admittance
L	Inductance
F	Fundamental Frequency
T	Fundamental Time Period

ACKNOWLEDGEMENT

First of all, we give thanks to Allah or God. Then we would like to take this opportunity to express our appreciation and gratitude to our project and thesis supervisor **Mr. Md. Dara Abdus Satter, Assistant Professor Department of EEE** for being dedicated in supporting, motivating and guiding us through this project. This venture isn't possible without his valuable counsel and makes a difference. Additionally much thanks for giving us chance to pick this venture.

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ABSTRACT

The Internet of Things (IoT) has been generally used to interconnect the accessible medicinal assets and offer savvy, solid, and compelling human services administration to the elderly individuals. Wellbeing observing for dynamic and helped living is one of the ideal models that can utilize the IoT focal points to enhance the elderly way of life. In this paper, we present an IoT engineering redid for social insurance applications. The proposed engineering gathers the information and transfers it to the cloud where it is handled and dissected. Criticism activities dependent on the broke down information can be sent back to the client. A model of the proposed design has been worked to exhibit its execution focal points.

CHAPTER-1

INTRODUCTION

1.1 Introduction

The Internet of Things (IoT) is bury correspondence of implanted gadgets utilizing organizing innovations. The IoT will be one of the imperative patterns in future, can influence the systems administration, business and correspondence. IoT commonly expected to propose the propelled high transfer speed network of implanted gadgets, frameworks and administrations which goes past machine-to-machine (M2M) setting. The propelled availability of gadgets helper in mechanization is conceivable in about all field.

Everybody today is so occupied in their lives, even they neglect to deal with their wellbeing. By keeping every one of these things in brains, innovation truly turns out to be a benefit for a person. With the headway in innovation, heaps of savvy or therapeutic sensors appeared that persistently breaks down individual patient movement and consequently predicts a heart assault before the patient feels wiped out. The Wi-Fi chips away at radio waves innovation, as the information to be gone through Wi-Fi is changed over into the electromagnetic flag which is then sent utilizing the recieving wire. This paper shows an IoT based ECG module with NodeMCU microcontroller unit to acquire the information from the sensor and store it to a cloud database utilizing ESP8266 WiFi Module. Further, sharing of the information by client through his own login by means of in PC.

Key Words: Heartbeat sensor, Pulse estimation, Arduino Programming, Sensor Based Framework (SBS), IOT using Wi-Fi module, information transmission to remote zones.

1.2 Problem Statement

It is a recently proposed framework comprises of IoT PC application in which heart beat is taken and master counsel is given. It is for the most part accommodating in remote zones where prompt drug isn't accessible. It is a recently Proposed Framework, Which is utilized to take beat among various clients. It is easy to use and enables the client to cooperate with specialist by sharing the beat.

1.3 Objectives

- Making a robotized framework which will screen have remotely is our essential goal.
- Making a caution or response framework which will respond at whatever point there is a disturbing circumstance.
- Providing an approach to remotely screen the beat, in multi day and furthermore the mount of rest of the patient by means of Think talk.
- Analyzing the gathered information utilizing the inherent Mat lab of the Think talk separate to recognize future risks.
- Sending disturbing messages by means of XAMPP to the concerning specialist or individuals if any variation from the norm is identified.
- Contributing in the field of IOT to clear a path for future venture in the innovative improvement.

1.4 Research Methodology

The issue of selective indoor or outside observing of patients or elderly individuals is mind boggling; including both indoor and open air cases is much increasingly exacerbated, particularly on account of IoT. Consequently, to do the plan of such a framework, we propose to systematize the structure procedure. The proposed plan philosophy outlined in Figure 1 is made out of two primary stages: issue detailing and item improvement, each comprising of three distinct advances. Additionally, to keep away from the oversight of any critical parts of the planned framework, the stake holder's, future client's and creator's viewpoints are contemplated at each phase of the

structure procedure The issue of select indoor or outside checking of patients or elderly individuals is mind boggling; including both indoor and open air cases is significantly progressively aggravated, particularly on account of IoT. In this manner, to do the structure of such a framework, we propose to systematize the plan procedure. The proposed structure strategy delineated in Figure 1 is made out of two primary stages: issue detailing and item improvement, each comprising of three unique advances. In addition, to stay away from the oversight of any essential parts of the planned framework, the stake holder's, future client's and planner's viewpoints are thought about at each phase of the structure procedure.

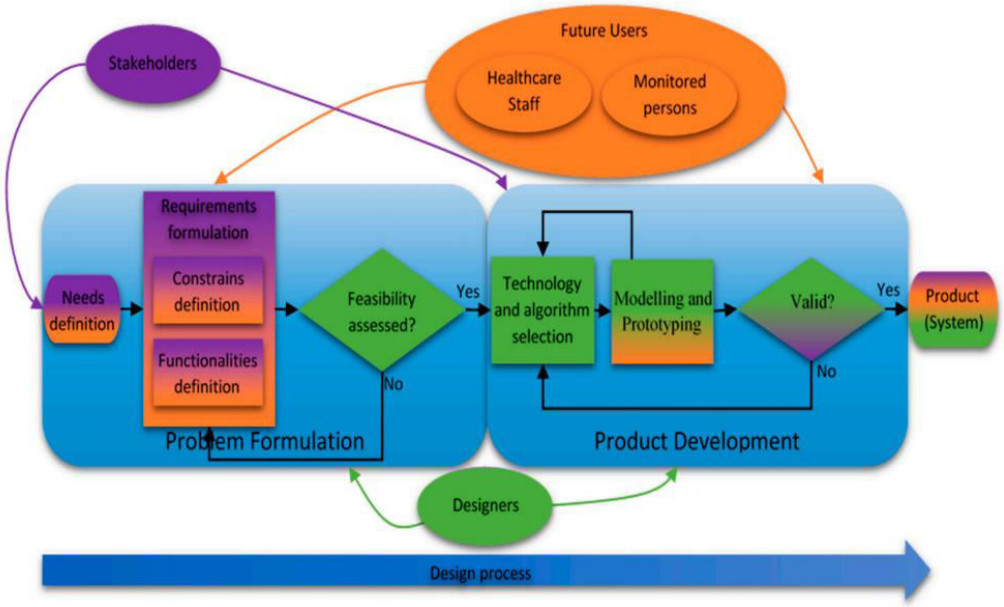

Figure:1.1 Flowchart of the design methodology.

1.5 Summary

In this modern age for the digitalized the pharmacy system we used modern technology. Our project IoT based heart rate monitoring system is the one part of the technology. The doctor available in the internet based here is the facility for treatment.

CHAPTER-2

LITERATURE REVIEWS

2.1 Introduction

These days various individuals are losing their life because of heart assault. Heart assault can happen when the stream of blood to heart is blocked. Attributable to late conclusion of heart assault we are lacking to spare the lives of numerous people. In this paper, we propose a framework that will recognize heart assault by checking the pulse dependent on IoT (Internet of Things). For a solid grown-up, normal pulse is 60 to 100 BPM (beats every moment). Competitor's heart beat for the most part run from 40 to 60 BPM relying on their wellness. In the event that an individual's pulse is always more than 100 thumps for every moment, the individual is said to have higher pulse which is likewise infamous as tachyarrhythmia. It can decrease the effectiveness of heart by frustration the measure of blood siphoned through the body can result in chest torment and wooziness. With the headway in innovation it is anything but difficult to screen the patient's pulse even at home. IoT is skill of system instrument to insightfulness and assemble data from world pervasively us at that point share the data athwart web anyplace it tends to be overseen for some diligence.

2.2 Literature Survey

Table:2.1: Parameter of internal parts

Sr. No.	Title of Papas	Year	Sensors and Technology
1	IoT based Heart Attack Detection, Heart Rate Monitor.	2018	Pulse sensor, ESP8266 wi-fi module, NodeMCU, LM35 temperature sensor, Arduino Uno
2	Heartbeat Sensing and Heart Attack Detection utilizing Internet of Things.	2018	Pulse sensor, wi-fi module, Arduino Uno
3	IoT Based Heart Attack Detection and Alert System[5]	2017	Analog sensor, wireless module, ECG leads, AVR microcontroller
4	IoT on Heart attack detection and heart rate monitoring	2017	MI Band 2, android phone, Big Data Analytics
5	Heart attack detection using Android Phone	2016	ECG monitor, Android phone
6	Heart attack detection and heart rate monitoring.	2016	Smart band, Android phone
7	Heart rate monitoring system using finger tip through Arduino and throw software.	2015	Fingertip sensor, Arduino Uno, Nodemcu, Android Phone
8	Heart attack detection using motion sensore.	2014	Kinect, Xbox one
9	Heart attack detection using Smart Phone	2013	Smart Phone

2.3 System Architecture

Fig. 2.1 demonstrates the framework design where a few subjects are outfitted with ear cut PPG pulse sensors. The sensor yield is intensified and separated and after that go to

the simple ADC0 stick of the ESP8266 NODEMCU module. With the battery and simple enhancer and channel circuit, this is a whole setup that is in favor of the subject for which we screen biomedical information. ESP8266 module has incorporated WiFi which gives association with the WiFi switch/Mobile Hotspot, assembling the signs from the sensors. For observing, the gadget ought to be associated with the IP of the code facilitating server. There are two conceivable outcomes to perform flag preparing and give GUI to the client: a) the code could be run specifically from the telephone or tablet, PC or other gadget. Here we just begin a html page straightforwardly from the telephone and for this situation the server isn't required. Anyway it is significantly more helpful, that the flag handling and GUI code is given by the server. This is additionally advantageous for gadget identification and the executives. The MAC addresses from the ESP8266 modules could be settled in the switch so as to have better authority over gadgets. There are likewise different conceivable outcomes to recognize the gadgets.

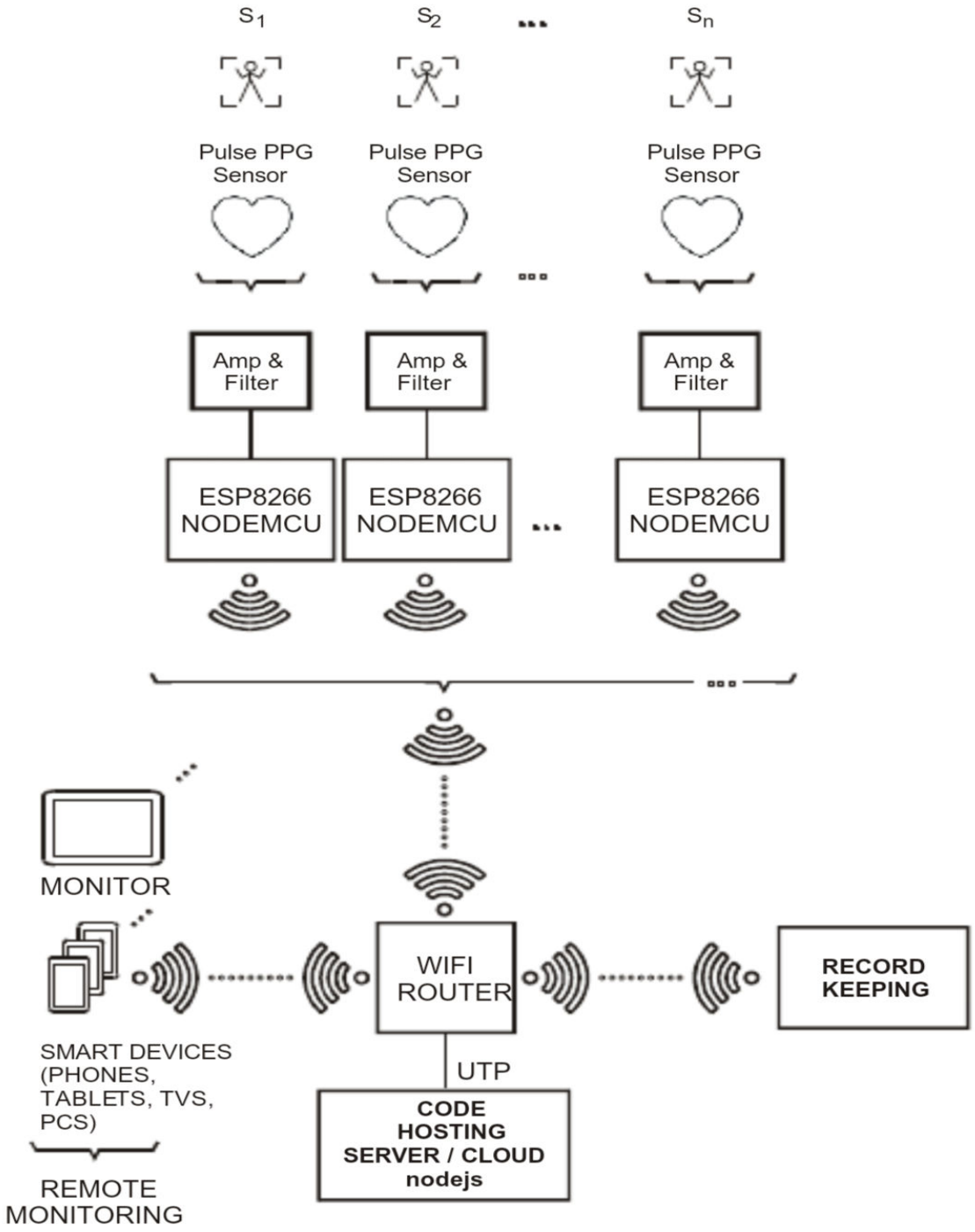

Figure 2.1: Framework structure for get-together numerous biomedical information from a few subjects by ESP8266 modules and arrangement of handling with GUI.

The ESP8266 board used was NodeMCU) with CPU Frequency: 80MHz and Flash Size: 4M (3M SPIFFS).

2.4 System components

2.4.1 Hardware Realization With Results In The Browser

Fig. 2. demonstrates the parts of the pulse ongoing gushing framework which comprises of: 1) Pulse sensor, 2) Node MCU ESP8266 module, 3) LCD 16x2, 4) I2C Interface. This is one of the two sheets that were utilized in model setup to stream information of two unique subjects to the customers.

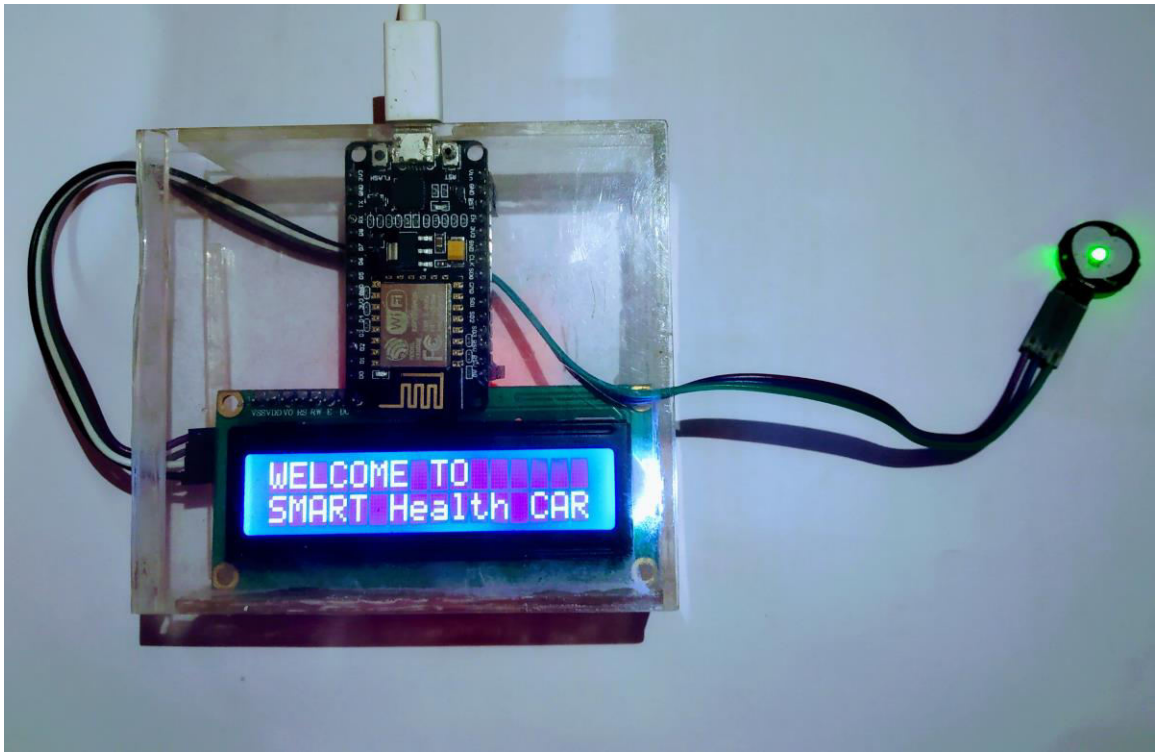

Fig. 2.2: Segments of the pulse ongoing spilling framework, here one of two indistinguishable setups is appeared.

2.4.2 Local host from another computer using XAMPP

Fig 2.3

1. Go to Your XAMPP Control board.

2. Tap on apache > config > Apache (httpd.conf).

3. Scan for Listen 80 and supplant with Listen 8080.

4. After that check your neighborhood ip utilizing ipconfig direction (cmd console).5. Look for Server Name localhost:80 and supplant with your neighborhood ip:8080(ex.192.168.1.156:8080).

Fig: 2.3 XAMPP Apache server

One can watch crude information, BPM on the site page. The observing could be extended to more gadgets in parallel and in better places. If necessary, since the flag handling and GUI is produced in html/JavaScript, the cell phone local applications could without much of a stretch be created.

Table. 6. demonstrates the observing of two patients in the internet browser. The checking could be performed on other shrewd gadgets as Smart TV. The information is sorted out in two sections one segment for each subject. The interface could be come to by entering the IP address and port of the Node.js server into the internet browser.

Table 2.2: Example of the patient monitoring in the web browser

Blood Pressure Demo

Image	Heart Rate:	Name:	Edit	Delete
Image	78	Rohim	Update	All Delete
Image	79	Korim	Update	All Delete
Image	75	Ajmal	Update	All Delete
Image	69	Kalam	Update	All Delete
Image	100	Harun	Update	All Delete
Image	69	Hasem	Update	All Delete
Image	120	Mofejul	Update	All Delete
Image	100	Samsur	Update	All Delete
Image	64	Kobir	Update	All Delete

2.5 Summary

In this project hardware, we used some equipment for that we can take proper heart rate health care. In this device for different type of patient used different type of device where that is separate for each patient. That's show to doctor by web chart.

CHAPTER-3

ANALYSIS AND SIMULATION

3.1 Introduction

This paper is sorted out by examining sensor innovation in telemedicine applications, talking about the correspondence advances which utilized for telemedicine and look at between them upon the utilized application, at that point examining the physiological parameters, at that point we depict the plan of pulse sensor hub as indicated by the physiological signs. We planned the information base to enroll the imperative signs estimations and afterward send them to the specialist for conclusions by web through portable application or site. We did the recreations of circuit structure of pulse sensor hub utilizing proteues program to do plan cycles and enhance the outcomes. The examination of our outcomes and the best in class at that point announce the additional estimation of our commitment of this work.

3.2 Analysis

In the Paper Analysis stage, investigator needs to recognize the customer necessities, and plan a diagram for the paper. Examiner needs to make discourse with the customer and behaviors definite overview of the customers' the same old thing. This examination distinguishes the idea of business, mark and different business traits. It additionally decides the forthcoming objectives and target group of onlookers. The investigation ought to be done in the way, that it may not be too tedious or less useful. The group ought to have the capacity to think of the entire money saving advantage examination and as the arrangement for the paper will be a yield of investigation, it ought to be reasonable. To accomplish this, examiner ought to counsel the fashioners, designers and analyzers to

concoct a practical arrangement. Yield of this stage ought to incorporate Work plan, Cost included, Team prerequisites, equipment programming necessities, supporting archives and the Client endorsement.

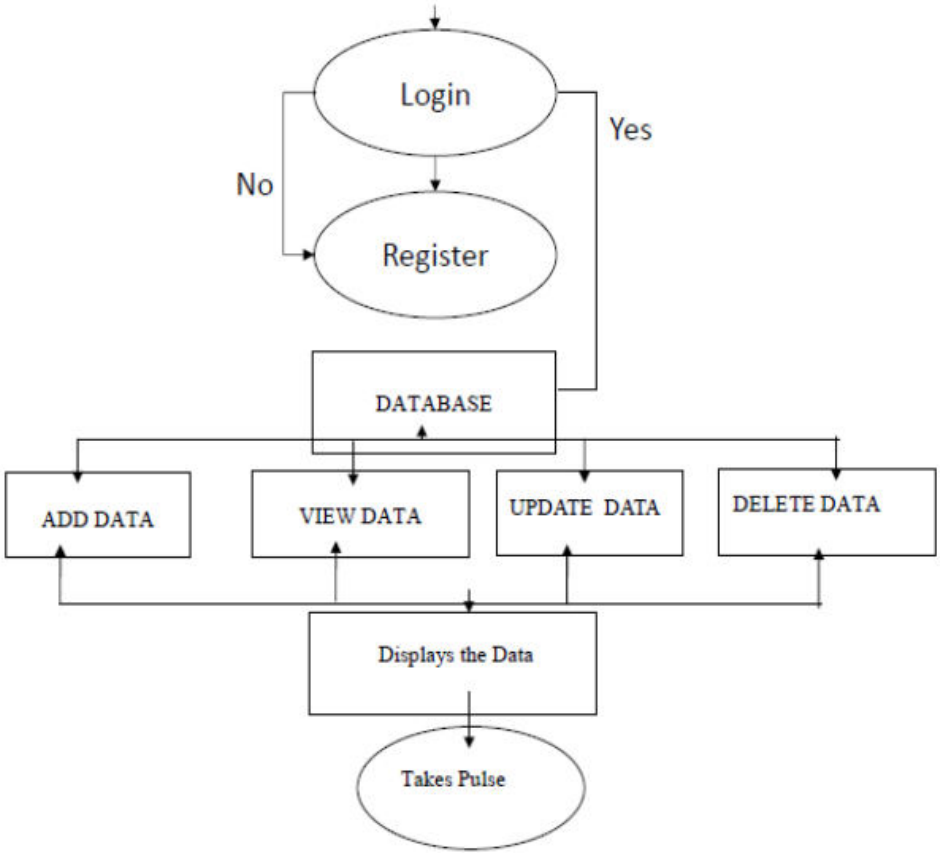

Fig 3.1 Flow of data for Pulse Rate reading system

3.3 Sensor Technology

Remote body sensors arrange (WBSN) is an exceptional reason sensor organize that fuses diverse systems and remote gadgets to empower remote observing for different crucial. Structure and usage of hardware installed framework for remote medicinal services observing. One of the focused on utilizations of WBSN is medicinal situations where states of vast number of patients are constantly being checked continuously. Remote observing of physiological.

signs of substantial number of patients is one of the present needs so as to convey an entire remote sensor arrange in human services framework. Such an application shows a few difficulties in programming and equipment plans. Some of them are as per the

following: dependable correspondence by wiping out crashes of two sensor signs and impedance from other outside remote gadgets, minimal effort, low power utilization, and giving adaptability to the patients. Structure and usage of remote sensors system and cloud based telemedicine framework for rustic facilities and wellbeing focuses. Universal Journal of Scientific and Engineering Research . A remote restorative sensor organize framework when executed in medicinal focuses has critical points of interest over customary wired-based patient-information gathering plans by giving better recovery and enhanced patient's personal satisfaction. Likewise a WBSN framework can possibly decrease the human services cost and additionally the remaining task at hand of medicinal callings, bringing about higher proficiency. "Wearable" sensors are smaller than expected electronic gadgets worn on the body, regularly incorporated with or intended to supplant existing medicinal adornments. This market section is blasting, empowered by Internet of Things innovation. A portion of the present patterns are savvy watches, brilliant glasses, and sports and wellness action trackers. Notwithstanding the buyer showcase, the restorative business is making the interest for gadgets that screen physiological conditions and capacities.

3.4 Communication Technology

The remote framework in WBSN utilizes restorative groups to acquire physiological information from sensor hubs. The medicinal groups are chosen to decrease obstruction and consequently increment the concurrence of sensor hub gadgets with other system gadgets accessible at therapeutic focuses. The gathered information is exchanged to remote stations with multi-bouncing method utilizing restorative entryway. The portal hubs associate the sensor hubs to neighborhood and the Internet for worldwide access. All things considered offices are as of now accessible in therapeutic focuses; restorative callings can get to patients' physiological flags anyplace in medicinal focus. The information can likewise be gotten to outside the medicinal focus as they will be made accessible on the Internet. Most well known remote correspondence advancements and conventions proposed in medicinal observing frameworks are recorded in Table 1. Existing checking frameworks utilize the short-go remote frameworks, for example.

Table 3.1 Use of wireless conventions in remote sensor organize applications.

Protocols	Zigbee	WiFi	RF
Operating power consumption	40 ma 3.3 V	300 ma 3.3 V	14 ma 3.3 V
Standby power consumption	15 ma	0.9 ma	7–11.3 ma
Interfacing type	UART	UART	UART
Standalone (used without external microcontroller)	No	Yes	No
Frequency	900–928 MHz	2.4 GHz	2.4 GHz
Communication type	m2m	p2p	m2m
Cose (LE)	420 LE	80 LE	35–150 LE

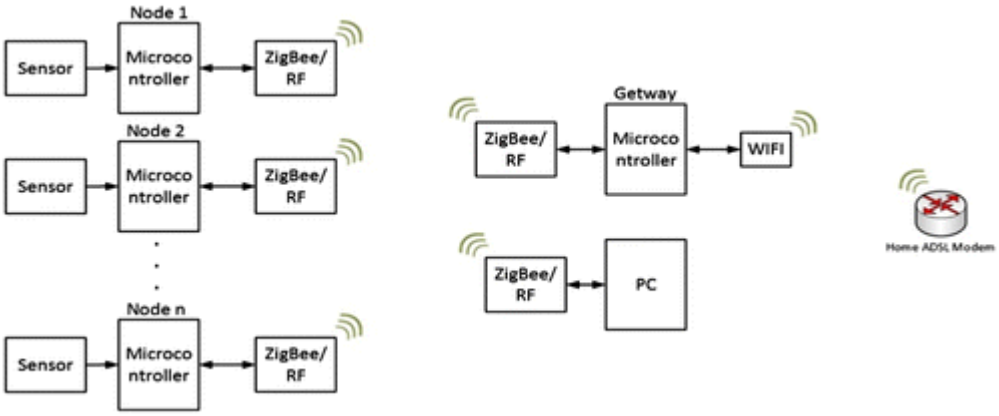

Figure 3.2 Use of ZigBee/RF convention in WSN.

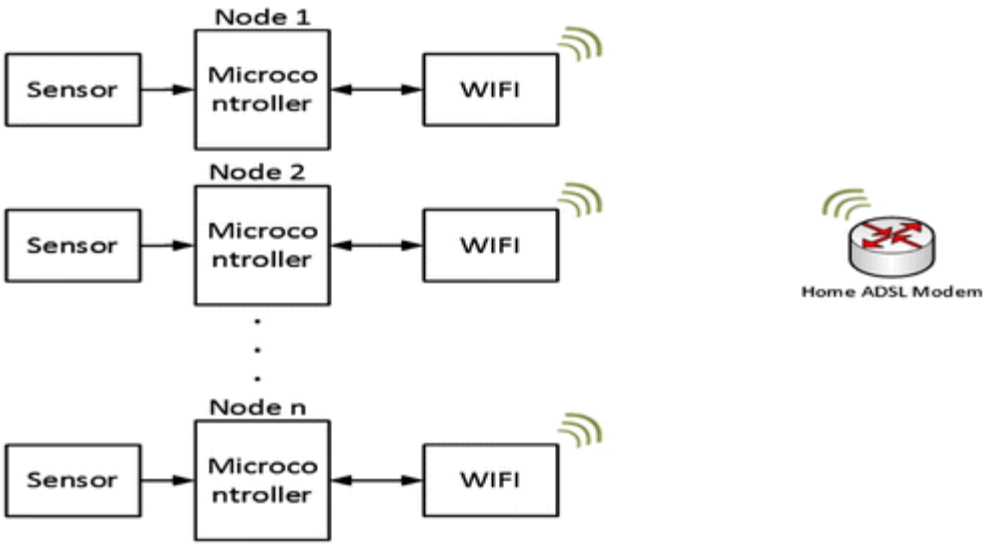

Figure:3.3 Usage of WiFi protocol in WSN.

3.5 Physiological parameters

The entire remote body-territory arrange depends on various frequencies so as to dispense with impedance issues and to apply to various conditions. We use MICS, WMTS and 433 ISM groups to identify signals from the sensors on the body. The objective in a WBAN application is to devote one sensor hub to one physiological flag to dispense with putting wires on the patient body. The physiological parameters that are observed are Electrocardiogram (ECG), pulse got from ECG motions by deciding the R-R interims, circulatory strain, body temperature, Galvanic Skin Response (GSR), Oxygen immersion in blood (SaO2), respiratory rate, Electromyography (EMG), Electroencephalogram (EEG) and three pivot development of the subject estimated utilizing an accelerometer. Figure 4 delineates the particulars of the physiological signs being particulars of the physiological signs being checked in telemedicine framework.

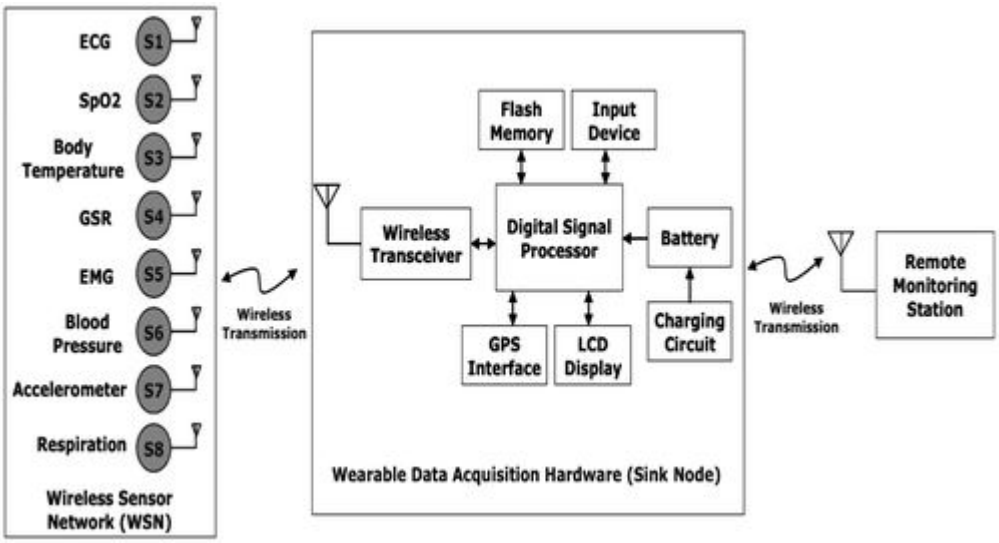

Figure:3.4 In general design of remote sensor arrange observing numerous channels all the while.

Be that as it may, there might be some clinical applications that require the observing of more channels of the equivalent physiological flag at the same time to give great quality screening. For the applications that require observing of more channels, for example, ECG/EEG/EMG, we consolidate the UWB innovation to accomplish high information rate remote connection [20] as appeared in Figure 5(a) and (b). We additionally prefer to call attention to that we are attempting to interface our gadgets with IEEE 802.15.4 (ZigBee) and WiFi connects to cover an expansive territory of body-region arrange. The choice of remote plans for sensor hubs will depend particularly on the condition that the sensor hubs will be utilized. Ultra wideband (otherwise called UWB or as computerized beat remote) is remote innovation for transmitting a lot of advanced information over wide range of recurrence groups with low power for short separation. Ultra wideband radio not exclusively can convey an immense measure of information over a separation up to 230 feet at low power (under 0.5 mW), however can help motions through entryways and different hindrances that will in general reflect signals at progressively constrained transmission capacities and higher power. Ultra wideband can be contrasted and another short-remove remote innovation, Bluetooth, which is a standard for interfacing handheld remote gadgets with other comparative gadgets and with work stations. UWB communicates computerized beats that are planned accurately on bearer

motion crosswise over wide range (number of recurrence channels) in the meantime. Transmitter and collector must be facilitated to send and get beats with a precision of trillionths of a second. On some random recurrence band that may as of now be being used, ultra wideband flag has less power than the ordinary and foreseen foundation commotion so hypothetically no impedance is conceivable. Time Domain, an organization applying to utilize the innovation, utilizes a microchip fabricated by IBM to transmit 1.25 million bits for each second, however says there is the potential for information rate in the billions of bits for every second.

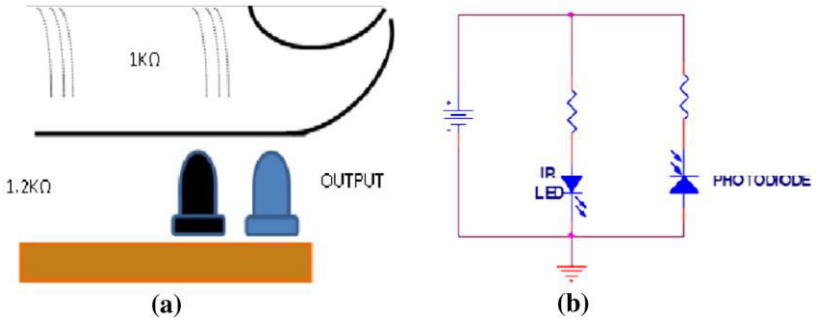

Figure 3.5 (a) Fingertip heartbeat sensor and (b) Circuit diagram of fingertip sensor**.**

3.6 Proposed design of heart rate sensor node

The body-zone arrange prototyping framework exhibited utilizes multi-jumping structure where the MICS band is utilized for social event signals from sensors and WMTS is utilized to transmit the sensor information to remote stations permitting longer range observing. These recurrence groups are universally accessible and are allowed for remote observing of a few patients all the while. The MICS band has low emanation control (25 μW, similar to UWB) prompting lower control utilization, and will in this manner give a standout amongst the most appropriate transmission groups for therapeutic sensor hubs. In spite of the fact that a couple of episodes have been accounted for because of the impedance from some nearby TV stations in USA, WMTS is as yet the most prominent band for remote telemetry utilized in healing centers. Execution investigation of low rate remote advances for restorative applications. PC Communications, The MICS directions necessitate that the yield intensity of any terminal must be held under −16dBm and isn't proposed for long-extend remote associations. Low information rate ultra wideband ECG

checking framework. In IEEE Engineering in Medicine and Biology Society Conference for therapeutic sensor body region organizing. To encourage a long-go correspondence, a WMTS connect working in the 608– 614 MHz band is utilized between the CCU and the base station taking into account any longer range. This suggests the middle of the road CCUs must have the capacity to work both at MICS and WMTS frequencies, giving connection between the hubs and the PC. The CCU stays in short proximity with the patient and might be joined to their belt for instance when it is for individual use. The ostensible remote separation for the MICS connect is around 10 m. The WMTS interface focuses on a separation in excess of 100 m.

Sensor hubs are intended to gather crude signs from human body. The flag from human body is typically feeble and combined with commotion. In the first place, the flag ought to experience enhancement and sifting procedure to build the flag quality, and to expel undesirable flags and commotion. After which, it will experience Analog to Digital transformation (ADC) stage to be changed over into computerized for advanced handling. The digitized flag is then handled and put away in the microchip. The chip will at that point pack those information and transmit over the air through transmitter (see Figure 3.6). The outline of Pulse Rate Sensor Node is appeared in Figure 3.6 As can been seen, the beat rate sensor hub involves. Microcontroller PIC16F877 and the handset AMIS-5210 are chosen in the task in view of the accompanying reasons: low-control utilization, measure, and the reasonableness working at the MICS band and for the physiological information handling. Figure 6 demonstrates the equipment usage of sensor hubs. Both temperature and heartbeat rate sensor hubs were based on normal PCB circuit. In this manner the hardware can be utilized tradable. The recieving wires for this task are planned as circle printed around the prototyping sheets (Figure 3.7). Equipment usage of Pulse Rate Sensor Node is appeared in Figure 3.8 The CCU likewise requires a miniaturized scale controller and a remote handset chip to facilitate all exercises like the sensor hubs.

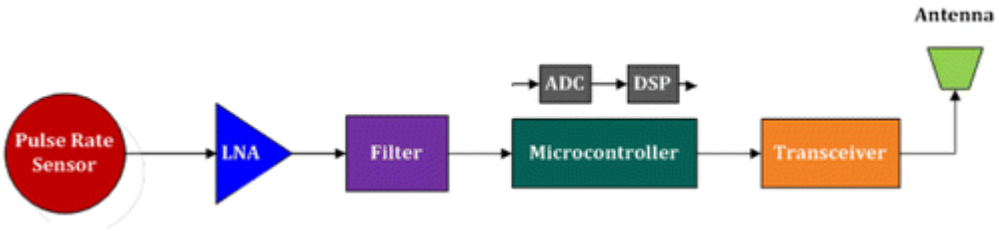

Figure 3.6 Block diagram of node pulse rate sensor.

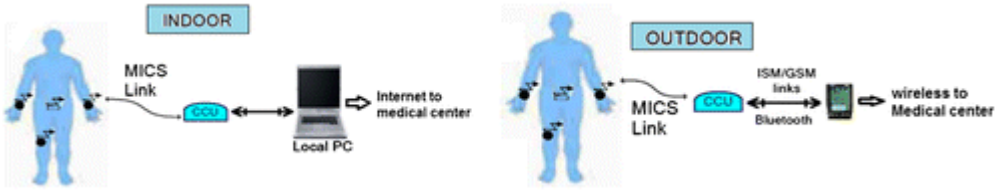

Figure 3.7 CCU boards

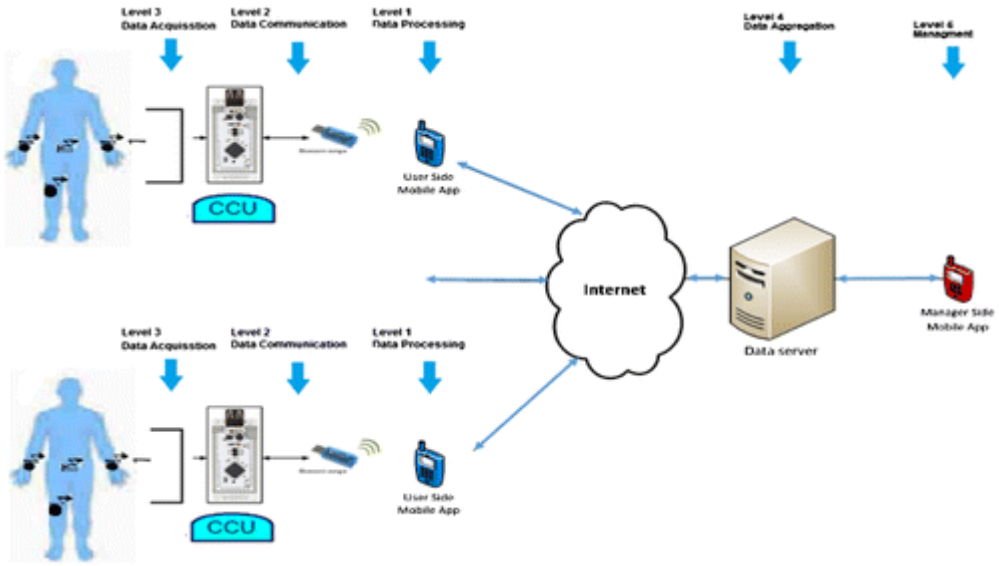

Figure 3.8 Setup of multi-persistent body sensor arrange framework, live checking of multi-patients.

The CCU equipment is made of the equivalent handset chip from AMI semiconductor (AMI52100 IC) and the microcontroller PIC16F87 [23]. The focused on remote separation among sensors and the CCU (the MICS connect) is 1– 10 meters. The CCU would thus be able to be situated at the midriff of the patient or at an effectively open

place.

(a) Central Control Unit (CCU) hardware designs

Two diverse CCU sheets are intended to understand the situations given in Figure 6. One CCU is intended to be associated with PC by means of the USB port Figure 7(a). The other CCU given in Figure 7(b) works as halfway gadget (i.e. remote entryway) that exhibits the WMTS remote connection. Albeit both CCUs can be utilized for different patients observing, the first CCU type can likewise be helpful for private use at patients' home or for single patient checking in clinic. It can get the physiological flags specifically from sensors without utilizing the door CCU.

The equipment for CCUs requires microcontroller and remote handset to organize every one of the exercises, like sensor sheets. The CCU-1/sensor hubs comprise of handset (AMI52100IC) from AMI semiconductor utilized for the MICS band age (we likewise utilized CC1000 in some sensor hubs to produce 433 MHz ISM and WMTS groups for sensors-CCU remote associations) and the microcontroller-PIC16F887. Notwithstanding these chips, we utilize another handset CC1010 chip from Chipcon (this chip contains CC1000 and a microcontroller worked in) on the middle of the road CCU board (CCU-2) to get remote transmission and systems administration with the WMTS band. The CC1010 and CC1000 handset chips can be arranged to transmit anyplace inside 300 and 1,000 MHz frequencies. They have been customized to work with one of WMTS groups in our model framework. The remote chips AMI52100 IC and CC1000 are chosen in the undertaking due to the accompanying reasons: by and large cost sparing, low-control utilization, size, and reasonableness of working at the MICS, WMTS, and 433MHzISM groups. AMIS has information rate ability of 19 kbps while CC1010 gives 76 kbps. The proposed sensor board incorporates handsets, microcontroller and sensor front-end gadgets, expends intensity of 90 mW for transmit mode and under 30 mW for get mode while working with supply voltage of 3.3 V.

(b) Database, software programs and monitoring:

Since all sensor hubs of body are speaking with the equivalent CCU, the information is prefixed with identifier that is utilized to recognize wellspring of information. To

decrease impacts further between information sent, a firmware (media get to layer (MAC) convention) is composed to control information transmissions. The correspondence among sensors and CCU is bidirectional as to help multi client (i.e. multi-understanding) correspondences.

3.7 Simulation

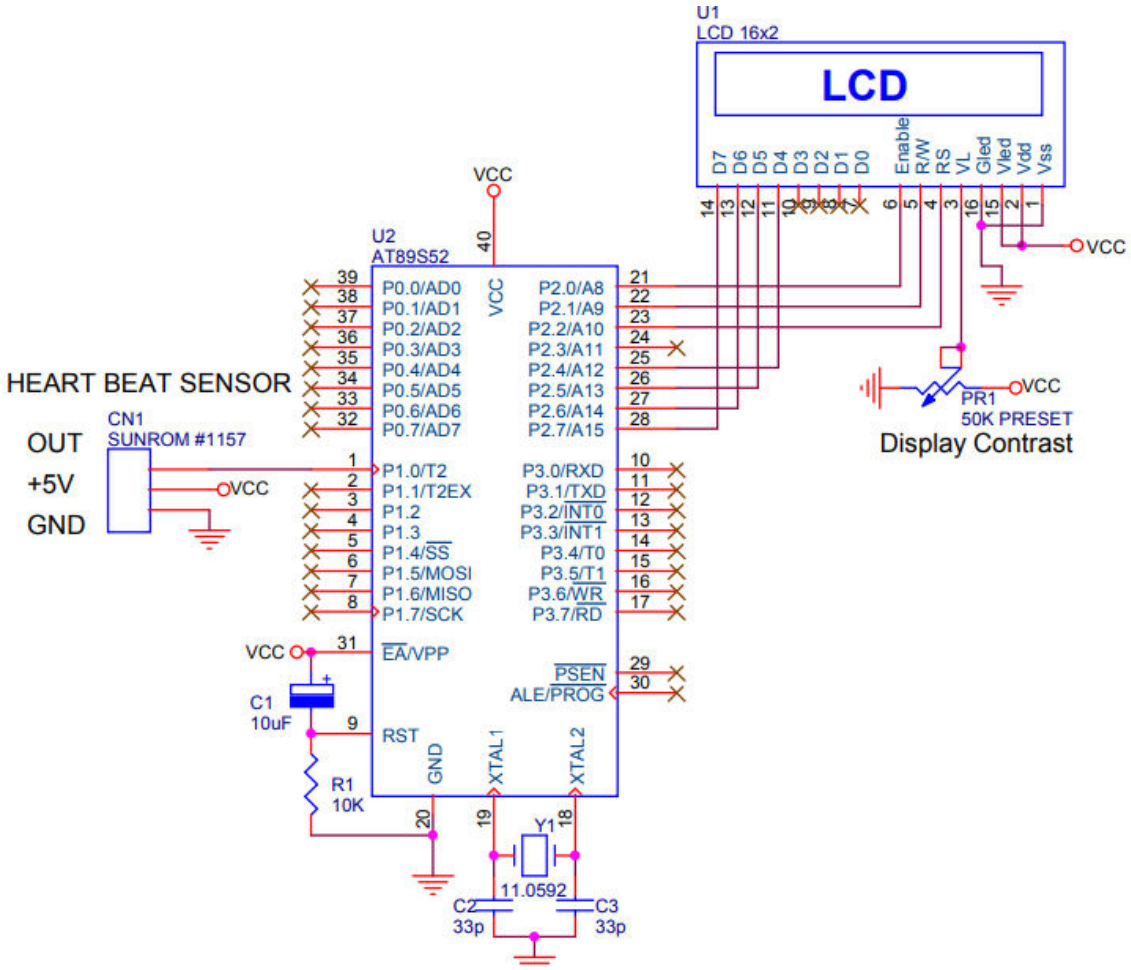

Fig.3.9 Simulation

3.8 Summary

This paper shows the utilization of Heart rate sensor as a key foundation empowering subtle, ceaseless, walking wellbeing checking. This new innovation can possibly offer a wide scope of advantages to patients, therapeutic work force, and society through

persistent observing in the mobile setting, early location of strange conditions, regulated recovery, and potential learning revelation through information mining of all assembled data We have tended to a few key specialized issues, for example, sensor hub equipment design, programming engineering, arrange time synchronization, and vitality protection. Moreover, further investigations of various medicinal conditions in clinical and wandering settings are important to decide explicit confinements and conceivable new uses of this innovation. It is required to propel the field toward clinical arrangement of wearable sensors and frameworks is talked about.

CHAPPTER 4

HARDWARE DEVELOPMENT

4.1 Introduction

For simply the IoT ability of this task, you just need an ESP8266 module and the Easy Pulse sensor. On the off chance that you like to show the PPG waveform and heartbeat rate locally, you will likewise require an ILI9341-based TFT LCD. You would likewise need to peruse my Tutorial 7 on the best way to utilize an ILI9341 TFT show with ESP8266. For outline of this undertaking, I am utilizing EasyESP-1 board. However, you can do this with NodeMCU or some other ESP8266 breakout board that has satisfactory GPIOs to drive the TFT and access to the ESP8266 simple information.

4.1.1 NodeMCU

The ESP8266 is the name of a smaller scale controller structured by Expressive Systems. The ESP8266 itself is an independent WiFi organizing arrangement offering as an extension from existing smaller scale controller to WiFi and is additionally equipped for running independent applications. This module goes with a verifiable USB connector and a rich gathering of stick outs. With a little scale USB connect, you can relate NodeMCU devkit to your workstation and glint it with no bother, much equivalent to Arduino. It is in like manner immediately breadboard all around arranged.

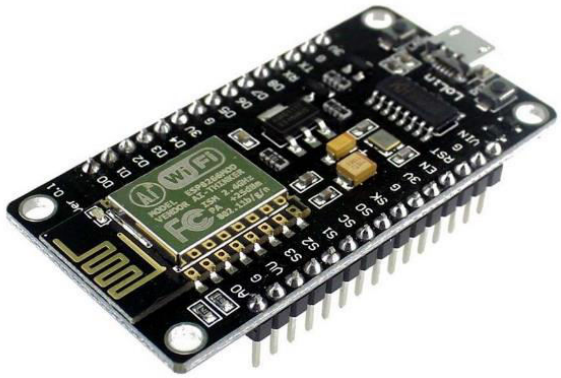

Fig.4.1: Node MCU (ESP8266)

4.1.2 Specification

- Voltage:3.3V.
- Wi-Fi Direct (P2P), delicate AP
- Current utilization: 10uA~170mA.
- Flash memory connectable: 16M B max (512K ordinary).
- Integrated TCP/IP convention stack
- Processor: Tensilica L106 32-bit.
- Processor speed: 80~160MHz.
- RAM: 32K + 80K.
- GPIOs: 17 (multiplexed with different capacities).
- Analog to Digita l: 1 contribution with 1024 stage goals.
- +19.5dBm yield control in 802.11b mode
- 802.11 bolster: b/g/n.
- Maximum simultaneous TCP associations: 5.

4.1.3 ESP8266 ESP-12Q Node MCU Schematic

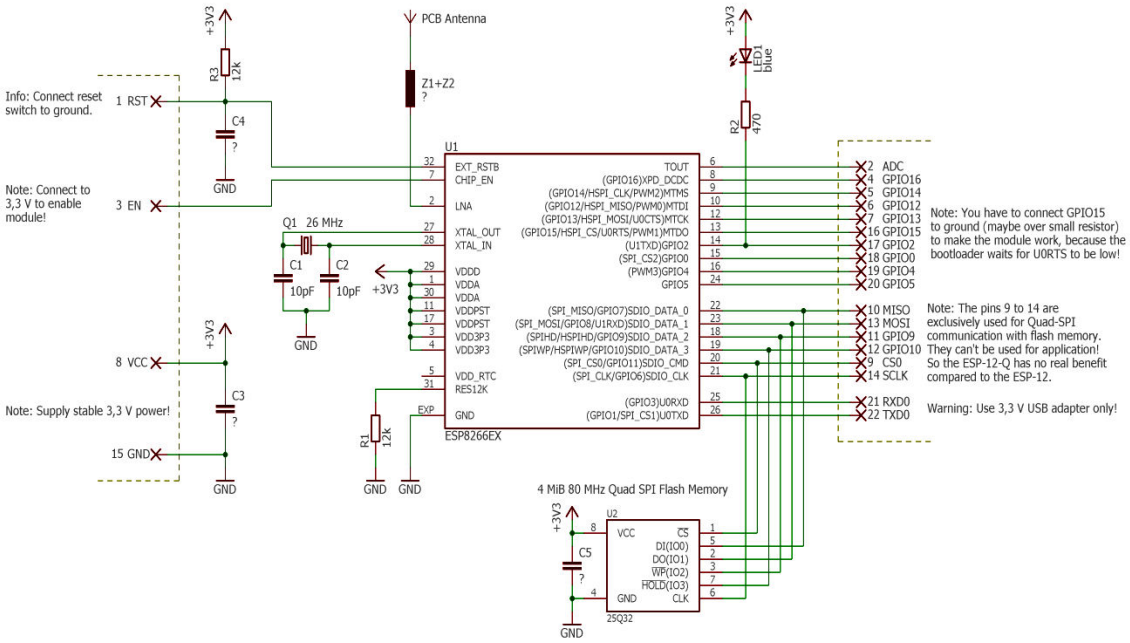

Fig.4.2: Circuit Diagram of ESP8266 ESP-12Q Node MCU

4.1.4 Pin Configuration

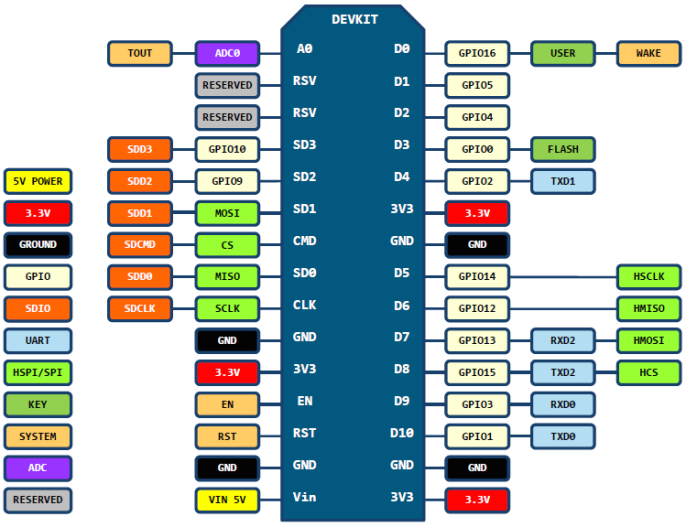

Fig:4.3: Pin Configuration of ESP8266 ESP-12Q Node MCU

4.1.5 Pin Definition

Table 4.1: Pin Definition of ESP8266 ESP-12Q Node MCU

Pin Name	Normally Used For	Alternate Purpose
Ground	Connected to the ground pin of the circuit.	–
TX	Connected to Rx pin of programmer/uc to upload program.	Can act as a General purpose Input/output pin when not used as TX
GPIO-2	General useful Input/output pin.	**-**
CH_EN	Chip Enable -Active high	-
RX	General useful Input/output pin.	Can go about as a General reason Input/output pin when not utilized as RX

4.1.6 Where to use ESP8266

The ESP8266 is an exceptionally easy to understand and minimal effort gadget to give web availability to your tasks. The module can work both as an Access point (can make hotspot) and as a station (can associate with Wi-Fi), henceforth it can without much of a stretch bring information and transfer it to the web making Internet of Things as simple as could be expected under the circumstances. It can in like manner get data from web using API's along these lines your endeavor could get to any information that is available in the web, subsequently making it increasingly shrewd. Another empowering segment of this module is that it will in general be changed using the Arduino IDE which makes it substantially more straightforward. Anyway this form of the module has just 2 GPIO pins (you can hack it to utilize something like 4) so you have to use it close by another microcontroller like Arduino, else you can look onto the more autonomous ESP-12 or ESP-32 versions. So if you are scanning for a module in any case IOT or to give web accessibility to your endeavor then this module is the right choice for you.

4.1.7 How to use the ESP8266 Module

There are such huge numbers of techniques and IDEs accessible to with ESP modules, however the most normally utilized on is the Arduino IDE. So given us a chance to talk about just about that further underneath. The ESP8266 module works with 3.3V just, anything over 3.7V would murder the module consequently be alerts with your circuits. The most ideal approach to program an ESP-01 is by utilizing the FTDI board that bolsters 3.3V programming. On the off chance that you don't have one it is prescribed to get one or for time being you can likewise utilize an Arduino load up. One normally issue that each one appearances with ESP-01 is the controlling up issue. The module is a bit control hungry while programming and thus you can control it with a 3.3V stick on Arduino or simply utilize a potential divider. So it is vital to make a little voltage controller for 3.31v that could supply at least 500mA. One suggested controller is the LM317 which could deal with the activity effectively. An improved circuit outline for utilizing the ESP8266-01 module is given underneath.

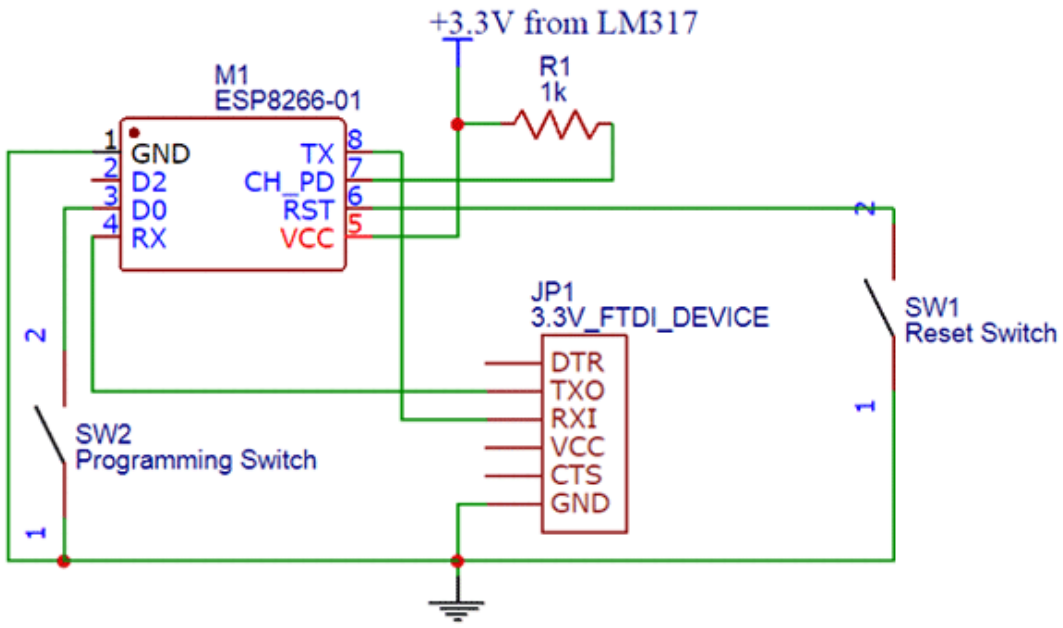

Fig.4.4: ESP8266 Serial Configuration

The switch SW2 (Programming Switch) ought to be held squeezed to hold the GPIO-0 stick to ground. Along these lines we can go into the programming mode and transfer the code. When the code is discharged the switch can be discharged.

4.2 Heart Beat Sensor

Heart beat sensor is intended to give computerized yield of warmth beat when a finger is put on it. At the point when the heart beat indicator is working, the beat LED flashes as one with every heart beat. This computerized yield can be associated with microcontroller specifically to gauge the Beats Per Minute (BPM) rate. It takes a shot at the standard of light regulation by blood course through finger at each heartbeat.

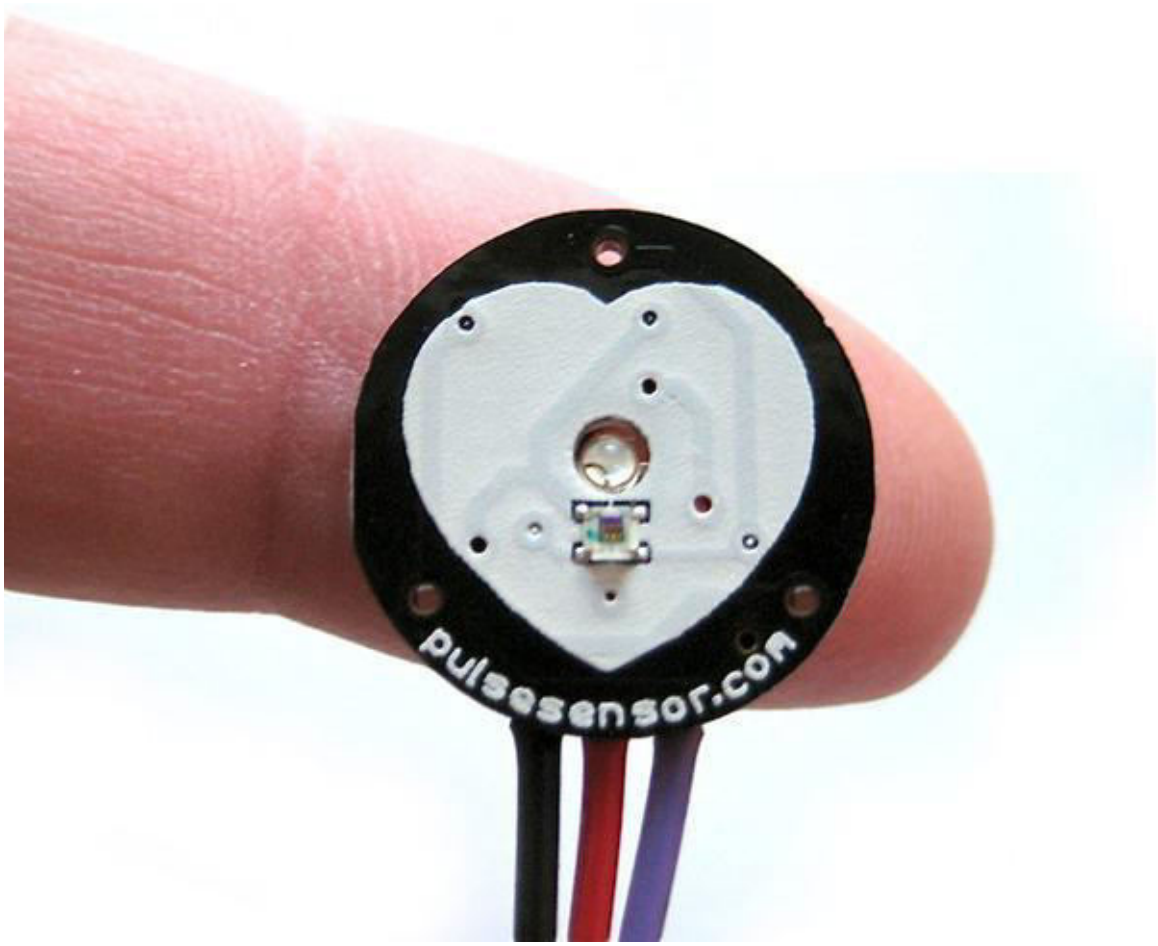

Fig.4.5 Heart Beat Sensor

4.2.1 Features

- Warmth beat sign by LED.
- Instant yield computerized motion for straightforwardly interfacing with microcontroller. Compact Size .Working Voltage +5V DC.

4.2.2 Applications

- Advanced Heart Rate screen.
- Patient Monitoring System.
- Bio-Feedback control of mechanical technology and applications.

4.2.3 Specification

Table 4.2 Specification Value of Heart Rate

Parameter	Value
Working Voltage	+5V DC regulated
Working Current	100 Ma
Data Level	5V TTL level
Heart Beat Detection	Indicated by LED and Output High Pulse
Light Source	660nm Super Red LED

4.2.4 Pin Details

Board has 3-stick connector for utilizing the sensor. Subtleties are set apart on PCB as underneath.

Table 4.3 Pin Details Name

PIN	NAME	DETAILS
1	+5V	Power supply input
2	OUT	High output
3	GND	Power supply GND

4.2.5 Heart beat output signal

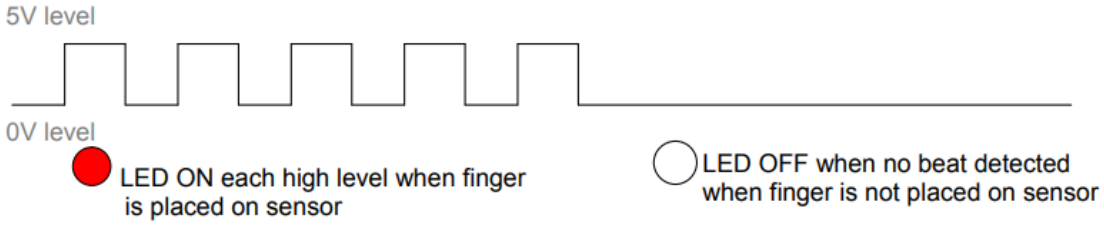

Fig.4.6 Heart Beat Sensor signal output

4.2.6 Working

Board has 3-stick connector for utilizing the sensor. Subtleties are set apart on PCB as below.The sensor comprises of a too brilliant red LED and light identifier. The LED should be too brilliant as the most extreme light should pass spread in finger and recognized by locator. Presently, when the heart siphons a beat of blood through the veins, the finger turns out to be marginally progressively hazy thus less light achieved the finder. With every heart heartbeat the identifier flag differs. This variety is changed over to electrical heartbeat. This flag is enhanced and activated through an enhancer which yields +5V rationale level flag. The yield flag is additionally shown by a LED which flickers on every heart beat.

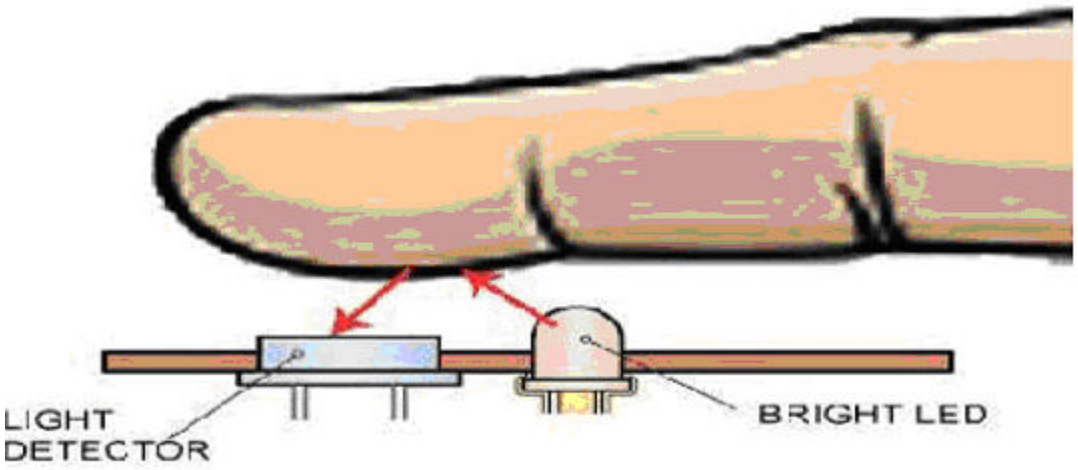

Fig.4.7 Sensor Principle

4.3 Introduction of Display

Alphanumeric showcases are utilized in a wide scope of uses, including palmtop PCs, word processors, printers, purpose of offer terminals, therapeutic instruments, mobile phones, and so forth. The 16 x 2 canny alphanumeric speck lattice show is fit for showing 224 unique characters and images. A full rundown of the characters and images is imprinted on pages 7/8 (take note of these images can shift between brand of LCD utilized). This booklet gives all the specialized determinations to associating the unit, which requires a solitary power supply (+5V).

A 16x2 LCD implies it can show 16 characters for every line and there are 2 such lines. In this LCD each character is shown in 5x7 pixel grid. This LCD has two registers, to be specific, Command and Data. The direction enlist stores the order guidelines given to the LCD. An order is a guidance given to LCD to complete a predefined errand like introducing it, clearing its screen, setting the cursor position, controlling presentation and so forth. The information enroll stores the information to be shown on the LCD. The information is the ASCII estimation of the character to be shown on the LCD. Snap to take in more about inside structure of a LCD.[11].

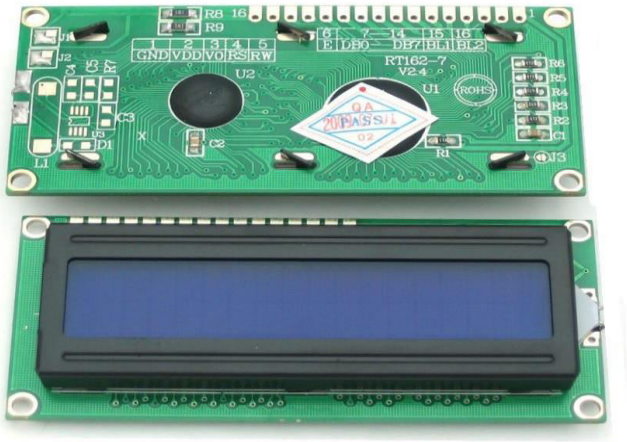

Fig 4.8: LCD (1602A)

4.3.1 Feature

i. 5 x 8 specks with cursor.
ii. Builtin controller (KS 0066).

iii. + 5V control supply (+ 3V).
iv. 1/16 obligation cycle.
v. B/L to be driven by stick 1, stick 2 or stick 15, stick 16 or A.K (LED) .
vi. N.V. discretionary for + 3V control supply.

4.4 Mechanical Data

Table: 4.4 Mechanical Data

Item	Standard Value	Unit
Module Dimension	80.0 x 36.0	Mm
Viewing Area	66.0 x 16.0	Mm
Dot Size	0.56 x 0.66	Mm
Character Size	2.96 x 5.56	Mm

4.5 Absolute Maximum Rating

Table: 4.5 Absolute Maximum Rating

ITEM	Symbol	Standard Value			UNIT
		MIN.	TYP.	MAX.	
Power Supply	VDD-VSS	- 0.3	–	7.0	V
Input Voltage	VI	- 0.3	–	VDD	V

NOTE: VSS = 0 Volt, VDD = 5.0 Volt

4.6 Electrical Specifications

Table: 4.6 Electrical Specifications

Item	Symbol	Condition		Standard Value			Unit
				Min	Typ	Max	
Supply Voltage	VDD	VDD = + 5V		4.7	5.0	5.3	V
		VDD = + 3V		2.7	3.0	5.3	V
Input Current	IDD	VDD = 5V		-	1.2	3.0	V
Prescribed LC Driving Voltage for Normal Temp. Rendition Module.	VDD-V_0	- 20 °C		-	-	-	V
		0°C		4.2	4.8	5.1	
		25°C		3.8	4.2	4.6	
		50°C		3.6	4.0	4.4	
		70°C		-	-	-	
LED Forward Voltage	VF	25°C		-	4.2	4.6	V
LED Forward Current	IF	25°C	Array	-	130	260	mA
			Edge	-	20	40	
EL Power Supply Current	IEL	Vel = 110VAC: 400Hz		-	-	5.0	Ma

4.7 116 x 2 Character LCD Pin Connection

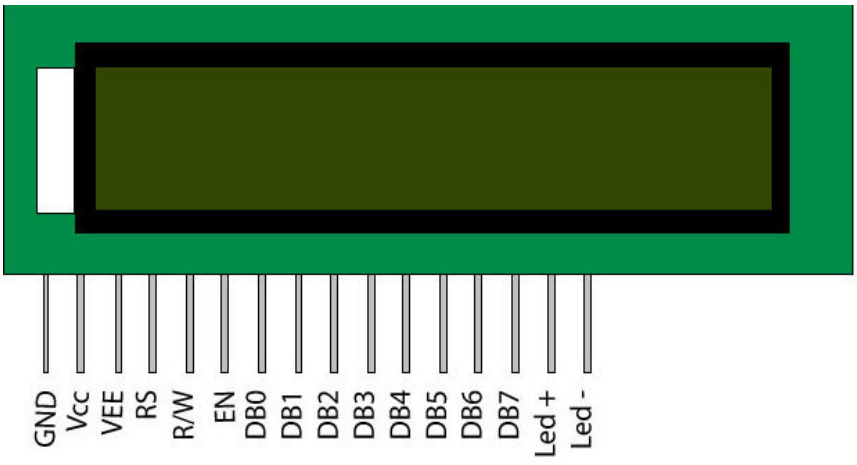

Fig 4.9: LCD Pin Connection

4.8 116 x 2 Character LCD Pin Configuration

Table: 4.7: 116 x 2 Character LCD Pin Configuration

Pin Number	Symbol	Function
1.	Vss	GND
2.	Vdd	+ 3V or + 5V
3.	V_0	Contrast Adjustment
4.	RS	H/L Register Select Signal
5.	R/W	H/L Read/Write Signal
6.	E	H-L Enable Signal
7.	DB0	H/L Data bus line
8.	DB1	H/L Data bus line
9.	DB2	H/L Data bus line
10.	DB3	H/L Data bus line
11.	DB4	H/L Data bus line
12.	DB5	H/L Data bus line
13.	DB6	H/L Data bus line
14.	DB7	H/L Data bus line
15.	A/Vee	+ 4.2V for LED/Negative voltage output
16.	K	Power supply for B/L (OV)

4.3 Summary

To direct this task we require sensors with the goal that we can screen the wellbeing state of the elderly individuals. So as to do as such, we picked four unique criteria's to screen the elderly individuals. The four criteria's we picked are body temperature, beat rate of the host, to what extent the individual is resting and the quantity of time an individual is utilizing the latrine along these lines computing how much time the host is spending there. In this way, for those four criteria's we picked the accompanying sensors.

CHAPTER 5

RESULTS AND DISCUSSIONS

5.1 Introduction

In this section in the wake of actualizing the code we will talk about how it is shown in the Think talk record of a client and how response or input is sent on the email and twitter. The information's we got in the wake of transmitting is spared in the billow of Think talk server and from that point with the assistance the highlights gave from Think talk we can show information and show in display of the device.

5.2 Result

The main cost that was required for our undertaking was the equipment cost, on the other had whatever other task that was directed was required all the more exorbitant equipment with progressively constrained highlights, similar to the Massimo Radical-7 and Free Scale Home Health Hub reference stage. Thus, it is sheltered to state that our task is savvier, with more highlights.

5.2.1 Result Web Display

In the Think talk server it takes 15 second postponements for every datum passage. The information entered in the capacity is then graphically depicted in the showcase. The information entered in the capacity is channel and field explicit. That implies it will go the explicit field of that channel that is given by the client. For, accommodation of the specialist of the elderly we opened a different channel for them. The patient who is under perception of that specialist is then put on various fields of that specialist's channel. The accompanying figure indicates it.

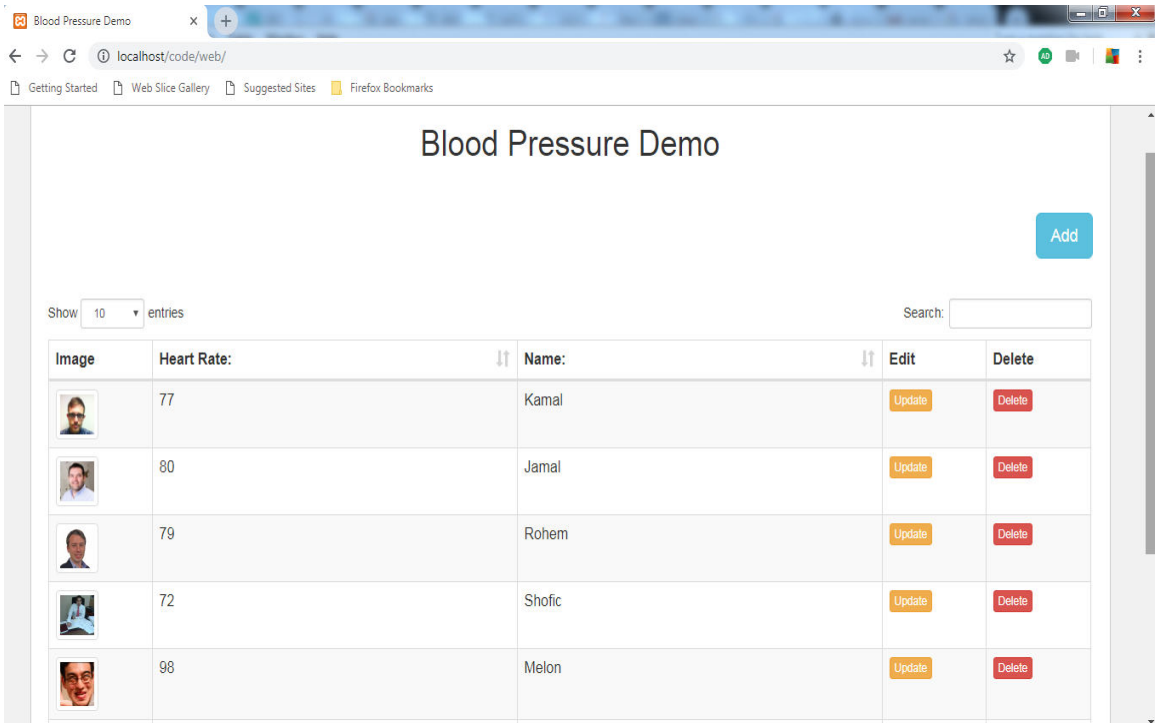

Fig 5.1 Different Channels for Doctors Channel

We gave different specialists for this situation for various hosts. Furthermore, the presentation is totally security ensured. That is, the client can keep the channel open for open review or it tends to be made private survey for comfort. Subsequent to choosing the predefined channel the client can see the accompanying field of the host's day by day refreshed diagrams for observing.

5.2.2 Display of Device

Fig:5.2 single device for single Patient

5.3 Description

In this task we will make a Heart Beat Detection and Monitoring System utilizing Arduino that will recognize the heart beat utilizing the Pulse Sensor and will demonstrate the readings in BPM (Beats Per Minute). It will likewise send the readings to Thing Speak server utilizing the Wi-Fi Bee module ESP8266, with the goal that Heart Beats can be checked from anyplace on the planet over the web. Thing Speak is an extraordinary hotspot for showing the information on the web and you can get to the information from Thing Speak whenever and at wherever.

5.4 Summary

In the Think talk server it takes 5 second postponements for every datum section. The information entered in the capacity is then graphically depicted in the showcase. The information entered in the capacity is channel and field explicit. That implies it will go the explicit field of that channel that is given by the client. For, accommodation of the specialist of the elderly we opened a different channel for them. The patient who is under perception of that specialist is then set on various fields of that specialist's channel. The accompanying figure demonstrates it.

CHAPTER 6

CONCLUSIONS

6.1 Introduction

Our primary target in this undertaking was to effectively screen the fundamental four criteria's specifically temperature, beat, utilizing of can and rest and respond amid crisis circumstance with no human collaboration. We needed to make a blemish on the field of IoT with the wellbeing division. With the ascent of IoT, the time of innovation is moving towards a far predominant measurement. So as to keep pace with the new advances, this task can beyond any doubt clear a path for the progression in this segment. In spite of the fact that our model is tried and executed, it will be hard to proceed with the undertaking without unrivaled quality equipment bolster alongside a great deal of new mix. The genuine advantage of this work must be completely acknowledged when it very well may be executed in full scale.

6.2 Challenges

There are three essential difficulties we look amid the venture execution.

6.2.1 ESP-8266 WiFi Module

The wifi module works in its very own particular dialect. Along these lines, we needed to confront a great deal issue in regards to the methods for its dialect. Once in a while the wifi module itself can't with the nearby system therefore the information sending got hindered numerous multiple times. Along these lines, a superior equipment bolster for wifi module is relied upon to send information easily.

6.2.2 Pulse Sensor

The information that is recovered from the beat sensor can give some blunder perusing at

times. Because of inaccessibility of better heartbeat sensor in our nation we needed to arrange it from USA. What's more, the information correlation of the nearby and outside sensor was detectable. This deferred our usage of the task somehow or another as heartbeat sensor is an indispensable piece of this venture.

6.2.3 Data Analysis and React

The information examination with MATLAB of Think talk and respond of the Think talk gave us a few difficulties. Particularly with caution message, it was hard to connect with the Push Inbox and with twitter.

6.3 Piece of Equipment or Facility

Made for full design which equipment manage for us that is the same china product same. But from this we get some facilities like as markets products. That device available most chip rate from the markets equipment. The details of the coast is given below.

6.1 IOT Based Heart Rate Monitoring System.

Table.6.1 Equipment cost

Se. No	Equipment Name	Cost
1	NodeMCU	450৳
2	Heartbeat sensor	120৳
3	LED (16x2)	120৳
4	Some fiberglass	15৳
	Total = 705৳	

Fig:6.2 IOT Based portable home digital blood pressure hospital heart rate used in the real life from china product.

The price of this product, all most 2000৳.

6.4 Future Scopes of the Work

- Integrating more sensors for increasingly explicit information obtaining and investigation.

- Will be pertinent in armed force benefits in dynamic circumstance.
- Will be utilized to give wellbeing administration to rustic zones in reasonable cost.
- Huge database will be worked for specialists to analyze individuals from various regions and societies.

Our undertaking can be considered as stage to create in the field of IoT on the wellbeing division. In creating nations like our own, this sort of inventive and practical task can enhance the eventual fate of innovation. In this way, we are anticipating actualize the venture so as to have an effect in the new period of innovation.

6.5 Summary

Our task can be considered as stage to create in the field of IoT on the wellbeing segment. In creating nations like our own, this sort of inventive and financially savvy task can enhance the fate of innovation. In this way, we are anticipating execute the undertaking so as to have an effect in the new period of innovation.

REFERENCES

[1] Gomez, C.; Paradells, J., Wireless home automation networks: A survey of architectures and technologies, IEEE Communications Magazine, vol.48, no.6, pp.92,101, June 2010 **(1.1)**

[2] Alam, M.R., Reaz, M.B.I., Ali, M.A.M., A Review of Smart HomesłPast, Present, and Future, IEEE Transactions on Systems, Man, and Cybernetics, Part C: Applications and Reviews, vol.42, no.6, pp.1190,1203, Nov. 2012 **(1.3)**

[3] Magno, M.; Polonelli, T.; Benini, L.; Popovici, E., A Low Cost, Highly Scalable Wireless Sensor Network Solution to Achieve Smart LED Light Control for Green Buildings, IEEE Sensors Journal, , vol.15, no.5, pp.2963,2973, May 2015 **(4.7, 4.6)**

[4] J. Byun, I. Hong, B. Lee, and S. Park, Intelligent household LED lighting system considering energy efficiency and user satisfaction, IEEE Transactions on Consumer Electronics, vol. 59, no. 1, pp. 70C76, Feb. 2013. **(4.8)**

[5] B.M. Van Der Werff, X. GUI and W.L. Xu.,A MOBILE- BASED HOME AUTOMATION SYSTEM, 2nd International conference on mobile technology, Applications and systems ,Pp1-5,2005. **(4.2)**

[6] Haidong Wang; Saboune, J.; El Saddik, A., ”Control your smart home with an autonomously mobile smartphone,” IEEE International Conference on Multimedia and Expo Workshops (ICMEW), vol., no., pp.1,6, 15-19 July 2013 **(4.3)**

[7] Wong, E.M.C., A phone-based remote controller for home and office automation, IEEE Transactions on Consumer Electronics, vol.40, no.1, pp.28,34, Feb 1994 **(4.5)**

[8] I. Coskun and H. Ardam, A remote controller for home and of-
fice appliances by telephone, IEEE Trans. Consumer Electron., vol. 44, no. 4, pp.1291-1297. Nov. 1998. **(4.2)**

[9] B. Koyuncu, PC remote control of appliances by using telephone lines, IEEE Trans. Consumer Electron., vol. 41, no. 1, pp. 201-209, Feb. 1995. **(4.2)**

[10] N. S. Liang, L. C. Fu, and C. L. Wu, An integrated, flexible, and Internet-based control architecture for home automation system in the Internet era, Proceedings of ICRA02, IEEE International Conference on Robotics and Automation, vol. 2,pp. 1101-1106, 2002. **(5.1)**

[11] R. J. C. Nunes and J. C. M. Delgado, An Internet application for home automation, MELECON 2000, 10th Mediterranean Electrotechnical Conference, vol. 1, pp. 298-301, 2000. **(1.2)**

[12] P. M. Corcoran, F. Papai and A. Zoldi, User interface technologies for home appliances and networks, IEEE Trans. Consumer Electron. , vol. 44, No. 3, pp. 679-685, Aug. 1998. **(6.1)**

[13] K. Tan , T. Lee and C. Y. Soh, Internet-Based Monitoring of Distributed Control Systems-An Undergraduate Experiment, IEEE Transactions on Education, vol. 45, no. 2, 2002 **(4.1)**

[14] C. C. Ko , B. M. Chen , S. Hu , V. Ramakrishnan , C. D. Cheng, Y. Zhuang and J. Chen, A Web-Based Virtual Laboratory on a Frequency Modulation Experiment, IEEE Transactions on Systems, Man, and Cybernetics-Part C: Application and Reviews, vol. 31, no. 3, pp.295 -303 2001 **(6.3)**

[15] N. Swamy , O. Kuljaca and F. Lewis, Internet-Based Educational Control Systems Lab Using Net-meeting, IEEE Trans action on Education, vol. 45, no. 2, pp.145 -151 2002 **(6.1)**

[16] P. Lin and H. Broberg, HVAC Applications, IEEE Industry Applications Magazine, pp.49 -54 2002 **(1.3)**

[17] Alkar, A.Z.; Buhur, U., An Internet based wireless home automation system for multifunctional devices, IEEE Transactions on Consumer Electronics, vol.51, no.4, pp.1169,1174,Nov. 2005. **(6.3)**

[18] Piyare, R.; Tazil, M., IoT based home automation system using cell phone, 2011 IEEE 15th International Symposium on Consumer Electronics (ISCE), vol., no., pp.192,195,14-17 June 2011. **(2.1)**

[19] Al-Ali, A.R.; AL-Rousan, M., Java-based home automation system, IEEE Transactions on Consumer Electronics, vol.50, no.2, pp.498,504, May 2004. **(3.1)**

[20] Gill, K.; Shuang-Hua Yang; Fang Yao; Xin Lu, A zigbee based home automation system, IEEE Transactions on Consumer Electronics, vol.55, no.2, pp.422,430, May 2009. **(3.2)**

Appendix

Web

```
 int Pulse_rate = 0;
const int T = 550;
 int value ;
#include <Wire.h>
#include <LiquidCrystal_I2C.h>
LiquidCrystal_I2C lcd(0x3F, 16, 4);
#include <ESP8266WiFi.h>
const char/ssid     = "ak";
const char/password = "00000001";
const char/host = "192.168.43.136";
const char/ streamId   = ".....";
const char/ privateKey = ".....";
String first_name;
String last_name="Monzurul Islam";
String id="123456";
lcd.init();
  lcd.backlight();
  lcd.setCursor(0, 0);
  lcd.print("WELCOME TO ");
  lcd.setCursor(0, 1);
  lcd.print("SMART Health CARE");
  delay(100);
  Serial.begin(115200);
  delay(10);
 _buffer.reserve(50);
  Serial.println("Sistem Started...");
```

```
WiFi.mode(WIFI_STA);
  WiFi.begin(ssid, password);
  while (WiFi.status() != WL_CONNECTED) {
    delay(500);
    Serial.print(".");
  }
  Serial.println("");
  Serial.println("WiFi connected");
  Serial.println("IP address: ");
  Serial.println(WiFi.localIP());
}
void loop() {
Pulse_rate=analogRead(A0);
Pulse_rate+=60;
if(Pulse_rate>68)
{
lcd.clear();
lcd.setCursor(0, 0);
  lcd.print("Pulse_rate");
  lcd.setCursor(0, 1);
  lcd.print(Pulse_rate);
Serial.println(Pulse_rate);
}
else
{
 //Serial.println("0");
}
first_name=Pulse_rate;
Serial.println(first_name);
server(first_name,last_name);
}
```

Server:

```
void server(String first_name,String last_name)
{
 Serial.print("connecting to ");
 Serial.println(host);
 WiFiClient client;
 const int httpPort = 80;
 if (!client.connect(host, httpPort)) {
  Serial.println("connection failed");
  return;
 }
 String url = "/code/server.php?";
     /* url += "id=";
      url += id;*/
      url += "first_name=";
      url += first_name;
      url += "&last_name=";
      url += last_name;
 Serial.print("Requesting URL: ");
 Serial.println(url);
 client.print(String("GET ") + url + " HTTP/1.1\r\n" +
              "Host: " + host + "\r\n" +
              "Connection: close\r\n\r\n");
 timeout = millis();
 while (client.available() == 0) {
Serial.println("ok1");
   if (millis() - timeout > 5000) {
Serial.println(">>> Client Timeout !");
 client.stop();
return;
   }
 while(client.available()){
```

```
println("Monzurul Islam");
String line = client.readStringUntil('\r');
  Serial.print(line);
  }
  Serial.println();
  Serial.println("closing connection");
  delay(10000);
  }
}
```