

A THREE LEVEL SECURITY FOR DATA ACQUISITION AND RETRIEVAL IN REMOTE HEALTH CARE SYSTEM

Submitted in partial fulfillment of the requirements for the award of
Bachelor of Engineering (B.E) degree in
Electronics and Telecommunications Engineering

By

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APRIL - 2021



**DEPARTMENT OF ELECTRONICS AND TELECOMMUNICATION
ENGINEERING**

BONAFIDE CERTIFICATE

This is to certify that this Project Report is the Bonafide work of **Ms.V. BHUVANESWARI(37250002)** and **Ms. V. JEEVITHA (37250008)** who carried out the project entitled **“A THREE LEVEL SECURITY FOR DATA ACQUISITION AND RETRIEVAL REMOTE HEALTH CARE SYSTEM”** under my supervision from September 2020 to April 2021.

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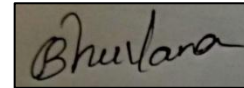
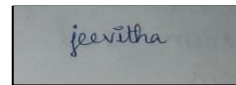
DECLARATION

I, **V. BHUVANESWARI(Reg.No.37250002)** and **V. JEEVITHA(Reg.No.37250008)** hereby declare that the Project Report entitled “**A THREE LEVEL SECURITY FOR DATA ACQUISITION AND RETRIEVAL IN REMOTE HEALTHCARE SYSTEM**” done by us under the guidance of **Mrs. POONGUZHALI S** is submitted in partial fulfillment of the requirements for the award of Bachelor of Engineering degree in Electronics and Telecommunication Engineering.

DATE : 19/04/2021

PLACE : CHENNAI

SIGNATURE OF THE CANDIDATE

A rectangular box containing the handwritten signature 'Bhuvana' in black ink.A rectangular box containing the handwritten signature 'jeevitha' in blue ink.

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ABSTRACT

The fundamental goal of this paper is to give dominating arrangement hospitalization for patients and basically for doctors who can't administer their patients at the correct time in the emergency clinic itself. The advantages of these endeavors are introduced, which followed by effective examinations in procuring various signs like temperature, ECG from Patients. The particular sensors are utilized to gauge the temperature, heart rate and ECG. It is anticipated that arising pattern of versatile advances trigger greater improvement of this LabVIEW based applications makes commitment the wellbeing upkeep. LabVIEW give easy to understand GUI Interface to tests and investigation of different physiological boundaries which is fundamental for patient's well being program. Telemedicine is surely extended on the grounds that the public tendency to shared and incorporated electronic wellbeing records is required. Thus, the recently evolved application, straightforwardly make patient current status accessible to specialist which is helpful for specialist to screen patients. In late Paper the accentuation was not given on the information security that would be taken care of productivity through three level information security. The specialist who is mindful to really focus on the patient will have full admittance to the clinical records.

CHAPTER NO	TITLE	PAGE NO
	ABSTRACT	V
	LIST OF FIGURES	IX
1.	INTRODUCTION	
	1.1 PROJECT OBJECTIVE	2
	1.2 OVERVIEW	3
	1.3 AIM OF THE PROJECT	4
	1.4 OVERVIEW OF LABVIEW	4
	1.5 STATEMENT OF A PROBLEM	5
	1.6 MOTIVATION	6
2	LITERATURE SURVEY	
	2.1 HEALTH PARAMETER MONITORING USING LIFI TECHNOLOGY	7
	2.2 LABVIEW-BASED PHYSIOLOGICAL PARAMETERS MONITORING SYSTEM FOR PATIENT HEALTHCARE	10
	2.3 IOT BASED PATIENT HEALTH MONITORING SYSTEM USING LABVIEW AND WIRELESS SENSOR NETWORK	11
	2.4 REAL TIME WIRELESS HEALTH MONITORING APPLICATION USING MOBILE DEVICES	13
	2.5 WIRELESS HEALTH MONITORING SYSTEM USING LABVIEW	16

	2.6 LABVIEW BASED HEALTH MONITORING SYSTEM USING ARDUINO	18
	2.7 INTELLIGENT WIRELESS MOBILE PATIENT MONITORING SYSTEM	19
3	EXISTING SYSTEM	
	3.1 EXISTING SYSTEM	24
	3.2 PROPOSED SYSTEM	24
	3.3 SCHEMATIC DIAGRAM	26
	3.4 WORKFLOW	27
4	HARDWARE REQUIREMENTS	
	4.1 HARDWARE REQUIREMENTS	28
	4.2 ARDUINO UNO AND ITS PROGRAMMING	28
	4.3 PIN CONFIGURATION OF ARDUINO	31
	4.4 COMMUNICATION	34
	4.5 ARDUINO IDE	35
	4.6 HEARTBEAT SENSOR	36
	4.7 ECG	39
	4.8 RS232	40

	4.9 UART	44
	4.10 BLUETOOTH MODULE(HC05)	45
5	SOFTWARE DESIGN AND IMPLEMENTATION	
	5.1 ARDUINO SOFTWARE	51
	5.2 LABVIEW	53
	5.3 IMPLEMENTATION	56
	5.4 DOCTORSIDE	57
	5.5 INITIAL SETUP OF LABVIEW	59
	5.6 OUTPUT	59
	5.7 DATA ACQUISITION	60
6	RESULT AND CONCLUSION	
	6.1 RESULT	61
	6.2 CONCLUSION	62
	REFERENCES	62

CHAPTER 1

INTRODUCTION

In country medical clinics, the offices for wellbeing caring are restricted. The Quality Of wellbeing the executives empowers issues in medical services framework Everyone Ought to get the information on own wellbeing as simple and ahead of schedule as could be expected. Likewise it ought to be worth for every .Latest report of The India Spend investigation of information says that the 500,000 specialists lack in India. WHO characterizes the specialist patient proportion will be 1:1000 which has been fizzled in India. In non-industrial nations there is absence of assets and the board to connect the issues of people. An average person can't bear the cost of the costly and every day check up for his well being. For this reason different frameworks which give simple and guaranteed caring unit has been created.

A new medical care framework ought to give better medical services administrations to individuals whenever anyplace a reasonable and patient amicable way. Presently, the medical services framework will transform from a conventional way to deal with a modernized patient focused methodology. In the conventional manner the specialists assume the significant part. For important analysis and prompting they need to visit the patients. There are two essential issues identified with this methodology. Initially, the medical services experts should be not at spot of the patient constantly and second the patient remaining parts conceded in the clinic, wired to bedside biomedical instruments, for a significant stretch of time. To tackle these two issues the patient situated methodology has been gotten. In this topic, the patients know with information and data to assume a more dynamic part in sickness finding and avoidance. The significant component of this subsequent methodology is a solid and promptly accessible patient observation framework (PMS).

Wellbeing is one of the worldwide difficulties for humankind. As indicated by the constitutions of the World Health Organization (WHO) the most noteworthy feasible norm of wellbeing is a major appropriate for a person. Sound people can get their life time and subsequently to increment in GDP and in charge incomes. Likewise decrease tension on the all around overpowered medical clinics, facilities, diminished response, clinical

experts and diminished responsibility on the public security noble for the organizations, and legislative or non-administrative focuses. To keep individuals powerful and sound, a promptly available current medical care framework is important. Observing of indispensable boundaries can incorporate at any rate circulatory strain pulse, and ideally likewise beat oximetry and respiratory rate. In working spaces for showcase a concurrent proportion of physiological boundaries, multimodular screens get sound into sedative machines and the bedside screens for basic consideration units.

These grant for ceaseless oversight of a patient as their any adjustments in ordinary state of patients get persistently educated to clinical staff. Today before obvious signs are perceptible to clinical staff, like atrial untimely ventricular compression (PVC) and fibrillation a few screens are accessible which can even caution of forthcoming lethal cardiovascular conditions. For electrocardiographic checking (ECG), old simple patient presentations, ordinarily had just one channel and dependent on oscilloscopes, regularly saved. This sensor is a practical board used to quantify the electrical movement of the heart.

1.1 PROJECT OBJECTIVE

With quick advancement of economies, development of maturing populace and the commonness of ongoing infections across the world, there is a critical need to discover better approaches to improve patient results, increment admittance mind, and decrease the expense of clinical consideration. Progressions in sensor innovation, the universal accessibility of cell innovation, and falling expenses of inserted specialized gadgets are opening up new channels for improving patient consideration and personal satisfaction. A medical services observing framework is important to continually screen patient's physiological boundaries. The tele-clinical framework centers around the estimation and the assessment of crucial boundaries for example temperature, electrocardiogram (ECG), pulse inconstancy, fall location and so forth. This undertaking regularity of cardiovascular capacity, measure the temperature of the patient immediately, measure the heartbeat rate and will have the ability of advising the specialist by informing him/her if the current ailment of the patient is unusual. The framework can examine the sign, recognize the

typical or unusual conditions like arrhythmia and with the assistance of Arduino Mega and LabVIEW, the signs from all sensors will be handled utilizing Arduino Mega and get prepared and seen on LabVIEW. On LabVIEW the signs are seen and shipped offweb by means of the LabVIEW web distributing apparatus. This Venture will empower specialists and guardians to notice patients without being genuinely present at their bedside, be it in the clinic or in their home.

1.2 OVERVIEW

The framework utilizes savvy sensors that creates crude information data gathered from every sensor and send it to a data set worker where the information can be additionally investigated and measurably kept up to be utilized by the clinical specialists. Keeping an information base worker is an absolute necessity so that there is even track of past clinical record of the patient giving a superior and improved analyzing.

Wellbeing is one of the worldwide difficulties for mankind [1]. As per the constitutions of World Health Organization (WHO) the most elevated feasible norm of wellbeing is a crucial idea for an individual[2]. Sound people lead to get their lifetime pay and henceforth to increment in total national output and in charge incomes. Sound people likewise lessen tension on the generally overpowered medical clinics, facilities, and clinical experts and decrease responsibility on the public wellbeing organizations, good cause, and legislative (or non-administrative) associations. To keep people solid powerful and promptly available current medical services framework is an essential. A modernized medical care framework ought to give better medical care administrations to individuals whenever and from anyplace in a monetary and patient amicable way. Presently, the medical services framework is going through a social move from a convention always to deal with a modernized patient focused methodology. In the conventional methodology the medical services experts assume the significant part. They need to visit the patients for vital finding and prompting. There are two essential issues related with this methodology. First and foremost, the medical care experts should be nearby of the patient constantly.

1.3 AIM OF THE PROJECT

To Implement Three Level Of Data Security:

- (i) Access rights by patient to access the data
- (ii) ensuring the data security by encryption and decryption
- (iii) Access permission by doctor when other doctors need to use

This framework incorporates biomedical boundaries heartbeat-TCRT1000 and SPO2-MQ2 checking actualized framework by straightforward equipment part just as inPC by LabVIEW programming A GUI based stage in neighborhood medical clinic PCs by LabVIEW interface sensors which goes about as biomedical gadgets. This paper comprises the essential framework for Human body checking usage for a patient in emergency clinics. This sort of framework truly accommodates emergency clinics for the basic circumstance of patients who need persistent perception abroad.

1.4 OVERVIEW OF LABVIEW

A. Signal Acquisition:

LabVIEW is intended to be utilized with equipment upheld by the National Instruments DAQmx driver. This incorporates most USB, PCI, and PXI information securing gadgets with simple information. A recreated NI-DAQmx gadget is a gadget made utilizing the NI-DAQmx Simulated Device alternative in the menu of MAX to work a capacity or program without equipment. This graphical programming is likewise intended to be utilized with a standard sound card and mouthpiece for acquiring sound signs.

Signal processing and analysis

LabVIEW contains more than 850 underlying investigation capacities to improve on advancement for an expansive scope of utilizations. Some usually utilized libraries include: Probability and Statistics, Optimization, Linear Algebra, Curve Fitting, Signal Generation, PID Control Algorithms, Fuzzy Logic, BodePlot.

Dispersed Application LabVIEW can create convey applications utilizing TCP/IP, Internet Toolkit, VI Server, Front Panel Web Publishing, Remote Data Acquisition (RDA)

An extra for LabVIEW which is free open source is linx and interfaces with normal inserted stages by giving bound together API, for example, chip KIT, Arduino and thensome. LINX's reflection layer offers help for equipment peripherals just as normal sensors. To interface with a chip-KIT for Arduino baseboard it empowers a similar code. VISA driver sets up the sequential correspondence among Arduino and LabVIEW.

Designed LabVIEW Interface

The ECG framework that has been created is utilized for the nonstop procurement and outline recording of single information channels. It permitted client to record and save cushioned simple CGI information from at least one people, which is ceaselessly obtained into a round support simultaneously in that information recently recovered from the cradle is plotted [6–8]. A typical motivation to understand information while the procurement is in progress is to measure and show the information in virtual-continuous.

1.5 STATEMENT OF A PROBLEM

In the previous papers accentuation was not given on information security that would be productively dealt with through three level information security. far off wellbeing observing can give significant physiological information in the home. This noticing is useful for old or industriously wiped out patients who should sidestep a long clinical center stay. Distant sensors are used to accumulate and convey indications of interest processors altered to get and normally inspect the sensor signals. In this endeavor, you are to pick fitting sensors as demonstrated by what you should perceive.

In Little emergency clinics this strategy conceivable, yet with regards to enormous emergency clinics it is beyond the realm of imagination. We can't keep an information base of a patient in printed copy if any mishaps like fire or record scattering happens. As an ever increasing number of clients are tapped in with their gadgets, the stopped up wireless transmissions make it hard to lock on a dependable sign. On The off chance that Wi-Fi is actualized in numerous emergency clinics, impedance from cells and PCs can hinder signals from observing hardware.

1.6 MOTIVATION

Remote patient monitoring system eliminates the hurdles such as distance improves the access of medical services. Patient monitoring through an android mobile phone enables the clinicians to monitor the patient from multiple locations.

CHAPTER 2

LITERATURE SURVEY

Professor Harald Haas, from the University of Edinburgh in the UK, is widely recognized as the original founder of Li-Fi. He coined the term Li-Fi and is Chair of Mobile Communications at the University of Edinburgh and co-founder of pure LiFi.

The general term visible light communication(VLC), includes any use of the visible light portion of the electromagnetic spectrum to transmit information. The D-Light project atEdinburgh'sInstitute for Digital Communications was funded from January 2010 toJanuary 2012. Has promoted this technology in his 2011TED Global Talk and helped start a company marketed. PureLiFi, formerly pureVLC, is an original equipment manufacturer(OEM) firm set up to commercialize Li-Fi products for integration with existingLED-lighting systems.

In October 2011,companies and industry groups formed theLi-FiConsortium,to promote high-speed optical wireless systems and to overcome the limited amount of radio-based wireless spectrum available by exploiting a completely different part of the electromagnetic spectrum. A number of companies offer uni-directional VLC products which is not the same as Li-Fi.

2.1 HEALTH PARAMETER MONITORING USING LI_FI TECHNOLOGY

VLC technology was exhibited in 2012 using Li-Fi. By August 2013, data rates of 1.6 Gbps Were Demonstrated over a single color LED. In September 2013, a press release said that Li-Fi,or VLC systems in general,do not require line-of-sight conditions. In October 2013, it was reported Chinese manufacturers were working onLi-Fi development kits.

One part of VLC is modeled after communication protocols established by the IEEEwork group. However, the IEEE 802.15.7 standard is out-of-date. Specifically,the standard fails to consider the latest technological developments in the field of optical wireless communications, specifically with the introduction of optical orthogonal frequency - division multiplexing modulation has been introduced.

It is shown that Li-Fi network is successfully can be used as a high-speed, secure and safe to human body data communication to provide real-time monitoring of heartbeats, blood pressure, temperature, and various other parameters.

Li-Fi technology is widely used in various applications such as healthcare, education, retail, aviation, exhibition industry, and others. Healthcare is one of primary application areas in the global Li-Fi market. Hospitals have always received technology in the form of wired connections.

For a long time, medical technology has lagged behind the rest. The scope for wireless communication in the medical field is set on the rise; there are many devices which work on Wi-Fi such as infusion pumps, defibrillators, lung ventilators, and anesthesia machine. When a doctor is supposed to use magnetic resonance imaging scanners along with infusion pumps, which work on Wi-Fi there results a frequency overlapping problem. With more and more number of wireless medical devices coming up, utilizing the radio frequency (RF) spectrum increases which lead an electromagnetic interference (EMI) that results in potentially hazardous events related to medical equipment operations . Apart from the interference with medical equipment, an EMI affects human body also in the form of diseases, immune dysfunction, electromagnetic hypersensitivity, etc., and in worst case, it may lead to cancer. Another limitation of Wi-Fi in hospital system is its security issue. Patient information must be private and secure but remain accessible to authorized persons. Hospitals are places where both EMI sensitivity and security of medical details are issues with the uses of Wi-Fi. To combat the above limitations of Wi-Fi in health monitoring system, Li-Fi is used, which is a novel technology for high density wireless data coverage relieving radio interferences in confined areas.

In contrast, **LiFi** transmits data through light waves on the electromagnetic spectrum, so is completely free from **harmful** radiofrequency radiation. Similarly, **LiFi** technology can be used in environments where WiFi is considered a hazard. **LiFi** is based on Visual Light Communication (VLC) that using light emitting diodes (LEDs) to fully networked wireless system . This transceiver will have a modulation technique to make the LED enable to carry the data using the light.

Nonetheless, the IEEE 802.15.7 standard defines the physical layer(PHY) and media access control(MAC) layer. The standard is able to deliver enough data rates to transmit audio, video and multimedia services. It takes into account the optical transmission mobility, its compatibility with artificial lighting presenting infrastructures, the deviance which may be caused by interference generated by the ambient lighting. The MAC layer allows us to use the link with the other layers like the TCP/IP protocol.

The Standard Defines three PHY layers with different rates:

- The PHY I was established for outdoor application and works from 11.67 kbit/s to 267.6 kbit/s.
- The PHY layer allows to reach data rates from 1.25 Mbit/s to 96 Mbit/s.
- The PHY III is used for many emissions sources with a particular modulation method called color shift keying (CSK). PHY III can deliver rates from 12 Mbit/s to 96 Mbit/s.

The modulation formats recognized for PHY I and PHY II are the coding on-off keying (OOK) and variable pulse position modulation (VPPM). The Manchester coding used for the PHY and PHY II layers include the clock inside the transmitted data by representing a logic 0 with an OOK symbol "01" and a logic 1 with an OK symbol "10", all with a DC component. The DC component avoids the light extinction in case of an extended line of logic 0. The first Li-Fi smartphone prototype was presented at the Consumer Electronics Show in Las Vegas from January 7–10 in 2014. The phone uses Sun Partner's WysipsCONNECT, a technique that converts light waves into usable energy, making the phones capable of receiving and decoding signals without drawing on its battery.

Li-Fi, or **light fidelity**, refers to 5G visible light communication systems using light from light-emitting diodes (LEDs) as a medium to deliver networked, mobile, high-speed communication in a similar manner as Wi-Fi. Li-Fi could lead to the Internet of Things, which is everything electronic being connected to the internet, with the LED lights on the electronics being used as internet access points. The Li-Fi market is projected to have a compound of 82% from 2013 to 2018 and to be worth over \$6 billion per year by 2018.

Visible Light Communications (VLC) signals work by switching bulbs on and off within nanoseconds, which is too quickly to be noticed by the human eye. Although Li-Fi bulbs would have to be kept on to transmit data, the bulbs could be dimmed to the point that they were not visible to humans and yet still functional. The light waves cannot penetrate walls which makes a much shorter range, though more secure from hacking, relative to Wi-Fi. Direct line of sight isn't necessary for Li-Fi to transmit signal and light reflected off of the walls can achieve 70 Mbps.

Li-Fi has the advantage of being able to be used in electromagnetic sensitive areas such as in aircraft cabins, hospitals and nuclear power plants without causing electromagnetic interference. Both Wi-Fi and Li-Fi transmit data over the electromagnetic spectrum, but whereas Wi-Fi utilises radio waves, Li-Fi uses visible light. While the US Federal Communications Commission has warned of a potential spectrum crisis because Wi-Fi is close to full capacity, Li-Fi has almost no limitations on capacity. The Visible Light Spectrum 10,000 times larger than the entire radio frequency spectrum. Researchers have reached data rates of over 10 Gbps, which is more than 250 times faster than superfast broadband. Li-Fi is expected to be ten times cheaper and more environmentally friendly than Wi-Fi. Short range, low reliability and high installation costs are the potential downsides.

2.2 LABVIEW-BASED PHYSIOLOGICAL PARAMETERS MONITORING SYSTEM FOR PATIENT HEALTHCARE

Observing framework alluded to rehashed or constant estimation of different physiological boundaries of patients. In the current paper by utilizing the LabVIEW which is graphical programming language, clinically significant boundaries for example Temperature, SpO₂ and Electrocardiogram, are gotten handled and shown in a graphical UI, at that point get accessible on website page progressively to be seen by an approved specialist. The calculation is assessed with ECG information documents, with various ECG morphologies and commotion content taken from Biopac MP150 instrument for ECG securing which contains 1000 examples for each ECG, recorded at an examining recurrence of 150 Hz. This information gets accessible to doctor, by utilizing different web distributing instruments in LabVIEW, who is at far off area. In this work we have built up a calculation dependent on wavelet change approach utilizing LabVIEW.

The Plan This Framework Comprised Of Three sections: sensors, signal handling circuits, and an easy to understand graphical UI (GUI). The initial segment included choice of proper sensors. For ECG, dispensable Ag/AgCl anodes; for temperature, Thermistor and LM35 exactness temperature sensors were chosen. The subsequent part consisted of preparing the signs from these sensors. This was accomplished by executing reasonable intensifiers and channels for the crucial signs. The last part centered around advancement of a GUI to show the fundamental signs in the LabVIEW environment.

ELECTROCARDIOGRAPH (ECG)

Electrocardiograph (ECG) is a transthoracic translation of the electrical movement of the heart over the long run caught and remotely recorded by skin anodes. It is Noninvasive chronicle created by an electrocardiographic gadget.

The ECG works generally by recognizing and intensifying the small electrical changes on the skin that are caused when the heart muscle "depolarizes" during every heartbeat. Very still, every heart muscle cell has a charge across its external divider,

or cellfilm diminishing this charge towards zero is called depolarization, which enacts the instruments in the phone that cause it to contract. During every heartbeat a solid heart will have a methodical movement of a flood of depolarization that is set off by the phones in the sinoatrial hub, fans out through the chamber, goes through "characteristic conduction pathways"and afterward spreads everywhere on the ventricles. This is identified as little ascents and falls in voltage between two cathodes set either side of the heart which is shown as a wavy line either on a screen or on paper. This showcase demonstrates the general mood of the heart and shortcomings in various pieces of the heart muscle.

2.3 IOT BASED PATIENT HEALTH MONITORING SYSTEM USING LABVIEW AND WIRELESS SENSOR NETWORK

Patient Health Monitoring is the one of the field that is quickly developing quick these days with the headway of advancements numerous scientists have accompanied different designs for patient wellbeing checking frameworks according to the mechanical turn of events. With the far reaching of web, Internet of things is among of the arisen field as of late in which many have had the option to fuse it into various applications. In this paper we present the framework called Iot based patient wellbeing observing framework utilizing LabVIEW and Wireless Sensor Network (WSN). The framework will actually want to take patients physiological boundaries and communicate it remotely by means of Xbees, shows the sensor information on LabVIEW and distribute on web server to empower other medical care suppliers from far distance to imagine, control and screen constantly through web availability.

Pulse is The Quantity Of Pulses Per unit of time, regularly communicated as beats per minute(bpm). Pulse can fluctuate as the body's need to retain oxygen and discharge carbon dioxide changes, for example, during activity or rest.

The Estimation Of pulse is utilized by clinical experts to aid the determination and following of ailments. It is likewise utilized by people, like competitors, who are keen on checking their pulse to acquire most extreme productivity from their preparation. The R wave to R wave stretch (RR span) is the backwards of the pulse.

Pulse is estimated by finding the beat of the body. This heartbeat rate can be estimated anytime the body where the vein's throb is sent to the surface by forcing it with the list and center fingers; regularly it is compacted against a fundamental design like bone. The thumb ought not be utilized for estimating someone else's pulse, as its solid heartbeat may meddle with separating the site of throb.

The resting pulse (HR_{rest}) is an individual's pulse when they are very still, that is resting yet conscious, and not having as of late endeavored. The commonplace solid resting pulse in grown-ups is 60–80 bpm, with rates under 60 bpm alluded to as bradycardia, and rates over 100 bpm alluded to as tachycardia. Note anyway that adapted competitors regularly have resting pulses under 60 bpm.

This framework incorporates biomedical boundaries temperature-LM35, heartbeat-TCRT1000 and SPO2-MQ2 observing actualized framework by basic equipment part just as in PC by LabVIEW programming. This live human body observing framework utilizing implanted likewise incorporate a website-based transmission uphold by actualizing utilizing Arduino atmega328 and Ethernet shield as base. This framework uphold live web transmission of patient's body boundaries. A GUI-based stage in neighborhood clinic PCs by LabVIEW interface sensors which goes about as biomedical gadgets. This paper comprises the essential framework for Humanbody observing execution for a patient in medical clinics. This kind of framework truly accommodating in emergency clinics for the basic circumstance patients who need consistent perception abroad. In this arrangement first all the prerequisite computerized signal processor and A/C converter, it prompts a little single chip arrangements. The epic logarithmic transimpedance enhancer is utilized here for power decrease.

2.4 REAL TIME WIRELESS HEALTH MONITORING APPLICATION USING MOBILE DEVICES

Wellbeing One The Worldwide Difficulties for mankind [1]. As indicated by the constitutions of World Health Organization (WHO) the most elevated achievable norm of wellbeing is a crucial appropriate for an individual [2]. Sound people lead to get their lifetime pay and thus to increment in total national output and in charge incomes. Sound

people likewise decrease tension on the generally over powered medical clinics, facilities, and clinical experts and lessen responsibility on the public wellbeing organizations, good cause, and legislative (or non-administrative) associations. To keep people solid a compelling and promptly available current medical care framework is an essential. A modernized medical care framework ought to give better medical services administrations to individuals whenever and from anyplace in a monetary and patient cordial way. Presently, the medical services framework is going through a social move from a conventional way to deal with a modernized patient focused methodology. In the

Customary methodology the medical care experts assume the significant part. They Need to visit the patients for important conclusions and exhorting them. There are two essential issues related with this methodology. First and foremost, the medical services experts should be near the patient constantly.

Also, furthermore, the patient remaining parts conceded in an emergency clinic, wired to bedside biomedical instruments, for a while. To take care of these two issues the patient situated methodology has been considered. In This methodology the patients are furnished with information and data to assume a more dynamic part in sickness analysis, and counteraction. The vital component of this subsequent methodology is a dependable and promptly accessible patient checking framework (PMS). The Requirement for a continuous account and warning of crucial indications of a patient is of prime significance for a powerful PMS. By typifying the benefits of current bioinstrumentation, PCs, and media transmission advances a cutting edge PMS ought to gain, record, show, and send the physiological information from the patient body to a far off area whenever. For more productive, convenient, and crisis clinical consideration the PMS should likewise be fused with an alert framework. To caution the patient just as the medical care specialist co-ops the PMS ought not just screen and examine the basic patient's information yet it ought to likewise send disturbing messages on the off chance that the checked information goes external their ordinary reaches. Thus, a functioning dataset framework should be related with the PMS. A large portion of the proposed PMSs are unified it might be said that all patients' information are put away in a solitary worker. By utilizing important firmware and

programming the worker can be associated with an open correspondence network by means of TCP/IP convention. In this way a patient can be checked from a far off area. Existing and inescapable cell phone organizations can aid this respect. As of late, portable organizations are viewed as basic for settling future worldwide wellbeing challenges [3]. With the worldwide market infiltration of the cell phones the versatile medical services framework (i.e., mHealth) is a developed thought now. By utilizing the cell phone medical services framework can be made accessible for individuals, who are living in far off regions absent a lot of admittance to different sorts of correspondences. Indeed, even a basic cell phone can turn into an incredible medical services instrument now. Instant messages and calls can rapidly convey constant and basic data of a patient to a far off area. Along these lines the patients, living in distant zones, can decrease superfluous to and fro travel to the far found medical services communities. Nonetheless, cell phones have become "keen" presently to accomplish more as opposed to just communicate clinical data guidance. Cell phone, upheld with fast information administrations, has altered medical care by assuming the part of an incredible clinical gadget for observing the patients' wellbeing. Coronary illness and diabetics observing and controlling frameworks are a lot of regular at this point. An expected 95,000 medical care applications are accessible today and more than 200 million individuals have downloaded these applications to their cell phones [4]. It is assessed that 500 million individuals will utilize medical care applications constantly of 2015 [5]. It is additionally assessed that cell phones and tablets will be the most well known mechanical improvements for specialists since the creation of the stethoscope. In the United States cell phones are being utilized by the doctors not exclusively to get to clinical reference material, preparing substance, and expert diaries yet additionally to utilize them for patient checking, imaging, and bedside care. Cell phones empower patients to play a more dynamic job for the advancement of their own wellbeing, for example, overseeing arrangements, refreshing solutions, and getting to their clinical records. Hence cell phones have boosted.

Thermoregulation is the capacity of a living being to keep its internal heat level inside specific limits, in any event, when the encompassing temperature is altogether different. This cycle is one part of homeostasis: a unique condition of steadiness

between a creature's interior climate and its outer climate or If the body can't keep a typical temperature and it increments fundamentally better than average, a condition known as hyperthermia happens. This happens when the body is presented steady temperatures of roughly 55° C, any delayed openness (longer than a couple of hours) at this temperature and up to around 70° C demise is practically unavoidable. The contrary condition, when internal heat level reductions beneath typical levels is known as hypothermia.

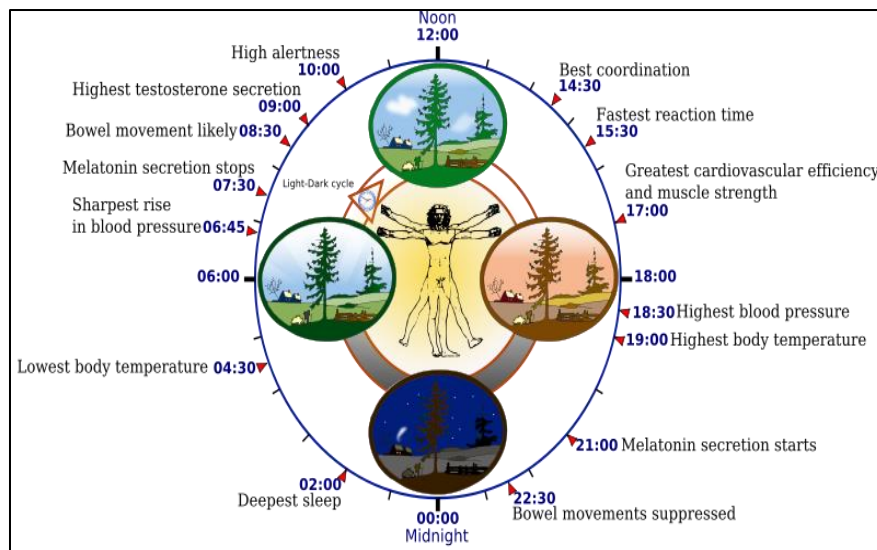


Figure 2.1: Overview of biological clock in humans

Various pieces of the body have various temperatures. Rectal and vaginal estimations, or estimations taken straightforwardly inside the body hole, are regularly marginally higher than oral estimations, and oral estimations are fairly higher than skin temperature. The usually acknowledged normal center internal heat level (taken inside) is 37.0 °C (98.6 °F). The common oral (under the tongue) estimation is marginally cooler, at 36.8±0.7 °C, or 98.2±1.3 °F. In Russia and previous Soviet nations, the normally cited esteem is 36.6 °C (97.9 °F), in view of an armpit (axillary) perusing. Albeit a few groups consider these numbers addressing the typical temperature, a wide scope of temperatures has been found in sound individuals. In examples of ordinary grown-up people, the noticed reach for oral temperature is 33.2–38.2 °C (92–101 °F), for rectal it is 34.4–37.8 °C (94–100 °F), for the Tympanic hole it is

35.4–37.8 °C(96–100 °F) and for helper it is 35.5–37.0 °C (96–99 °F).

2.5 WIRELESS HEALTH MONITORING SYSTEM USING LABVIEW

This project deals with the wireless communication devices and systems which have significant impact on the healthcare industry nowadays. A correct characterization is to handle, analyze the data from the specified sensors fixed in the human body sends it to the microcontroller which transmits the data over through a zigbee module that displays it on the LCD screen. At the receiving end, data are received and send to the pc through max232 and these parameters are displayed in the computer by using LabVIEW. Thus zigbee is used to transmit and receive the data from PIC microcontroller, which connected directly with specified Human body sensors. Both the simulation and experimental results under diverse conditions are presented to clearly describe the process of characterization of our system.

Telemedicine is the newest technology which is the combination of telecommunication and information technology for medical purposes. It gives a new way to deliver healthcare services when the distance between the doctor and patient is significantly away. Rural area will get the benefit from this application. Patient Monitoring is one of the major sectors in telemedicine, which always needs improvement to make it better. It is also important for respiratory therapy, recovery rooms, out-patient care, radiology, ambulatory, home and sleep screening applications. Previously, the available medical monitoring systems were generally bulky and thus uncomfortable to be carried by patients.

The objectives of the project are: ← To design and fabricate patient monitoring system for monitoring Body temperature, Heart Beat, Respiration and ECG from the Human body. ← To develop wireless system of monitoring system using Zigbee. ← To develop data monitoring system using integration between LabVIEW. ← 1.

TRANSMITTER OPERATION

In the transmitting module continuously reads patients body Temperature, Heart beat and Respiration through the respective sensor and display in the LCD and sends

it to the PIC microcontroller which transmit the data through the zigbee module.

RECEIVER OPERATION

In this receiving module the signal received by the zigbee module displays the data in the Hyper terminal software. It receives the signal from the Zigbee in the transmitter side and displays the data to the receiver which is kept inside the doctors chamber. And in case of emergency condition the abnormal condition will be indicated.

2.6 LABVIEW BASED HEALTH MONITORING SYSTEM USING ARDUINO

This paper demonstrates the refined technique for checking human body boundaries like temperature, heartbeat rate, SPO2 utilizing implanted web worker and LabVIEW innovation. The equipment is created on Arduino atmega328 regulator board and web network just as various sensors. LabVIEW is utilized in programming part to give GUI based climate to client which makes easy to understand easier than coding and web is utilized to produce implanted web workers. Henceforth this interfacing takes our venture to jump toward the up and coming age of, anyplace whenever access. It tends to be taken care of to web through site or organization framework so tolerant condition and biomedical boundaries can be screen around the world. It is Low expense and low force framework in term of equipment just as programming. It is accomplished by methods for installing Real time working framework. For Pervasive Healthcare electronic ongoing observing uses the Context Aware momentary subordinate medical care engineering and medical services experts would remote be able to live screen the patient.

This framework incorporates biomedical boundaries temperature-LM35, heartbeat-TCRT1000 and SPO2-MQ2 observing executed framework by basic equipment part just as in PC by LabVIEW programming. This live human body on serving framework utilizing installed additionally incorporates website based transmission uphold by actualizing utilizing Arduino atmega328 and Ethernet shield as base. This framework uphold live web transmission of patient's body boundaries. A GUI based stage in nearby emergency clinic PCs by LabVIEW interface sensors which goes about as biomedical gadgets. This paper comprises the fundamental framework for Human

body checking usage for a patient in medical clinics. This sort of framework truly supportive in emergency clinics for the basic circumstance patients who need consistent perception abroad . In this arrangement deters the necessity of computerized signal processor and A/D converter, it prompts a little single chip arrangements. The epic logarithmic transimpedance intensifier is utilized here for power decrease.

The framework takes up Heart Beat Rate, Temperature, Blood Oxygen Level (Oxygen Immersion) and Breath Rate. Sensors are fastened to microcontroller. Graphical User Interface(GUI) is utilized here to show the worth. Alerts Created If there is any anomaly in actual boundaries of patient observing. Framework can likewise be utilized to screen execution of competitors dependent on got actual boundaries. –The target of this exploration is to plan a gadget which is minimal effort, non-nosy, remote, versatile and solid to utilize. This gadget will give the data about the four boundaries on Electrocardiogram, Body Temperature, Oxygen Concentration and HeartRate progressively and it will be sent remotely from far off to the base station.

2.7 INTELLIGENT WIRELESS MOBILE PATIENT MONITORING SYSTEM

Nowadays, Heart-related disorders are on the rising. Cardiovascular breakdown is referred to as the significant ally of the unexpected and alarming death rate in the forefront pressure filled lifestyle around the planet. A System that alerts the person about the start of the ailment earlier normally will be an assistance to the overall population. This is achievable by passing on advances in distant development to the current patient checking structure. This paper proposes the improvement of a module that offers adaptability to the trained professional and the patient, by accepting a clear notable methodology, recognizing the irregularities in the bio indication of the patient early and sending a SMS caution to the expert through Global System for Mobile(GSM) as such making sensible judicious strides hence forth reducing the essential level of the patient. By and large examinations drove by World Health Association (WHO) have attested that the heart-related ailments are on the climb. A Significant part of the heart related issues are credited to the high level lifestyles, food affinities, heaviness, smoking, tobacco gnawing and on appearance genuine exercises, etc The post-usable patients can make intricacies at whatever point they are

delivered from the crisis facility. In specific patients, the heart issues may reoccur, when they start achieving their standard work. Thus the ECG of such patients should be checked for a long time after their treatment. This assists in diagnosing the improper working of the heart and avoid any and all risks. A part of these lives can every now and again be saved if extreme thought and cardiovascular operation is given inside the supposed splendid hour. Along these lines, the necessity for admonishment on direct clinical thought and headway of good prosperity by lenient noticing and follow-up gets unavoidable. In this manner, patients who are in peril require that their cardiovascular prosperity to be noticed a significant part of the time whether they are inside or outside emergency treatment is possible. Telemedicine is by and large saw as a component of the unprecedented inevitable destiny of the front line practice of drug.

CHAPTER 3

EXISTING SYSTEM

- Robust healthcare is a requirement for both developed countries, where the cost of healthcare is high and security and privacy are critical issues and developing countries like India.
- where there is a mass population to handle in hospitals and robust healthcare procedures are required. Doctors should visit the patient regularly and check the status. Situation may occur like nurse make mistake while noting the report.
- Doctors or Nurses will use the NFC card in card reader so that its sensors will send the details to microcontroller, from there through ZIGBEE we can view in PC.
- NFC tag can be employed for automation of identification of patient and doctors in hospital using smartphones and tablet computers that use the Android platform. NFC can be used to explore new ways of real-time hospital workflows and data processing in the medical world.
- It is often frustrating when the slow speed of network leads to limited connectivity and long processing hours while using wireless internet either at home network or coffee shop or airport or competing for bandwidth at a conference.
- As more and more users are tapped in with their devices, the clogged airwaves make it difficult to latch on a reliable signal. If Wi-Fi is implemented in many hospitals, interference from cell phones and computers can block signals from monitoring equipment.
- Existing methodologies in patient monitoring system focuses on providing better healthcare facilities to a number of patients with limited medicinal resources.
- These monitoring systems limit the patients to the bed and enable them move around only a particular range from the bed side.
- Out of this range there is no possibility to collect the data from patients.

- The decisions or suggestions given by the system are not highly accurate.
- The traditional forecasting techniques do not provide timely and accurate results.
- This increases the risk of error in providing appropriate clinical services.

DRAWBACKS

- In small hospitals this method is possible, but when it comes to big hospitals it is not possible.
- We cannot maintain a database of a patient in hardcopy if any accidents, life fire or file misplacement occurs.
- As more and more users are tapped in with their devices, the clogged airwaves make it difficult to latch on a reliable signal.
- If Wi-Fi is implemented in many hospitals, interference from cellphones and computers can block signals from monitoring equipment.

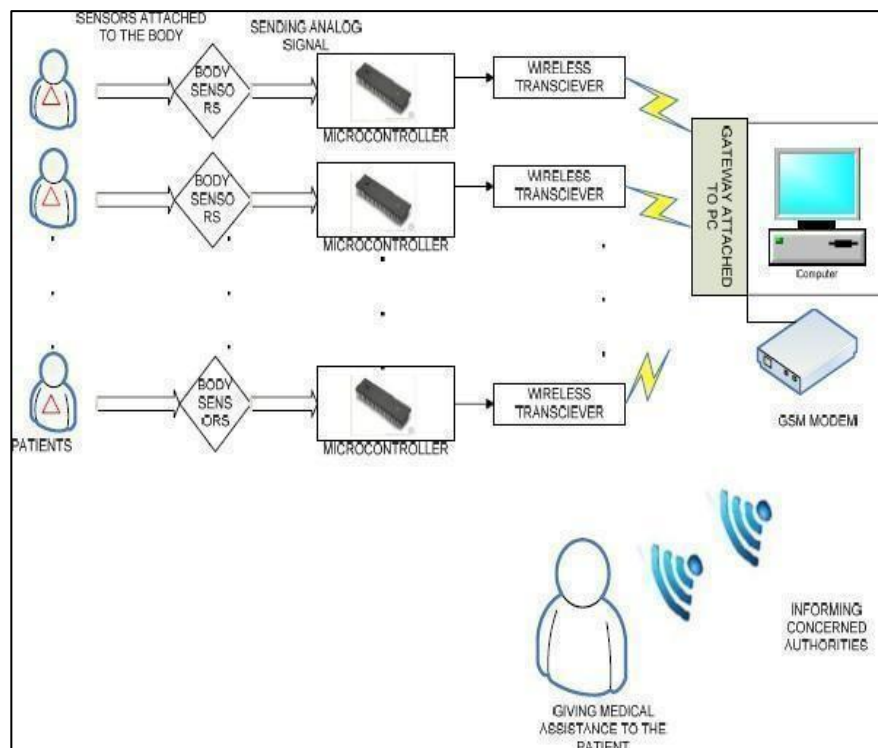


Fig3.1: Existing System

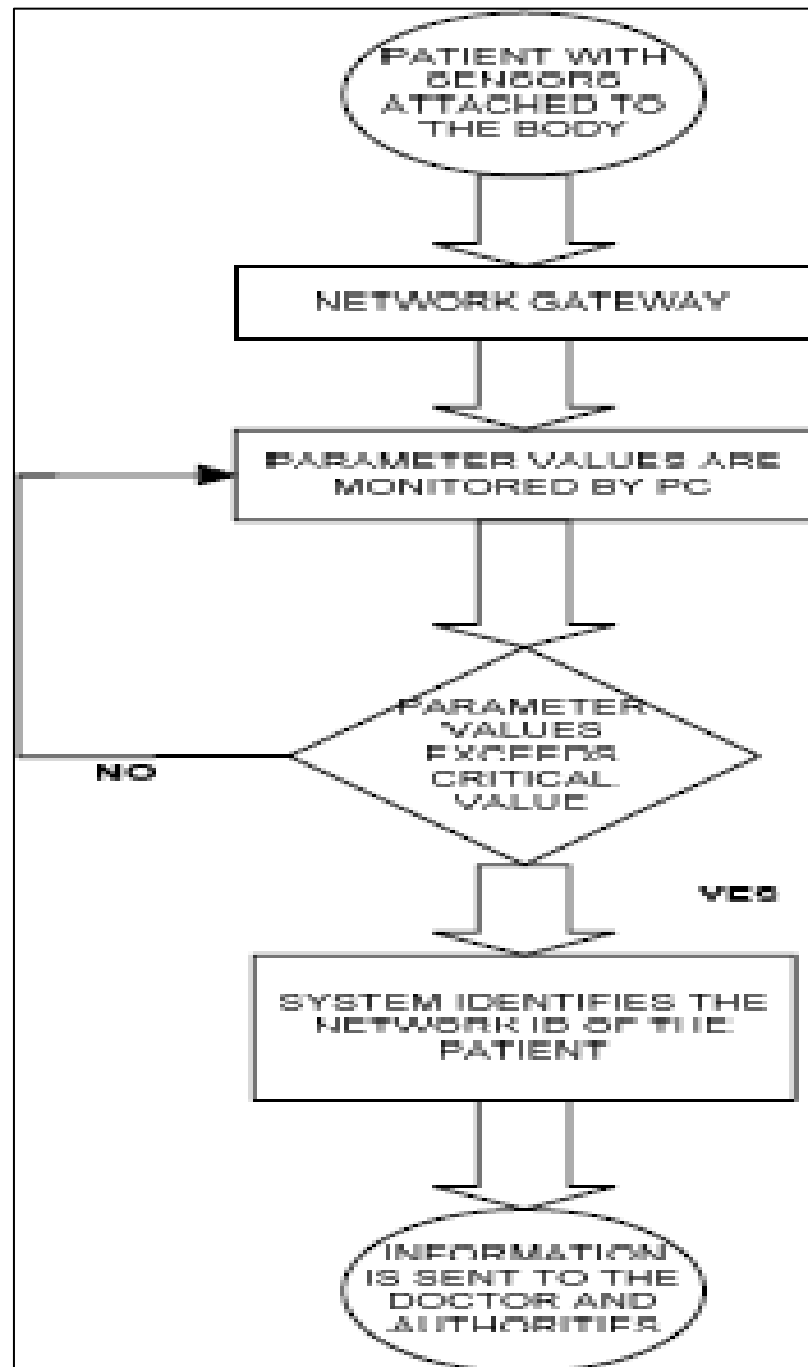


Fig3.2: Flow Chart of existing system

3.2 PROPOSED SYSTEM

This paper shows the modern technique for checking human body boundaries like, heartbeat rate, utilizing Arduino and LabVIEW innovation. The equipment is created on Arduino atmega328 regulator board and various sensors. LabVIEW misutilized programming part to give GUI based climate to client which makes easy to use less difficult than coding and web is utilized to produce implanted web worker. Subsequently This interfacing takes our venture to jump toward the up and coming age of, anyplace whenever access. It very well may be taken care of to web through site or organization framework so persistent's condition and biomedical boundaries can be screen around the world. It is Low expense and low force framework in term of equipment just as programming. It is accomplished by methods for installed Real time working framework. For Pervasive Healthcare electronic constant observing uses the Context Aware momentary subordinate medical services engineering and medical services experts would remote be able to live screen the patient.

- The system is divided into two phases.
- The first is the acquisition and wireless transmission module, second is the data receiver module.
- The device used in the acquisition model is responsible for acquiring ECG and temperature, through the use of specific leads attached to the patient during the session.
- The ADC circuit is used to convert the sensor analog voltage into digital format than fed to microcontroller.
- The microcontroller gets the sensor data and transmit the data to the PC using bluetooth module.
- In Receiver side the received data are uploaded to PC.

- If then normal occur in the sensor value the microcontroller send the message to the doctor about patient detail with specified condition of abnormality .
- Hence this will helpful to doctor to identify the patient problem and resolve it.

ADVANTAGES:

- The Objective of this research to design a device which is low-cost, non-intrusive, wireless, portable and reliable to use.
- This device will provide the information about the four parameters Electrocardiogram, and Heart Rate in real time and it will be sent wirelessly from remote to base station
- The health care sensors are playing a vital role in hospitals. The Patient Monitoring system is one of the major improvements because of its advanced technology.
- This project proposes System that provides Heart beat monitoring system based on LabVIEW.
- This study describes the development and implementation of an Android based phone in the home monitoring health care system. The system utilizes Android devices as mobile access terminals for patient monitoring services.
- The microcontroller gets the sensor data and transmit the data to the PC using Bluetooth module.
- In receiver side the received data are uploaded to PC.
- If the normal occur in the sensor value the microcontroller send the message to the doctor about patient details with specified condition of abnormality.
- Hence this will be helpful to doctor to identify the patient problem and resolve it.

3.3 SCHEMATIC DIAGRAM

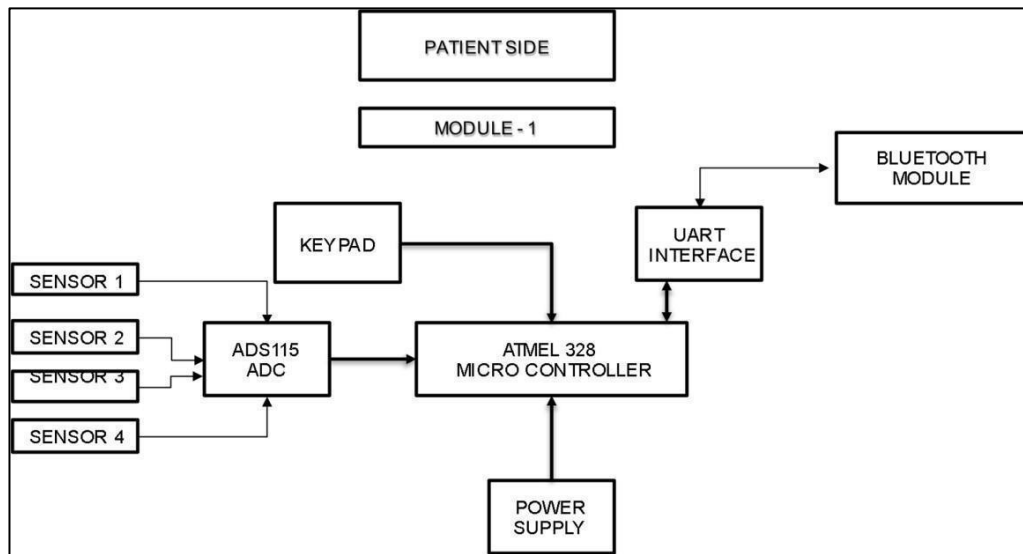


Fig 3.3: Patient module

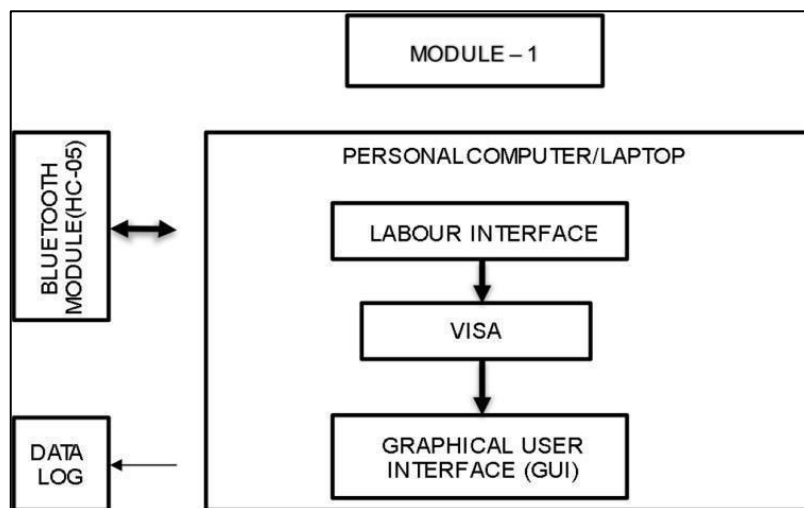


Fig 3.4: Receiver Module

3.4 WORKFLOW

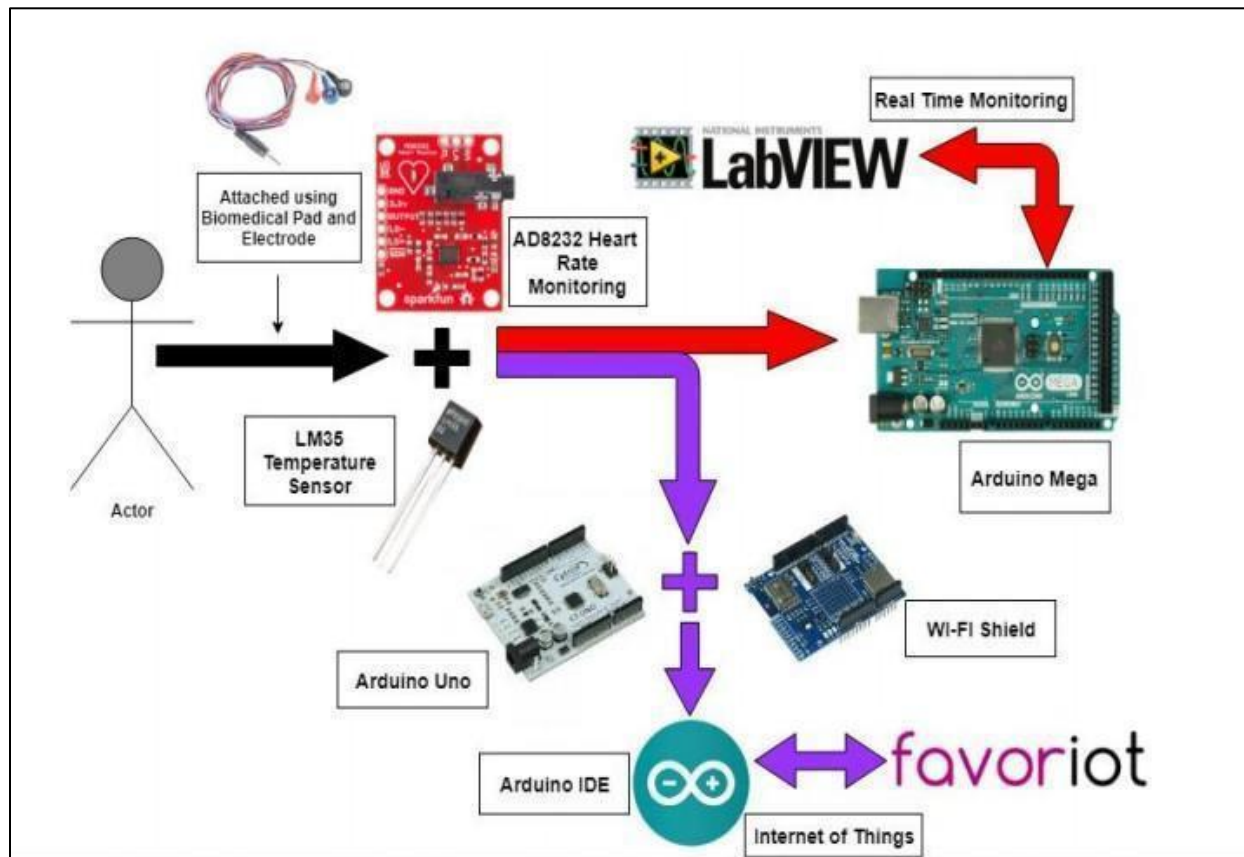


Fig 3.5 : Work Flow

CHAPTER4

HARDWARE REQUIREMENTS

HARDWARE REQUIREMENTS

- Arduino
- Sensor parts
- RFTransmitter
- LCD Interface
- RS232 Cable
- PANIC SWITCH
- Power supply unit
- Buzzer

SOFTWARE REQUIREMENTS

☑ Windows Operating System

☑ National Instruments LabVIEW 2013

☑ Web Browser

4.2 ARDUINO UNO AND ITS PROGRAMMING

Arduino is an apparatus for appearing well good and control a greater amount of the actual world than your work station. It's an open-source actual registering stage dependent on a straightforward microcontroller board, and an advancement climate for composing programming for the board.

Arduino Can Utilize To Create Intuitive Articles, taking contributions from an assortment of switches or sensors, and controlling an assortment of lights, engines, and other actual yields. Arduino undertakings can be independent, or they can be speak with programming running on your PC. The sheets can be amassed by hand or bought pre

assembled; the open-source IDE can be downloaded for nothing. The Arduino programming language is a usage of Wiring, a comparative actual figuring stage, which depends on the Processing media programming climate.

ARDUINO UNO:

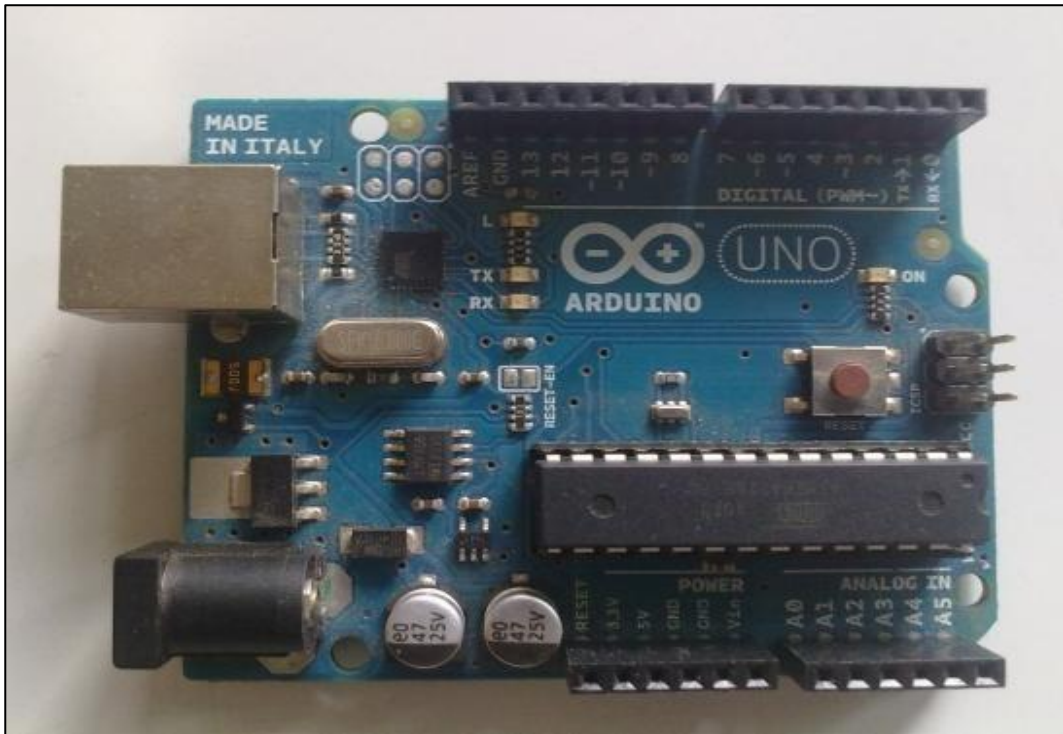


Figure 4.1:Arduino UNO

The Duemilanove board includes an Atmel ATmega328 microcontroller working at 5 V with 2 Kb of RAM, 32 Kb of flash memory for putting away projects and 1 Kb of EEPROM for putting away boundaries. The clock speed is 16 MHz, which means about executing around 300,000 lines of C source code each second. The board has 14 computerized I/O pins and 6 simple information pins. There is a USB connector for conversing with the host PC and a DC power jack for associating an outside 6-20 V force source, for instance a 9 V battery, when running a program while not associated with the host PC. Headers are given to interfacing to the I/O pins utilizing 22 g strong wire or header connectors.

The Arduino programming language is an improved on adaptation of C/C++. On the off chance that know C, programming the Arduino will be recognizable. On The Off Chance that you don't know C, no compelling reason to stress as a couple of orders are expected to perform valuable capacities.

A significant element of the Arduino is that you can make a control program on the host PC, download it to the Arduino And will naturally. Eliminated USB link association with the PC, and the program will in any case run from the to each time you press these button. Eliminate The Battery And put the Arduino board in a storeroom for a half year. At the point when you reconnect the battery, the last program you put away will run. This implies that you associate the board to the host PC to create and investigate your program, however whenever that is done, you presently don't require the PC to run the program.

The Arduino Uno is a microcontroller board dependent on the ATmega328. It has 14 advanced information/output pins (of which 6 can be utilized as PWM yields), 6 simple data sources, a 16 MHz crystal resonator, a USB association, a power jack, an ICSP header, and a reset button. It contains all that expected to help the microcontroller; basically associate it to a PC with a USB link or force it with an AC-to-DC connector or battery to begin.

The Uno contrasts from all former sheets in that it doesn't utilize the FTDI USB-to-serial driver chip. All Things being equal, it includes the ATmega16 U2 (ATmega8U2 up to variant R2) customized as a USB-to-serial converter.

IT CONSISTS OF

Microcontroller

ATmega328 Operating Voltage 5

Input Voltage (recommended) 7-12V

Input Voltage (limits) 6-20V

Digital I/O Pins 14 (of which 6 provide PWM output)

Analog Input Pins 6

DC Current per I/O Pin 40

mADC Current for 3.3V Pin 50mA

Flash Memory 32KB (ATmega328) of which 0.5KB used by bootloader

SRAM 2KB (ATmega328)

EEPROM 1KB (ATmega328)

Clock Speed 16MHz/

4.3 PIN CONFIGURATION OF ARDUINO

The Arduino Uno can be fueled through the USB association or with an outer force supply. The Force Source is chosen consequently. Outside (non-USB) force can come either from an AC-to-DC connector (divider mole) or battery. The connector can be associated by connecting a 2.1mm focus positive fitting to the board's force jack. Leads from a battery can be embedded in the Gnd and Vin pin headers of the POWER connector.

The board can work on an outside supply of 6 to 20 volts. Whenever provided with under 7V, notwithstanding, the 5V pin may supply under five volts and the board might be flimsy. In the event that utilizing more than 12V, the voltage controller may overheat and harm the board. The prescribed reach is 7 to 12 volts.

The power pins are as follows:

VIN. The input voltage to the Arduino board when it's using an external power source (as opposed to 5 volts from the USB connection or other regulated power source). You Can supply voltage through this pin, or, if supplying voltage via the power jack, access it through this pin.

5V. this pin outputs a regulated 5V from the regulator on the board. The board can be supplied with power either from the power jack (7-12V), the USB connector (5V), or the VIN pin of the board (7-12V). Supplying voltage via the 5V or 3.3V pins bypasses the regulator, and can damage your board.

3V3. A 3.3 volt supply generated by the on-board regulator. Maximum current draw is 50mA.

GND. Ground pins.

IOREF: This pin on the Arduino board provides the voltage reference with which the microcontroller operates. A properly configured shield can read the IOREF pin voltage and select the appropriate power source or enable voltage translators on the outputs for working with the 5V or 3.3V.

Memory: The ATmega328 has 32 KB (with 0.5 KB used for the bootloader). It also has 2 KB of SRAM and 1 KB of EEPROM.

Input and Output

Each of the 14 digital pins on the Uno can be used as an input or output, using `pinMode()`, `digital Write()`, and `digital Read()` functions. They operate at 5 volts. Each pin can provide or receive a maximum of 40 mA and has an internal pull-up resistor (disconnected by default) of 20-50 kohms. In addition, some pins have specialized functions:

- **Serial: 0 (RX) and 1 (TX).** Used To Receive (RX) and Transmit (TX) TTL serial data.

These pins are connected to the corresponding pins of the ATmega8U2 USB-to-TTL Serial chip.

External Interrupts: 2 and 3. These pins can be configured to trigger an interrupt on a low value, a rising or falling edge, or a change in value. See the `attach Interrupt()` function for details.

PWM: 3, 5, 6, 9, 10, and 11. Provide 8-bit PWM output with the `analogWrite()` function.

SPI: 10 (SS), 11 (MOSI), 12 (MISO), 13 (SCK). These pins support SPI

communication using the SPI library.

LED: 13. There is a built-in LED connected to digital pin 13. When the pin is HIGH value, the LED is on, when the pin is LOW, it's off.

The Uno has 6 analog inputs, labeled A0 through A5, each of which provide 10 bits of resolution (i.e. 1024 different values). By default they measure from ground to 5 volts, though it is possible to change the upper end of their range using the AREF pin and the `analogReference()` function. Additionally, some pins have specialized functionality:

TWI: A4 or SDA pin and A5 or SCL pin:

Support TWI communication using the Wire library.

There are a couple of other pins on the board:

AREF. Reference voltage for the analog inputs. Used with `analogReference()`.

Reset. Bring this line LOW to reset the microcontroller. Typically used to add a reset button shields which block the one on the board.

4.4 COMMUNICATION

Microcontrollers rely upon a host PC for creating and arranging programs. The product utilized on the host PC is known as an integrated development environment, or IDE. For the Arduino, the improved environment depends on the open source Processing IDE, which is portrayed by its makers as a "programming language and environment for individuals who need program pictures, liveliness, and communications." The Arduino programming language uses an open source project known as Wiring (wiring.org.co). The Arduino language depends on ordinary C. In the event that you are new to this language, don't stress; it's not difficult to learn, and the Arduino IDE gives some input when you commit errors in your projects.

The Arduino Uno has various interfaces for speaking with a PC, another Arduino, or

other microcontrollers. The ATmega328 gives UART TTL (5V) sequential correspondence, which is accessible on advanced pins 0 (RX) and 1 (TX). An ATmega16U2 on the board channels this sequential correspondence over USB and shows up as a virtual com port to programming on the PC. The '16U2 firmware utilizes the standard USB COM drivers, and no outside driver is required. Notwithstanding, on Windows, an info record is required. The Arduino programming incorporates a chronic screen which permits straight forward literary information to be shipped off and from the Arduino board. The RX and TX LEDs on the board will streak when information is being sent through the USB-to-sequential chip and USB association with the PC (however not for sequential correspondence on pins 0 and 1).

4.5 ARDUINO IDE

- Including an Integrated Development Environment (IDE) for programming.
- The language is based on C



```

sketch_LABVIEW_TX_CODE_2
#include <Keypad.h>
#include <Wire.h>
#include <Adafruit_BMP085.h>
#include <SoftwareSerial.h>
Adafruit_BMP085 bap;
SoftwareSerial mySerial(10, 11); // RX, TX
const byte ROWS = 4; //four rows
const byte COLS = 4; //three columns
char keys[ROWS][COLS] = {
  {'1', '4', '7', '*'},
  {'2', '5', '8', '0'},
  {'3', '6', '9', '#'},
  {'A', 'B', 'C', 'D'}
};
byte rowPins[ROWS] = {5, 4, 3, 2}; //connect to the row pinouts of the keypad
byte colPins[COLS] = {9, 8, 7, 6}; //connect to the column pinouts of the keypad
Keypad keypad = Keypad( makeKeymap(keys), rowPins, colPins, ROWS, COLS );
float temperature = 34.57;
String receiveddata = "";
String firstdatastring = "111";
String seconddatastring = "222";
String thirddatastring = "333";
String sendingstring = "";
int sendingmode = 6;
int sendingcount = 0;
void setup() {

```

Fig 4.2 : Arduino IDE

#include <Servo.h>

Which tells the Arduino IDE that you wish to include the Servo library in your sketch. With The Functionality Of The Library now available to you, you can use its various functions to control one or more servos. For example, you can use the write function to rotate a servo to a specific position, from 0 to 180 degrees. The following code

```
myServo.write(90);
```

Moves a servo to its midpoint, or 90 degree position. Structurally, Arduino sketches are very straightforward and are pretty easy to read and understand. The Arduino program contains two main parts: setup () and loop (). These are programming functions that do what their names suggest: setup () sets up the Arduino hardware, such as specifying which I/O lines you plan to use, and whether

They Are Inputs Or Outputs. The Loop () function is repeated endlessly when the Arduino is operating.

ArduinoIDE (Integrated Development Environment) is used to write the program dump into the Arduino board

4.6 HEARTBEAT SENSOR

A person's heartbeat is the sound of the valves of his/hers heart contracting or expanding as they force blood from one region to another. The number of times the heartbeats per minute (BPM), is the heart beat rate and the beat of the heart that can be felt in any artery that lies close to the skin is the pulse.

TWO WAYS TO MEASURE HEARTBEAT

Manual Way: Heart beat can be checked manually by checking one's pulses at two locations- wrist (the radial pulse) and the neck (carotid pulse). The procedure is to place the two fingers (index and middle finger) on the wrist (or neck below the windpipe) and count the number of pulses for 30 seconds and then multiplying that number by 2 to get the heart beat rate. However pressure should be applied minimum and also fingers should be moved up and down till the pulse is felt.

Using Sensor: HeartBeat can be measured based on optical power variation as light is scattered or absorbed during its path through the blood as the heart beat changes.

PRINCIPLE OF HEARTBEAT SENSOR

The heartbeat sensor is based on the principle of photoplethysmography. It measures the change in volume of blood through any organ of the body which causes a change in the light intensity through that organ (a vascular region). In case of applications where heart pulse rate is to be monitored, the timing of the pulses is more important. The flow of blood volume is decided by the rate of heart pulses and since light is absorbed by blood, the signal pulses are equivalent to the heart beat pulses.

There are two types of photoplethysmography:

Transmission: Light emitted from the light emitting device is transmitted through a vascular region of the body like an earlobe and received by the detector.

Reflection: Light emitted from the light emitting device is reflected by the regions.

WORKING OF A HEARTBEAT SENSOR

The basic heartbeat sensor consists of a light emitting diode and a detector like a light detecting resistor or a photodiode. The heart beat pulses causes a variation in the flow of blood to different regions of the body. When a tissue is illuminated with the light source, i.e. light emitted by the led, it either reflects (a finger tissue) or transmits the light (earlobe). Some of the light is absorbed by the blood and the transmitted or the reflected light is received by the light detector. The amount of light absorbed depends on the blood volume in that tissue. The detector output is in form of electrical signal and is proportional to the heart beat rate.

This signal is actually a DC signal relating to the tissues and the blood volume and the AC component synchronous with the heart beat and caused by pulsatile changes in arterial blood volume is superimposed on the DC signal. Thus the major requirement is to isolate that AC component as it is of prime importance.

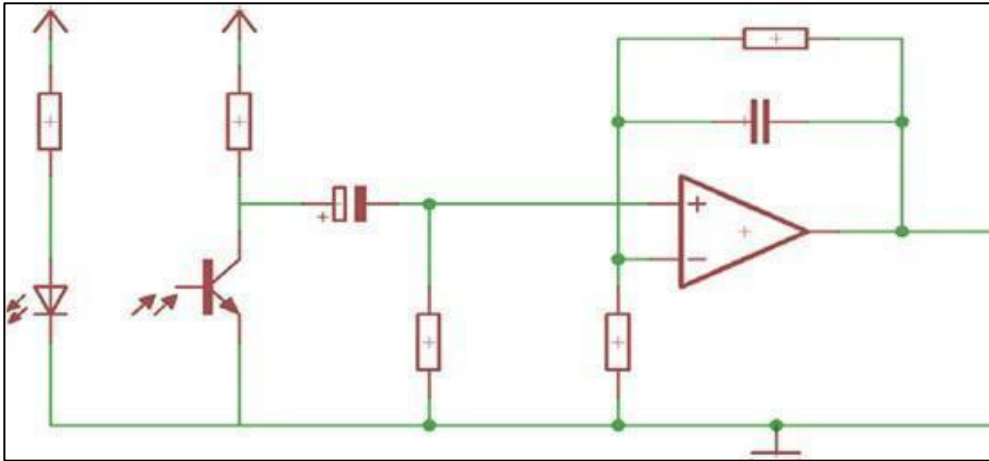


Fig 4.3 : Circuit diagram of Heart beat sensor

To achieve the task of getting the AC signal, the output from the detector is first filtered using a 2 stage HP-LP circuit and is then converted to digital pulses using a comparator circuit using simple ADC. The Digital pulses are given to Microcontroller for calculating the heart beat rate,

$$\text{BPM(Beats Per Minute)} = 60 * f$$

Where f is the pulse frequency

Practical Heartbeat Sensor

Practical heartbeat Sensor examples are Heart Rate Sensor (Product No PC-3147). It Consists of an infrared led and ldr embedded onto a clip like structure. The clip is attached to the organ (earlobe or the finger) with the detector part on the flesh.



Fig 4.4 : Heart Beat sensor

4.7 ECG

ECG records the electrical activity generated by heart muscle depolarization, which propagate in pulsating electrical waves towards the skin. Although the electricity amount is in fact very small, it can be picked up reliably with ECG electrodes attached to the skin. The full ECG setup comprises at least four electrodes which are placed on the chest or at the four extremities according to standard nomenclature (RA = right arm; LA = left arm; RL = right leg; LL = left leg). Of course, variations of this setup exist to allow more flexible and less intrusive recordings, for example, by attaching the electrodes to the fore arms and legs.

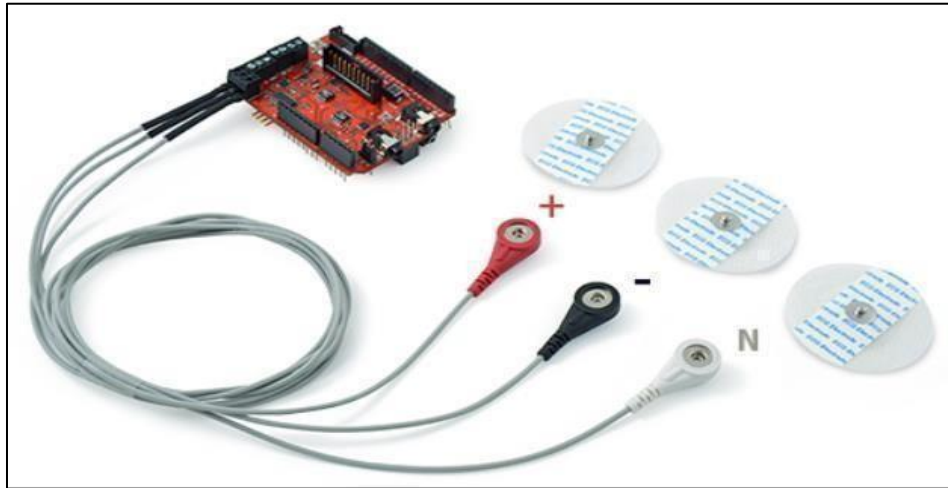


Fig 4.5 : ECG

4.8 RS232

At the point when we take a gander at the connector pin out of the RS232 port, we see two pins which are positively utilized for stream control. These two pins are RTS, solicitation send and CTS, clear to send. With DTE/DCE correspondence (for example a PC speaking with a modem gadget) RTS is a yield on the DTE and contribution on the DCE. CTS are the noting signal coming from the DCE.

Prior to sending a character, the DTE asks authorization by setting its RTS yield. No data will be sent until the DCE awards consent by utilizing the CTS line.

In the event that the DCE can't deal with new demands, the CTS sign will go low. A basic however valuable component permitting stream control one way. The supposition that will be that the DTE can generally deal with approaching data quicker than the DCE can send it. Before, this was valid. Modem paces of 300 baud were normal and 1200 baud was viewed as a high velocity association.

For additional control of the data stream, the two gadgets can flag their status to the opposite side. For this reason, the DTR information terminal preparedness informational collection prepared signs are available. The DTE utilizes the DTR sign to flag that is prepared to acknowledge data, though the DCE utilizes the DSR signal for similar reason. Utilizing these signs includes not a little convention of mentioning and replying similarly as with the RTS/CTS handshaking. These signs are one way in

particular.

The Last stream control signal present DTE/DCE correspondence the transporter identify. It isn't utilized straightforwardly for stream control, yet chiefly a sign of the capacity of the modem gadget to speak with its partner. This sign shows the presence of a correspondence connect between two modem gadgets.

MAX 232

INTRODUCTION

MAX-232 is primary used for people building electronics within RS-232 interface. Serial RS-232 communication works with voltages (-15V...-3V for high) and +3V...+15V for low) which are not compatible with normal computer logic voltages. To receive serial data from an RS-232 interface the voltage has to be reduced, and the low and high voltage level inverted. In the other direction (sending data from some logic over RS-232) the low logic voltage has to be "bumped up", and a negative voltage has to be generated, too.

RS-232	TTL	Logic
-15 V ... -3 V	<-> +2 V ... +5 V	<-> high
+3 V ... +15 V	<-> 0 V ... +0.8 V	<-> low

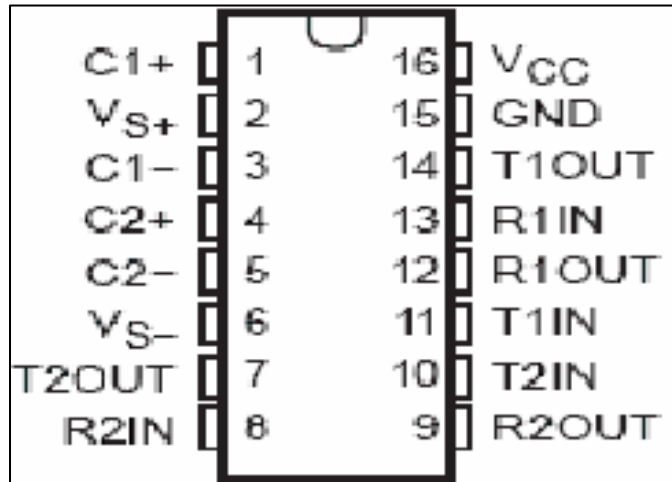


Fig 4.6: Pin Diagram Of Max 232

RS232 COMMUNICATION

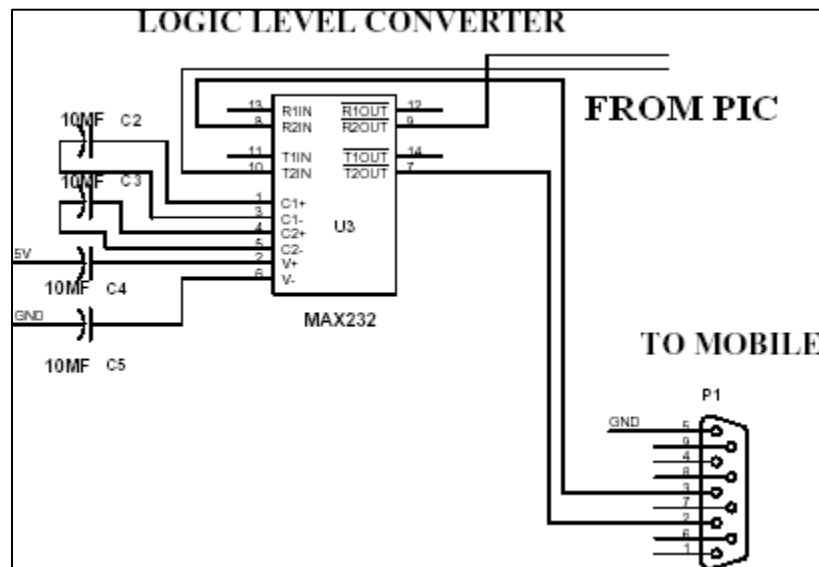


Fig 4.7: Circuit Diagram of Serial Communication

INTRODUCTION

In telecommunications, RS-232 is a standard for serial binary data interconnection between DTE (Data terminal equipment) and DCE (Data Circuit-terminating Equipment). It is commonly used in computer serial ports.

Scope of the Standard:

The Electronic Industries Alliance (EIA) standard RS-232-C [3] as of 1969 defines:

- Electrical signal characteristics such as voltage levels, signaling rate, timing and slew-rate signals, voltage withstand level, short-circuit behavior, maximum stray capacitance and cable length.
- Interface mechanical characteristics, pluggable connectors and pin identification.
- Functions of each circuit in the interface connectors.
- Standard subsets of interface circuits for selected telecom applications

The standard does not define bit rates for transmission, although the standard says it is intended for bit rates lower than 20,000 bits per second. Many modern devices can exceed this speed (38,400 and 57,600 bit/s being common, and 115,200 and 230,400 bit/s making occasional appearances) while still using RS-232 compatible signal levels.

Details of character format and transmission bit rate are controlled by the serial port hardware, often as a single integrated circuit called a UART that converts data from parallel to serial form. A typical serial port includes specialized driver and receiver integrated circuits to convert between internal logic levels and RS-232 compatible signal levels.

CIRCUIT WORKING DESCRIPTION

In this circuit the MAX 232 IC used as level logic converter. The MAX232 is a dual driver/receiver that includes a coactive voltage generator to supply EIA 232 voltage levels from a single 5v supply. Each receiver converts EIA-232 to 5v TTL/CMOS levels.Each driver convertsTLL/CMOS input levels into EIA-232levels.

Function Tables	
EACH DRIVER	
INPUT TIN	OUTPUT TOUT
L	H
H	L
H = high level, L = low level	
EACH RECEIVER	
INPUT RIN	OUTPUT ROUT
L	H
H	L
H = high level, L = low level	

Table 4.1 : Function table

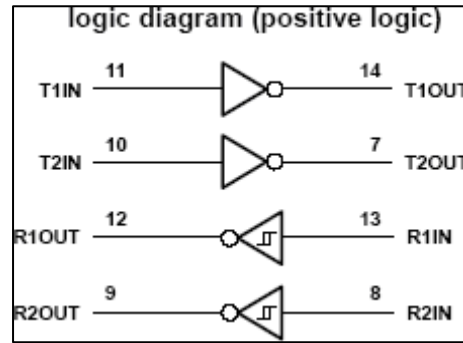


Fig 4.8: Logic diagram

In this circuit the microcontroller transmitter pin is connected in the MAX232 T2IN pin which converts input 5v TTL/CMOS level to RS232 level. Then T2OUT pin is connected to the revive pin of 9 pin D type serial connector which is directly connected to PC.

In PC the transmitting data is given to R2IN of MAX232 through transmitting pin of 9 pinD type connector which converts the RS232 level to 5v TTL/CMOS level. The R2OUTpin is connected to receiver pin of the microcontroller. Likewise the data is transmitted and received between the microcontroller and PC or other device vice versa.

4.9 UART

A widespread nonconcurrent collector/transmitter, shortened UART is a piece of equipment that deciphers information among equal and sequential structures. UARTsare regularly utilized related to correspondence principles, for example, EIA, RS-232,RS-422 or RS-485. The all inclusive assignment demonstrates that the information organization and transmission speeds are configurable. The electric flagging levels and techniques, (for example, differential flagging and so forth) are dealt with by a driver circuit outside to theUART.

A UART is typically an individual (or a piece of an) coordinated circuit utilized for sequential correspondences over a PC or fringe gadget sequential port. UARTs are currently ordinarily remembered for microcontrollers. A double UART, or DUART,consolidates two UARTs into a solitary chip. An octal UART or OCTART consolidates eight UARTs to bundle,a model being the N PSCC

2698. Numerous advanced ICs presently accompany a UART that can likewise convey simultaneously; these gadgets are called USARTs (all inclusive coordinated/non concurrent collector/transmitter).

The all inclusive offbeat recipient/transmitter (UART) takes bytes of information and communicates the individual pieces in a successive fashion.[1] At the objective, second UART re-gathers the pieces into complete bytes. Each UART contains a move register, which is the crucial technique for change among sequential and equal structures. Sequential transmission of computerized data (bits) through a solitary wire or other medium is less exorbitant than equal transmission through numerous wires.

The UART as a rule doesn't straightforwardly create or get the outer signs utilized between various things of hardware. Separate interface gadgets are utilized to change over the rationale level signs of the UART to and from the outer flagging levels. Outer Signs might be of a wide range of structures. Instances of norms for voltage flagging are RS-232, RS-422 and RS-485 from the EIA. Generally, current (in current circles) was utilized in broadcast circuits. Some flagging plans don't utilize electrical wires. Instances of such are optical fiber, IrDA (infrared), and (remote) Bluetooth in its Serial Port Profile (SPP). Some flagging plans use tweak of a transporter signal (with or without wires).

Correspondence Might be Simplex (in one course in particular, with no arrangement for the accepting gadget to send data back to the communicating gadget), full duplex (the two gadgets send and get simultaneously) or half duplex (gadgets alternate communicating and getting).

4.10 BLUETOOTH MODULE (HC05)

- It is used for many applications like wireless headset, game controllers, wireless mouse, wireless keyboard and many more consumer applications.
- Its Range Upto <100m which depends upon transmitter and receiver, atmosphere, geographic & urban conditions.

- It is IEEE 802.15.1 standardized protocol, through which one can build wireless Personal Area Network (PAN). It uses frequency-hopping spread spectrum (FHSS) radio technology to send data over air.
- It uses serial communication to communicate with devices. It communicates with microcontroller using serial port (USART).

HC-05 Bluetooth Module

- HC-05 is a Bluetooth module which is designed for wireless communication. This module can be used in a master or slave configuration.

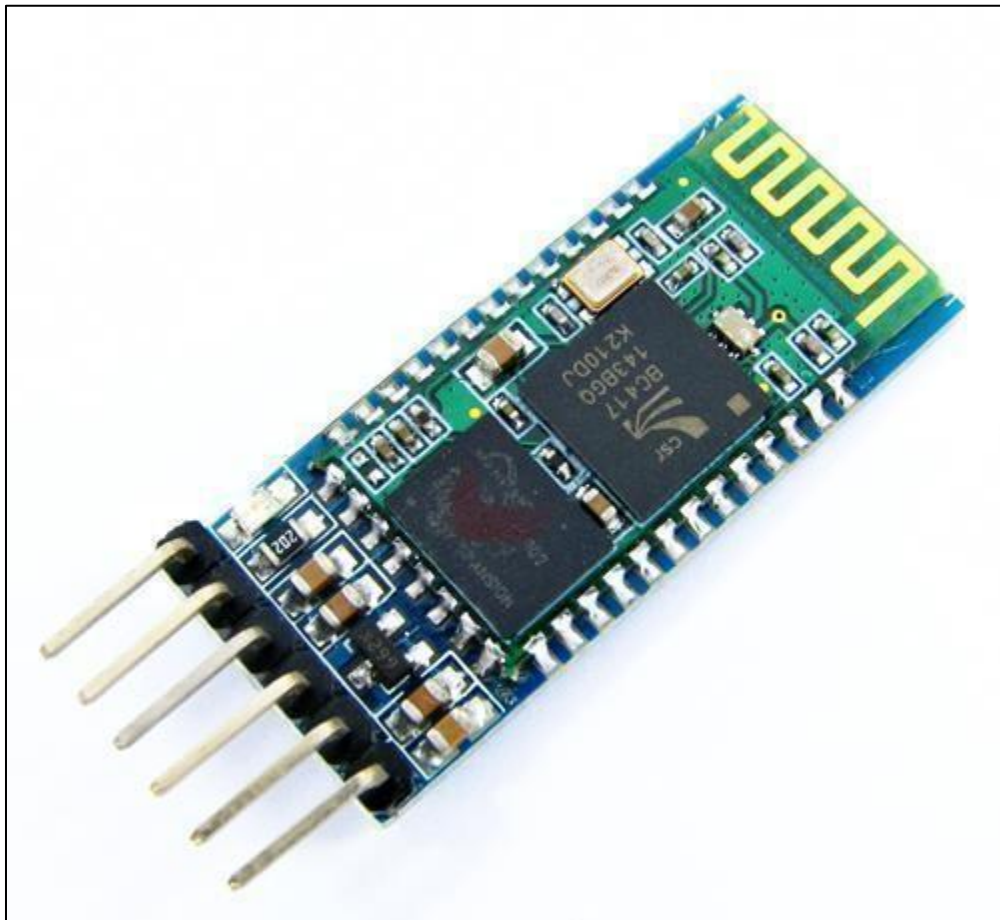


Fig 4.9: HC-05 Bluetooth Module

PIN DESCRIPTION

Bluetooth serial modules allow all serial enabled devices to communicate with each other using Bluetooth.

It has 6 pins,

1. **Key/EN:** It is used to bring Bluetooth module in AT commands mode. If Key/EN pin is set to high, then this module will work in command mode. Otherwise by default it is in data mode. The default baud rate of HC-05 in command mode is 38400bps and 9600 in data mode.

HC-05 module has two modes,

1. **Data mode:** Exchange of data between devices.
2. **Command Mode:** It uses AT commands which are used to change setting of HC-05. To send commands to module serial(USART) port is used.

2. **VCC:** Connect 5 V or 3.3 V to this Pin.

3. **GND:** Ground Pin of module.

4. **TXD:** Transmit Serial data (wirelessly received data by Bluetooth Module Transmitted Out serially on TXD pin)

5. **RXD:** Receive data serially (received data will be transmitted wirelessly by Bluetooth module).

6. **State:** It tells whether the module is connected or not.

HC-05 module Information

- HC-05 has red LED which indicates connection status, whether the Bluetooth is connected or not. Before connecting to HC-05 module this red LED blinks continuously in a periodic manner. When it gets connected to another Bluetooth device, its blinking slows down to two seconds.
- This module works on 3.3V. We can connect 5V supply voltage as well since module has on board 5 to 3.3 V regulator.
- As HC-05 Bluetooth module has 3.3 V level for RX/TX and microcontroller can

detect 3.3 V level, so, no need to shift transmit level of HC-05 module. But we need to shift the transmit voltage level from microcontroller to RX of HC-05 module.

Bluetooth communication between Devices

E.g. Send data from the Smartphone terminal to HC-05 Bluetooth module and see this data on PC serial terminal and vice versa.

To communicate with smartphones with HC-05 Bluetooth module, smartphone requires Bluetooth terminal application for transmitting and receiving data. you can find Bluetooth terminal applications for android and windows in respective app. store.

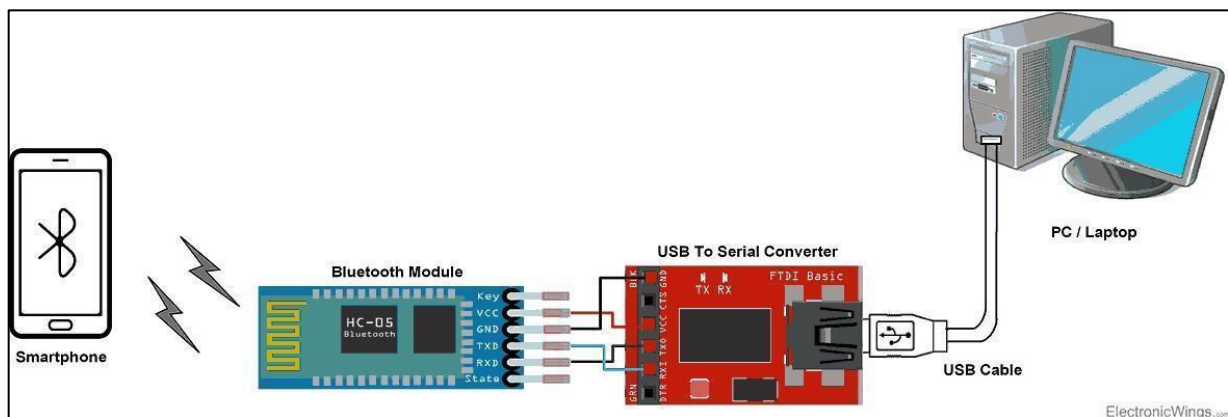


Fig 4.10: Bluetooth Module Serial Interface

So, when we want to communicate through smartphone with HC-05 Bluetooth module, connect this HC-05 module to the PC via serial to USB converter.

Before establishing communication between two Bluetooth devices, 1st we need to pair HC-05 module to smartphone for communication.

Pair HC-05 and smartphone:

1. Search for new Bluetooth device from your phone. You will find Bluetooth Device With "HC-05" name.
2. Click on connect/pair device option; default pin for HC-05 is 1234 or 0000.

After pairing two Bluetooth devices, open terminal software (e.g. Teraterm, Realterm etc.) in PC, and select the port where we have connected USB to serial module. Also select default baud rate of 9600 bps.

In the smartphone, open the Bluetooth terminal application and connect to paired device HC-05.

It is simple to communicate, we just have to type in the Bluetooth terminal application on our smartphones. Characters will get sent wirelessly to Bluetooth module HC-05. HC-05 will automatically transmit it serially to the PC, which will appear on terminal. Same way we can send data from PC to smartphone.

Command Mode

- When we want to change settings of HC-05 Bluetooth module like change password for connection, baud rate, Bluetooth device's name etc.
- To do this, HC-05 has AT commands.
- To use HC-05 Bluetooth module in AT command mode, connect "Key" pin to High (VCC).
- Default Baud rate of HC-05 in command mode is 38400 bps.
- Following are some AT commands generally used to change settings of Bluetooth module.
- To send these commands, we have to connect HC-05 Bluetooth module to the PC via serial to USB converter and transmit these commands through the serial terminal of PC.

Command	Description	Response
AT	Checking communication	OK
AT+PSWD=XXXX	Set Password e.g.AT+PSWD=4567	OK
AT+NAME=XXXX	Set Bluetooth DeviceName e.g.AT+NAME=MyHC-05	OK
AT+UART=Baud rate, stop bit, paritybit	Change Baud rate e.g.AT+UART=9600,1,0	OK
AT+VERSION?	Respond version no. ofBluetooth module	+Version:XXOK e.g.+Version:2.020130107OK
AT+ORGL	Send detail of setting doneby manufacturer	Parameters: device type, modulemode, serial parameter,passkey,etc.

Table 4.2: Command modes of bluetooth module

CHAPTER 5

SOFTWARE DESIGN AND IMPLEMENTATION

5.1 ARDUINO

Arduino is a tool for appearing well good and control a greater amount of the actual world than your personal computer. It's an open-source actual figuring stage dependent on a straightforward microcontroller board, and an improved climate for composing programming for the board.

Arduino can be utilized to create intelligent articles,taking contributions from an assortment of switches or sensors,and controlling an assortment of lights, engines,and other actual yields. Arduino undertakings can be independent, or they can be spoken with programming running on rPC(for example Streak, Processing, MaxMSP.)The sheets can be massed by hand or bought Preassembled;the open-source IDE can be downloaded for nothing.

The Arduino programming language is an execution of Wiring, a comparative actual registering stage, which is based on the Processing multimedia programming environment.

Why Arduino?

There are many other microcontrollers and microcontroller platforms available for physical computing. Parallax Basic Stamp,Netmedia'sBX-24, Phidgets, MIT's Handyboard, and many others offer similar functionality. All of these tools take the messy details of microcontroller programming andwrapitupinaneasy-to-usepackage. Arduino also simplifies the process of working with microcontrollers, but it offers some advantage for teachers,students, and interested amateurs over other systems:

Inexpensive-Arduinobboards are relatively inexpensive compared to other microcontroller platforms. The least expensive version of the Arduino module can be assembled by hand, and even the pre-assembled Arduino Modules Cost Less Than \$50.

Cross-platform - The Arduino software runs on Windows, Macintosh OSX, and Linux Operating systems. Most microcontroller systems are limited to Windows.

Simple, clear programming environment - The Arduino programming environment is easy-to-use for beginners, yet flexible enough for advanced users to take advantage of as well. For teachers, it's conveniently based on the Processing programming environment, so students learning to program in that environment will be familiar with the look and feel of Arduino.

Open source and extensible software- The Arduino software and is published as open source tools, available for extension by experienced programmers. The Language can be expanded through C++ libraries, and people wanting to understand the technical details can make the leap from Arduino to the AVR C programming language on which it's based..

5.2 LABVIEW

LabVIEW was first dispatched 1986 as an apparatus for researchers and architects to encourage mechanized estimations - the point was that it would be an instrument that would be as profitable for researchers and designers as accounting pages were for monetary examiners.

Says Jeff Kodosky of National Instruments who thought of the underlying thought and created it: "We weren't trying to make a language however that is the thing that we wound up doing in light of the fact that we required that degree of adaptability and control to manage the sorts of IO and preparing required."

Also, Kodosky had been utilizing an early Apple Mac which used designs more

than some other processing framework. Kodowsky needed to have the option to use this ability to empower faster programming of the control for instruments.

LabVIEW utilizes a realistic interface that empowers various components to be consolidated to give the necessary stream.

LabVIEW is basically a climate that empowers programming in G – this is a graphical programming language made by National Instruments that was at first evolved to convey by means of GPIB, yet from that point forward it has been impressive refreshed. These days, G can be utilized for robotized test applications, general information obtaining, programming FPGAs, and so on . . .

LabVIEW is basically the UI for G. Anyway as the product has created, the term LabVIEW is currently inseparable from the G language. LabVIEW likewise gives a large group of different offices including troubleshooting, computerized multithreading, application UI, equipment the board and interface for framework plan. Thus, LabVIEW goes about as a gateway for an assortment of offices, unite the munderasolitary component that is not difficult to oversee.

LabVIEW runs on Windows, OS X (Apple) and Linux stages, making it appropriate foremost registering frameworks.

LabVIEW key ideas

Inside LabVIEW there are a few components and ideas that are critical to the organization and activity of the climate. These include:

- **LabVIEW environment:** The LabVIEW environment consists of LabVIEW VI manager (project explorer), the programming tools, debugging features, templates and ready built sample examples, and an easy interface to the hardware drivers.
- **LabVIEW VIs:** The LabVIEW Visa “Virtual Instrument” that enables a user interface to be built and it contains the programming code.

- **LabVIEW G programming:** This is the graphical programming language where the functional algorithms are built using “drag and drop” techniques.
- **LabVIEW dataflow :** This is the core concept that determines the running order for the programme.

LabVIEW applications

LabVIEW provides a powerful platform for undertaking a wide variety of different applications. It started as an environment for managing test programming, but since its inception, the applications for which it can be used have considerably expanded. It has expanded from being a graphical test management language to become a graphical system design environment.

This means that it can be used for an enormous variety of interesting and diverse applications. Not only can it be used for equipment control (including the control of the large Hadron Collider at CERN) and a variety of data acquisition applications (including car development simulation where Big Data monitoring is undertaken) to the system design arena where it has been used for development of projects from RF circuitry to biomedical equipment, green technology and much more.

LabVIEW advantages

- Graphical interface is flexible and simple to use. Most Engineers And Scientists Can Learn To use it quickly.
- LabVIEW provides a universal platform for numerous applications in diverse fields.
- LabVIEW can be used with 3rd party hardware: it can interface with C++, VB, Fortran etc etc.
- Easy To interface to many hardware items like Data acquisition and test equipment products.

LabVIEW disadvantages

- LabVIEW is single sourced and some companies may not like to use product that is single sourced and not standardised by the industry.
- Cost of ownership—although in line with many other industry products of a similar nature, its cost should be considered before it is introduced.
- For those more accustomed to text programming, graphical programming can take a little familiarisation time.

Like Any Product, LabVIEW has some disadvantages, but many who use it find it particularly effective. In view of this, LabVIEW should be carefully assessed before its use is introduced.

5.3 IMPLEMENTATION

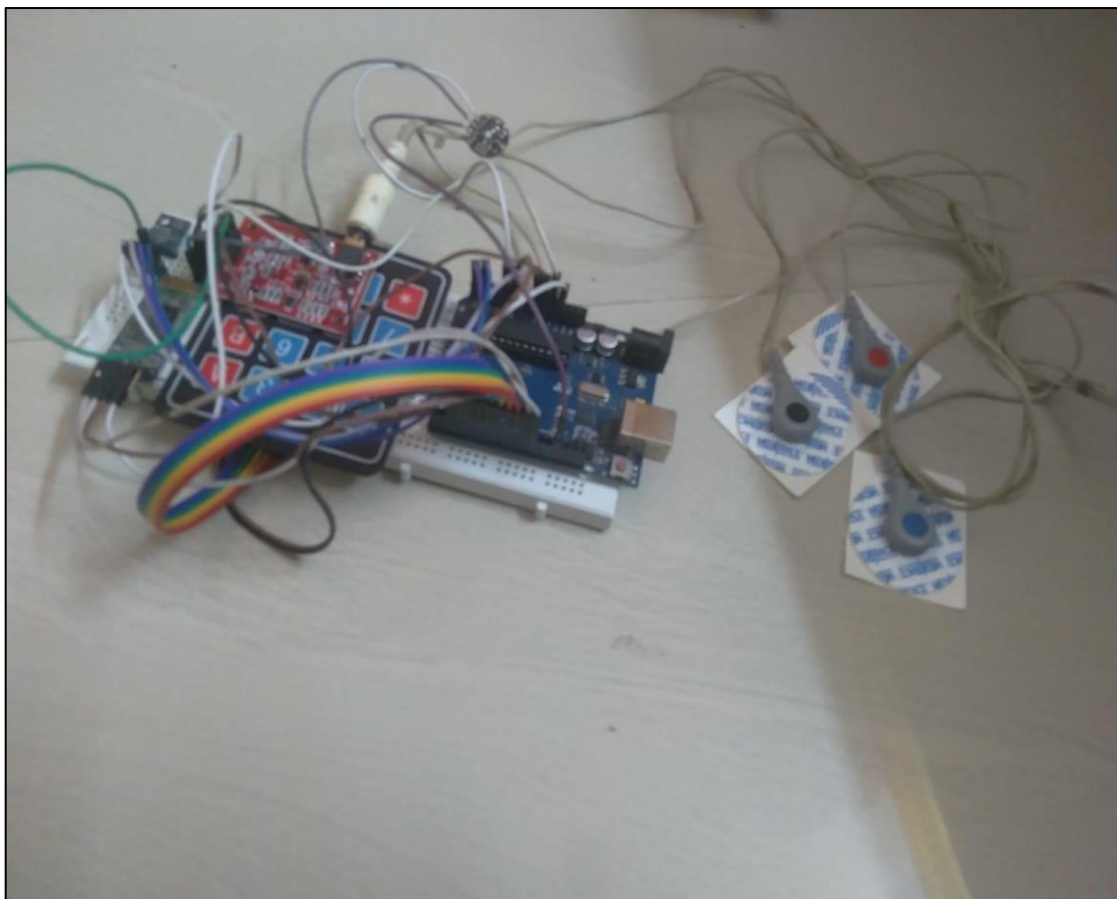


Fig 5.1: Patient side module

Figure shows the patient module. It comprises of three sorts of sensors specifically temperature sensor, heart rate sensor and ECG sensor. The simple estimations of sensors are gathered and connected to Arduino. The Arduino comprises of ADC which converts analog values to digital values and the data is transferred to doctor through wireless communication through HC-05 blue module in an encrypted form. The keypad is utilized to get consent which information is to be moved either a temperature sensor or heart rate sensor.

5.4 DOCTORSIDE

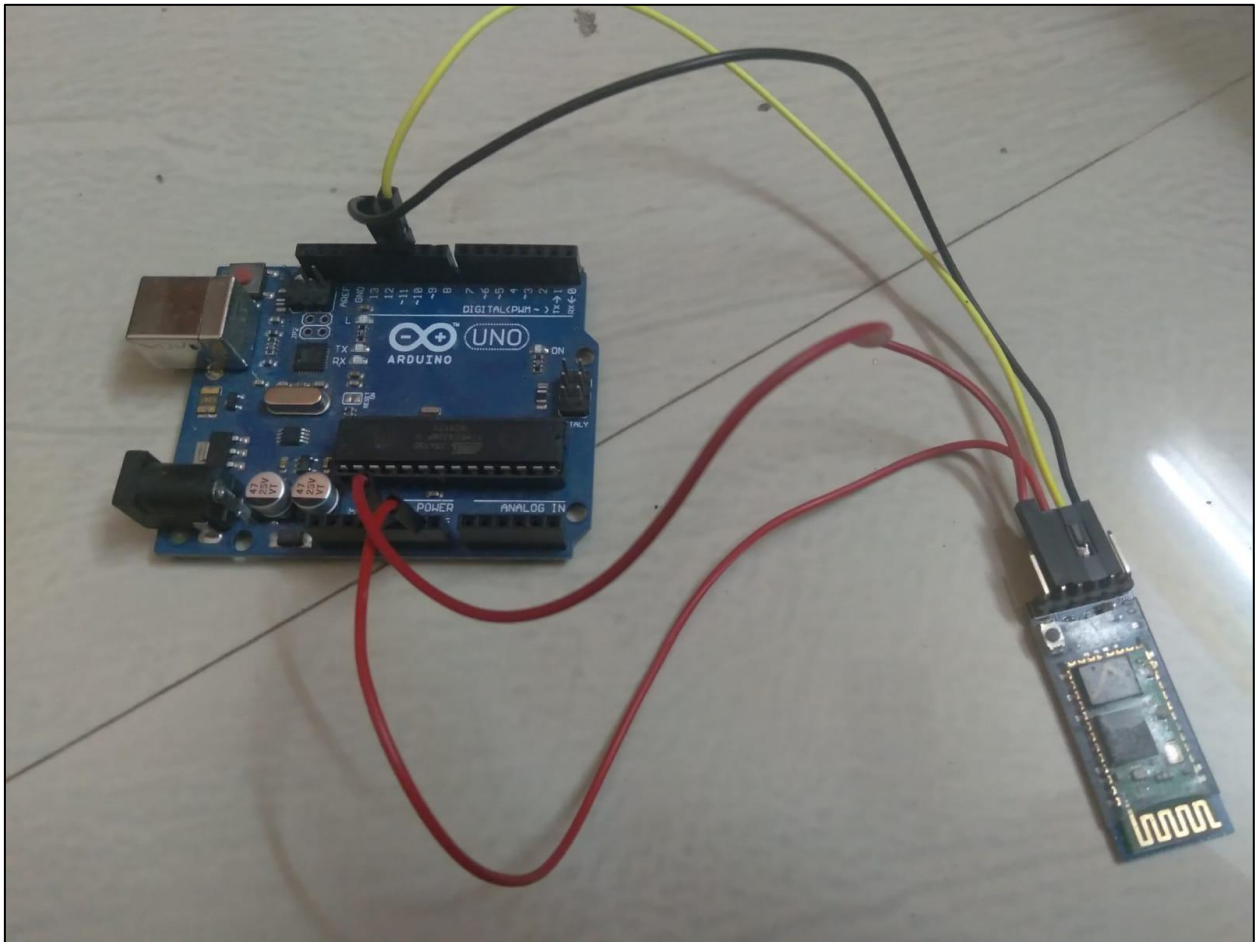


Fig5.2: Doctor side module

Monitoring system referred to repeated or continuous measurement of various physiological parameter of patient. In the present paper by using the LabVIEW which is graphical programming language, clinically important parameters (i.e.) Temperature, SpO₂ and Electrocardiogram, are obtained processed and displayed in a graphical user interface, then get available on web page in real time to be viewed by an authorized doctor. The algorithm is evaluated with ECG data files, with different ECG morphologies and noise content taken from Biopac MP150 instrument for ecg acquisition which contains 1000 samples per ECG, recorded at a sampling frequency of 150Hz. All this data get available to physicians, by using various web publishing tool in LabVIEW, who is at a remote location. In this work we have developed an algorithm based on wavelet transform approach using LabVIEW.

The design of this system consisted of three parts: sensors, signal processing circuits, and a user-friendly graphical user interface (GUI). The first part involved selection of appropriate sensors. For ECG, disposable Ag/AgCl electrodes; for temperature, Thermister and LM35 precision temperature sensor were selected. The second part consisted of processing the signals obtained from these sensors. This was achieved by implementing suitable amplifiers and filters for the vital signs. The final part focused on development of a GUI to display the vital signs in the LabVIEW environment.

5.5 INITIAL SETUP OF LABVIEW

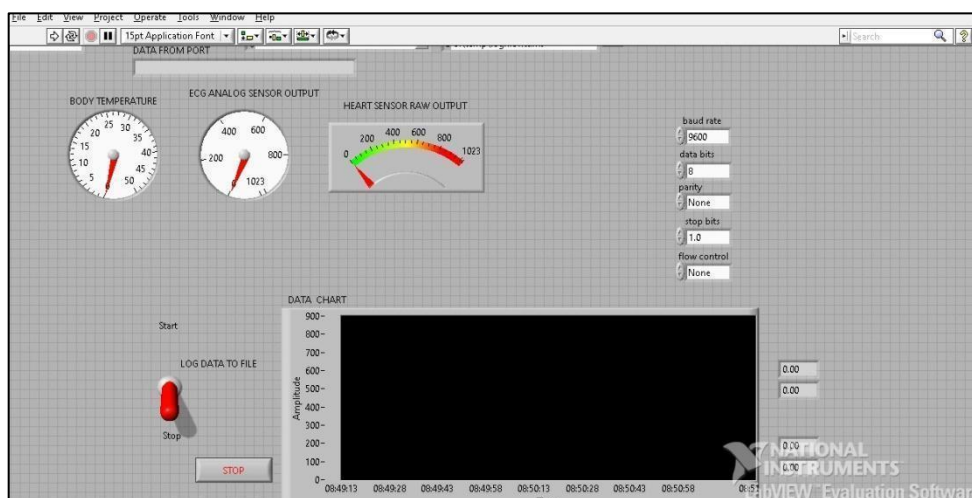


Fig 5.3: Initial setup of LabVIEW

The above figure shows the initial set up for LabVIEW software. It consists of three

dials for displaying the values of sensors.Using Data Chart The Data can be represented in a graphical form. It gives clear understanding about the data. DataLog is used to collect data and save the data in the form of excel.

5.6 OUTPUT

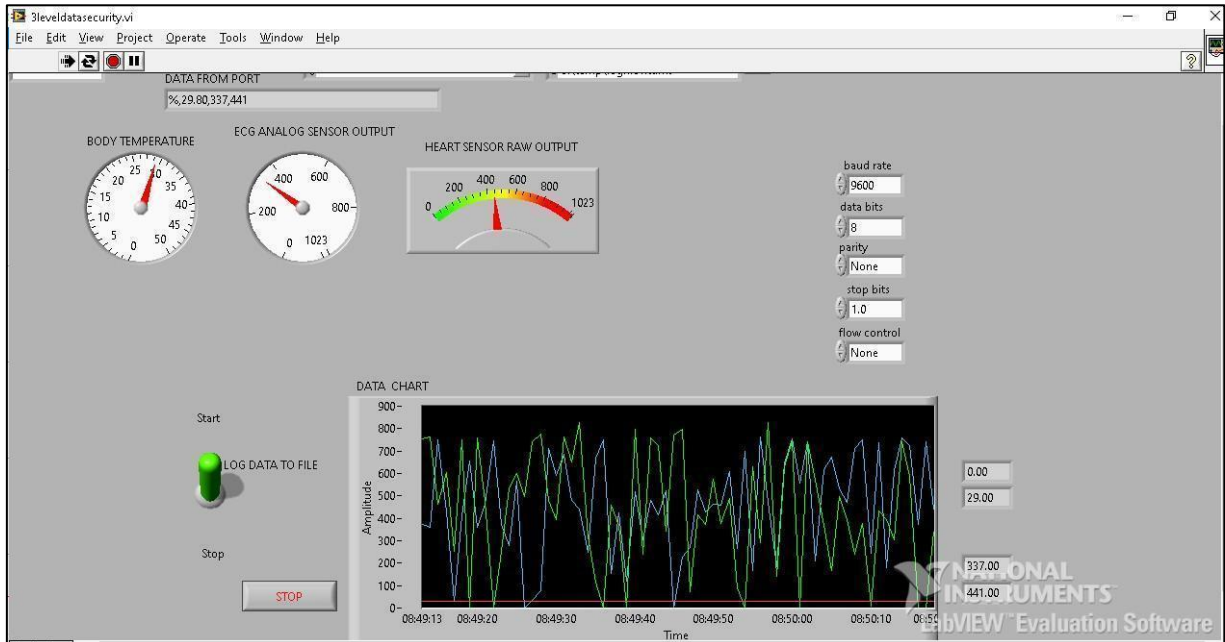


Fig 5.4: Output in LabVIEW

The above figure shows the output of sensors .when the log data to file is turned ON the data is continuously collected and saved in a form of a EXCEL. Hence this will helpful to doctor to identify the patient problem and resolve it.

5.7 DATA ACQUISITION

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Fig 5.5: Data Acquisition of Sensors

The above excel shows the data acquisition of sensor values and it will be very much beneficial for patients and doctor for monitoring.

CHAPTER 6

RESULT AND CONCLUSION

6.1 RESULT

The outcome from this examination was effective temperature of the patient, ECG and pulse. At whatever point there is an increment of the patient internal heat level and heartbeat rate the approved guardians get message so they can take some quick measures. The following are a few outcomes acquired and can be envisioned on GUI made on LabVIEW and furthermore far distance doctors can see additionally with assistance of web yet they ought to have connection to get it. The LabVIEW GUI was planned on LabVIEW 2014. internal heat level patients. The framework likewise ready to give remote checking to the specialist to screen patient from a significant distance. This investigation can give a ton of good for patients, specialist and to the general public. Information of this venture has been led and broke down. The examination of information comprised of the information investigation between this framework and the accessible gadgets just as the correlation of information between ongoing checking and web of things.

6.2 CONCLUSION

The outcome from this exploration was effectively acquired temperature of the patient, ECG and pulse are gathered effectively. The LabVIEW GUI was planned on LabVIEW 2010. The framework additionally ready to give remote checking to the specialist to screen patient from a good ways. This investigation can give a ton good for patients, specialist and to the general public. Information of this venture has been directed and examined. The examination of information comprised of the information investigation between this framework and the accessible gadgets just as the correlation of information between constant checking.

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