

IOT BASED HEALTH TRACKING GLOVE FOR ELDERLY PEOPLE USING GAIT MONITORING SYSTEM

Submitted in partial fulfillment of the requirements for the award of

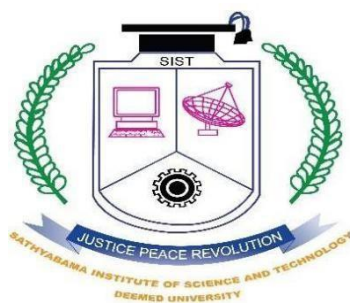
Bachelor of engineering degree in

ELECTRONICS AND COMMUNICATION ENGINEERING

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

SATHYABAMA

INSTITUTE OF SCIENCE AND TECHNOLOGY

(DEEMED TO BE UNIVERSITY)

Accredited with Grade “A” by NAAC

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

BONAFIDE CERTIFICATE

This is to certify that this project report is the bonafide work of **KOMMI VENKATA LOHITH (Reg. No. 38130109), CHINTHAKUNTA NARASIMHA REDDY (Reg. No. 38130045)** who carried out the project entitled “ **IOT BASED HEALTH TRACKING GLOVE FOR ELDERLY PEOPLE USING GAIT MONITORING SYSTEM**” under my supervision from **November-2021** to **April-2022**.

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We **CHINTHAKUNTA NARASIMHA REDDY (Reg. No. 38130045)** and **KOMMI VENKATA LOHITH (Reg. No. 38130109)**, hereby declare that the project report entitled **“IOT BASED HEALTH TRACKING GLOVE FOR ELDERLY PEOPLE USING GAIT MONITORING SYSTEM”** done by me under the guidance of **Ms. S. Poonguzhali M.E., Ph.D.**, is submitted in partial fulfilment of the requirements for the award of Bachelor of Engineering degree in Electronics and Communication Engineering.

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ABSTRACT

Today, many of the standards regarding health monitoring are aimed towards patients in hospital or health-care environments where physical, personnel and procedural security all contribute to the overall data security. Importantly, many of the monitoring systems in hospitals can be configured and maintained by competent persons and are not overly constrained in terms of electrical power, communications and local processing capability. This is however in stark contrast to the resource constrained IoT devices typically used to support people interacting with environments inside/outside of their home. Another complication arises when consumer devices and apps aimed at digital natives for health and fitness tracking are re-purposed for monitoring elderly people for whom interaction with technology is largely alien. For example, elderly people are less likely to implement the most important protective behaviours such as updating devices and changing default passwords and may be more susceptible to falling victim to social engineering and counterfeiting. This system assesses the applicability of current privacy and security models in the context of supporting and monitoring elderly people (e.g. early onset dementia, cognitive impairment, children) interacting with their wider environments outside of the home.

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CHAPTER 1

INTRODUCTION

1.1 OVERVIEW

- A key aspect is the range of users who may need differing levels of access to the information – the patient, family carers, social care providers and medical staff such as GPs and paramedics.
- Internet of things serves as a catalyst for the healthcare and plays prominent role in wide range of healthcare applications.
- In this project the Node MCU microcontroller is used as a gateway to communicate to the various sensors such as temperature sensor, Respiration sensor, Blood Oxygen level and heart beat sensor. These sensors are used to monitor the elderly people or physically handicapped people like mentally people.
- The microcontroller picks up the sensor data and sends it to the network through IOT and hence provides real time monitoring of the health care parameters for doctors. The data can be access anytime by the doctor. The controller is in addition connected with buzzer to alert the caretaker about variation in sensor output. Other than the main issue in remote patient monitoring system is that the data as to be securely transmitted to the destination end and provision is made to allow only authorized user to access the data.

1.2 DEFINITION OF IOT

In this section, we explain some of the IoT definitions. Also, we explain the layered architecture for IoT.

Internet of Things (IoT) has increasingly gained attention in industry to interact with different types of devices. IoT can have influence on industry and society by integrating physical devices into information networks [8]. IoT impacts can be on different perspectives, namely for private and business users. From the perspective of a private user, IoT has effect on both working and personal fields,

such as smart homes and offices, e-health and assisted living. From the aspect of a business user the impacts would be in fields such as automation and industrial manufacturing, logistics, business process management, intelligent transportation of people and goods [9].

IoT integrates physical things into information networks. IoT covers the overall infrastructure, including software, hardware and services, which is used to support these information networks. The integrated physical things can exchange data about the physical properties and information that they sense in their environment. To identify devices, we can use identification technologies like for example RFID, which allow each device be uniquely identified [10].

Internet of Things-Architecture ² (IoT-A) defines it as “*The idea of a globally interconnected continuum of devices, objects and things in general emerged with the RFID technology, and this concept has considerably been extended to the current vision that envisages a plethora of heterogeneous objects interacting with the physical environment.*”

IoT has a layered architecture designed to answer the demands of various industries, enterprises and society. Fig. 2.1 shows a generic layered architecture for IoT that consist of five layers, which are discussed, in the following:

- Edge Technology layer

This is a hardware layer that consists of embedded systems, RFID tags, sensor networks and all of the other sensors in different forms. This hardware layer can perform several functions, such as collecting information from a system or an environment, processing information and supporting communication.

- Access Gateway layer

This layer is concerned with data handling, and is responsible for publishing and subscribing the services that are provided by the *Things*, message routing, and hovelling the communication between platforms.

- Middleware layer

This layer has some critical functionalities, such as aggregating and filtering the received data from the hardware devices, performing information discovery and providing access control to the devices for applications.

- Application layer

This layer is responsible for delivering various application services. These services are provided through the middleware layer to different applications and users in IoT-based systems. The application services can be used in different industries such as, logistics, retail, healthcare, etc.

IoT-based system is in charge of providing knowledge from an environment to a non-expert user. IoT-based system can be used in different environments, so it needs to be able to address many heterogeneous devices. Thus, a major concern within developing an IoT-based system is how to handle the interaction with the heterogeneous devices for non-expert users. This concern can be addressed by a middleware layer between devices and non-expert users. This layer is responsible to hide the diversity of devices from the user perspective, and provides access transparency to the devices for the end users.

The idea of creating abstractions of devices has been addressed in the literature. The middleware we found in the literature can provide satisfaction by facilitating the interaction with devices, but they do not support low-level device configuration [4].

CHAPTER 2

LITERATURE SURVEY

2.1 Health Monitoring Laboratories by Interfacing Physiological Sensors to Mobile Android Devices

This paper describes, Android Java-DSP (AJDSP) as a mobile application that interfaces with sensors and enables simulation. This also helped in visualization of signal processing. In this system firstly there is creation of interface between both external sensors and on-board device sensors for monitoring the physiological parameter of human being. This paper also explored the trend of mobile sensing and adapted it towards improving digital signal processing (DSP), by building interfaces to medical sensor and external sensors. In this paper there is use of SHIMMER. It is a small wireless low power sensor International Journal of Advance Foundation and Research in Computer platform that can record and transmit physiological (Health related like ECG) and kinematic data in real-time. The drawback of this system is that it only monitors the patient which is admitted in the hospital. In this low power sensor are used.

2.2 Smart Elderly Home Monitoring System with an Android Phone

This paper considers or takes into account certain facts, which are heart attack and stroke as they are the major cause of hospitalization of the elder people. There is more chances of survival if the older people gets the treatment within an hour. it had also been developed. An android smart phone with accelerometer is used to detect a fall of the carrier, and this android device is known as healthcare device. The android phone is then connected to the monitoring system by using the TCP/IP protocol through Wi-Fi. Because of this system, elderly and chronically ill patients can stay independently in their own home and secure in the knowledge that they are being monitored. The drawback of this system is that it only considers elder people as there is more chances of sudden (emergency situation) outbreak in them like heart attack and stroke.

2.3 Design and Implementation of Wearable ECG System

This system describes the design and implementation part of wearable ECG with the smart phone for the real time monitoring of health. In this system smart shirt are developed with ECG sensors and can be worn by any type of patient for monitoring his or her health in real time and get required treatment or prescription. These systems are mainly developed considering elder people in mind as they live alone in their homes. Therefore this system basically monitors the elderly people for self diagnosis purpose. The result of this system was the system could monitor and diagnose patients' heart conditions in real time, when they wear a sports-shirt with a ECG sensor in it. In addition to this, the system also provides graphical information with history management tools and an automatic emergency call system to the patient to get the required treatment in time. The drawback of the system is that it only concentrates on elder people and it includes shirt (ECG sensor) for wearing which cost a lot.

2.4 Remote patient monitoring system

This paper provides the image based system which acquires the ECG signal via digital camera; this information is performed on the tool like MATLAB and data sending through the internet network and stored in database. Then the original image is then availed to the doctor via Android mobiles. The purpose of this system is the vital signs and parameters from the ICU monitoring system and makes this data to be available to the doctor who may not be in the hospital and in the country. In case of any abnormality, the doctor is alerted by sending a notification from C2DM server to his mobile. The drawback of this paper is that, due to the slow internet connection the data will not be send to the doctor which is located remotely. The image is captured through the camera, which must be HD which cost a lot

2.5 Hospital Health Care Monitoring System using Wireless Sensors Network

In this paper there is continuous observation of the patient's physiological parameters such as blood pressure of patient as well as heart rate. This system is mainly useful for pregnant women to measure the various parameters like blood pressure, heart beat and fetal movement to control the health issue. This system has to monitoring more than one patient at a time and easily able to sense the

blood pressure (BP) and heart rate of the patients. In this system, there is a sensor node attached to body of patient to measure signals from the wireless sensors and sends these signal to the database. This system can detect the abnormal conditions of the patient, raise an alarm to the patient and sends a SMS/Email to the doctor for treatment. The main advantage of this system is to increase the freedom for enhancing patient's quality of life. The demerit of this system is that in this the patients need to get admitted in the hospital for continuous monitoring of the patient physiological parameters. This WSN gets complicated if number of patient is admitted in the hospital beyond the specified limit.

This papers tells us that mobile health uses embedded sensors and their applications 1. Microphone Sensors-Use to access patients feels i.e. my tonic syndrome 2. Camera Sensors-Provides information about images and videos. 3. Acidometer Sensors-Purpose of this system is to track the person's physical activity. The purpose of this paper is use applications of embedded to mobile phone sensors. The drawback of this system are that various sensors are used which cost a lot.

2.6 Wireless Health and the Smart Phone Conundrum

This paper tells us that, they implemented wireless healthcare by sensor communication, data processing, data visualization etc on different mobile platforms. There is central controller for wireless health application. They developed libraries for particular mobile devices to implement the health care on different platforms. CDMA and UTMS have more network then Bluetooth and Wi-Fi, and all this cellular connectivity is supported by mobile platforms. They started by, assessing the best smart phone platform for the health care, next they determine the runtime environment to the smart phone platform and finally they developed the wireless health application for that particular platform. They provide different and better debugging environment for different platforms. The drawback of this paper is that they do not represent the complete wireless heath software library

2.7 Android ECG application development:

The paper describes the design and implementation part of ECG application. The main purpose or objective of this paper was to use the power of

android platform and produce a prototype model of ECG application. It performs its works with VS100, Bluetooth ECG monitoring device. This paper also describes the architecture, development environment and tools that are used in android mobile application development. The tools used in development process or phase are Eclipse, Android SDK, ADT plugging for Eclipse. This device monitors Heart Rate via Bluetooth communication. The result of this paper was communicating with vital sense device via Bluetooth communication.

This paper tells us that the patient monitors his or her health which may be physical or mental, through the mobile devices and gives extra information like location of user and provide the security and reliability. New technology is used for this purpose. To maintain the security they use a wireless Technology called as NFC (Near Field Communication Technology for the Future) which interacts with the electromagnetic radio fields. NFC technology is used to access the patient information, and this information is stored in hospital EMR Database. Doctor refers to the data instead of going via the paper. When the patient gets discharge all the details will be transferred to the NFC tag from EMR The drawback of this paper is that, this system mainly emphasis on the database security rather than providing service like nearest hospital list and alert to the family members. International Journal of Advance Foundation and Research in Computer

Majumder combined an infrastructure less ad-hoc network with a fixed one to form a hybrid network, to cover a wider area. Routing is a challenging task in the hybrid network. A systematic simulation based performance analysis of destination sequenced distance vector routing (DSDV) and dynamic source routing (DSR) protocols in the hybrid networking environment was carried out using NS2. Three QoS parameters, namely, packet delivery ratio, average end-to-end delay and normalized routing load are considered. The experimental results show that the packet delivery ratio of DSR shows 10% increase when compared to DSDV. Techniques in Majumder et al. [1] and Jahir et al. [2] discussed hybrid networks and their implementation, using DSR and AODV protocols. A novel routing protocol, developed for ad-hoc networks, consisting of hybrid nodes using high bandwidth free space optical (FSO) and radio frequency (RF) links is discussed by Jahir et al. [2]. FSO is used as the primary link and RF is used in case of FSO link failures. The present research aims for forming multipath routing

in a heterogeneous network, by considering multiple QoS metrics, such as delay, bandwidth and link stability. Optimal route is elected to improve packet delivery, reduce end-to-end delay and minimize energy consumption.

Warren et al. [3] and Fensli et al. projected the interoperability of wireless body area network and the infrastructures of the health care systems. Virone et al. [5] developed network architecture for smart healthcare for continuous monitoring of assisted and independent-living residents. Ntareme et al. [6] Analysed the delay tolerant network (DTN) service and protocol stack and present an implementation called "Bytewalla" on the android platform. It allows the use of android phones for the physical transfer of data between nodes with no physical links. Location based services (LBS) refers to the general class of services that use location and time data as control features in computer programme. Health information and services need to be delivered in real-time, and, location of the patients' must not be a barrier. LBS for healthcare by Ronnie and Sungwon [7] increases patients' self-confidence and autonomy with the help of wireless body [sensor](#) networks capable of monitoring, measuring health conditions and transmitting the same for expert advice. BEDnet has a poor data transfer speed due to limitations of J2ME. It can only be used by a single application and does not work on Android and iOS devices. As the successor of BEDnet, Beddernet [9] is Bluetooth based mobile ad-hoc networking software, developed for Android OS. It is built on top of Bluetooth's radio frequency communication (RFCOMM) protocol also implements DSDV routing protocol. Compared to BEDnet, Beddernet has 10% increased communication throughput and supports both unicasting and multicasting. Sebastian et al. [10] and Prema [11] proposed a method to capture image of the patients' heart rate and generate alert regarding the patient's condition to the physician.

The commercially available fetal monitoring system for clinical use was designed by Hammacher and Hewlett-Packard in 1968 using external tomography and phonocardiography, but the technological improvements have permitted further development of more and more accurate tools of monitoring. As per the American College of Obstetricians and Gynaecologists (ACOG) statement, electronic fetal heart rate monitoring is increased in use, e.g. 62% of pregnant women in 1988, 74% in 1992 and 85% in 2002. Ananth et al. [12] presents the use

of electronic fetal monitoring in United States during the 1980s helped to increase the live births.

Recently there is an increasing interest for using wireless approaches for data transfer. Budinger presents some classical approaches in deploying wireless monitoring for measuring body parameters. As it can be seen in Rohan et al.'s work, the need for a low-cost wireless and mobile fetal computing environment is based on the carrier sense multiple access with collision avoidance (CSMA/CA) using over wireless communication networks (wireless LANs). Using a Bluetooth module attached to the fetal heart rate (FHR) monitoring device provides the advantage of using a smart-phone and set alarms to prevent high-risk situations.

This paper is developed for continuously monitoring the health condition of pregnant ladies. Due to lack of hospital facilities in villages and no proper checkups of pregnant ladies in many areas will affect the pregnant women and her child. Which will also increases the risk of pregnancy and death of both women and child or any one. Constant health monitoring of pregnant women with proper supervision will reduces the risk of pregnancy and costly hospitalization. In addition to that the death rate of pregnant women can be reduced. This device also helps to hear the instructions and prescription which is given by the doctor. In this proposed system IoT(internet of things) also implemented which will helps the patient to get advices from doctor from any place at any time. The main objective of this paper is to avoid the complications in pregnancy and destructive occasions. Now a day's technology plays the vital role in health monitoring system. It is sensory device for various medical parameters. In rural areas, People are not really worried about their health because of absence of hospitals in the adjacent areas and also they need to travel extended space even for lesser wound and routine checkups. At the initial period of pregnancy they don't do their regular checkups because of the predictable scans which can avoid birth of handicapped kids and other problems in fetal body. For example, pregnant women must be accomplishing Ultra rigorous scans minimum two times during pregnancy stage to familiar with fetal growth. This project describes, important parameters of pregnant women like temperature, pulse rate and kicking of child are restrained and the information is stored in memory card.

CHAPTER 3

AIM AND SCOPE OF THE PROJECT

3.1 AIM AND SCOPE

Our aim is to develop a smart health monitoring system to monitor the health parameters of the patient securely. A doctor or health specialist can use the system to watch remotely all important health parameters of the patient. This can also be viewed by the patients family members. Giving care and health assistance to the bedridden patients at critical stages with advanced medical facilities have become one of the major problems in the recent times. In hospitals where many patients whose physical conditions must be monitored frequently as a part of a diagnostic procedure, the necessity for a cost-effective and quick responding alert mechanism has become tough. Proper implementation of such systems can provide timely warnings to the medical doctors and their service can be activated in case of medical emergencies.

3.2 EXISTING SYSTEM

- The health care sensors are playing an essential role in hospitals. The patient monitoring system is one of the major developments because of its innovative technology. An automatic wireless health monitoring system is used to measure patient's body temperature and heartbeat by using embedded technology.
- The proposed system uses both the sensors like heartbeat sensor and temperature sensor. These sensors mainly involves in monitoring the condition of the patient.
- But the sensor data cannot be upload to cloud.
- So each and every time doctor will go there and check the parameter.
- In some conditions doctor may busy means they never monitoring the person.

3.3 PROPOSED SYSTEM

- IOT elderly, mentally handicapped people monitoring has 4 sensors. First one is a temperature sensor, second is Heartbeat sensor and the third one is pressure sensor and final one is vibration sensor. This project is very useful since the doctor or parent can monitor elderly, mentally handicapped people health parameters just by visiting website or URL. And nowadays many IOT apps are also being developed. So now the doctor or family members can monitor or track the elderly, mentally handicapped people health through the Android apps.
- To operate IOT based health monitoring system project, you need a Wi-Fi connection. The microcontroller connects to the Wi-Fi network using a Wi-Fi module. This project will not work without a working Wi-Fi network. You can create a Wi-Fi zone using a Wi-Fi module or you can even create a Wi-Fi zone using Hotspot on your smartphone.
- The Node MCU board continuously reads input from these 4 sensors. Then it sends this data to the cloud by sending this data to a particular URL/IP address. Then this action of sending data to IP is repeated after a particular interval of time. For example in this project, we have sent data after every 30 seconds.

CHAPTER 4

SYSTEM DESIGN - EMBEDDED SYSTEMS

4.1 OVERVIEW OF EMBEDDED SYSTEMS

An embedded system is a special-purpose computer system designed to perform one or a few dedicated functions, often with real-time computing constraints. It is usually embedded as part of a complete device including hardware and mechanical parts. In contrast, a general-purpose computer, such as a personal computer, can do many different tasks depending on programming. Embedded systems have become very important today as they control many of the common devices we use.

Since the embedded system is dedicated to specific tasks, design engineers can optimize it, reducing the size and cost of the product, or increasing the reliability and performance. Some embedded systems are mass-produced, benefiting from economies of scale.

Physically, embedded systems range from portable devices such as digital watches and MP3 players, to large stationary installations like traffic lights, factory controllers, or the systems controlling nuclear power plants. Complexity varies from low, with a single microcontroller chip, to very high with multiple units, peripherals and networks mounted inside a large chassis or enclosure.

In general, "embedded system" is not an exactly defined term, as many systems have some element of programmability. For example, Handheld computers share some elements with embedded systems — such as the operating systems and microprocessors which power them — but are not truly embedded systems, because they allow different applications to be loaded and peripherals to be connected.

Embedded systems provide several functions :

- Monitor the environment; embedded systems read data from input sensors. This data is then processed and the results displayed in some format to a user or users.

- Control the environment; embedded systems generate and transmit commands for actuators.
- Transform the information; embedded systems transform the data collected in some meaningful way, such as data compression/decompression

Although interaction with the external world via sensors and actuators is an important aspect of embedded systems, these systems also provide functionality specific to their applications. Embedded systems typically execute applications such as control laws, finite state machines, and signal processing algorithms. These systems must also detect and react to faults in both the internal computing environment as well as the surrounding electromechanical systems.

There are many categories of embedded systems, from communication devices to home appliances to control systems. Examples include;

- Communication devices

E.g.: modems, cellular phones

- Home Appliances

E.g.: CD player, VCR, microwave oven

- Control Systems

E.g.: Automobile anti-lock braking systems, robotics, satellite control

4.1.1 BLOCK DIAGRAM OF EMBEDDED SYSTEMS:

An embedded system usually contains an embedded processor. Many appliances that have a digital interface -- microwaves, VCRs, cars -- utilize embedded systems. Some embedded systems include an operating system. Others are very specialized resulting in the entire logic being implemented as a single program. These systems are embedded into some device for some specific purpose other than to provide general purpose computing . A typical embedded system is shown in Fig 1.1

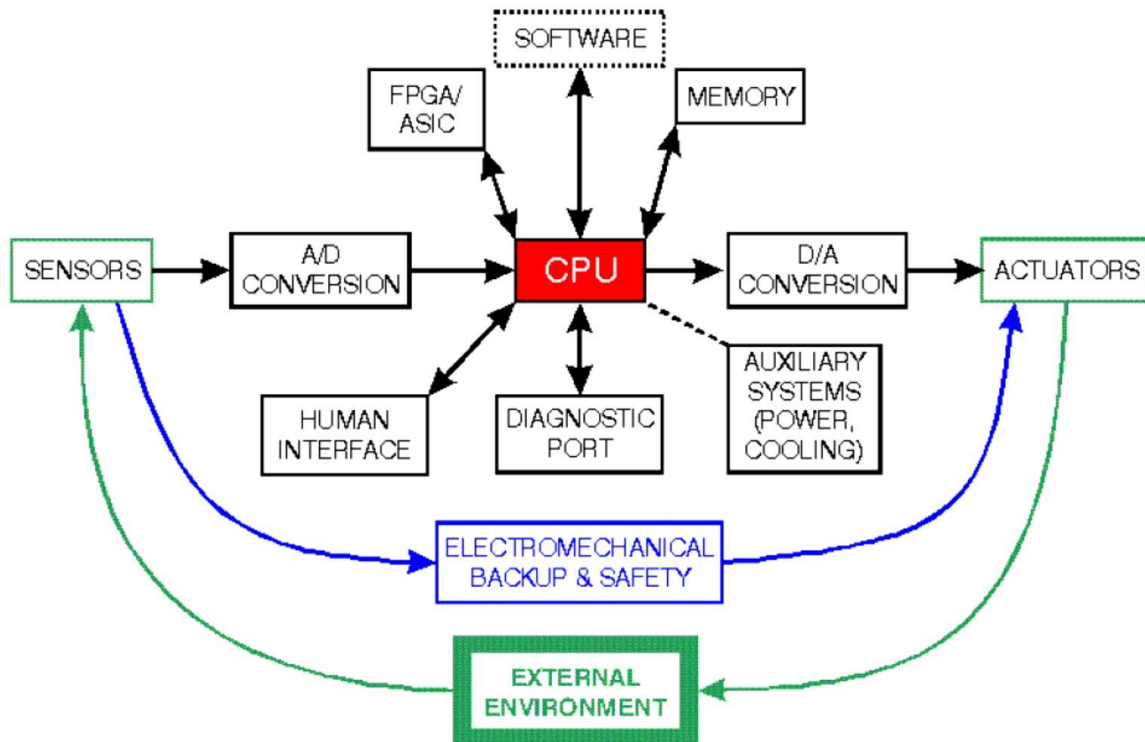


Fig 1.1 Block diagram of a typical embedded system

4.1.2 CHARACTERISTICS OF EMBEDDED SYSTEMS:

Embedded systems are characterized by a unique set of characteristics. Each of these characteristics imposed a specific set of design constraints on embedded systems designers. The challenge to designing embedded systems is to conform to the specific set of constraints for the application.

4.1.3 APPLICATION SPECIFIC SYSTEMS:

Embedded systems are not general-purpose computers. Embedded system designs are optimized for a specific application. Many of the job characteristics are known before the hardware is designed. This allows the designer to focus on the specific design constraints of a well-defined application. As such, there is limited user reprogram ability. Some embedded systems, however, require the flexibility of reprogram ability. Programmable DSPs are common for such applications.

4.1.4 REACTIVE SYSTEMS

As mentioned earlier, a typical embedded systems model responds to the environment via sensors and control the environment using actuators. This requires embedded systems to run at the speed of the environment. This characteristic of embedded system is called “reactive”. Reactive computation means that the system (primarily the software component) executes in response to external events. External events can be either periodic or aperiodic. Periodic events make it easier to schedule processing to guarantee performance. Aperiodic events are harder to schedule. The maximum event arrival rate must be estimated in order to accommodate worst case situations. Most embedded systems have a significant reactive component. One of the biggest challenges for embedded system designers is performing an accurate worst case design analysis on systems with statistical performance characteristics (e.g., cache memory on a DSP or other embedded processor). Real time system operation means that the correctness of a computation depends, in part, on the time at which it is delivered. Systems with this requirement must often design to worst case performance. But accurately predicting the worst case may be difficult on complicated architectures. This often leads to overly pessimistic estimates erring on the side of caution. Many embedded systems have a significant requirement for real time operation in order to meet external I/O and control stability requirements. Many real-time systems are also reactive systems.

4.1.5 DISTRIBUTED SYSTEMS

A common characteristic of an embedded system is one that consists of communicating processes executing on several CPUs or ASICs which are connected by communication links. The reason for this is economy. Economical 4 8-bit microcontrollers may be cheaper than a 32-bit processors. Even after adding the cost of the communication links, this approach may be preferable. In this approach, multiple processors are usually required to handle multiple time-critical tasks. Devices under control of embedded systems may also be physically distributed.

4.2 HETEROGENEOUS ARCHITECTURES

Embedded systems often are composed of heterogeneous architectures (Fig 1.2). They may contain different processors in the same system solution. They may also be mixed signal systems. The combination of I/O interfaces, local and remote memories, and sensors and actuators makes embedded system design truly unique. Embedded systems also have tight design constraints, and heterogeneity provides better design flexibility.

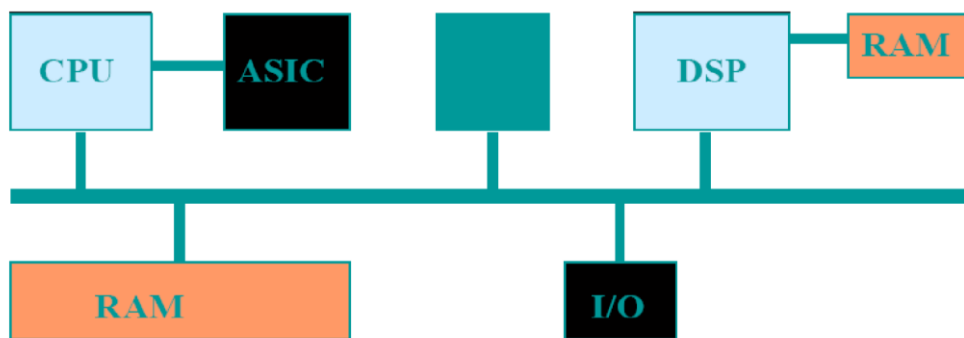


Fig 1.2 Embedded Systems having Heterogeneous Architectures

4.3 HARSH ENVIRONMENT

Many embedded systems do not operate in a controlled environment. Excessive heat is often a problem, especially in applications involving combustion (e.g., many transportation applications). Additional problems can be caused for embedded computing by a need for protection from vibration, shock, lightning, power supply fluctuations, water, corrosion, fire, and general physical abuse.

4.4 SYSTEM SAFETY AND RELIABILITY

As embedded system complexity and computing power continue to grow, they are starting to control more and more of the safety aspects of the overall system. These safety measures may be in the form of software as well as hardware control. Mechanical safety backups are normally activated when the computer system loses control in order to safely shut down system operation. Software safety and reliability is a bigger issue. Software doesn't normally "break" in the sense of hardware. However software may be so complex that a set of unexpected circumstances can cause software failures leading to unsafe situations. Discussion of this topic is outside the scope of this book, but the

challenges for embedded designers include designing reliable software and building cheap, available systems using unreliable components. The main challenge for embedded system designers is to obtain low-cost reliability with minimal redundancy.

4.5 CONTROL OF PHYSICAL SYSTEMS

One of the main reasons for embedding a computer is to interact with the environment. This is often done by monitoring and controlling external machinery. Embedded computers transform the analog signals from sensors into digital form for processing. Outputs must be transformed back to analog signal levels. When controlling physical equipment, large current loads may need to be switched in order to operate motors and other actuators. To meet these needs, embedded systems may need large computer circuit boards with many non-digital components. Embedded system designers must carefully balance system tradeoffs among analog components, power, mechanical, network, and digital hardware with corresponding software.

4.6 SMALL AND LOW WEIGHT

Many embedded computers are physically located within some larger system. The form factor for the embedded system may be dictated by aesthetics. For example, the form factor for a missile may have to fit inside the nose of the missile. One of the challenges for embedded systems designers is to develop non-rectangular geometries for certain solutions. Weight can also be a critical constraint. Embedded automobile control systems, for example, must be light weight for fuel economy. Portable CD players must be light weight for portability purposes.

4.7 COST SENSITIVITY

Cost is an issue in most systems, but the sensitivity to cost changes can vary dramatically in embedded systems. This is mainly due to the effect of computer costs have on profitability and is more a function of the proportion of cost changes compared to the total system cost.

4.8 POWER MANAGEMENT

Embedded systems have strict constraints on power. Given the portability requirements of many embedded systems, the need to conserve power is important to maintain battery life as long as possible. Minimization of heat production is another obvious concern for embedded systems.

4.9 POWER SUPPLY

All electronic circuits work only in low DC voltage, so we need a power supply unit to provide the appropriate voltage supply for their proper functioning. This unit consists of transformer, rectifier, filter & regulator. AC voltage of typically 230volts rms is connected to a transformer voltage down to the level to the desired ac voltage. A diode rectifier that provides the full wave rectified voltage that is initially filtered by a simple capacitor filter to produce a dc voltage. This resulting dc voltage usually has some ripple or ac voltage variation. A regulator circuit can use this dc input to provide dc voltage that not only has much less ripple voltage but also remains the same dc value even the dc voltage varies somewhat, or the load connected to the output dc voltages changes.

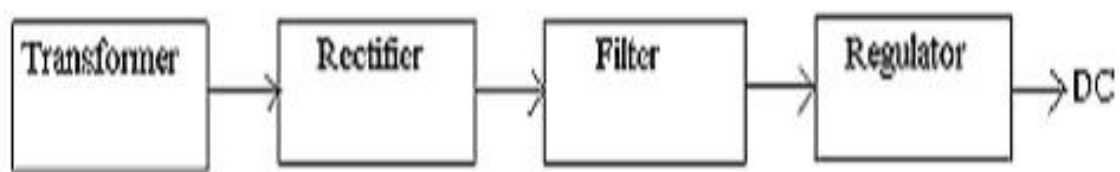


Fig 1.3 General Block Of Power Supply Unit

4.9.1 TRANSFORMER

A transformer is a static piece of which electric power in one circuit is transformed into electric power of same frequency in another circuit. It can raise or lower the voltage in the circuit, but with a corresponding decrease or increase in current. It works with the principle of mutual induction. In our project we are using a step down transformer to providing a necessary supply for the electronic circuits. Here we step down a 230volts ac into 12volts ac.

4.9.2 RECTIFIER

A dc level obtained from a sinusoidal input can be improved 100% using a process called full wave rectification. Here in our project for full wave rectification we use bridge rectifier. From the basic bridge configuration we see that two diodes(say D2 & D3) are conducting while the other two diodes (D1 & D4) are in off state during the period $t = 0$ to $T/2$. Accordingly for the negative cycle of the input the conducting diodes are D1 & D4 .Thus the polarity across the load is the same.

In the bridge rectifier the diodes may be of variable types like 1N4001, 1N4003, 1N4004, 1N4005, 1N4007 etc.... can be used. But here we use 1N4007, because it can withstand up to 1000v.

4.9.3 FILTERS

In order to obtain a dc voltage of 0 Hz, we have to use a low pass filter. So that a capacitive filter circuit is used where a capacitor is connected at the rectifier output & a dc is obtained across it. The filtered waveform is essentially a dc voltage with negligible ripples & it is ultimately fed to the load.

4.9.4 REGISTERS

The controller IC has two 8 bit registers, an instruction register (IR) and a data register (DR). The IR stores the instruction codes and address information for display data RAM (DD RAM) and character generator RAM (CG RAM). The IR can be written, but not read by the MPU.

The DR temporally stores data to be written to /read from the DD RAM or CG RAM. The data written to DR by the MPU, is automatically written to the DD RAM or CG RAM as an internal operation.

When an address code is written to IR, the data is automatically transferred from the DD RAM or CG RAM to the DR. data transfer between the MPU is then completed when the MPU reads the DR. likewise, for the next MPU read of the DR, data in DD RAM or CG RAM at the address is sent to the DR automatically. Similarly, for the MPU write of the DR, the next DD RAM or CG RAM address is selected for the write operation.

The dot-matrix liquid crystal display controller and driver LSI displays alphanumeric, Japanese kana characters, and symbols. It can be configured to drive a dot-matrix liquid crystal display under the control of a 4- or 8-bit microprocessor. Since all the functions such as display RAM, character generator, and liquid crystal driver, required for driving a dot-matrix liquid crystal display are internally provided on one chip, a minimal system can be interfaced with this controller/driver.

4.9.5 REGULATORS

The output voltage from the capacitor is more filtered & finally regulated. The voltage regulator is a device, which maintains the output voltage constant irrespective of the change in supply variations, load variations & temperature changes. Here we use fixed voltage regulator namely LM7805. The IC LM7805 is a +5v regulator which is used for microcontroller.

4.9.6 FEATURES AND DESCRIPTION OF REGULATORS

- Output Current up to 1A
- Output Voltages of 5, 6, 8, 9, 10, 12, 15, 18, 24V
- Thermal Overload Protection
- Short Circuit Protection
- Output Transistor Safe Operating Area Protection

4.10 REQUIREMENT ANALYSIS

4.10.1 HARDWARE REQUIREMENTS

- Node MCU
- Temperature sensor
- Respiratory sensor
- Heartbeat sensor
- Buzzer

HARDWARE REQUIREMENTS:

HARDWARE SETUP DETAILS:

ESP8266 Node MCU Wi-Fi Devkit

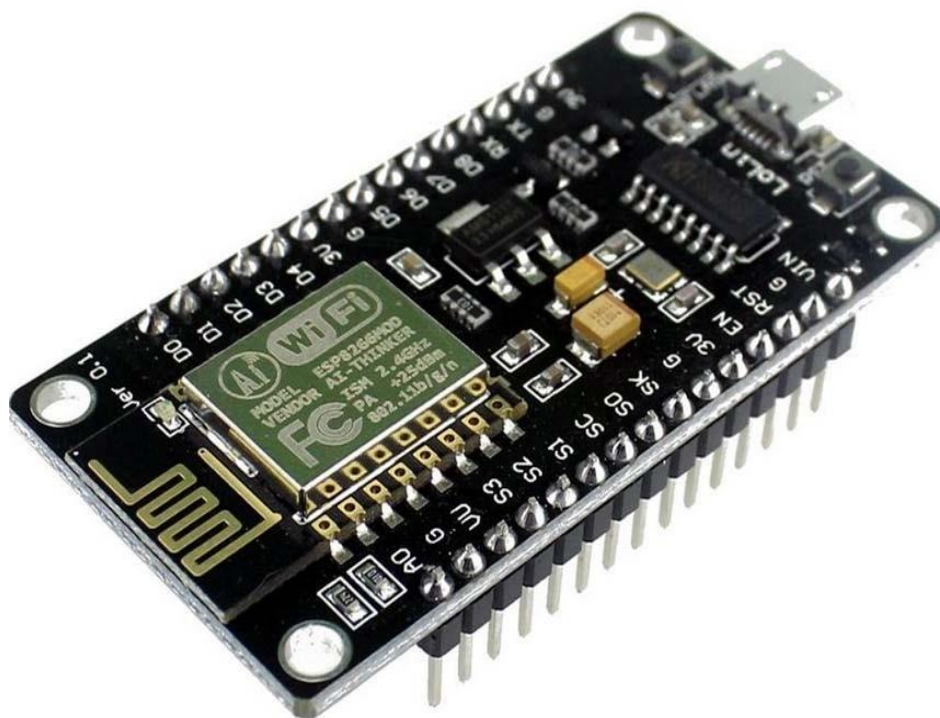


Fig: 1.4 ESP8266 NODEMCU WIFI DEVKIT

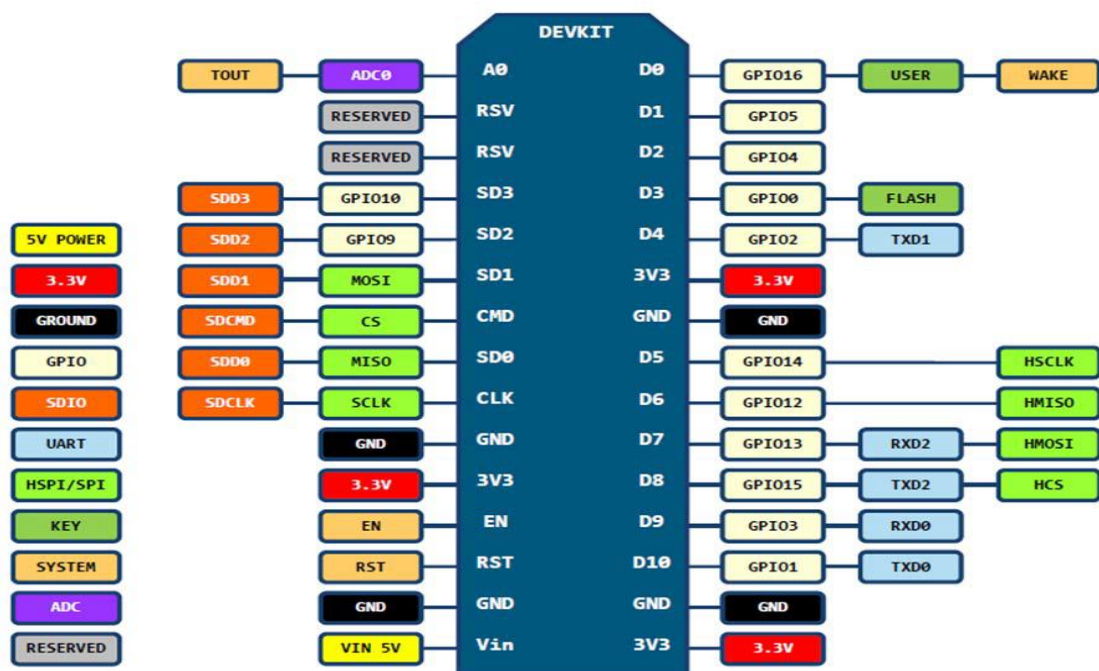
4.10.2 SPECIFICATION

- Voltage: 3.3V.
- Wi-Fi Direct (P2P), soft-AP.

- Current consumption: 10uA~170mA.
- Flash memory attachable: 16MB max (512K normal).
- Integrated TCP/IP protocol stack.
- Processor: Tensilica L106 32-bit.
- Processor speed: 80~160MHz.
- RAM: 32K + 80K.
- GPIOs: 17 (multiplexed with other functions).
- Analog to Digital: 1 input with 1024 step resolution. • +19.5dBm output power in 802.11b mode
- 802.11 support: b/g/n.

Maximum concurrent TCP connections: 5.

Pin Definition:



D0(GPIO16) can only be used as gpio read/write, no interrupt supported, no pwm/i2c/ow supported.

Fig: 1.5 Pin Definition

4.10.3 USING ARDUINO IDE

The most basic way to use the ESP8266 module is to use serial commands, as the chip is basically a WiFi/Serial transceiver. However, this is not convenient. What we recommend is using the very cool Arduino ESP8266 project,

which is a modified version of the Arduino IDE that you need to install on your computer. This makes it very convenient to use the ESP8266 chip as we will be using the well-known Arduino IDE. Following the below step to install ESP8266 library to work in Arduino IDE environment.

Install the ESP8266 Board Package

Enter `http://arduino.esp8266.com/stable/package_esp8266com_index.json` into Additional Board Manager URLs field in the Arduino v1.6.4+ preferences.

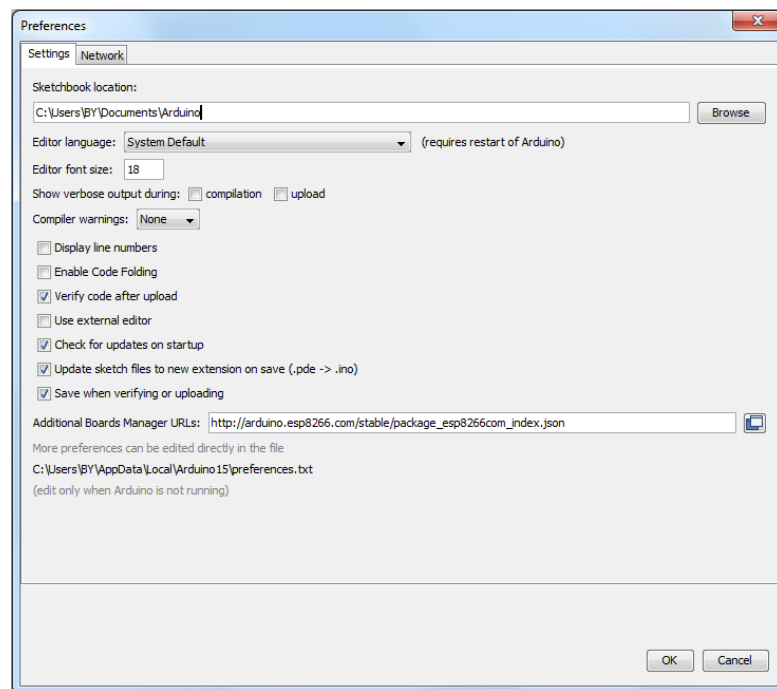


Fig: 1.6 Preferences

Click 'File' -> 'Preferences' to access this panel. Next, use the Board manager to install the ESP8266 package.

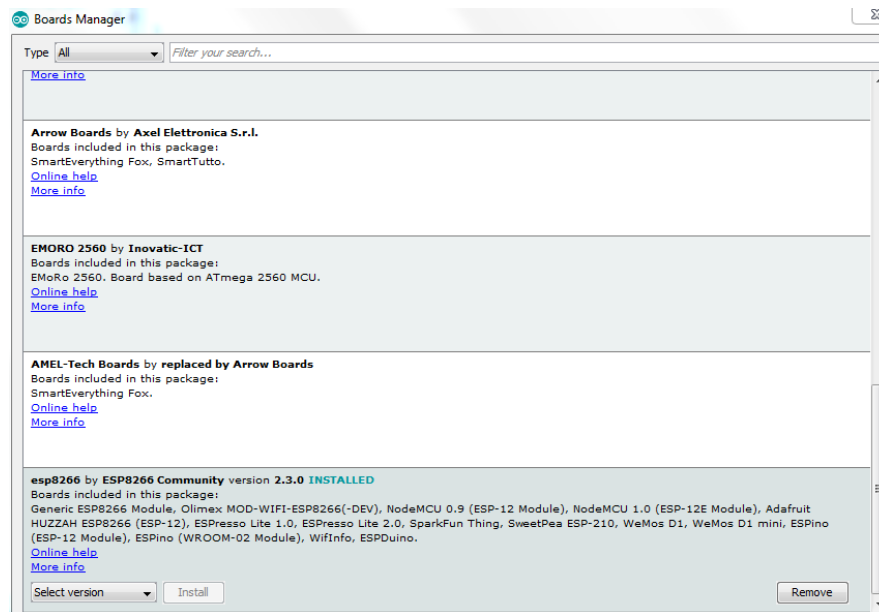


Fig 1.7: Boards Manager

Click 'Tools' -> 'Board:' -> 'Board Manager...' to access this panel. Scroll down to 'esp8266 by ESP8266 Community' and click "Install" button to install the ESP8266 library package. Once installation completed, close and re-open Arduino IDE for ESP8266 library to take effect.

Setup ESP8266 Support

When you've restarted Arduino IDE, select 'Generic ESP8266 Module' from the 'Tools' -> 'Board:' dropdown menu.

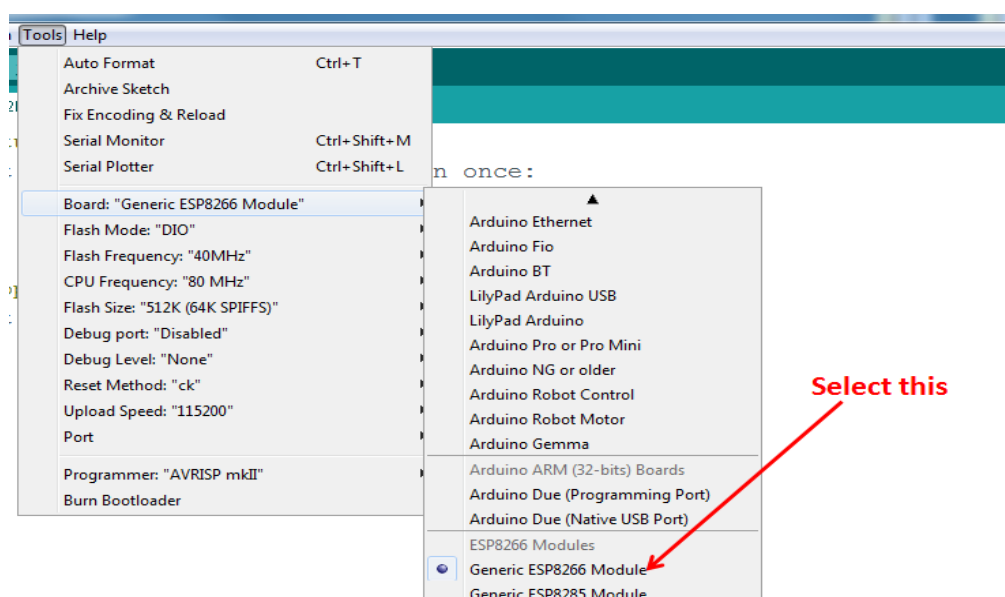


Fig 1.8: Support to Setup ESP8266

Select 80 MHz as the CPU frequency (you can try 160 MHz overclock later)

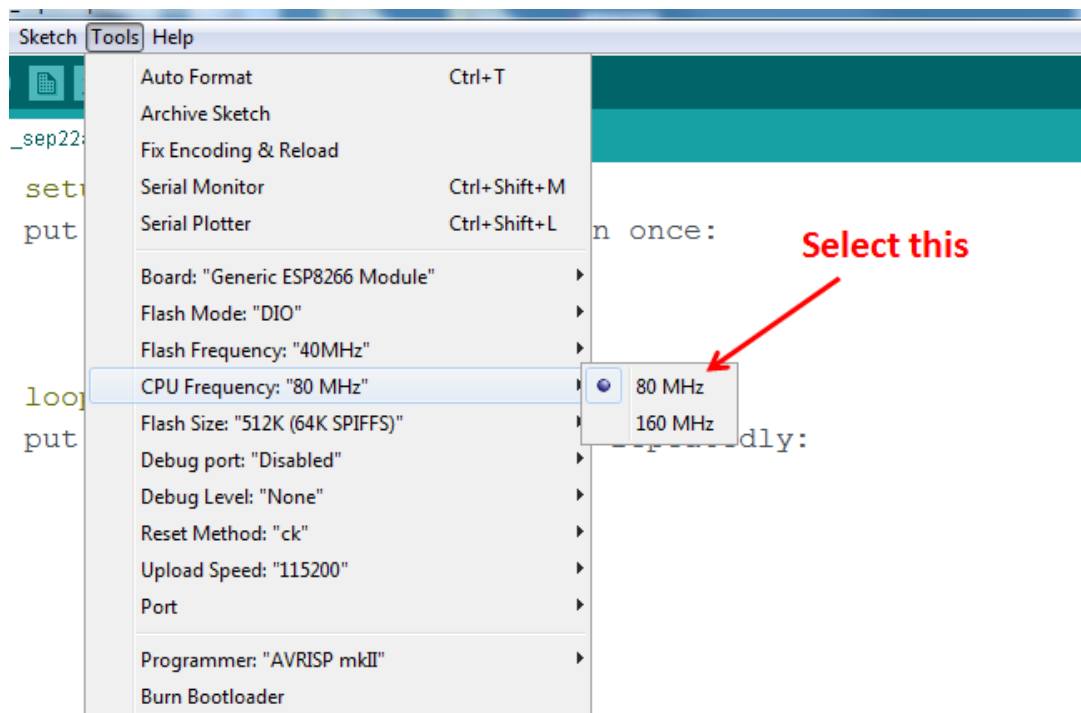


Fig 1.9: Tools

Select '115200' baud upload speed is a good place to start - later on you can try higher speeds but 115200 is a good safe place to start.

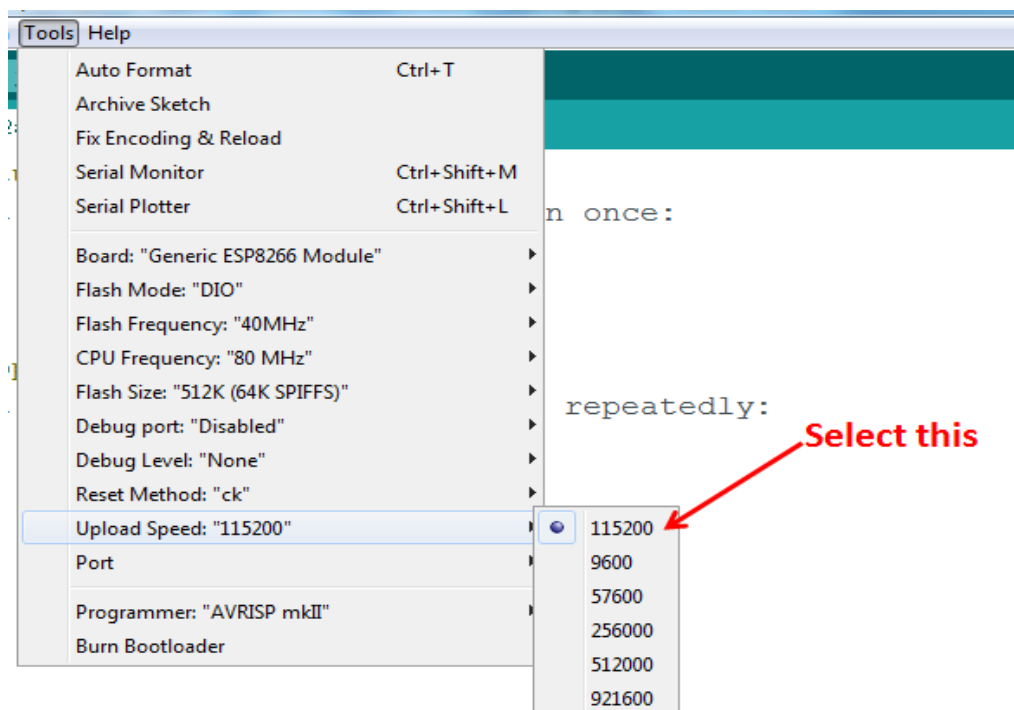


Fig 1.10: Select 115200 baud upload speed

Go to your Windows 'Device Manager' to find out which Com Port 'USB-Serial CH340' is assigned to. Select the matching COM/serial port for your CH340 USB-Serial interface.

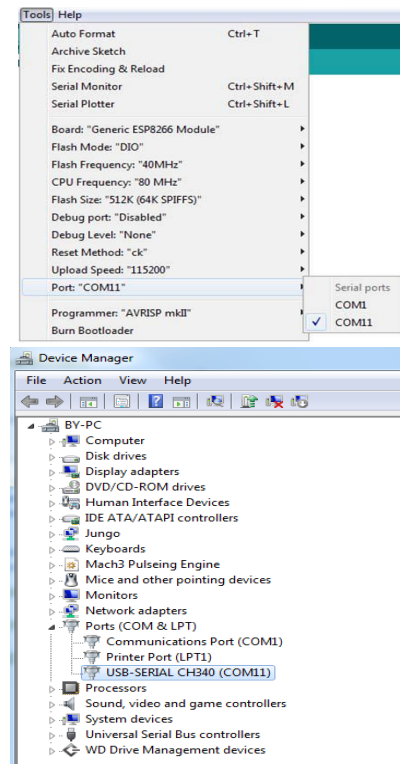


Fig 1.11: Device Manager

4.10.4 BLINK TEST

We'll begin with the simple blink test. Enter this into the sketch window (and save since you'll have to). Connect a LED as shown in Figure1.12.

Now you'll need to put the board into bootload mode. You'll have to do this before each upload. There is no timeout for bootload mode, so you don't have to rush!

- Hold down the 'Flash' button.
- While holding down 'Flash', press the 'RST' button.
- Release 'RST', then release 'Flash'

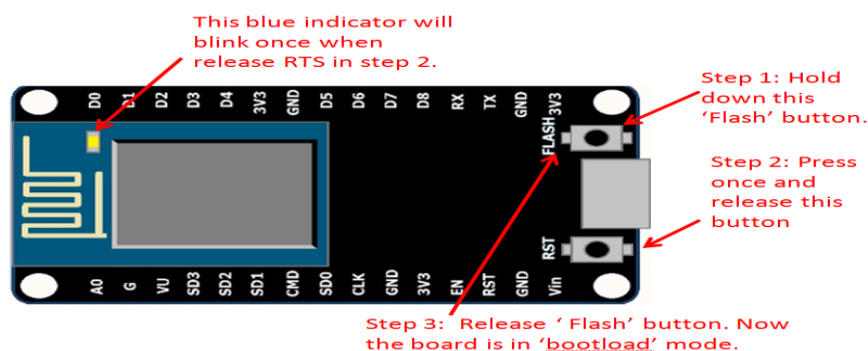


Fig 1.12: Connection of LED

Once the ESP board is in bootload mode, upload the sketch via the IDE,

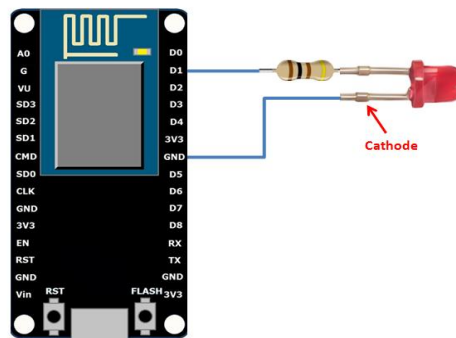


Fig: 1.13 Connection diagram for the blinking test

Flashing Node MCU Firmware on the ESP8266 using Windows

Node MCU is a firmware that allows you to program the ESP8266 modules with LUA script. And you'll find it very similar to the way you program your Arduino. With just a few lines of code you can establish a WiFi connection, control the ESP8266 GPIOs, turning your ESP8266 into a web server and a lot more. In this tutorial we are going to use another ESP8266 module with pin header adapter board which is breadboard friendly.

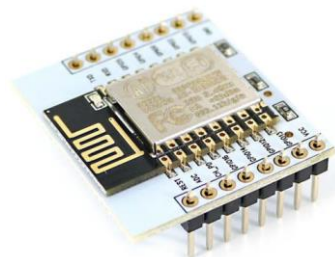


Fig: 1.14 ESP8266 Module Breadboard Friendly with Header Connector

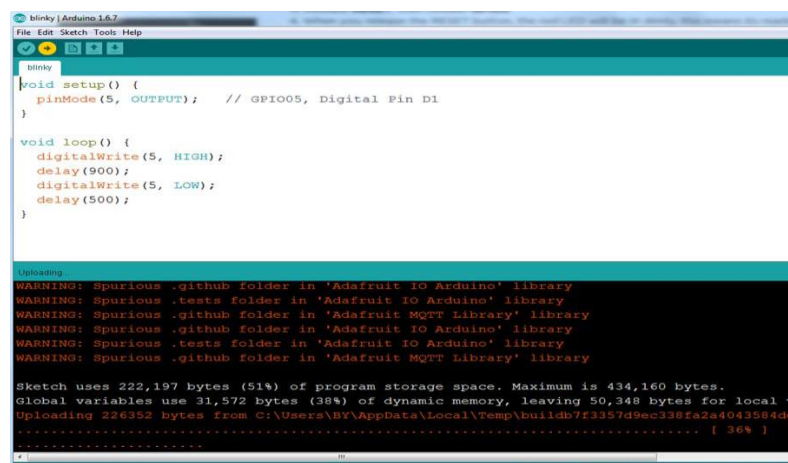


Fig 1.15: Blinky

Pin Assignment:

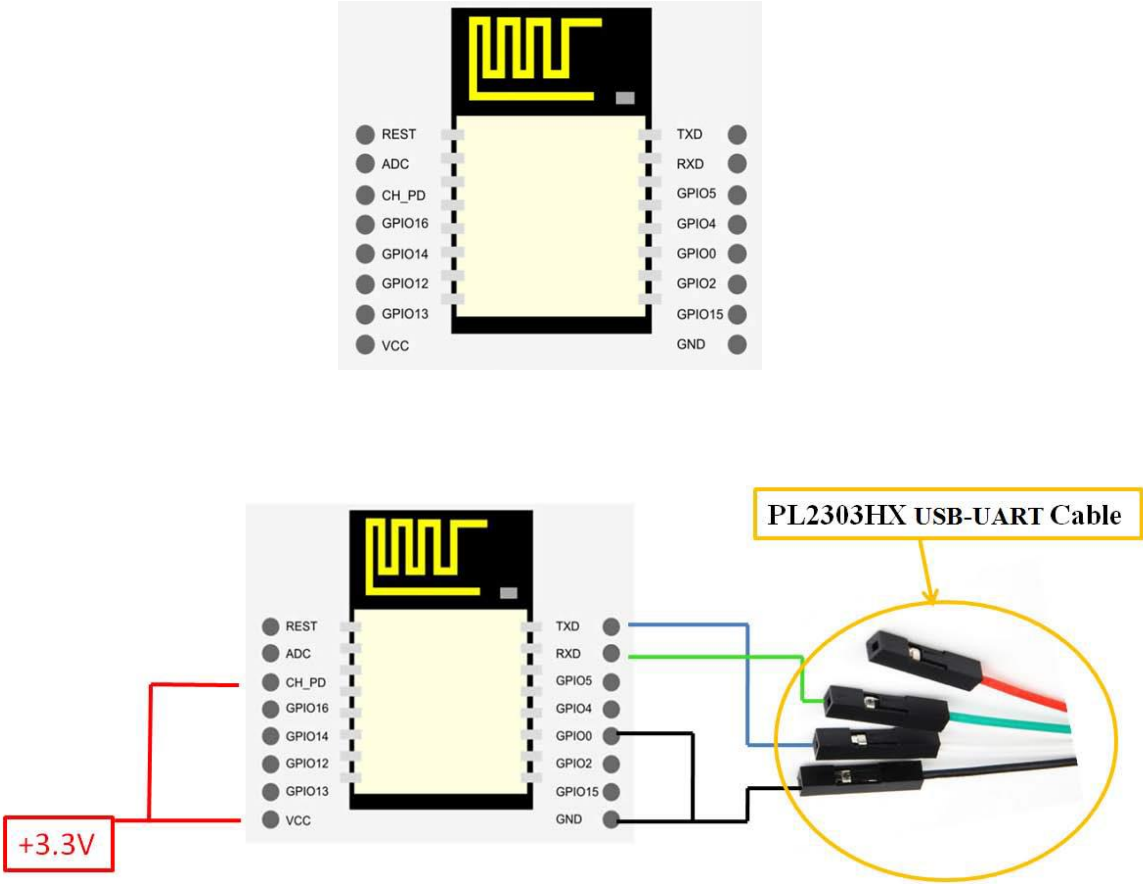


Fig 1.16: Pin Assignment

CHAPTER 5

METHODOLOGY

- The given proposed system is done by using Node MCU microcontroller
- The temperature sensor is used to identify the body temperature of an elderly and vulnerable peoples.
- The heartbeat sensor is used to identify the heartbeat level of the elderly and vulnerable peoples.
- When the elderly peoples fall down means vibration sensor is used to alert the parent and doctor.
- If any of the parameter getting critical send the alert message to doctor
- As well as stored the value in cloud.

5.1 BLOCK DIAGRAM

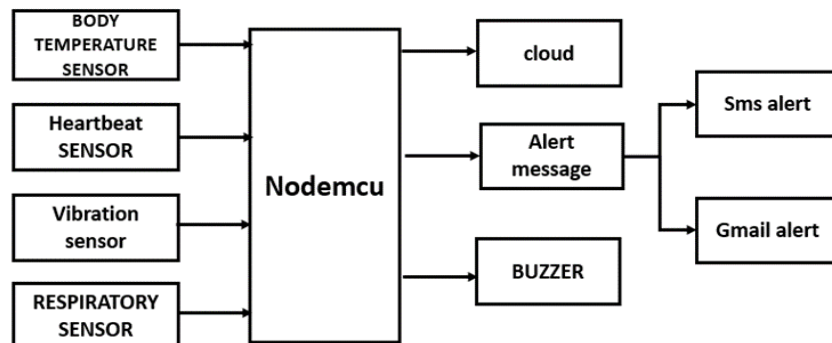


Fig 1.17: Block Diagram

5.2 HUMIDITY SENSOR

Measurement and control of temperature and relative humidity finds applications in numerous areas. These days devices are available which have both temperature and humidity sensors with signal conditioning, ADC, calibration and communication interface all built inside them. The use of such smart sensors greatly simplify the design and reduces the overall cost. We discussed in past

about [Humidity and temperature measurements with Sensirion's SHT1x/SHT7x sensors](#). These sensors are capable of measuring both temperature and relative humidity and provide fully calibrated digital outputs. While SHT1x/SHT7x are very accurate sensors, they are still expensive for hobbyists use. This articles discusses the DHT11 sensor which also provides calibrated digital outputs for temperature and humidity but is relatively lot cheaper than the Sensirion sensors. The DHT11 sensor uses a proprietary 1-wire protocol which we will be exploring here and implementing with the PIC16F628A microcontroller that will receive the temperature and humidity values from the sensor and display them on a 16×2 character LCD.

About DHT11 sensor

The DHT11 sensor comes in a single row 4-pin package and operates from 3.5 to 5.5V power supply. It can measure temperature from 0-50 °C with an accuracy of $\pm 2^{\circ}\text{C}$ and relative humidity ranging from 20-95% with an accuracy of $\pm 5\%$. The sensor provides fully calibrated digital outputs for the two measurements. It has got its own proprietary 1-wire protocol, and therefore, the communication between the sensor and a microcontroller is not possible through a direct interface with any of its peripherals. The protocol must be implemented in the firmware of the MCU with precise timing required by the sensor. The following timing diagrams describe the data transfer protocol between a MCU and the DHT11 sensor. The MCU initiates data transmission by issuing a “Start” signal. The MCU pin must be configured as output for this purpose. The MCU first pulls the data line low for at least 18 ms and then pulls it high for next 20-40 ?s before it releases it.

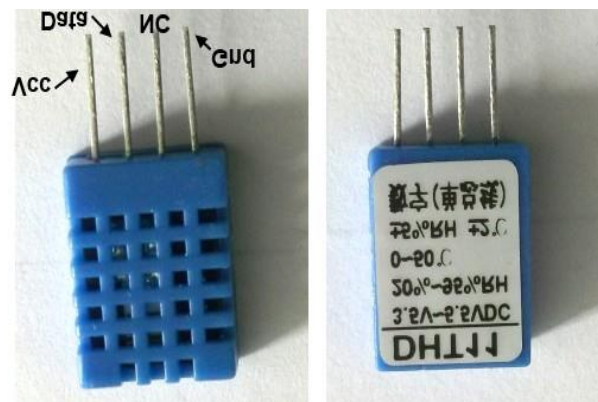


Fig 1.18: DHT11 Sensor

DHT11 sensor comes in a single row 4-pin package

Next, the sensor responds to the MCU “Start” signal by pulling the line low for 80 µs followed by a logic high signal that also lasts for 80 µs. Remember that the MCU pin must be configured to input after finishing the “Start” signal. Once detecting the response signal from the sensor, the MCU should be ready to receive data from the sensor. The sensor then sends 40 bits (5 bytes) of data continuously in the data line. Note that while transmitting bytes, the sensor sends the most significant bit first.

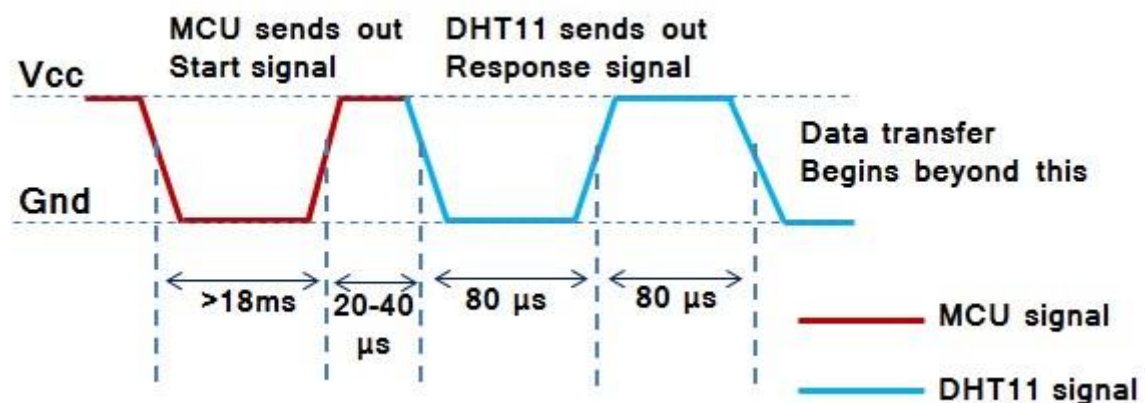


Fig 1.19: "Start" and "Response" signals

The 40-bit data from the sensor has the following structure.

Data (40-bit) = Integer Byte of RH + Decimal Byte of RH + Integer Byte of Temp. + Decimal Byte of Temp. + Checksum Byte

For DHT11 sensor, the decimal bytes of temperature and humidity measurements are always zero. Therefore, the first and third bytes of received data actually give the numeric values of the measured relative humidity (%) and temperature (°C). The last byte is the checksum byte which is used to make sure that the data transfer has happened without any error. If all the five bytes are transferred successfully then the checksum byte must be equal to the last 8 bits of the sum of the first four bytes, i.e.,

Checksum = Last 8 bits of (Integer Byte of RH + Decimal Byte of RH + Integer Byte of Temp. + Decimal Byte of Temp.)

Now let's talk about the most important thing, which is signalling for transmitting “0” and “1”. In order to send a bit of data, the sensor first pulls the line

low for 50 μ s. Then it raises the line to high for 26-28 μ s if it has to send “0”, or for 70 μ s if the bit to be transmitted is “1”. So it is the width of the positive pulse that carries information about 1 and 0.

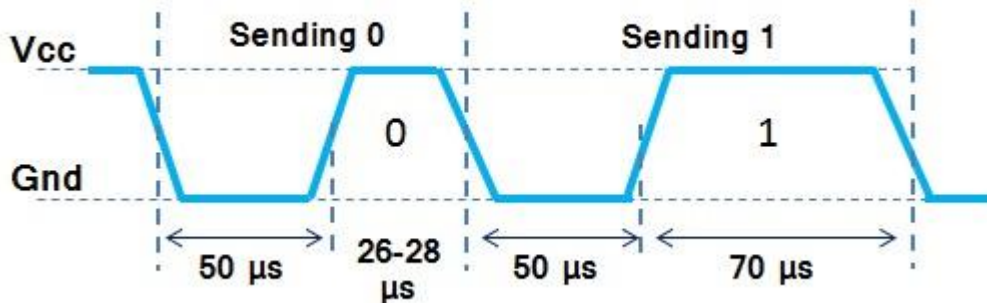


Fig 1.20: Timing difference for transmitting "1s" and "0s"

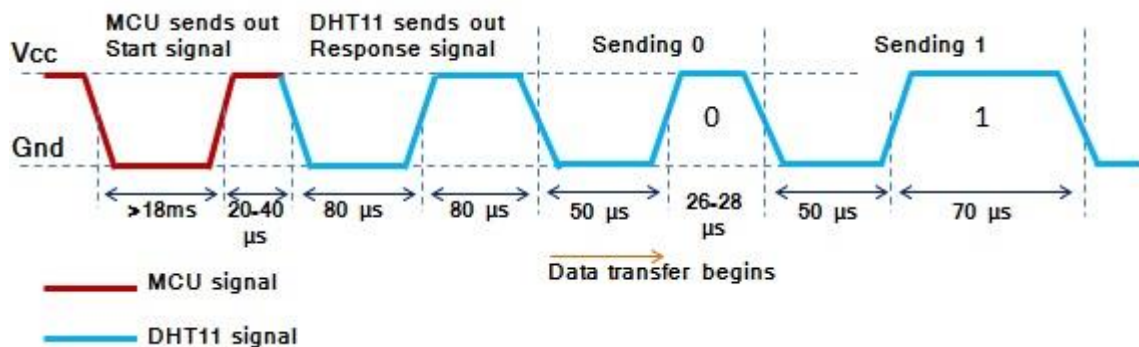


Fig 1.21: Response and Data signals in sequence

At the end of the last transmitted bit, the sensor pulls the data line low for 50 μ s and then releases it. The DHT11 sensor requires an external pull-up resistor to be connected between its Vcc and the data line so that under idle condition, the data line is always pulled high. After finishing the data transmission and releasing the data line, the DHT11 sensor goes to the low-power consumption mode until a new “Start” signal arrives from the MCU.

5.3 RESPIRATORY SENSOR

Air and gas flows as well as line and therapy pressures have to be monitored and controlled in numerous medical instruments such as respiratory devices, aesthetic devices, sleep diagnosis devices, sleep apnea therapy devices (CPAP), spirometers and oxygen concentrators. High-quality sensors

in respiratory devices measure minute flow rates around the zero point of the respiratory flow and also detect flow rates of several hundred l/min. Applications in aesthetic devices call for sensors with high resistance to anaesthetics. In controlled CPAP devices, pressure sensors continuously monitor the therapy pressure, thereby improving the comfort and quality of the treatment. Spirometers utilize special pneumotacho graphs that measure the respiratory flow using efficient differential pressure sensors.

First Sensor develops and manufactures highly reliable sensors and customized sensor systems as a strategic partner to medical product manufacturers in the area of breathing and respiration. Our complete advisory, development, production and service processes comply with the high requirements for medical products according to EN ISO 13485

The respiration sensor is fixed to a long hook and loop strap that is placed around the chest or abdomen. For most applications, placing one sensor around the abdomen is necessary. Optionally, you can place a second respiration sensor around the chest. Using two sensors is helpful for abdominal breathing exercises.

Unravel the strap and attach it around the abdomen (or torso) so that the sensor is in the front. Ask the client to breathe out as fully as possible and attach the sensor so there is minimal tension. The fit should be snug enough that the strap stays fixed when the subject is relaxed.

There should also be enough slack in the rubber strap of the sensor so that expansion of the abdomen causes this rubber strap to expand without being overextended.

The respiration signal is a relative measure of abdomen expansion.

The Respiration Sensor is a sensitive girth sensor using an easy fitting high durability latex rubber band fixed with self-adhering belt. It detects chest or abdominal expansion/contraction and shows the respiration waveform and amplitude. It can be worn over clothing. Respiration can be measured by means of an inductive or resistive respiration belt, but also by means of measuring the EMG of the diaphragm.

For several medical purposes, the respiration of a patient needs to be measured. Sometimes we want to have an impression about the pulmonary function, sometimes we just want to detect and calculate the amount of apneas.

We have both inductive and resistive respiration belts available for the measurement of respiration. Next to that it is also possible to measure the nasal airflow by means of our differential pressure sensors.

The Future Internet goal is to provide an infrastructure to have an immediate access to information about the physical world and its objects. Physical objects can be applicable to different application domains, such as e-health, warehouse management, etc. Each application domain may have different types of physical devices. Each physical device can have its own specifications, which is required to use in order to interact with it. To achieve the future Internet goal, a layered vision is required that can facilitate data access. Internet of Things (IoT) is a vision that aims to integrate the virtual world of information to the real world of devices through a layered architecture.

The term „Internet of Things“ consists of two words, namely *Internet* and *Things*. *Internet* refers to the global network infrastructure with scalable, configurable capabilities based on interoperable and standard communication protocols. *Things* are physical objects or devices, or virtual objects, devices or information, which have identities, physical attributes and virtual personalities, and use intelligent interfaces [1]. For instance, a virtual object can represent an abstract unit of sensor nodes that contains metadata to identify and discover its corresponding sensor nodes. Therefore, IoT refers to the *things* that can provide information from the physical environment through the Internet.

Middleware is as an interface between the hardware layer and the application layer, which is responsible for interacting with devices and information management [2]. The role of a middleware is to present a unified programming model to interact with devices. A middleware is in charge of masking the heterogeneity and distribution problems that we face when interacting with devices [3].

5.4 HEARTBEAT SENSOR

A person's heartbeat is the sound of the valves in his/her's heart contracting or expanding as they force blood from one region to another. The number of times the heart beats 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 a 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 a sensor: Heart Beat 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.

5.4.1 PRINCLIPLE OF HEART BEAT SENSOR

The heartbeat sensor is based on the principle of photo phlethysmography. 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 photophlethysmography:

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

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

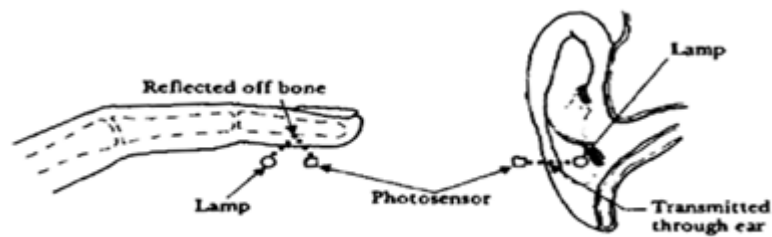


Fig 1.22: Photosensor

5.4.2 WORKING OF HEART BEAT 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.

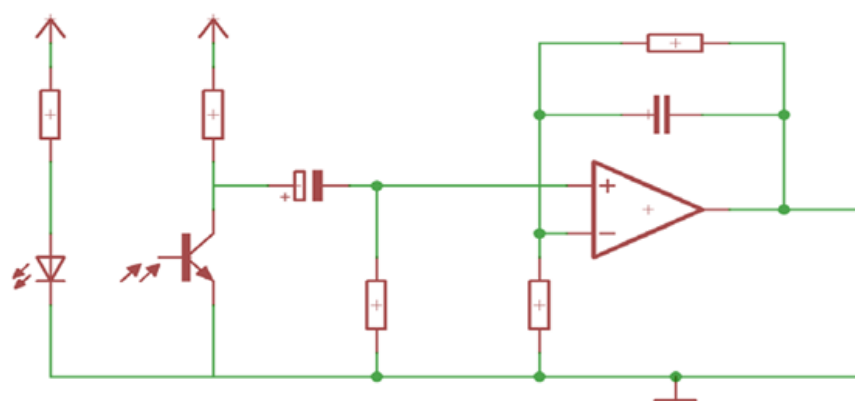


Fig 1.23: Connections of AC & DC signal

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 or using simple ADC. The digital pulses are given to a microcontroller for calculating the heart beat rate,

$$\text{BPM(Beats per minute)} = 60 * f (\text{Where } f \text{ is the pulse frequency})$$

5.4.3 PRACTICAL HEART BEAT SENSOR

Practical heartbeat Sensor examples are Heart Rate Sensor (Product No PC-3147). It consists of an infrared led and an Idr 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 1.24: TRCT1000 Practical Heart Beat Sensor

Another example is TCRT1000, having 4 pins-

Pin1: To give supply voltage to the LED

Pin2 and 3 are grounded. Pin 4 is the output. Pin 1 is also the enable pin and pulling it high turns the LED on and the sensor starts working. It is embedded on a wearable device which can be worn on the wrist and the output can be sent wirelessly (through Bluetooth) to the computer for processing.



Fig 1.25: Application Developing your own Heartbeat Sensor System

A basic Heartbeat Sensor system can also be built using basic components like a Ldr, comparator IC LM358 and a Microcontroller as given below

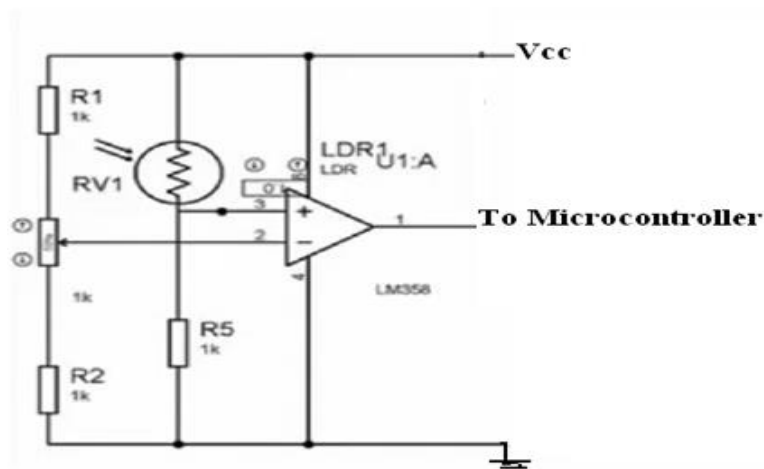


Fig 1.26: Basic Heart Beat sensor system

As described above regarding the principle of heart beat sensor, when the finger tissue or the earlobe tissue is illuminated using a light source, the light is transmitted after getting modulated i.e. a part getting absorbed by the blood and the rest being transmitted. This modulated light is received by the light detector.

Here a Light Dependant Resistor (LDR) is used as a light detector. It works on the principle that when light falls on the resistor, its resistance changes. As the light intensity increases, the resistance decreases. Thus the voltage drop across the resistor decreases.

5.5 BUZZER

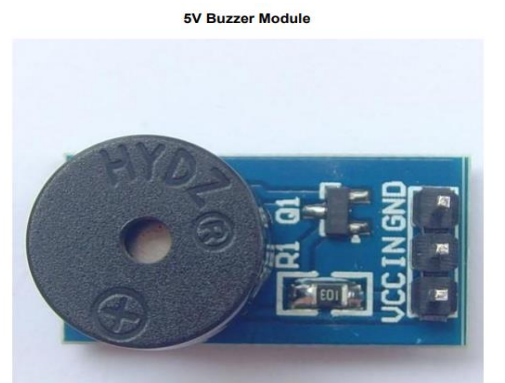


Fig 1.27: Buzzer

5.5.1 GENERAL DESCRIPTION

A buzzer or beeper is an audio signaling device, which may be mechanical, electromechanical, or piezoelectric. Typical uses of buzzers and beepers include alarm devices, timers and confirmation of user input such as a mouse click or keystroke. Buzzer is an integrated structure of electronic transducers, DC power supply, widely used in computers, printers, copiers, alarms, electronic toys, automotive electronic equipment, telephones, timers and other electronic products for sound devices. Active buzzer 5V Rated power can be directly connected to a continuous sound, this section dedicated sensor expansion module and the board in combination, can complete a simple circuit design, to "plug and play."

5.5.2 SPECIFICATION

- On-board passive buzzer
- On-board 8550 triode drive
- Can control with single-chip microcontroller IO directly
- Working voltage: 5V
- Board size: 22 (mm) x12 (mm)

5.5.3 PIN CONFIGURATION

Pin Configuration:

1. VCC
2. Input
3. Ground

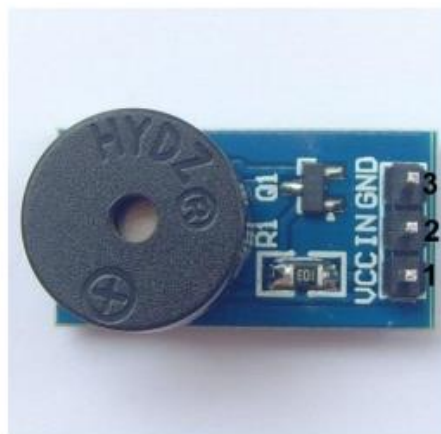


Fig 1.28: Pin Configuration

5.5.4 SCHEMATIC DIAGRAM

Schematic Diagram:

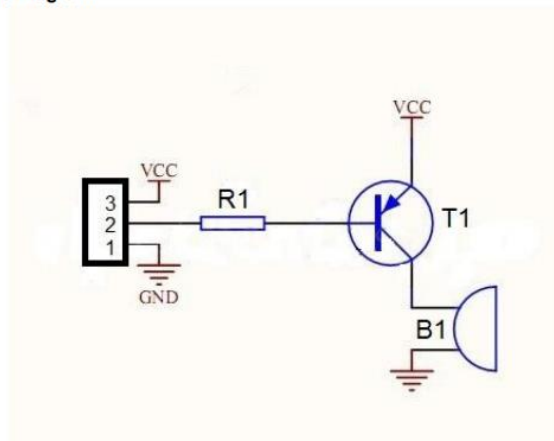


Fig 1.29: Schematic Diagram of Buzzer

5.5.5 HOW TO TEST?

1. Connect your Arduino microcontroller to the computer.
2. Connect the VCC pin of your module to the 5V pin of your Arduino.
3. Connect the GND pin of your module to the GND pin of your Arduino.
4. Connect the Input pin of your module to the pin 13 of your Arduino.
5. Enter this program to your Arduino Integrated Development Environment (IDE):

```
int buzzer = 13;

void setup() {
  pinMode(buzzer, OUTPUT);
}

void loop() {
  digitalWrite(buzzer, HIGH);
  delay(1000);
  digitalWrite(buzzer, LOW);
  delay(1000);
}
```

}

6. Lastly, click the Upload Button.

5.5.6 TESTING RESULTS

The sample sketch above is a blink which is also applicable for LEDs. The output is the turning on and off of the buzzer every other second. The picture below shows the setup of your module and Arduino:

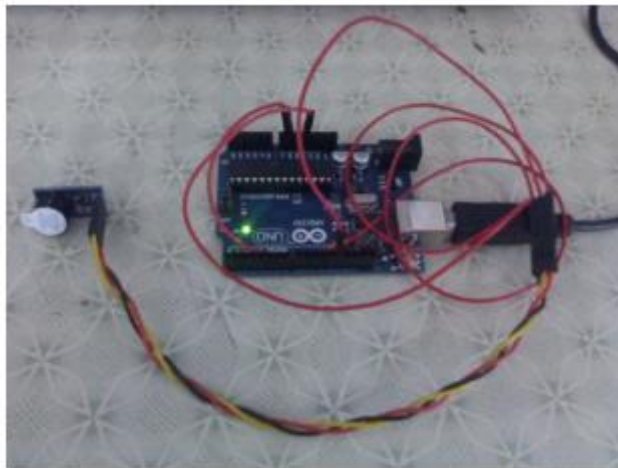


Fig 1.30: Testing Results

5.6 SOFTWARE REQUIREMENTS

- Arduino ide
- Arduino c

CHAPTER 6

ARDUINO UNO AND ITS PROGRAMMING

Arduino is a tool for making computers that can sense and control more of the physical world than your desktop computer. It's an open-source physical computing platform based on a simple microcontroller board, and a development environment for writing software for the board.

Arduino can be used to develop interactive objects, taking inputs from a variety of switches or sensors, and controlling a variety of lights, motors, and other physical outputs. Arduino projects can be stand-alone, or they can be communicate with software running on your computer. The boards can be assembled by hand or purchased preassembled; the open-source IDE can be downloaded for free.

The Arduino programming language is an implementation of Wiring, a similar physical computing platform, which is based on the Processing multimedia programming environment.

6.1 OVERVIEW

The Arduino microcontroller is an easy to use yet powerful single board computer that has gained considerable traction in the hobby and professional market. The Arduino is open-source, which means hardware is reasonably priced and development software is free. This guide covers the Arduino Uno board (Spark fun DEV-09950, \$29.95), a good choice for students and educators. With the Arduino board, you can write programs and create interface circuits to read switches and other sensors, and to control motors and lights with very little effort. Many of the pictures and drawings in this guide were taken from the documentation on the This is what the Arduino board looks like.



Fig 1.31: Arduino UNO board

The Duemilanove board features an Atmel ATmega328 microcontroller operating at 5 V with 2 Kb of RAM, 32 Kb of flash memory for storing programs and 1 Kb of EEPROM for storing parameters. The clock speed is 16 MHz, which translates to about executing about 300,000 lines of C source code per second. The board has 14 digital I/O pins and 6 analog input pins. There is a USB connector for talking to the host computer and a DC power jack for connecting an external 6-20 V power source, for example a 9 V battery, when running a program while not connected to the host computer. Headers are provided for interfacing to the I/O pins using 22 g solid wire or header connectors.

The Arduino programming language is a simplified version of C/C++. If you know C, programming the Arduino will be familiar. If you do not know C, no need to worry as only a few commands are needed to perform useful functions.

An important feature of the Arduino is that you can create a control program on the host PC, download it to the Arduino and it will run automatically. Remove the USB cable connection to the PC, and the program will still run from the top each time you push the reset button. Remove the battery and put the Arduino board in a closet for six months. When you reconnect the battery, the last program you stored will run. This means that you connect the board to the host PC to develop and debug your program, but once that is done, you no longer need the PC to run the program.

The Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converter.

6.2 SUMMARY

Microcontroller ATmega328

Operating Voltage 5V

Input Voltage (recommended) 7-12

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 m

DC Current for 3.3V Pin 50 mA

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

SRAM 2 KB (ATmega328)

EEPROM 1 KB (ATmega328)

Clock Speed 16 MHz

6.3 PIN CONFIGURATION

The Arduino Uno can be powered via the USB connection or with an external power supply. The power source is selected automatically.

External (non-USB) power can come either from an AC-to-DC adapter (wall- wart) or battery. The adapter can be connected by plugging a 2.1mm center-positive plug into the board's power jack. Leads from a battery can be inserted in the Gnd and Vin pin headers of the POWER connector.

The board can operate on an external supply of 6 to 20 volts. If supplied with less than 7V, however, the 5V pin may supply less than five volts and the board may be unstable. If using more than 12V, the voltage regulator may overheat and damage the board. The recommended range 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 DC 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 50 mA.
- **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 3.3.

- **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 Trans mit (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 `analog Write()` 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 is it possible to change the upper end of their range using the AREF pin and the `analog Reference()` function. Additionally, some pins have specialized functionality:

- **TWI: A4 or SDA pin and A5 or SCL pin.**

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

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

6.4 COMMUNICATION

Microcontrollers depend on a host computer for developing and compiling programs. The software used on the host computer is known as an integrated development environment, or IDE. For the Arduino, the development environment is based on the open source Processing platform (www.processing.org) which is described by its creators as a “programming language and environment for people who want to program images, animation, and interactions.” The Arduino programming language leverages an open source project known as Wiring (wiring.org.co). The Arduino language is based on good old- fashioned C. If you are unfamiliar with this language, don’t worry; it’s not hard to learn, and the Arduino IDE provides some feedback when you make mistakes in your programs. The Arduino Uno has a number of facilities for communicating with a computer, another Arduino, or other microcontrollers. The ATmega328 provides UART TTL (5V) serial communication, which is available on digital pins 0 (RX) and 1 (TX). An ATmega16U2 on the board channels this serial communication over USB and appears as a virtual com port to software on the computer. The '16U2 firmware uses the standard USB COM drivers, and no external driver is needed. However, on Windows, a inf file is required. The Arduino software includes a serial monitor which allows simple textual data to be sent to and from the Arduino board. The RX and TX LEDs on the board will flash when data is being transmitted via the USB-to-serial chip and USB connection to the computer (but not for serial communication on pins 0 and 1).

A Software Serial library allows for serial communication on any of the Uno's digital pins. The ATmega328 also supports I2C (TWI) and SPI communication. The Arduino software includes a Wire library to simplify use of the I2C bus; see the documentation for details. For SPI communication, use the SPI library.

Repositories that extend core programming functionality. Libraries let you re- use code without having to physically copy and paste it into all your programs. The standard Arduino software installation comes with several libraries you may use, and you can download others from the Arduino support pages and from third-party

websites that publish Arduino library code. A good example of a library you'll use with the Robot and likely many other robot projects is

Servo

This library allows you to connect one or more hobby R/C servos to the Arduino's digital I/O pins. The Servo library comes with the standard Arduino installation package Library->Servo. This adds the line

#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.

Arduino IDE (Integrated development environment) is used to write the program and dump into the Arduino board.

6.5 ARDUINO SOFTWARE:

1. Open Arduino IDE as shown below

Open Arduino IDE

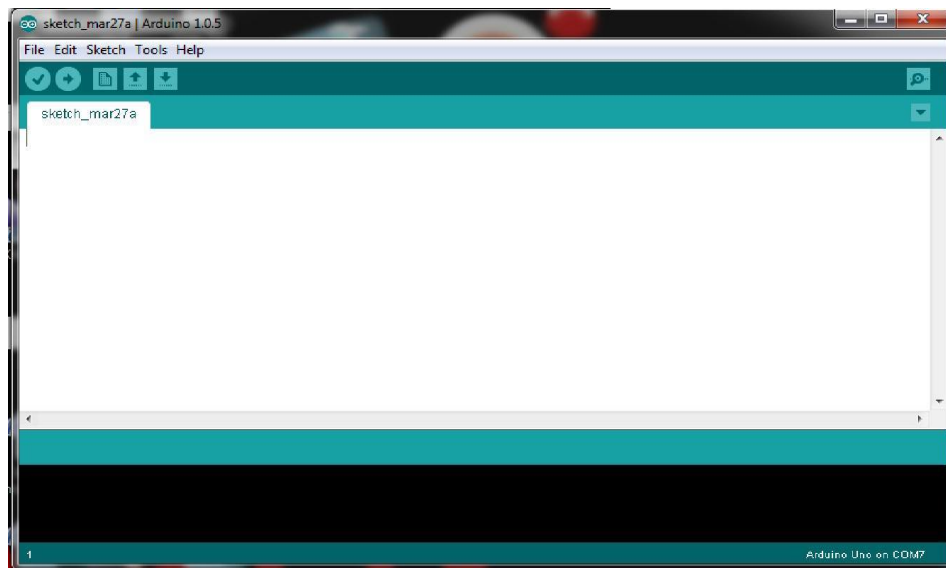


Fig 1.32: Arduino IDE

2. Select the COM Port from tool

Select the COM Port

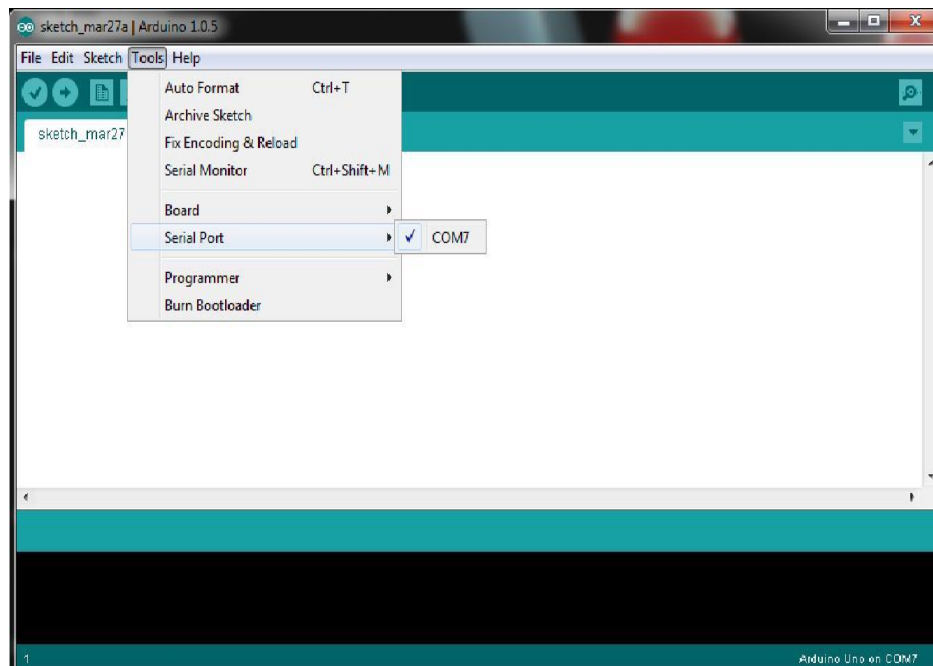


Fig 1.33: Tools

3. Select the required Arduino board from Tools as shown below

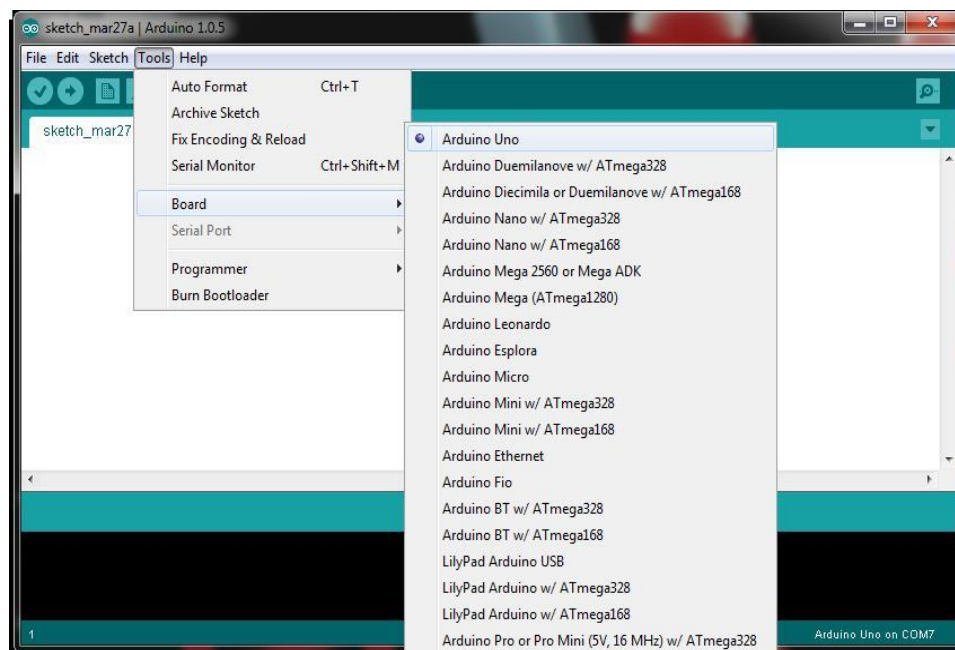


Fig 1.34: Select the required Arduino board

4. Write the sketch in Arduino IDE

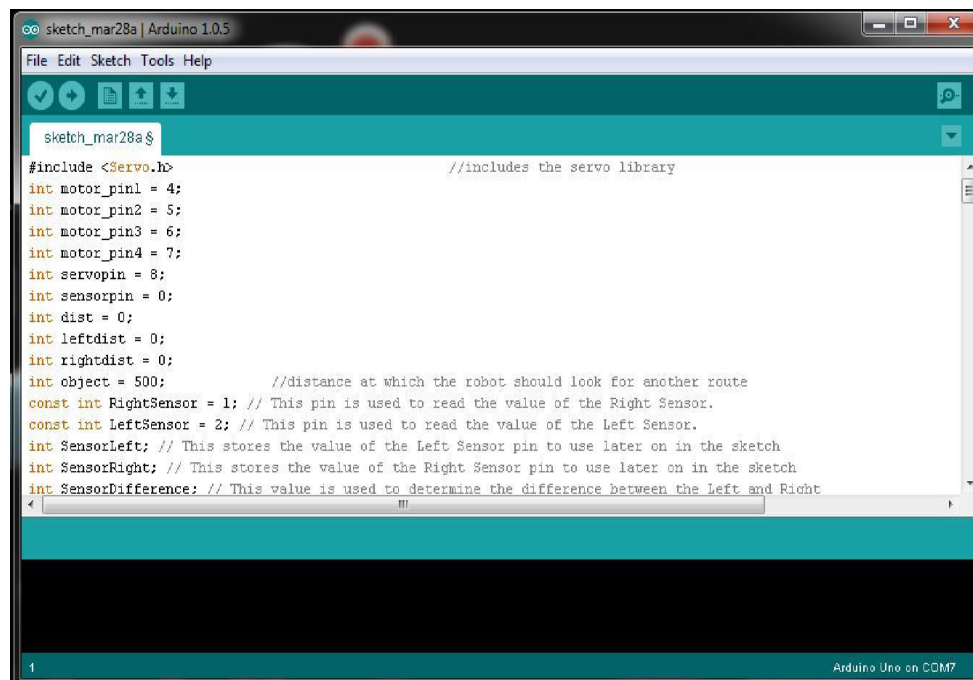


Fig 1.35: Sketch in Arduino IDE

5. Compile and upload the Sketch to Arduino board

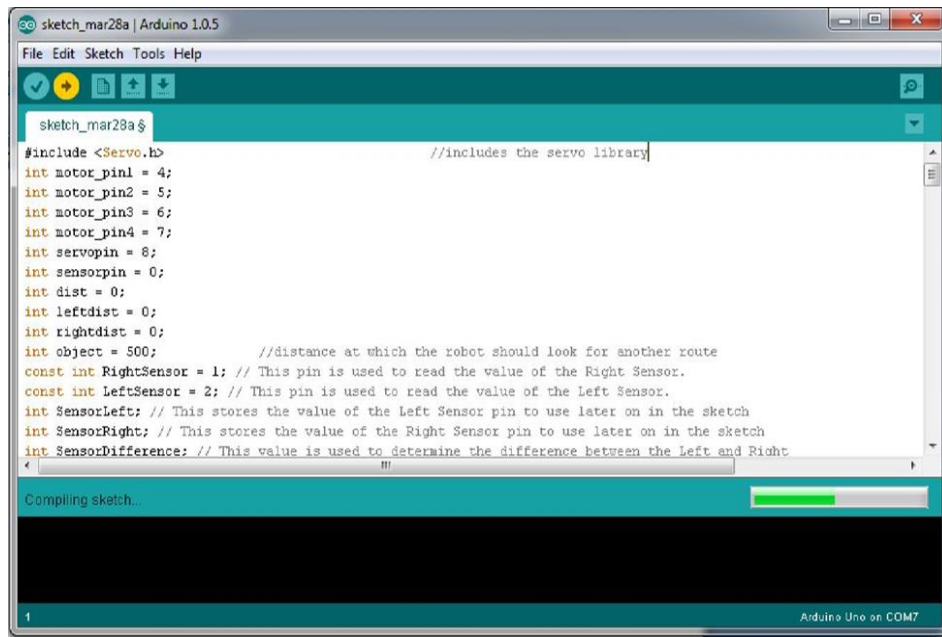


Fig 1.36: upload the Sketch to Arduino board.

6.6 APPLICATIONS

This is an important sensor based project which has the latest technology implemented in it. And it has many applications & advantages as mentioned below.

- 1) IOT Healthcare is the most demanding field in the medical area. This project is for, elderly person in our home. Also for the senior citizen living alone or living with 1 or 2 members. This project really proves helpful when family members need to go out for some emergency work.
- 2) Disable patients can use this project. Disable patients who find it really difficult to go to doctors on daily basis or for those patients who need continuous monitoring from the doctor.

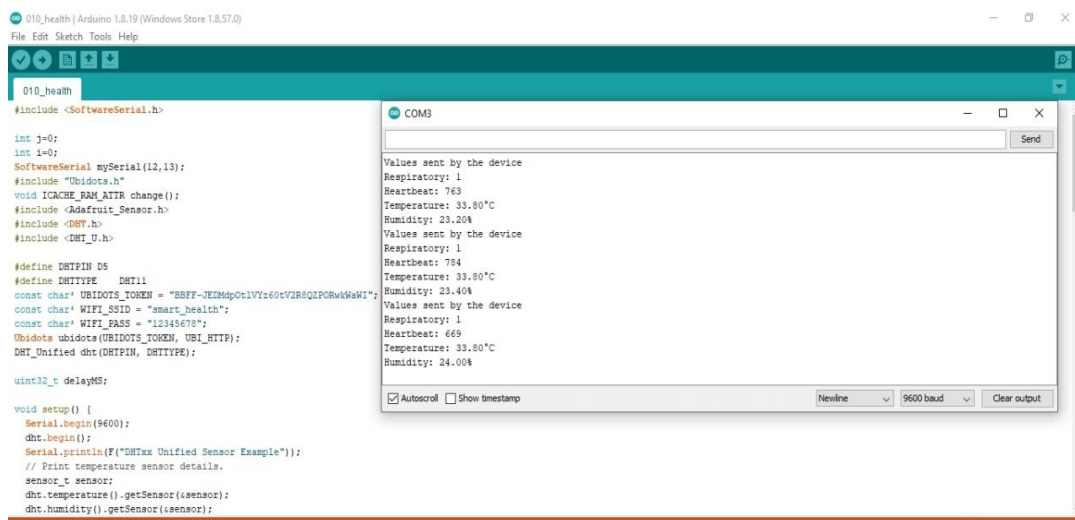
CHAPTER 7

RESULT

From this system we getting the patient health data like temperature, heartbeat, pressure and respiration values.

Here we can get the data from cloud continuously from anywhere of patient health condition, and if any difficult situation it will give alert through buzzer or sent an email as well as SMS to the respective persons like parents and doctors.

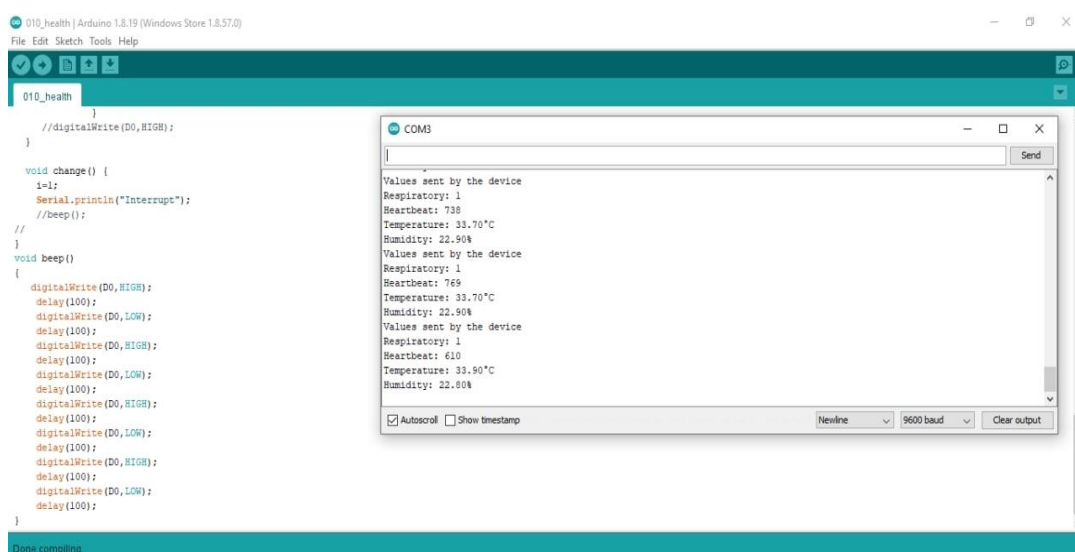
OUTPUT



The screenshot shows the Arduino IDE with the '010_health' program loaded. The program includes headers for SoftwareSerial, Ubidots, and Adafruit_Sensor. It defines pins for DHT and DHT11 sensors and sets up a serial connection at 9600 baud. The setup function initializes the serial port and prints a message. The loop function reads sensor data and prints it to the serial monitor. The serial monitor shows the following output:

```
Values sent by the device
Respiratory: 1
Heartbeat: 763
Temperature: 33.80°C
Humidity: 23.20%
Values sent by the device
Respiratory: 1
Heartbeat: 784
Temperature: 33.80°C
Humidity: 23.40%
Values sent by the device
Respiratory: 1
Heartbeat: 669
Temperature: 33.80°C
Humidity: 24.00%
```

Fig 1.37: Aurdino program(1)



The screenshot shows the Arduino IDE with the '010_health' program loaded. The program includes headers for SoftwareSerial, Ubidots, and Adafruit_Sensor. It defines pins for DHT and DHT11 sensors and sets up a serial connection at 9600 baud. The setup function initializes the serial port and prints a message. The loop function reads sensor data and prints it to the serial monitor. The serial monitor shows the following output:

```
Values sent by the device
Respiratory: 1
Heartbeat: 738
Temperature: 33.70°C
Humidity: 22.90%
Values sent by the device
Respiratory: 1
Heartbeat: 769
Temperature: 33.70°C
Humidity: 22.90%
Values sent by the device
Respiratory: 1
Heartbeat: 610
Temperature: 33.90°C
Humidity: 22.80%
```

Fig 1.38: Aurdino program(2)

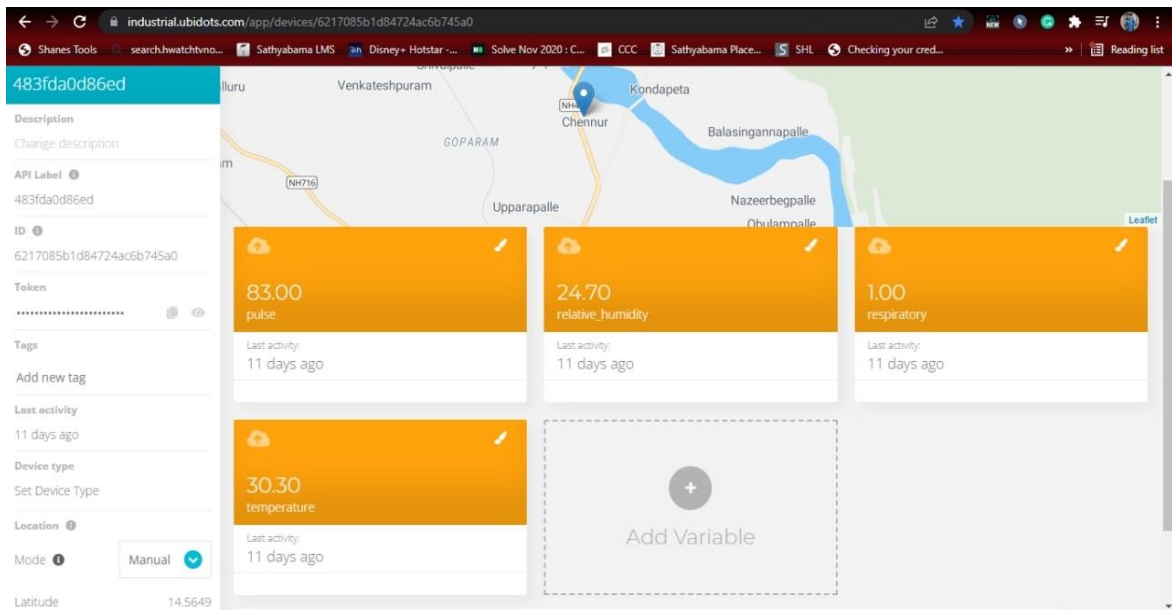


Fig 1.39: Ubidots home page

SMS ALERT:

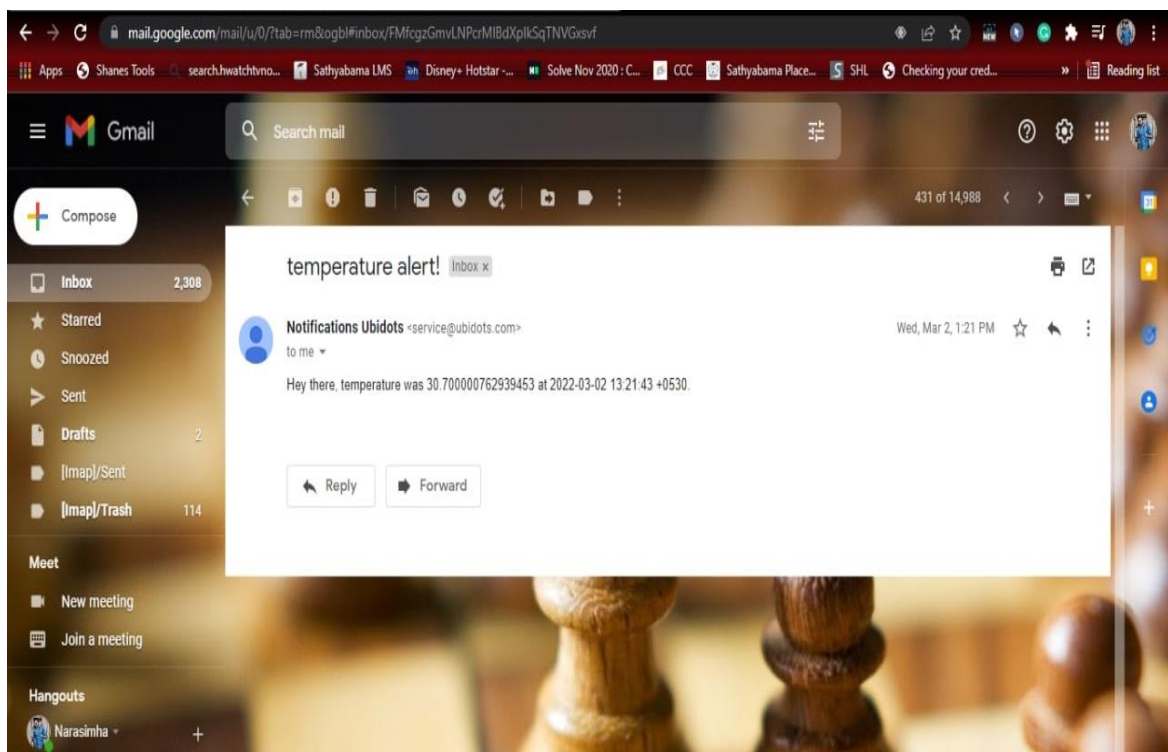


Fig 1.40: SMS Alert

CHAPTER 8

CONCLUSION

IOT Monitoring proves really helpful when we need to monitor & record and keep track of changes in the health parameters of the patient over the period of time. So with the IOT health monitoring, we can have the database of these changes in the health parameters. Doctors can take the reference of these changes or the history of the patient while suggesting the treatment or the medicines to the patient. Hospital stays are minimized due to Remote Patient Monitoring. Hospital visits for normal routine check-ups are Minimized. Patient health parameter data is stored over the cloud. So it is more beneficial than maintaining the records on printed papers kept in the files. Or even the digital records which are kept in a particular computer or laptop or memory device like pen- drive. Because there are chances that these devices can get corrupt and data might be lost. Whereas, in case of IOT, the cloud storage is more reliable and does have minimal chances of data loss.

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2. Internet of Things, "European Research Cluster on the Internet of Things," [Online]:<http://www.internet-of-things-research.eu/aboutiot.htm>
3. D. Miorandi, S. Sicarib, F. De Pellegrinia and I. Chlamtac, "Internet of Things: Vision, applications and research challenges," Ad Hoc Networks 10 (2012) 14971516.
4. Ravi Kishore Kodali, Govinda Swamy and Boppana Lakshmi, "An Implementation of IoT for Healthcare," 2015 IEEE Recent Advances in Intelligent Computational Systems (RAICS) — 10-12 December 2015 Trivandrum.
5. Punit Gupta, Deepika Agrawal, Jasmeet Chhabra, Pulkit Kumar Dhir, "IoT based Smart HealthCare Kit," 2016 International Conference on Computational Techniques in Information and Communication Technologies (ICCTICT).

APPENDIX

A. SOURCE CODE

```
#include <SoftwareSerial.h>
int j=0;
int i=0;
SoftwareSerial mySerial(12,13);
#include "Ubidots.h"
void ICACHE_RAM_ATTR change();
#include <Adafruit_Sensor.h>
#include <DHT.h>
#include <DHT_U.h>
#define DHTPIN D5
#define DHTTYPE DHT11
const char* UBIDOTS_TOKEN = "BBFF-
JEDMdpOtIVYz60tV2R8QZPORwkWaWI";
// Put here your Ubidots TOKEN
const char* WIFI_SSID = "smart_health";
// Put here your Wi-Fi SSID
const char* WIFI_PASS = "12345678";
Ubidots ubidots(UBIDOTS_TOKEN, UBI_HTTP);
DHT_Unified dht(DHTPIN, DHTTYPE);
uint32_t delayMS;
void setup() {
  Serial.begin(9600);
  dht.begin();
  Serial.println(F("DHTxx Unified Sensor Example"));
  // Print temperature sensor details.
  sensor_t sensor;
  dht.temperature().getSensor(&sensor);
  dht.humidity().getSensor(&sensor);
  pinMode(D0,OUTPUT); //buzzer
  digitalWrite(D0,LOW);
  pinMode(D1,INPUT); //resp
```

```

pinMode(D2,INPUT); //impact
attachInterrupt(digitalPinToInterrupt(D2), change, CHANGE);
ubidots.wifiConnect(WIFI_SSID, WIFI_PASS);
delayMS = sensor.min_delay / 1000;
}
void loop()
{
  //ubidots.add("Impact", i);
  int resp = digitalRead(D1);
  Serial.print("Respiratory: ");
  Serial.println(resp);
  ubidots.add("Respiratory", resp);
  int pulse = analogRead(A0);
  ubidots.add("pulse", random(75,85));
  Serial.print("Heartbeat: ");
  Serial.println(pulse);
  //ubidots.add("flame", flame);
  sensors_event_t event;
  dht.temperature().getEvent(&event);
  if (isnan(event.temperature)) {
    Serial.println(F("Error reading temperature!"));
  }
  else {
    Serial.print(F("Temperature: "));
    Serial.print(event.temperature);
    ubidots.add("temperature", event.temperature);
    Serial.println(F("°C"));
  }
  // Get humidity event and print its value.
  dht.humidity().getEvent(&event);
  if (isnan(event.relative_humidity)) {
    Serial.println(F("Error reading humidity!"));
  }
  else {

```

```

    Serial.print(F("Humidity: "));
    Serial.print(event.relative_humidity);
    ubidots.add("relative_humidity",event.relative_humidity);
    Serial.println(F("%"));
}
if (i==1)
{
    ubidots.add("Impact", i);
    beep();
    i=0;
}
    bool bufferSent = false;
        bufferSent = ubidots.send(); // Will send data to a device label that
matches the device Id
        if (bufferSent) {
            Serial.println("Values sent by the device");
        }
        //digitalWrite(D0,HIGH);
    }
void change() {
    i=1;
    Serial.println("Interrupt");
    //beep();
}
void beep()
{
    digitalWrite(D0,HIGH);
    delay(100);
    digitalWrite(D0,LOW);
    delay(100);
    digitalWrite(D0,HIGH);
    delay(100);
    digitalWrite(D0,LOW);
    delay(100);
}

```

```

digitalWrite(D0,HIGH);
delay(100);
digitalWrite(D0,LOW);
delay(100);
digitalWrite(D0,HIGH);
delay(100);
digitalWrite(D0,LOW);
delay(100);
}

```

B. SCREENSHOTS



Fig 1.41: Glove

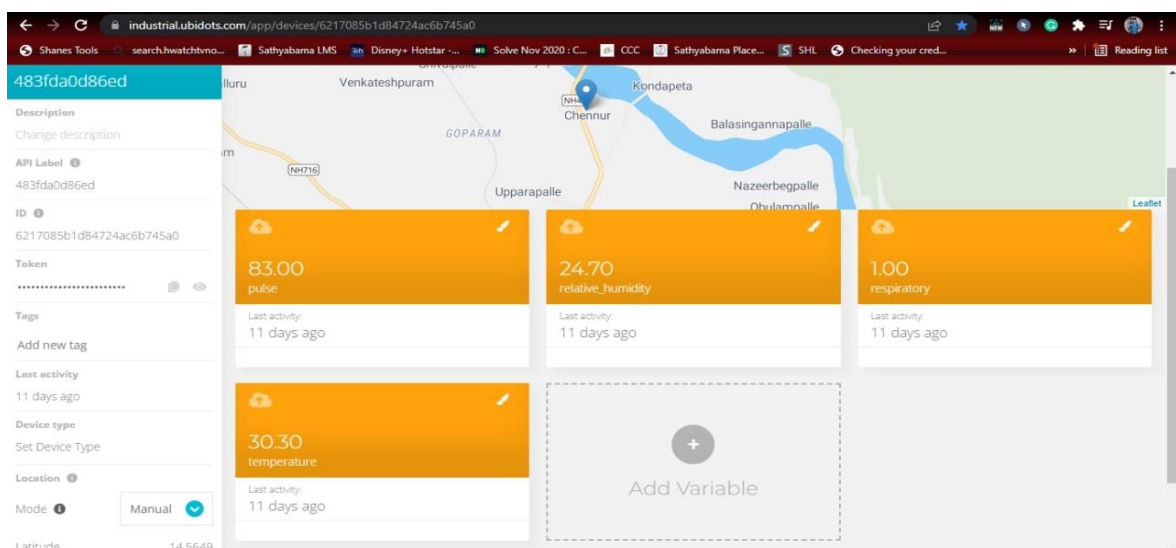


Fig 1.42: Values of each sensor

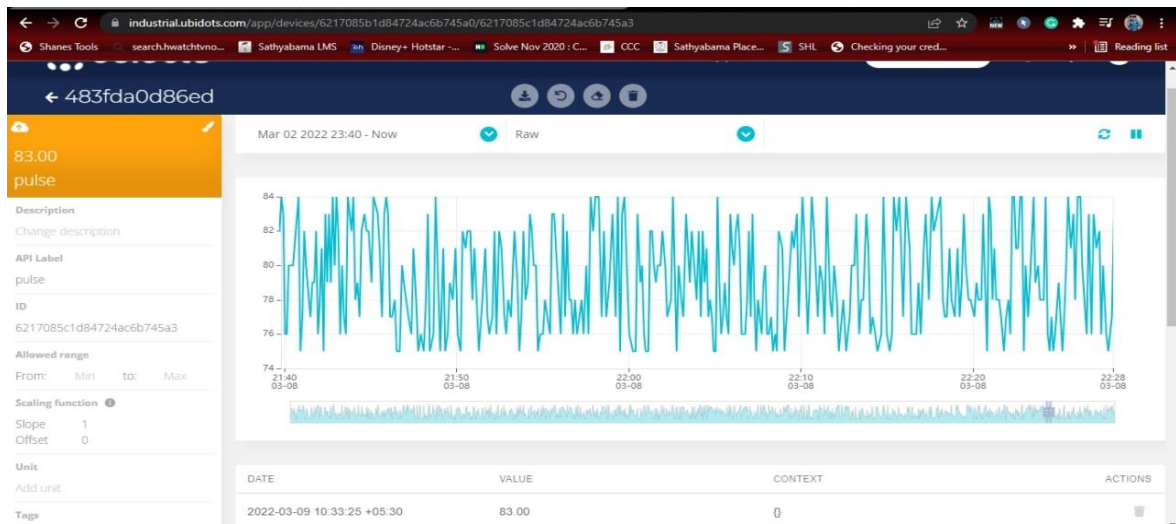


Fig 1.43: Pulse Graph

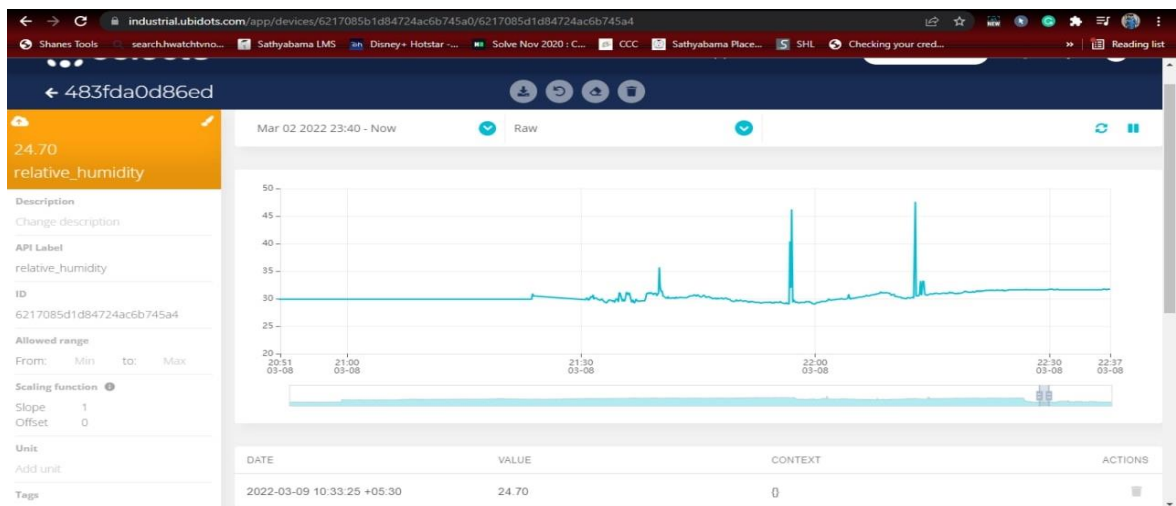


Fig 1.44: Humidity Graph

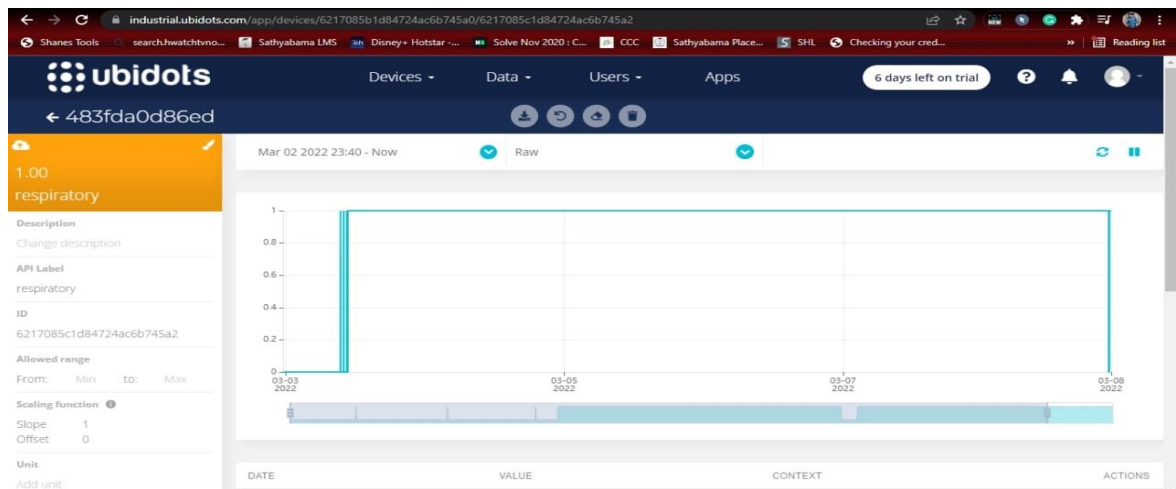


Fig 1.45: Respiratory Graph

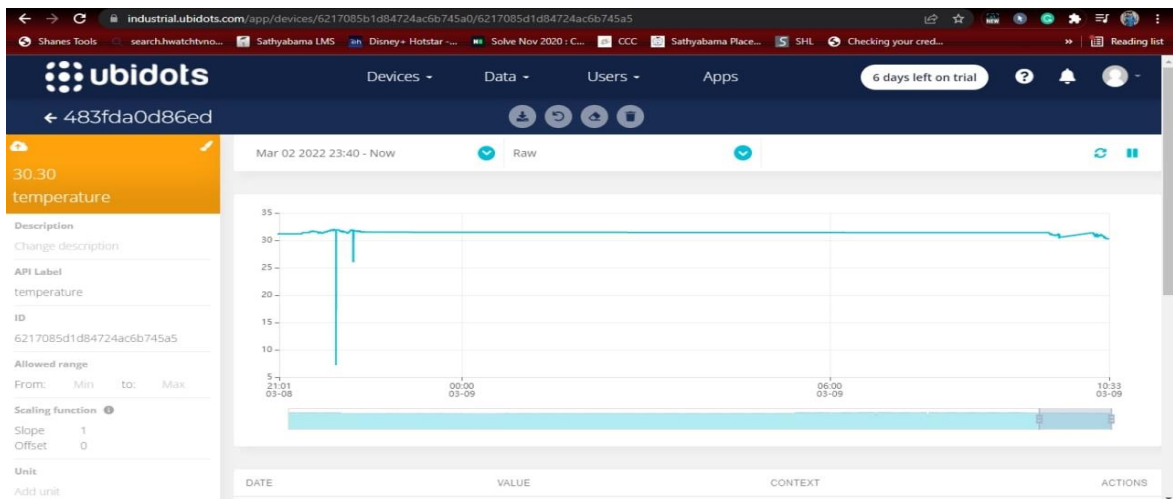


Fig 1.46: Temperature Graph

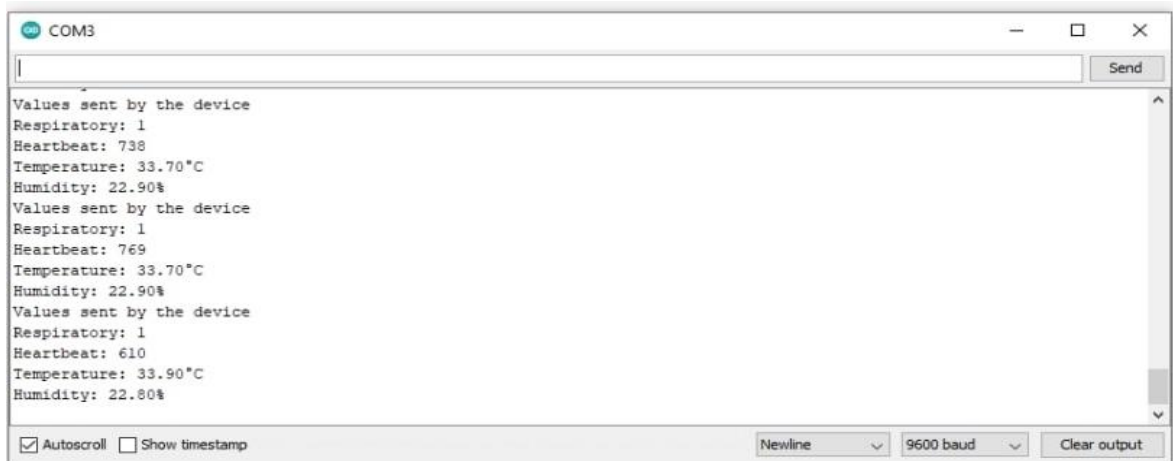


Fig 1.47: Values

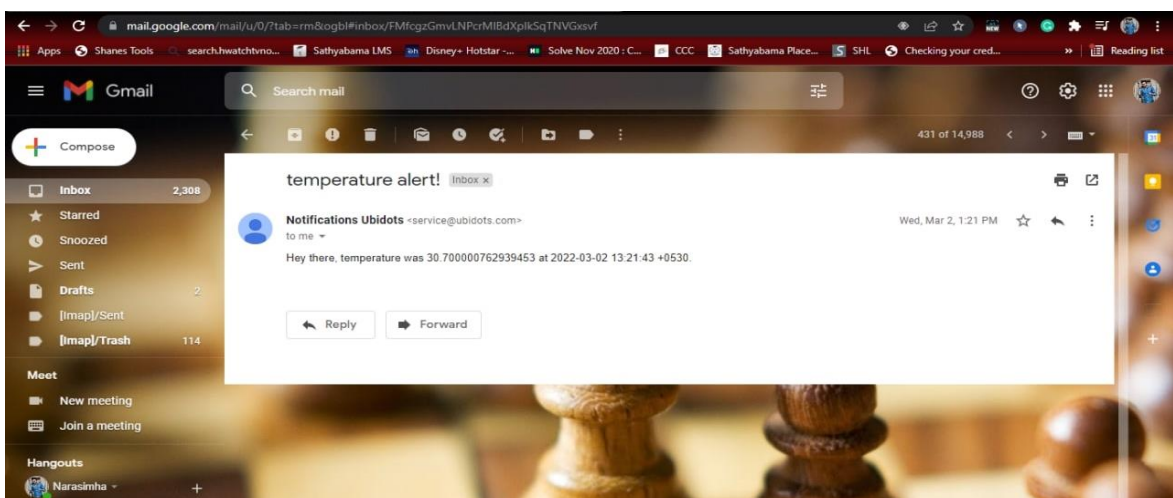


Fig 1.48: SMS Alert

C. PLAGIARISM REPORT

IOT BASED HEALTH TRACKING GLOVE FOR ELDERLY PEOPLE USING GAIT MONITORING SYSTEM (1).docx

by IoT Based Health Tracking Glove For Elderly People IoT Based Health
Tracking Glove For Elderly People

Submission date: 19-Mar-2022 01:57AM (UTC-0400)

Submission ID: 1787638609

File name: NG_GLOVE_FOR_ELDERLY_PEOPLE_USING_GAIT_MONITORING_SYSTEM_1.docx (794.98K)

Word count: 3468

Character count: 18356

IOT BASED HEALTH TRACKING GLOVE FOR ELDERLY PEOPLE USING GAIT MONITORING SYSTEM

Abstract:

Numerous medical care principles for clinical patients today, or medical care that screens physical, work force, and security, add to by and large wellbeing. Above all, most clinic checking frameworks can be changed and kept up with by experts and don't force severe limitations on electrical, interchanges, or neighborhood support capacities. This is as a distinct difference to the abilities of customary IoT gadgets to assist with peopling work inside/outside. Another test is upgrading computerized shopper apparatuses and projects to screen life and actual work to screen grown-up innovation communications. For instance, more seasoned individuals are more averse to take part in security ways of behaving, like refreshing materials or evolving passwords, and are bound to succumb to development or impersonation conduct. The framework surveys the utilization of privacy and safety efforts to help and screen the old (early migraines, inabilities, kids, and so forth) who work with their environmental factors outside the home.

Keywords- Health Tracking Glove, IoT, Gait Monitoring, Monitoring Elderly People

INTRODUCTION:

Above all, buyers need various degrees of data - patients, family parental figures, social specialists, general experts, and paramedics. The Internet of Things fills in as a wellbeing arrangement and assumes a significant part in numerous wellbeing exercises. In this venture, the Nodemcu microcontroller is utilized as a door for correspondence with an assortment of sensors, including sensors, respirators, blood oxygen levels, and heart sensors. These sensors are utilized to screen the older or individuals with mental handicaps. The microcontroller catches the sensors and communicates them by means of IoT, in this way guaranteeing ongoing observing of doctors' wellbeing norms. You can get data from your primary care physician at whatever point you need. The auditor likewise speaks with the speaker and illuminates the caretaker regarding the disconnection at the result. Notwithstanding the fundamental issues with the controller framework, the data is

shipped off the objective and the client is relied upon to approach the data as it were.

LITERATURE SURVEY

The utilization of IoT innovation in current medication permits doctors and attendants to effectively get to an assortment of clinical settings (e.g., using time productively, patient experience the board, and treatment). Probably the main developments of IoT in the medical services area are the Sensory Network (BSN) association [1], which permits patients to be observed utilizing a variety of little and light sensors [2]. Thusly, the data gathered from different apparel materials is put away in an ongoing data set, and continuous data is conveyed to residents, specialists, and experts in crises. Thusly, [3] the program will build the effortlessness and unwavering quality of daily existence as far as solace, assurance and the executives, and lessen the cost for most everyday items. Later on, we have distinguished the need to give data on the

fundamental data channels, broadband organizations, and customary wellbeing observing projects. Be that as it may, to comprehend the necessities of these organizations, particularly the speed prerequisites and how much information gave, we have concentrated on network-associated conventions like CoAP, MQTT, and HTTP [4].

The IoT network depends on wellbeing and confirmation programs. The stage depends on Pandaboard, WiSMote and TI SmartRF06. The CC2538 dashboard is important for data innovation the board and goes about as a brilliant site. The all-inclusive strategy is superior to the most recent model of courier, which utilizes the best administration between the sensor hub and the shrewd technique [5]. As a matter of fact, the impacts of a DoS assault are the equivalent relying upon the framework plan. Wellbeing and Wellness Monitoring IoT applications are one of the ideal models that can altogether work on the strength of the old. Here we present the IoT engineering that meets the wellbeing necessities. Information is shipped off the cloud [6] for assortment, handling and assessment. The purchaser exhibits pay put together way of behaving based with respect to the consequences of the examination.

Existing system:

Clinical gadgets assume a vital part in emergency clinics. The patient checking framework is perhaps the main capacity on account of innovation. An uncontrolled framework that screens the patient's internal heat level and pulse utilizing the innovation.

The proposed framework utilizes the two gadgets like heart sensors and temperature sensors. These sensors assume a significant part in checking the patient's condition.

Be that as it may, sensor data can't be shipped off the cloud

So generally, go to the specialist and see the boundaries

At times, specialists might be occupied, and that implies they won't ever follow up

Proposed system:

More established IoTs and individuals with scholarly inabilities have sensors 4. The first is a sensor, the second is a heart sensor, the third is a sensor, and the latter is a vibration sensor. This venture is extremely valuable since specialists or guardians can screen older and insane individuals by visiting the site or URL. Today, numerous IoT applications are being created. So presently specialists or relatives can screen and control the old and the insane through the Android application.

You really want a Wi-Fi organization to set up an IoT wellbeing checking framework. The microcontroller associates with a Wi-Fi network utilizing a Wi-Fi module. This venture won't work without a functioning Wi-Fi organization. You can make a Wi-Fi zone utilizing the Wi-Fi module or make a Wi-Fi zone utilizing Hotspot on your telephone.

The Nodemcu board keeps on perusing the substance of these gadgets 4. Presently send this data to the cloud and send this data to the URL/IP address. Presently the method involved with sending data to the IP will be rehashed inevitably. For instance, in this undertaking, we sent the data following 30 seconds.

Methodology:

This framework is controlled by a Nodemcu microcontroller

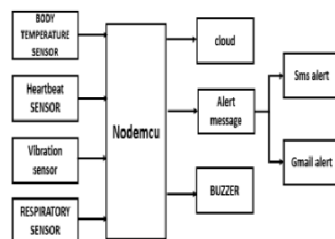
Temperature is utilized to decide the internal heat level of grown-ups and poor people.

Pulse is utilized to decide the pulse of the older and weak individuals.

Vibration sensors are utilized to caution guardians and specialists as individuals age.

On the off chance that any of these are not kidding, send a clinical alarm Like keeping a cloud in the cloud.

Block diagram:



POWER SUPPLY

Since all electronic frameworks work on DC power just, we want power to give the power expected to work appropriately. This unit comprises of a transformer, rectifier, channel and regulator. The 230-volt rms AC voltage is associated with the transformer voltage at the ideal level, up to the ideal AC voltage. The diode rectifier first supplies a full voltage rectifier voltage separated through a basic capacitor to work the DC voltage. Thus, a steady voltage is normally an alternate wave or an exchanging voltage. The circuits will supply the DC voltage with a little wave power through the info DC and will continue as before.

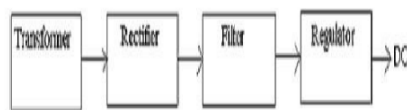


Figure 1. General pieces of force supply

TRANSFORMER:

A transformer is a steady unit of electrical energy in a circuit that changes one line in a circuit over to another. It is feasible to increment or diminishing the circuit voltage, however it diminishes or increments after some time. It chips away at the rule of incorporation. In our undertaking, we are involving the change interaction to give the essential gear to power. Here we have diminished the 12-volt AC to 230-volt AC.

RECTIFIER:

The DC level found at the sinusoidal information can be further developed 100 percent utilizing an interaction called full amendment. Here we use span fixes in our total redesign project. From the base extension, we see that the other two diodes (say D2 and D3) are dynamic, while the other two diodes (D1 and D4) don't prevent from $t = 0$ to $T/2$. The heap is something very similar.

Diodes can be utilized in different ways to fix spans, like 1N4001, 1N4003, 1N4004, 1N4005, 1N4007 ... it tends to be utilized. In any case, here we are utilizing 1N4007 in light of the fact that it can endure 1000V.

FILTERS:

To get a steady voltage of 0 Hz, we need to utilize a little channel. In this way, when the capacitor is associated with the result rectifier, the capacitor of the circuit channel is utilized, straightforwardly. The channel is a voltage DC with a frequency and is at long last taken care of to the heap.

REGISTERS:

The IC regulator has two 8-bit books, a committed book (IR) and a pamphlet (DR).

The IR stores the guidance code and the location data for the RAM (DD RAM) and the RAM (CG RAM). IR can be recorded, however MPU doesn't peruse.

DR impermanent capacity composes/peruses information from DD RAM or CG RAM. Information recorded from MPU to DR is consequently recorded on DD RAM or CG RAM inside.

Whenever the location code is written in IR, the data is quickly moved from DD RAM or CG RAM to DR. Presently, when the MPU peruses DR, the correspondence between the MPUs is finished. Thusly, the following MPU peruses DR and quickly sends data to DD RAM or CG RAM at that location to DR. Thusly, to compose DR MPU, select the accompanying DD RAM or CG RAM to play out the activity.

REGULATORS:

The result voltage of the capacitor is re-sifted and at last controlled. Voltage control is a gadget that keeps up with voltage yield paying little heed to changes in supply, burden, or temperature. Here we utilize the DC voltage regulator, which is the LM7805. The IC LM7805 is a + 5v regulator utilized in microcontrollers.

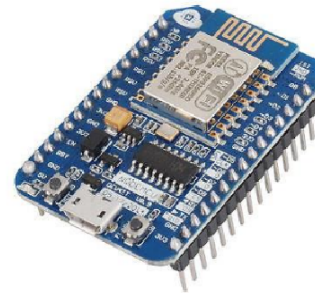
FEATURES AND DESCRIPTION OF REGULATORS

- Yields up to 1A
- Yield rates of 5, 6, 8, 9, 10, 12, 15, 18, 24V
- Exorbitant security
- Stay away from short-circuits
- Yields safeguard the semiconductor

ESP8266 ARDUINO CORE

As Arduino.cc grows new non-AVR based MCU sheets like ARM/SAM MCUs and will

be utilized in Arduino. Because, they should change the Arduino IDE with the goal that it will be exceptionally simple to change the IDE to help one more chain of devices.



Permit Arduino C/C ++ to advance to make new things. They did this with the direction given by SAM Core. "Presentation" is an assortment of programming apparatuses expected by the organization and the Arduino IDE to accumulate an Arduino C/C ++ source document to get to the MCU machine. Some ESP8266 fans have made an Arduino feed on the ESP8266 WiPi SoC, known as the "ESP8266 Core of the Arduino IDE." [16] It has been the site of the improvement of different ESP8266 programming advancement projects and improvement sheets like NodeMCU.

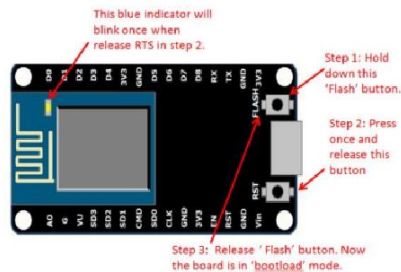
Blink Test

We start with the straightforward trial of brightening. Enter the window project (save on a case-by-case basis). Associate the LED as displayed in Figure 3-1.

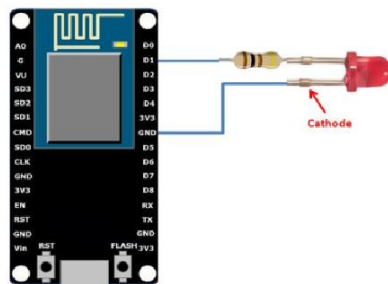
Presently you want to place the board in the boot mode. You should do this prior to sending. You don't need to rush since there is no boot!

- Snap and hold the 'Streak' button.
- While holding 'Streak', click 'RST'.

- Discharge 'RST' and discharge 'Streak'



When the ESP space is booted, send the IDE picture.



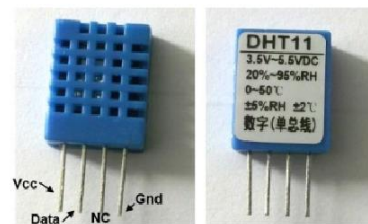
DHT11 sensor

The DHT11 connector accompanies a 4-pin line and is fueled by 3.5 to 5.5V. It very well may be estimated from 0-50 ° C to ± 2 ° C, with a normal temperature of 20-95% and a precision of $\pm 5\%$. Rukuruzi gives total mathematical data on two aspects. Since it has a one of a kind 1-wire convention, it is absurd to expect to convey straightforwardly or in a roundabout way between the sensor and the microcontroller. The convention should be executed in the MCU programming as expected by the sensor. The accompanying graph depicts the information convention sent between the MCU and the DHT11 sensor. MCU is sending off "Begin". For this reason, the MCU needle should be introduced as a result. The MCU first pulls the information

line down no less than 18 ms and afterward pulls it up 20-40 minutes prior to leaving.

The DHT11 sensor accompanies a solitary 4-pin line

Will the sensor then answer the MCU "Begin" signal by hauling the line under 80? S then high rationale likewise endures 80? S. Note that subsequent to finishing the "Begin" sign, the MCU should be embedded to embed the needle. When the sensor reaction signal is known, the MCU should be prepared to get data from the sensor. Rukuruzi presently sends 40 pieces (5 bytes) of data to the message line. Note that while sending a byte, the sensor sends the main byte first.



RESPIRATORY SENSOR:

Gas, pipelines, and clinical gear ought to be endlessly checked in an assortment of clinical gadgets, including aviation route hardware, symptomatic gear, rest indicative gear, rest treatment hardware (CPAP), spirometers, and oxygen. Respiratory quality gadgets measure the progression of the respirator to around 0 every moment and show a speed of many l/min. Utilization of corrective hardware with sedation. In the CPAP-controlled gadget, the instrument keeps on checking the speed of the emergency clinic, along these lines working on the quality and nature of clinical consideration. The spirometer utilizes an exceptional pneumatic model to quantify the respiratory rate utilizing an assortment of sensors.

The primary sensor creates and fabricates dependable gadgets and one of a kind sensor frameworks for respiratory and aviation route administration accomplices. Our thorough counseling, improvement, efficiency and administration meet clinical prerequisites as per EN ISO 13485.

Place the aviation route in a long line of ropes around the chest and midsection. For most applications, it is critical to carry one sensor closer to the next. Whenever wanted, a subsequent respirator might be set close to the chest. Utilizing the two apparatuses assists with breathing activities.

Eliminate the belt, append it to the mid-region (or body), and spot the sensor inside. Request that the client inhale as well as could be expected and introduce a pressure sensor. The benefit ought to be adequate to situate the zone while relaxing the point. The sensor mud should be sluggish enough that it will extend the constriction that makes the rope lift excessively. Side effects of a respiratory emergency include:

The breathing sensor is a roundabout sensor that permits simple association of long hooks affixed with a belt. It gets chest development/constriction and tells the best way to inhale and sufficiency. Can worn on dress. Breath can be estimated utilizing a respirator or non-slip security belt, as well as stomach EMG. In most operations, the patient's breathing should be estimated. Here and there we need to contemplate lung work, and in some cases, we need to know and compute the degree of apnea.

HEARTBEAT SENSOR

The human heart is the volume of the heart that causes draining from one region. One-minute pulse (BPM), palpitations, and heart palpitations are

looseness of the bowels that is felt in the muscles near the skin.

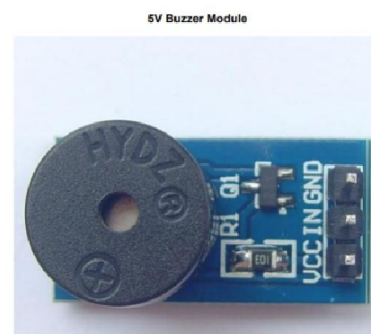
Two Ways to Measure a Heartbeat

Fingerprints: Human looseness of the bowels can be controlled physically by pushing on the arm (outspread heartbeat) and the neck (carotid vein). The strategy is to put two hands (cost and center finger) on the hand (or neck), count the runs for 30 seconds, and increase these two numbers to track down the heartbeat. Be that as it may, the strain ought to be kept to a base and the fingers ought to be raised all over until this heartbeat.

Utilizing Sensors: The pulse can be estimated in view of optical energy changes as light voyages or enters the circulation system.

Principle of Heartbeat Sensor

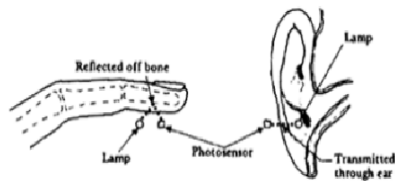
Heart failure depends on the standard of photograph holotomography. It estimates the adjustment of how much blood in all pieces of the body, prompting an adjustment of how much light through the vascular zone. Beat time is significant when it is critical to screen pulse. Blood not entirely set in stone by the pulse, and on the grounds that the light is consumed by the blood, the side effects show similar side effects as the heart.



There are two sorts of Photofletismography.

Transmission: Light is provided by a gadget that emanates light through any piece of the body's muscles, like the ear, and is consumed by the sensor.

Input: Indicates the light given by the light transmission gear nearby.



Buzzer:

Sound or sound sign is a sound sign gadget that can be mechanical, electrical, or piezoelectric. Generally utilizing sound and call logs including call logs, timing, mouse snaps, and information control keys. Ringer is an electronic gadget with a wide scope of DC gadgets that are generally utilized in PCs, printers, printers, PCs, electronic games, electronic gadgets, phones, schedules and other electronic sound items. 5V functional control The deliberate power can be appropriately joined with the persistent clamor, and a straightforward round plan of "attachment and play" should be possible by interfacing the sensor extension sensor to the board of this segment.

How to test:

1. Associate your Arduino microcontroller to the PC.
2. Associate the VCC pin of your module to the 5V pin of your Arduino.
3. Interface the GND pin of your module to the GND pin of your Arduino.
4. Interface the info pin of the module to the 13 pins of the Arduino.

5. Introduce programming in Arduino Integrated Environment (IDE):

```
int sound = 13;

Invalid setting () {

pinMode (speaker, OUTPUT);

}}

unsigned circle () {

DigitalWrite (signal, HIGH);

hours (1000);

DigitalWrite (speaker, MINOR);

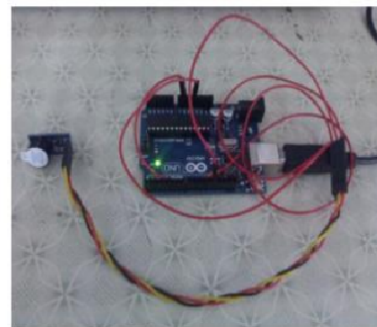
hours (1000);

}}
```

6. At last, click the download button.

Testing Results:

The above model is a glimmering plan, and one goes to the LED. The result is to change the discussion on and off at regular intervals. The accompanying figure shows the design of your module and Arduino.



Applications:

This is a significant task in light of present day innovation. It likewise has many projects that are essentially as great as the ones referenced previously.

1) IoT medication is perhaps the main clinical benefit. This venture has a place with the seniors of our home. More seasoned individuals living alone or with 1-2 individuals. This venture is particularly useful when relatives need earnestness.

2) Patients with inabilities can utilize this task. Stop patients who find it undeniably challenging to see a specialist consistently or need standard check-ups.

RESULT



CONCLUSION

IoT checking is particularly useful when changes in quiet wellbeing should be observed, recorded, and checked sooner rather than later. Thusly, with the assistance of IoT observing, we can have an information base of these progressions throughout everyday life. Specialists can allude to these progressions or patient accounts while mentioning treatment or medicine for the patient. The length of clinic stay has been diminished because of the significant distance from the patient. Decrease of normal clinical assessments Patients' expectations for everyday comforts are put away in the cloud. Accordingly, it is more vital to keep the records on the document in the record. Or on the other hand even recorded sound put away on memory gadgets, like a PC, a PC, a pen. This is a direct result of the way that these materials can be harmed and data lost. For IoTs, notwithstanding, distributed storage is secure and can't lose information.

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