International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

IOT Based Heart Attack Detection and Heart Rate Monitor

Mrs. Abida K[1], Mrs. Ashwini K[2], Dr.Suganda P[3], Bharati S[4], Shahida M S[5]

[1,2]Assistant Professor, Department Of Electronics and Communications, Rural Engineering College, Hulkoti
[3]Associate Professor, Department Of Electronics and Communications, Rural Engineering College, Hulkoti
[4,5]Student, Department Of Electronics and Communications, Rural Engineering College, Hulkoti

1. INTRODUCTION

Heart attacks are now acommon cause of death for many people. Blocking the flow of blood to the heart might result in heart failure. we were unable to save lives of many people due to the late discovery of the incident.In this article, we provide a framework that uses IOT(internet of things)to check the pulse in order to identify cardiac failure. A healthy adult's typical pulse ranges from 60 to 100 bpm (beats per minute) depending on their health, athlete's heart rates often range 40 to 60 beats per minutes. An individual is thought to have a higher pulse, known as sinus pulse, if their pulse is consistency greater than 100 pulsation per minute.

Using IOT, heart attack Mrs Abida K, Mrs.Ashwini K, Dr.Sugandamonitoring Bharati Shivur and Shahida Sandgod, REC. Many people are losing their lives nowadays as a result of heart attacks and delays in providing proper medical care to patient. As a result, we are employing IOT to develop a hear rate monitoring and heart attack identification system in this project. The patient will have a sensor equipped devices and an android app. The heart beat sensor will enable online heartbeat monitoring and transmission. The user may set the heartbeat's maximum and minimum levels. Once these limitations are established, the system may begin keeping track of the patient's heartbeat. If the heartbeat measurements fall above are below the user defined limit, the system will transmit a warning about high

According to the National Heart, Lung, and Blood Institute, "more than a million Americans have heart attacks each year, and about half (515,000) of them pass away." About One hour after the onset of symptoms, half of those who pass away do so before getting to the hospital. Following a heart attack, the first few hours are crucial for rescuing much of the heart muscle that is. starved for oxygen and avoiding lasting heart damage. The symptoms differ from person to person, and the patient's unawareness and lack of early warnings is the most To combat this, we are creating a system that will assist in lowering the number of heart-related deaths.

The rapid development of electronic gadgets like smart phones and tablets, which can be used for physical or wireless communication, has made them a necessary part of daily life in the modern era of communication and technology. Internet of Things (IOT) is the next phase of the linked world, which connects gadgets, sensors, appliances, cars, and other "things". The radio-frequency identification (RFID) tag, cell phones, sensors, actuators, and many more items are examples of things or objects. We can link everything, get access from anywhere, at any time, and quickly access any service or data about any object thanks to the Internet of Things. One of the most crucial parts of the human body is the heart. It serves as a pump for distributing blood and oxygen throughout the body, maintaining the body intact.

1.1 IOT (INTERNET OF THINGS)

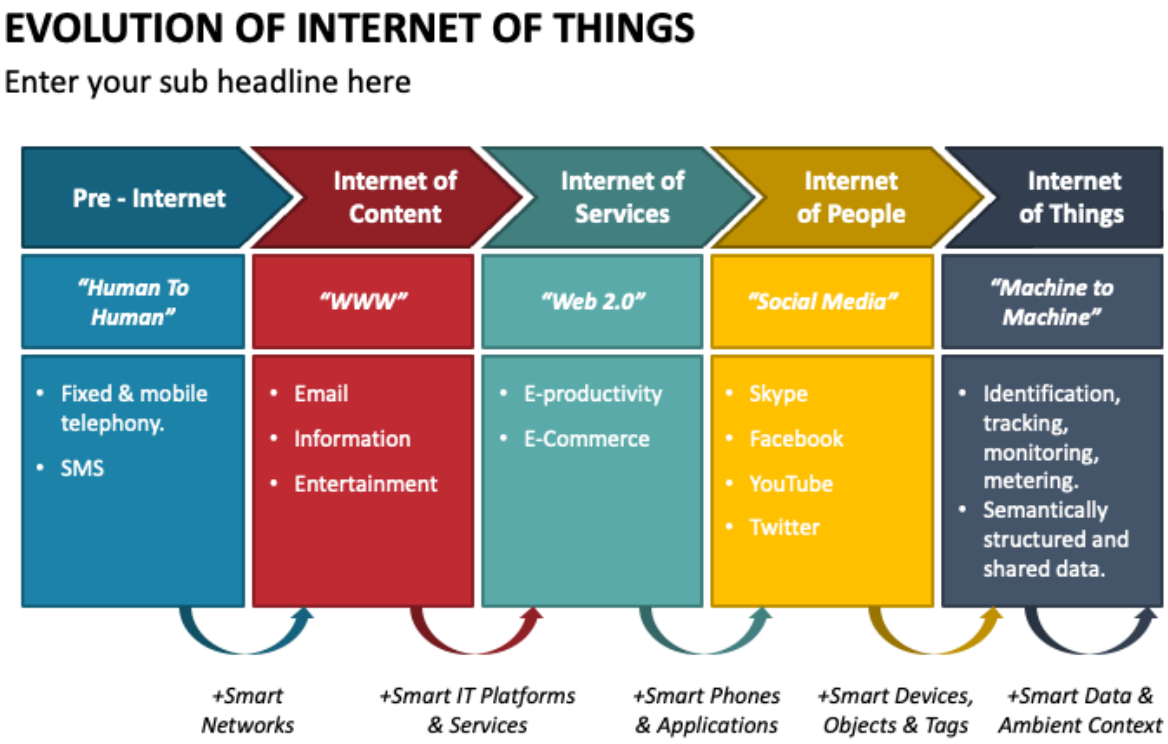
Ubiquitous computing is a term that was given by Mark Weiser. It is an emerging concept in computer science where computing can be done anytime and anywhere. These types of computing can occur using any device, at any location, and in any format. A user interacts with the computer, which can exist in many different forms, including laptop computers, tablets and terminals in everyday objects such as a fridge or a pair of glasses. The underlying technologies to support ubiquitous computing include Internet, advanced middleware, operating system, mobile code, sensors, microprocessors, new I/O and user interfaces, networks, mobile protocols, location and positioning and new materials. Since, real world objects are involved; it is also known as physical computing or the Internet of Things. This concept will provide a breakthrough in the field of artificial Intelligence and Human Computer Interaction (VermesanFriess,2013).

Fig: INTERNET OF THINGS

The internet which first began with desktop computers and then evolved to laptops, tablets and mobile phones is now going a step further and extending to real world everyday objects. The physical items can now be controlled remotely from anywhere. Apart from the field of computer science it is also finding applicability in different fields like business, economy, agriculture, healthcare, etc. At the same time, however, the Internet of Things raises significant challenges which could adversely affect its applicability. Hacking of Internet-connected devices, surveillance concerns, and privacy fears already have captured public attention. Technical challenges still remain a major concern for developing IOT based applications.

1.1.1 HISTORY

The Internet of Things (IOT) is the network of physical objects—devices, instruments, vehicles, buildings and other items embedded with electronics, circuits ,software, sensors and network connectivity that enables these objects to collect and exchange data. The Internet of Things allows objects to be sensed and controlled remotely across existing network infrastructure, creating opportunities for more direct integration of the physical world in to computer -based
Systems , and resulting in improved efficiency and accuracy. The concept of a network of smart devices was discussed as early as 1982, with a modified Coke machine at Carnegie Mellon University becoming the first internet-connected appliance [3], able to report its inventory and



whether newly loaded drinks were cold.Kevin Ashton (born 1968) is a British technology pioneer who is known for inventing the term "the Internet of Things" to describe a system where the Internet is connected to the physical world via ubiquitous sensors. IOT is able to interact healthcare, transportation, and automotive industries. IOT technologies are at their infant stages; without human intervention. Some preliminary IOT applications have been already developed in however, many new developments have occurred in the integration of objects with sensors in the Internet. The development of IOT involves many issues such as infrastructure, communications, interfaces, protocols, and standards. The objective of this paper is to give general concept of IOT, the architecture and layers in IOT, some basic terms associated with it and the services provided.

Kevin Ashton firstly proposed the concept of IOT in 1999, and he referred the IOT as uniquely identifiable connected objects with radio-frequency identification (RFID) technology. However, the

exact definition of IOT is still in the forming process that is subject to the perspectives taken. IOT was generally defined as "dynamic global network infrastructure with self-configuring capabilities based on standards and communication protocols
process data according to predefined schemesLooking at the evolution of the Internet we can classify it into five eras:

1.The Internet of Documents -- e-libraries, document based webpages.
2.The Internet of Commerce -- e-commerce, e-banking and stock trading websites.
3.The Internet of Applications -- Web 2.0
4.The Internet of People -- Social networks.
5.The Internet of Things -- Connected devices and machines.

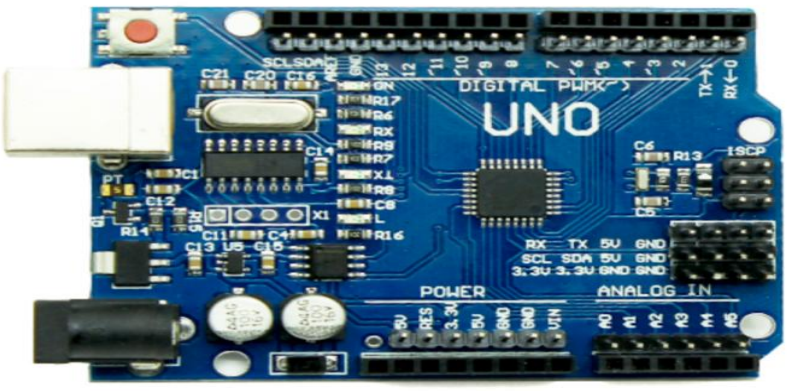
Physical and virtual things in an IOT have their own identities and attributes and are capable of using intelligent interfaces and being integrated as an information network. In easy terms IOT can be treated as a set of connected devices that are uniquely identifiable. The words "Internet" and "Things" mean an inter-connected world-wide network based on sensors, communication, networking, and information processing technologies, which might be the new version of information and communications technology (ICT). To date, a number of technologies are involved in IOT, such as wireless sensor networks (WSNs), barcodes, intelligent sensing, RFID, NFCs, low energy wireless communications, cloud computing and so on. The IOT describes the next generation of Internet, where the physical things could be accessed and identified through the Internet. Depending on various technologies for the implementation, the definition of the IOT varies. However, the fundamental of IOT implies that objects in an IOT can be identified uniquely in the virtual representations. Within an
IOT, all things are able to exchange data and if needed,

1.1.2 TOOLS

1. Arduino

Arduino is the leading company on the IOT market that produces electronic devices and software for them. Arduino hardware offerings include microcontroller boards, modules, shields and kits.Hardware specifications are suitable for creating various projects, such as robotics and home automation.
Software products are represented by:

- **Arduino IDE** — an open-source prototyping platform, which can be used to easily write code compatible with any Arduino board.
- **Arduino Cloud** — a single platform that enables the wireless communication of IOT devices, as well as their remote control and data collection.
- **IOT Cloud Remote** — an application for creating dashboards to control cloud-connected devices.
- **Web Editor** — an application for coding from a browser.

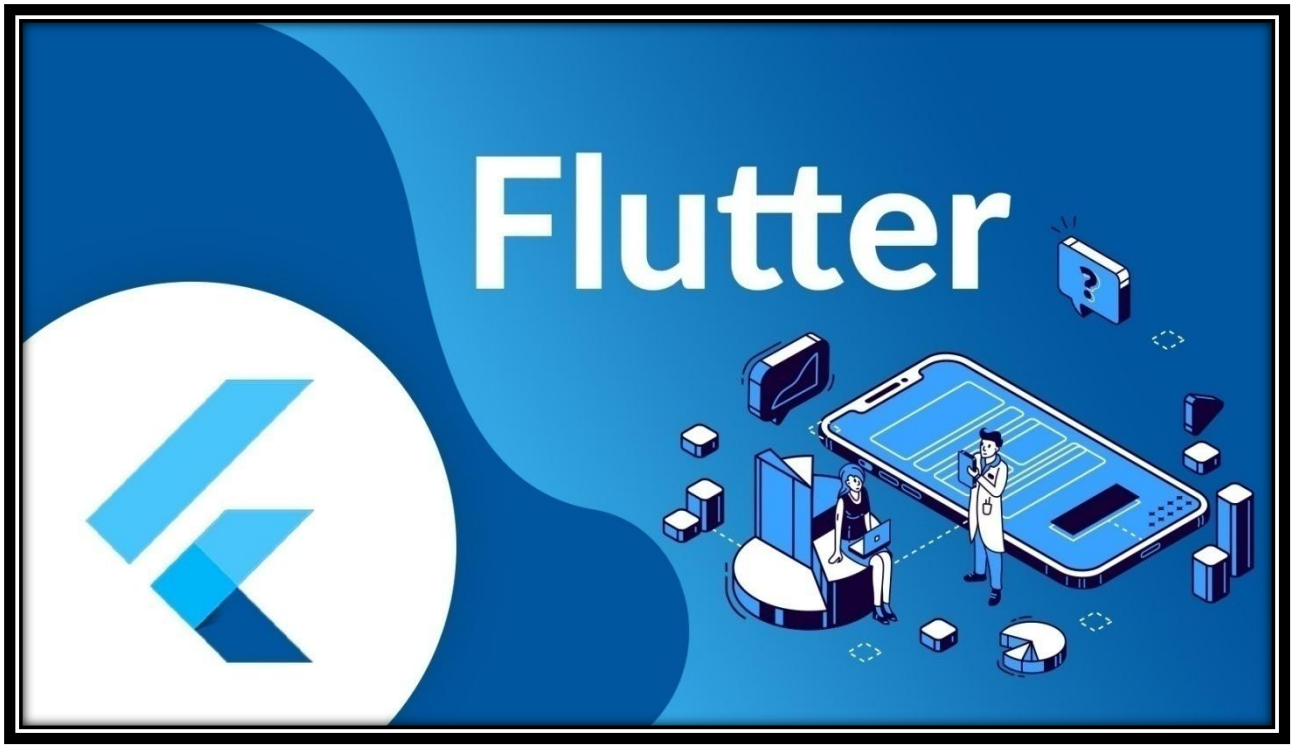


2. Flutter

Another hardware product for IOT solutions is **Flutter** — a programmable processor core. The board is based on Arduino, has a powerful ARM processor, built-in battery charging and a security chip. A long-range wireless transmitter makes this board the perfect fit for wireless networks of sensors.

Flutter offers:

- the Basic control module
- the Pro control module
- complete kits (Quick Start Kit, Vehicle Control Kits)
- accessory boards (the Bluetooth adapter, the Breakout, the Remote Control, the Explorer)
- a solar panel, a cylindrical battery and other accessories
- 3D-printed parts for your device.



3. Kinoma

A group of software engineers from Marvell Technology, Inc., a leading manufacturer of memory devices, microcontrollers, telecom equipment and semiconductor devices, has developed a line of open-source **Kinoma software and hardware** products for the Internet of Things and embedded solutions.

- **Kinoma Create** — a hardware platform for prototyping IoT devices. It's powered by JavaScript and has an integrated SD card, speaker, microphone, Bluetooth and Wi-Fi. It enables the interaction of devices with cloud platforms via the WebSocket internet protocol.
- **Kinoma Studio** — an integrated development environment (IDE) that provides the hardware simulator and sensor library, allowing developers to create robust applications.
- **Kinoma Connect** — an application for Android and iOS supporting IoT devices.

4. Tessel 2

To create connected devices, you can also use **Tessel 2** — a programmable microcontroller supporting JavaScript, Node.js libraries and other languages. It runs Linux and provides access to many NPM modules with all their capabilities.

Tessel 2 can be extended by external hardware (sensors, peripherals) due to a built-in module and USB ports. It also provides Wi-Fi and Ethernet connectivity, a MediaTek router, 64MB of RAM and 32MB of Flash. Convenient command-line tools simplify prototyping.

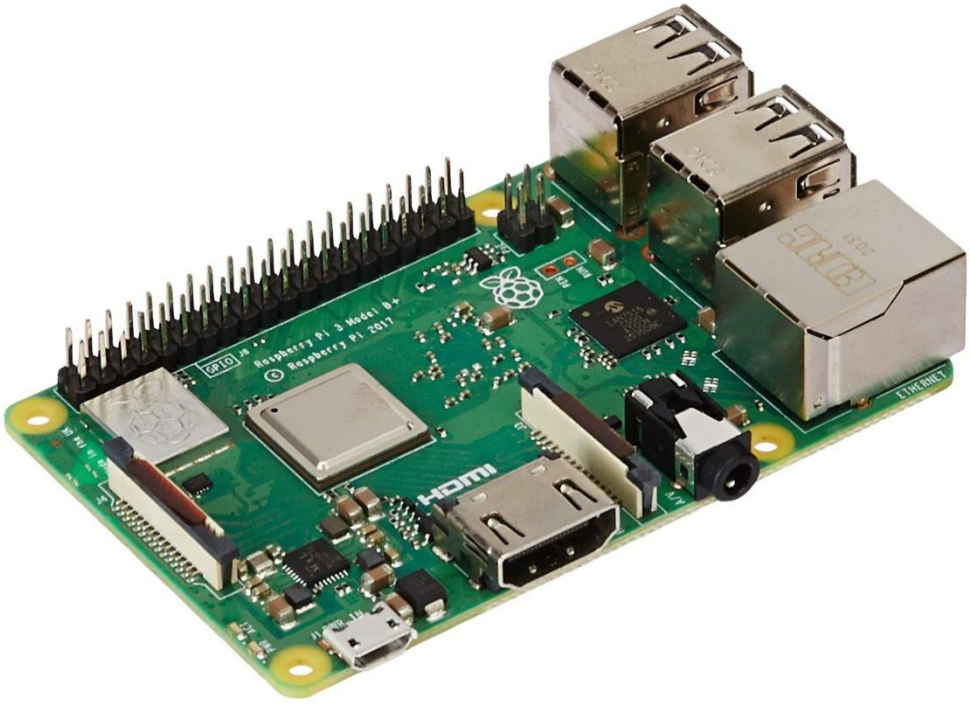
5. M2MLabs Mainspring

The development of machine-to-machine applications is easy with the **M2MLabs Mainspring** framework. This open-source Java-based framework is widely used for building fleet management apps and remote monitoring projects. It enables flexible device configuration and supports the reliable connection between machines. App prototyping is very quick with M2MLabs Mainspring.

Moreover, it ensures long-term data storage and retrieval thanks to a scalable Apache Cassandra database.

6. Raspberry Pi OS (ex. Raspbian)

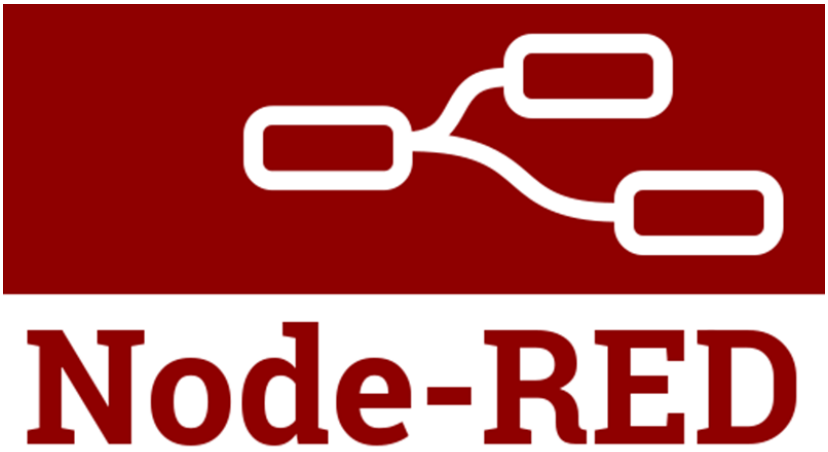
Raspberry Pi OS, formerly known as Raspbian, is the official operating system for the Raspberry Pi hardware. A 32-bit version is available currently, with a 64-bit version in active development. This is a free, Debian-based system. Raspberry includes basic programs and utilities to make the hardware run, but it also compiles thousands of packages and pre-compiled software for easy installation.



7. Node-RED

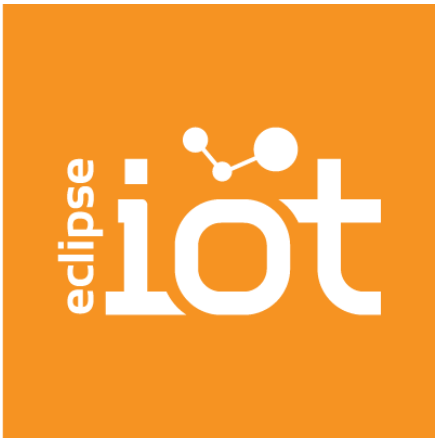
Node-RED is a free programming tool based on Node.js and designed to integrate distributed IoT hardware and software systems and automate their interaction. It works primarily in Linux environments but can be installed on Android and Windows as well (you'll only need a Linux subsystem for WIndows). Node-RED offers out-of-the-box repositories, interfaces for connecting to MQTT, logic sets and format parsers, as well as the ability to write custom components.

You can extend Node-RED capabilities by integrating it with cloud platforms (Azure, AWS, IBM) and other third-party systems.



8. Eclipse IOT

A wide range of open-source projects for IOT development is gathered under the **Eclipse** umbrella. They include software development platforms, frameworks, services, standards, tools for building digital twins, fog computing and edge computing solutions, and many more. Eclipse IOT projects focus on working with the Lua programming language, which is considered a good fit for Internet of Things projects.



9. SiteWhere

SiteWhere is an open-source multi-tenant platform for building, deploying and supporting IOT applications at the industrial level. The platform uses technologies such as the Docker framework, Kubernetes, microservices and Apache Kafka. SiteWhere facilitates big data transfer, storage, processing and integration, device management and event handling. You can deploy SitePlatform locally or to the cloud platforms, including Azure, AWS, GCP.

10. DeviceHive

The **DeviceHive** platform covers end-to-end IOT services, including:

- prototyping and production at scale
- connection of any devices via MQTT, REST API, WebSockets
- integration with cloud platforms and third-party systems

- real-time data analytics using the best data solutions such as Apache Spark and Kafka.

DeviceHive offers public, private, or hybrid cloud deployment models, a container-based architecture managed by Kubernetes, and support to libraries written in various languages. You can use this scalable and device-agnostic platform for implementing IoT projects of any complexity.

11. Home Assistant

Home Assistant is a comprehensive home automation software system. This single center integrates smart home devices, providing local control and security. Home Assistant offers convenient mobile applications that enable the remote management of your devices and send notifications if something goes wrong. You can also extend the functionality of this tool by integrating it with additional apps.

12. OpenRemote

OpenRemote is a platform you can use to create and manage IoT monitoring applications. The primary domains leveraging the tool are smart city and mobility, energy management and asset management. OpenRemote is offered under an open-source or a commercial license. The team behind it also provides a range of services from concept development to implementation and product maintenance.

13. ThingsBoard

The **ThingsBoard** IOT platform uses MQTT, Co -AP and HTTP protocols to connect devices and handle data from them. Out-of-the-box configurable dashboards, charts, maps and widgets provide you with robust real-time visualization of your data, which you can share with partners. In addition, you can create custom widgets using the built-in editor.

ThingsBoard Rule Engine allows you to create rule chains and event-based workflows for the perfect match with your use case requirements.

The platform can support multiple tenants and millions of devices. Cloud and on-prem deployment is available. You can choose a monolithic architecture for a small project or a microservices architecture for a highly scalable project.

14. Milesight DeviceHub

Milesight is a leading global provider of surveillance cameras, AI systems, IOT hardware and software products. **DeviceHub** is among the company's key software solutions. This is a connectivity suite that enables the deployment of multiple devices, their real-time monitoring and remote upgrading. With DeviceHub, you get comprehensive reports on monitored devices and take insightful actions. Both the cloud and on-premises versions of the platform are available.

15. Zetta

Zetta is a platform for designing APIs for IOT devices. The platform is based on Node.js and combines reactive programming, WebSockets and REST APIs. A Zetta server can run in the cloud or locally on hardware such as Raspberry Pi or Intel Edison.

The development process is simplified due to abstractions and direct access to protocols and conventions. Visualization tools ensure the continuous monitoring of device behavior and timely reaction to abnormalities. With Zetta, you can create data-intensive mobile, device and cloud applications and integrate smaller systems into one coherent system.

1.1.3 RESOURCES

Useful IOT Websites Internet of Things Council – This European think tank offers the best and latest IOT

• information. They analyze every aspect of IOT from forecasting to discussing prototype development, and the social implications of IOT. LinkedIn Pulse Content – LinkedIn, described as the world's largest professional network

,• allows over 100 million professionals to network. It opened its publishing platform, Pulse, to the public in 2014, resulting in a wealth of valuable professional and industry information. This information includes rare insight, training media, and more related to IOT systems and technologies. Lynda.com IoT Videos – This online learning organization offers thousands of videos on

• various topics (including IOT) supplied by professionals, organizations, and individuals. YouTube IOT Videos – Individuals just like you produce thousands of IOT videos on YT to
• address particular topics not covered elsewhere, or covered poorly elsewhere. These videos use different languages, styles, and offer unique voices.

1.2 IMPORTANCE OF IOT

Over the past few years, IOT has become one of the most important technologies of the 21st century. Now that we can connect everyday objects-kitchen appliances, cars, thermostats, baby monitors-to the internet via embedded devices, seamless communication is possible between people, processes, and things. By means of low-cost computing, the cloud, big data, analytics, and mobile technologies, physical things can share and collect data with minimal human intervention. In this hyper connected world, digital systems can record, monitor, and adjust each interaction between connected things. The physical world meets the digital world-and they cooperate

TECHNOLOGIES USED BY IOT

Access to low-cost, low-power sensor technology. Affordable and reliable sensors are making lOT technology possible for more manufacturers.
Connectivity: A host of network protocols for the internet has made it easy to connect sensors to the cloud and to other "things" for efficient data transfer. Cloud computing platforms . The increase in the availability of cloud platforms enables both businesses and consumers to access the infrastructure they need to scale up without actually having to manage it all.
Machine learning and analytics: With advances in machine learning and analytics, along with access to varied and vast amounts of data stored in the doud, businesses can gather insights faster and more easily. The emergence of these allied technologies continues to push the boundaries of lot and the data produced by lot also feeds these technologies.
Conversational artificial intelligence (AI): Advances in neural networks have brought natural-language processing (NLP) to lOT devices (such as digital personal assistants Alexa, Cortana, and Siri) and made them appealing, affordable, and viable for home use.

1.3 ARCHITECTURE OF IOT

A critical requirement of an IoT is that the things in the network must be connected to each other. IoT system architecture must guarantee the operations of IoT, which connects the physical and the virtual worlds. Design of IoT architecture involves many factors such as networking, communication, processes etc. In designing the architecture of IoT, the extensibility, scalability, and operability among devices should be taken into consideration. Due A critical requirement of an IoT is that the to the fact that things may move and need to interact with others in real-time mode, IoT architecture should be adaptive to make devices interact with other dynamically and support communication amongst them. In addition, IoT should possess the decentralized and heterogeneous nature.

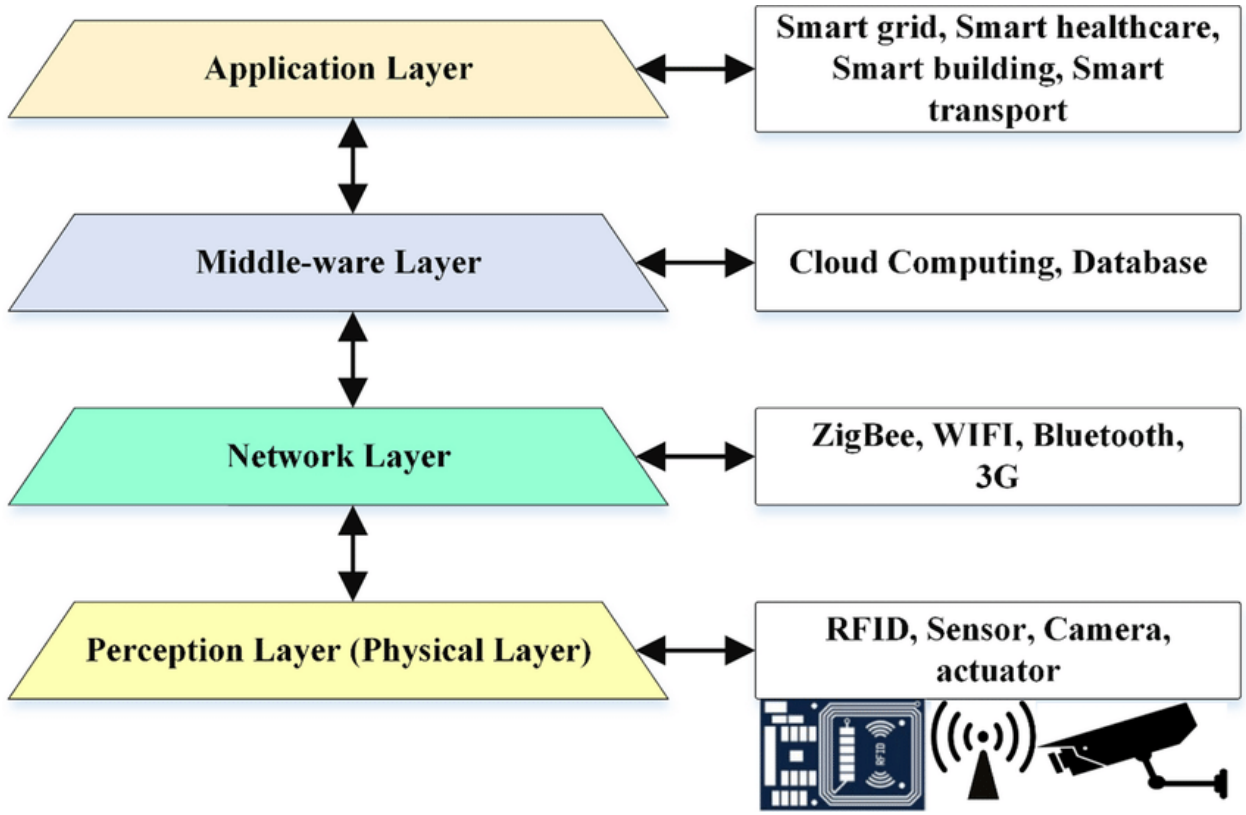


Fig: ARCHITECTURAL LAYERS OF IOT

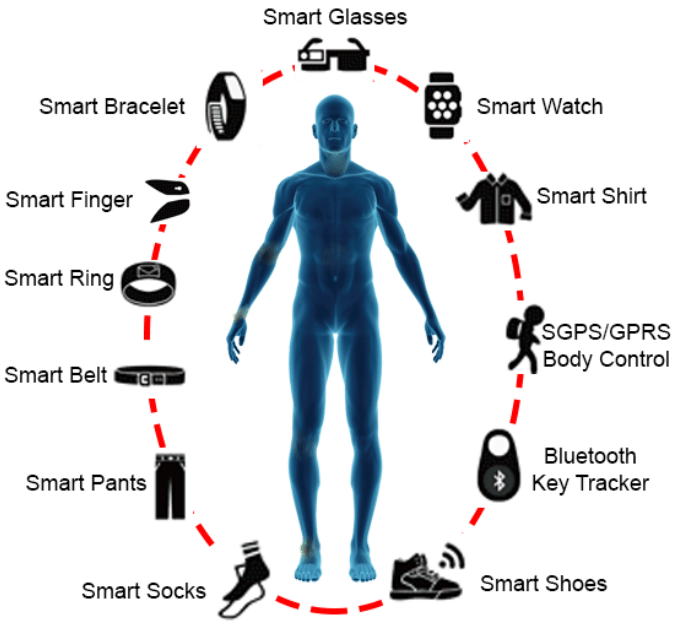
SERVICE ORIENTED ARCHITECTURE

A critical requirement of an IoT is that the things in the network must be inter-connected. IoT system architecture must guarantee the operations of IoT, which bridges the gap between the physical and the virtual worlds. Design of IoT architecture involves many factors such as networking, communication, business models and processes, and security. In designing the architecture of IoT, the extensibility, scalability, and interoperability among heterogeneous devices and their models should be taken into consideration. Due to the fact that things may move physically and need to interact with each other in real-time mode, IoT architecture should be adaptive to make devices interact with other things dynamically and support unambiguous communication of events

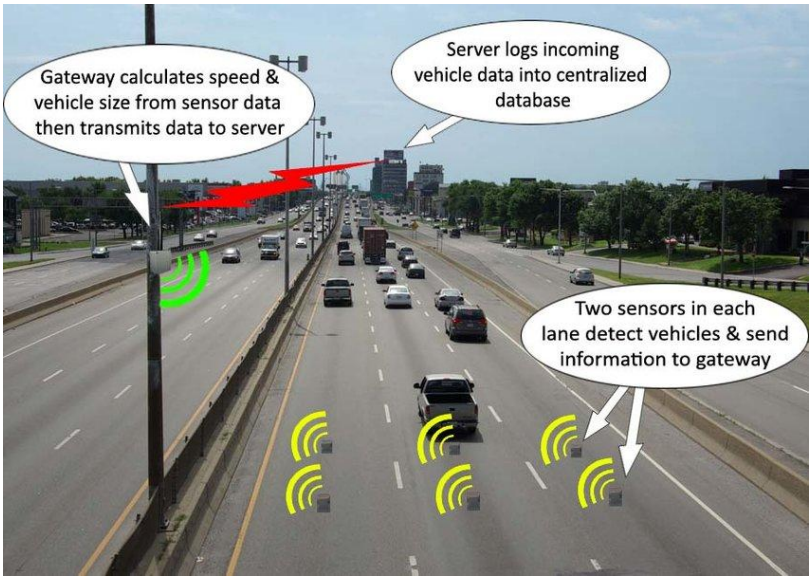
1.4 APPLICATIONS

• Smart Homes: Developing smart homes has caused a revolution in designing residential homes. The smart home products would save energy, time and money. A Smart Home would enable the owner to control house hold jobs at the house even from a remote location. For example, switching on the air conditioner or heaters minutes before reaching home, switching on / off the lights, controlling the washing machine, etc. Although such smart homes have been implemented but the cost of establishing such homes is still a major restriction that limits its usage (Lueth, 2016).

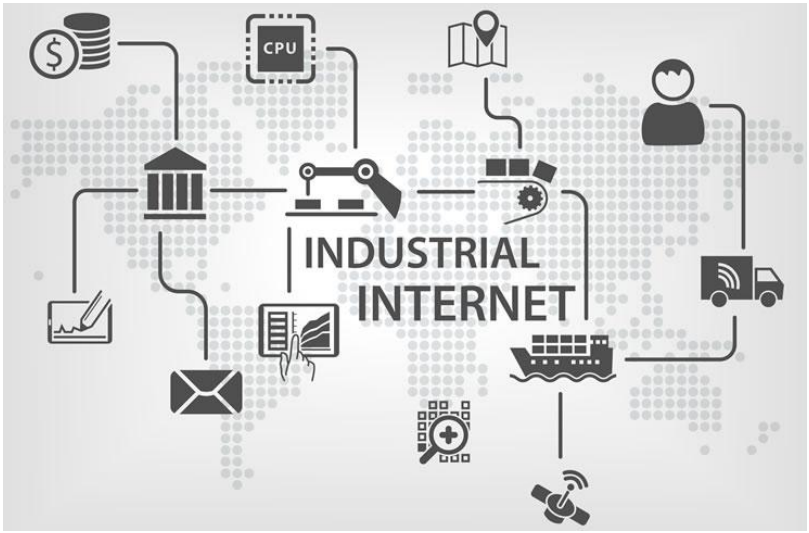
• **Wearable Devices:** Wearable devices include wrist watches or glasses that are installed with sensors and software which collect and analyze data. Companies like Google and Samsung have invested heavily in building such devices. These devices broadly cover fitness, health and entertainment requirements. A major challenge for developing such systems are that it should be light weight, small in size and should have very low power consumption (Kashyap, 2016).



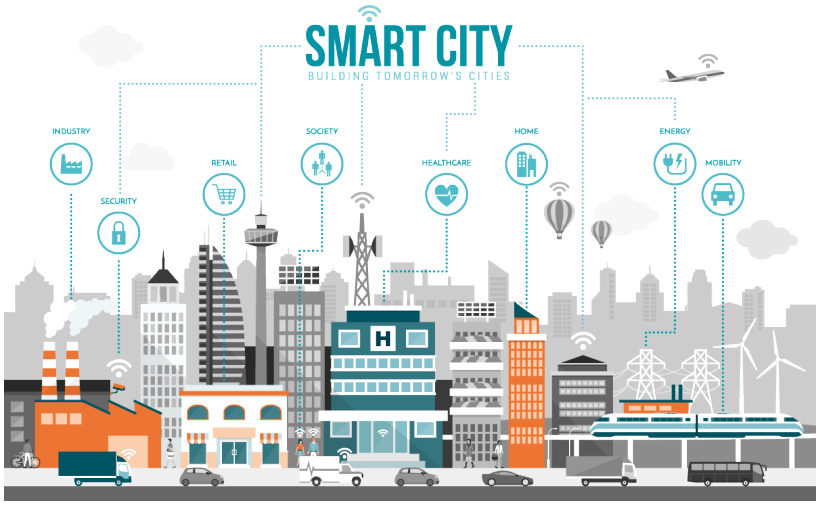
• **Traffic Monitoring:** Vehicles should be capable of optimizing its operation, fuel consumption, pollution control, maintenance and comfort of passengers. A breakthrough will be achieved if such smart traffic could be developed as it would drastically reduce road accident causalities. By installing sensors and using web applications, citizens can also find free available parking slots across the city.



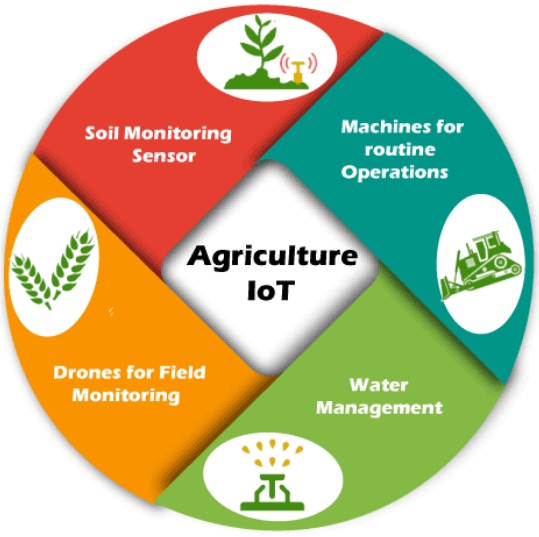
• **Industrial Internet:** Industrial Internet is the new buzz in the industrial sector, also termed as Industrial Internet of Things (IIOT). It is empowering industrial engineering with sensors, software and big data analytics to create brilliant machines. IIOT holds great potential for quality control and sustainability. Applications for tracking goods, real time information exchange about inventory among suppliers and retailers and automated delivery will increase the supply chain efficiency.



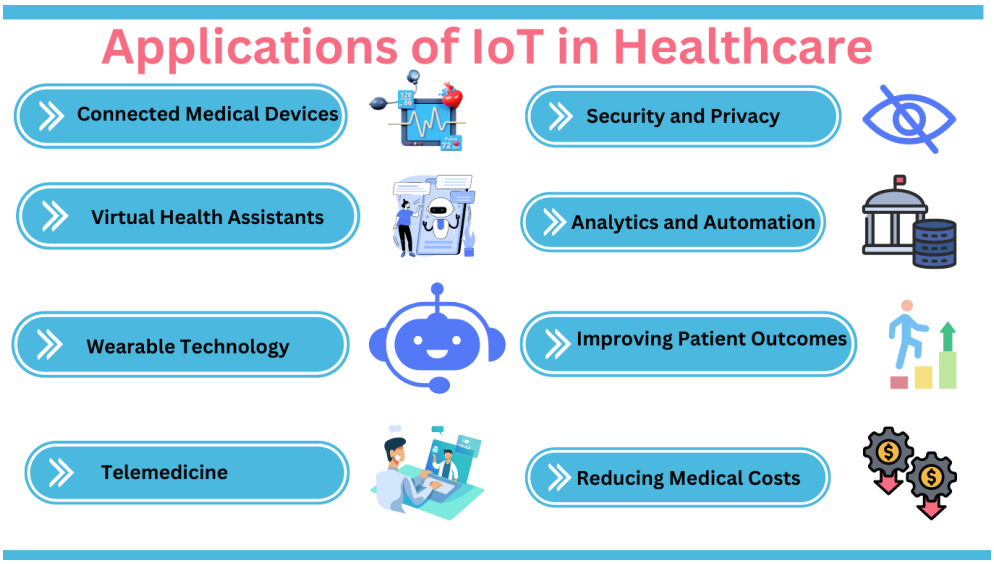
• **Smart Cities:** Smart city is another buzzword gaining immense interest from the public. Smart surveillance, automated transportation, smarter energy management systems, water distribution, urban security and environmental monitoring all are examples of internet of things applications for smart cities. It will solve major problems faced by the people living in cities like pollution, traffic congestion and shortage of energy supplies etc. Products like cellular communication enabled Smart trash will send alerts to municipal services when a bin needs to be emptied (Lueth, 2016).



• **Agriculture:** With the continuous increase in world's population, demand for food supply is extremely raised. Governments are helping farmers to use advanced techniques and research to increase food production. Smart farming is one of the fastest growing field in IoT. Farmers are using meaningful insights from the data to yield better return on investment. Sensing for soil moisture and nutrients, controlling water usage for plant growth and determining custom fertilizer are some simple uses of IoT (Kashyap, 2016).

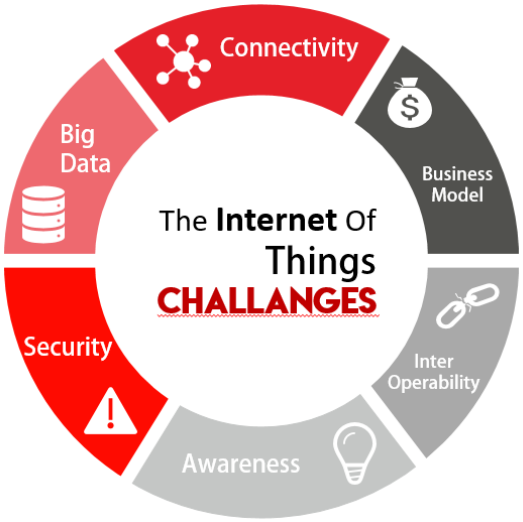


• **Healthcare:** The concept of connected healthcare system and smart medical devices bears enormous potential not just for companies, but also for the well-being of people in general. Research shows IoT in healthcare will be massive in coming years. IoT in healthcare is aimed at empowering people to live healthier life by wearing connected devices. The collected data will help in personalized analysis of an individual's health and provide tailor made strategies to combat illness (Kashyap, 2016.



1.5 IOT CHALLENGES

The major concerns related to IOT are (Rose, Eldridge, & Chapin, 2015):



Connectivity: The increase of connected heterogeneous IoT device takes a huge toll on the existing internet infrastructure and comes with challenges on connectivity. Connectivity plays a vital role in transport of data from sensor, stores them in IoT backend, and does automation to provide feedback to actuator or application. Connectivity includes communication with IoT device, reliable delivery across the networks, implementation of various protocol, and translation between protocols. Some of connectivity medium are Wi-Fi, Bluetooth, Zigbee, LoRa, 6LoWPAN, LTE, etc. Each technology has distinct characteristics, including the range of their signal, the extent of their data throughput (or bandwidth), and the power needed by the communication device (or battery life) among other attributes. The wireless technology is growing in a rapid rate which allows the users to choose their connectivity standard by considering various characteristics of the standards. One of the challenges in choosing the technology of connectivity is the need for power consumption. Let say a smart home where some IoT devices send signals and data all the time that take more power resources. For efficiency, it takes the longest battery life with lower power consumption.

Business model: The IoT will have great impact on the economy by transforming many enterprises into digital business, enables business by automating the manual process and facilitating new business model. The problem that still happen now is how industry can generate service revenues from their IoT solution. Key of monetizing IoT is having the right strategy. While right strategy is defined by business model to create and deliver value to customer and of course get profit from those value. Many company are jumping into the opportunity of building IoT product without a clear monetization strategy. Today, 4 IoT business model generally are Subscription Model, Outcome Based Model, Asset Sharing Model and IoT as a Service Model. The picture below will give short brief.

Interoperability: Interoperability becomes one of major challenge for development of IoT system because all objects being linked and integrated were heterogeneous. It means that all components involved were provided by different vendors, independently developed, had diverse communication protocol and utilized different data. Additionally, "things" may be made by various manufacturers that do not necessarily comply with a common standard. It may operate using variety of communication technologies and need interoperability like a simple bridge between different protocols. The highly competitive nature of the IoT makes interoperability between things even a more difficult task to achieve. Plus, wireless communication technologies are evolving and changing rapidly. Achieving interoperability is vital for interconnecting multiple things together across different communication networks. IoT's purpose is connecting billion of device such as sensors and smart devices through internet and communicate with each other in a way or another.

Awareness:Although IoT provides great potential in helping people in many aspects of their life. it is still getting less attention from community. Not many consumers know what IoT means. The top barrier of development and mass production of IoT technology are lack of both awareness and value perception among consumers (according to Acquity Group Research). The lack of awareness from community arises when there was perception: what is the importance of connecting their devices (as lights, clocks, refrigerators, and other home appliances) to the internet. This perception indeed is the main obstacle to the development of IoT industry. Perceived value from customers is also followed with cost, security concern and privacy issue. Lack of awareness also emerges from the industry sector, where not many enterprises know about this technology or even if they know, most enterprises still face problem who will be leading this initiative. Leaders, in this case CIO should start exploring use cases related to IoT that are suitable to be applied in their organizations toward digitalization, and focus on specific business goal having best roadmap to create significant value rather than talking about the IoT in general.

Security:Gartner IoT research finds that organizations cite security as top implementation concern and top barrier to IoT. Devices connected to the internet will be vulnerable to attack. The attack exploited the security weaknesses of thousands of IoT devices, allowing them to be hijacked. Moreover, beside the devices itself, security risks that arise can be sourced from the platform, operating system, communications that occur, or even a poorly designed system where the device is connected. Some fundamental security requirements in the IoT such as authorization, authentication, confidentiality, trust, and data security need to be considered. The challenges are how to create and deliver specific security objectives for privacy, safety and reliability to business stakeholders, and ensure that hardware and software devices are attack-resistant and security-capable, through hardware- and software-based

controls. Data generated by things need to be collected, analysed, stored, dispatched and always presented in a secure manner from malicious software attacks. Additionally, Gartner predicts by 2020, more than 25% of the identified attacks in enterprise will involve the IoT.

Big Data: Sensors from many devices simultaneously and continuously generate huge amount of data, referred as Big Data. IoT will be dealing with large volume and different varieties of data that causes significant challenges. Those large data generated needs Big Data capabilities but the challenge arises when time, resources, processing capabilities and where the data being processed become constrained. Collecting, preparing and analyzing this fragmented data are not easy, the volume of data can be increased at any time and very complex and even with unstructured formats. That is why Big Data becomes more challenging in IoT system implementation. To create business value, this data must be converted into decisions and actions. Taking advantage of the opportunities, data and analytics take a more active and dynamic role in empowering the activities of the entire organization and lie at the center of every competitive business. Advance analytics will provide insights on how products and services are being used and can be improved. Creating desired business outcome in IoT will demand data scientist to analyse data as "*brain*" of enterprise. Gartner said through 2020, a lack of data science specialist will inhabit 75% of organization from achieving the full potential of IoT.

2. LITERATURE SUEVEY

Peter Leijdekkers et al.

[1] of University of Technology, Sydney proposed an arrangement of individual trial application, which diminishes defer time between beginning of heart assault and a notification to the crisis administrations. The individual test comprehends these issues by utilizing inescapable innovation: a cellular device and a little ECG sensor which can be worn and is effectively conveyed by the individual. By soliciting a set from inquiries, the individual acknowledges what they went through can be a heart assault. The application additionally investigations two ECG chronicles on the cellular device for heart assault signs to affirm this. In this way, the application can rapidly survey the client's condition and give suitable exhortation without the intercession of a therapeutic expert. It additionally directs the client and spectators in getting the correct help via computerizing the call. The ECG is recorded and dissected progressively on the cellular device utilizing a 2 terminal, 1- lead heart monitor. The calculation utilized here can identify the heart beat anomalies, for example, ventricular tachycardia. In the event that the application finds out that the user is in danger it encourages the user to notify the authorized administration right away. In a situation that user has a heart failure the system consequently decides the present area of the user and alarm the emergency ambulance and other required people to the user's area.

Dr.A.A.Gurjar et al.

[2] of Sipna COET, Amravati, proposed a framework where heartbeat is checked and heart assault location is noted. The sensor used is interlinked to a microcontroller that allows reading pulses and sending them over Internet. The user may set the high and low limits of heartbeat. Later, monitoring begins to check if the heartbeats are crossing the limits either way. The transmitting circuit with the patient and the other circuit with the authorized personnel are used. Heartbeat sensor is used to identify the current pulse rate and display it on the LCD screen. This suggested system can be used in all places without any constraints. There is no obligation to stay at home and use the device. Nikunj Patel et al.

[3] of CSPIT, CHARUSAT proposed a framework which has a distinction of identifying heart assault with assistance of watching pulse dependent on web of thing. Our strategy utilizes a heartbeat sensor,

Arduino board and a Wi-Fi module. In the wake of setting up the framework, the beat sensor will begin detecting pulse readings and will show the heartbeat of individual on LCD screen. Likewise, with the utilization of Wi-Fi module it will transmit the information over web. Framework permits a set point which can help in deciding if an individual is sound or not by checking his/her pulse and contrasting it and set point. In the wake of setting these limits, the framework will begin checking the pulse of patient and quickly the pulse goes above or beneath as far as possible the framework will send an alarm message. As a piece of this undertaking we are executing an android application show that will follow the heartbeat of specific patient and screen it effectively and give the crisis message on odds of heart assault. K.S.Abbirame et al.

[4] of KVCET, Chennai, Tamil Nadu, India proposed a developing framework which will diminish the demise rate because of heart assault by early location of heart assault. In our framework we are utilizing pulse sensor, GSM and GPS to quantify the pulse and offer the data. The pulse sensor will ceaselessly screen pulse of a client. We effectively set the edge an incentive in the framework. When it goes beneath or over the edge esteem, the microcontroller will initiate the GSM and GPS to share the data with area of the client to the closest wellbeing division and to the relatives. The structure will create a message at whatever point the client's pulse ends up unusual, with his/her area to the closest wellbeing area and to the recently put away relatives number. A. Dutta et al.

[5] of Institute of Engineering and Management, Salt Lake, Kolkata , built up a gadget utilizing miniaturized scale controller and heart beat sensor. It identifies beat rate as well as demonstrates the infection suggested by the example portrayed by the pulse. The client first sets his age and sexual orientation before running the machine. The miniaturized scale controller checks the bit rates consistently and passes on the patient through its presentation and alert segment the state of the patient. Understanding is additionally guided for the need of any crisis drug or discussion with a specialist. There will likewise be arrangement for demonstrating the client his/her most extreme work force with the goal that they can push their limits prompting a sound way of life. Gadget is utilized for 24 hours and recorded information stays accessible for examination. The client can comprehend what is the genuine state of the working of his heart without relying upon doctors.This gadget is a stage forward to bio-electro joint effort. This is a wired gadget further act of spontaneity of remote element can be introduced to it. Direct specialist video connection can be give or appended to it. Wi-Fi association with the Smart gadgets can be set up in it. This gadget all in all substance can not just control(to some degree) essential heart issues which is an issue of each family unit yet can likewise give an inspiration to expanding working limit by demonstrating the individual the degree of his pulse. This gadget can even control demise the same number of individuals bite the dust on their approach to clinics since they can't be furnished with the essential controlling drug which can deal with their circumstance for some additional time. Samar Ali et al.

[6] of Abu Dhabi University, UAE, they proposed a system that checks for vehicle impact through the identification of heart assaults that drivers may experience the ill effects of. They introduced the system of the administration empowered through a technology for IoT systems and two varieties. They proposed a voice controlled mobile heart attack detection service display and a motioncontrolled show. Both fuse sensors from savvy; provided its fame with clients and expanding accessibility. The principal variety of real time mobile heart detection system just thinks about what the client could utilize administration in vehicles, while second variety helps the client outside vehicular system settings. They additionally talked about the system and presented associated work and foundation data of the

innovations that it uses. They likewise wanted to consider programmed recognition of heart assaults through the usage of the heart's movement when solid FDA-endorsed ECG sensors are fused in wearable gadgets. Pughazendi N et al.

[7] implemented a system where protection evaluative measures for both driver and the vehicle are enhanced. The paper suggests the usage of sensors. Heartbeat sensor is utilized for screening heartbeats in 60 seconds of the driver continually and keeps mishaps from occurring by controlling through internet. Internet is connected to various devices and thus passes on the crisis notification to the required authorized people. Traffic light sensor is utilized to pursue the traffic principles and guidelines by the driver. In the event of the red light being ON ,at that point the vehicle consequently stops before it reaches the said fixed line. Fuel level sensor is utilized to quantify fuel level of the vehicle and figure if accessible fuel is sufficient to achieve to goal or not, in the event that it isn't sufficient, at that point guide will recommend the driver to achieve the close-by petroleum bunks. Arulananth T.S et al.

[8] suggested in the respective paper that heart rate is measured by either the ECG waveform or by sensing the pulse of the user. The cadenced development and withdrawal of a supply route of blood is constrained through it by the customary withdrawals of the heart. The beat can be felt from those zones where the course is near the skin. Portrayal of a method of estimating the pulse through the tip of the finger and Arduino microcontroller is performed. It depends on the chief of Photo-Phelthysmography, which is non-intrusive strategy for estimating the variety in blood volume in tissue utilizing a light source and indicator. While the heart is pulsating, it is siphoning blood all through the body, and that makes the blood volume inside the finger course to change as well. This variance of blood can be distinguished through an optical detecting instrument put around the fingertip. The flag can be enhanced and is sent to Arduino with the assistance of sequential port correspondence. With the assistance of preparing and programming, pulse observing and tallying is performed D. Selvathi et al.

[9] argues that there is no particular dedicated system for heart attack prediction and that a patient is monitored only after he/she has suffered a heart attack. Heart attack can be detected by observing the pulse rate of the patient, that is, the beats per minute of the patient’s heart. At an incident that the beat rate other than the limit fluctuation (60- 90)occurs, it is treated as a sign of heart assault. A heartbeat sensor is utilized for detecting the heart rate signals. The microcontroller tallies these results and verifies the beats. At an occurrence where the beats are more prominent or below than specific dimensions, the microcontroller enacts mobile communicative module and transmits alarm indication to important contacts stored in a mcu. The created framework is tried with estimation of both genders. Ponugamatla Kalyan et al.

[10] discusses about the accurate and exact prediction of a heart disease by observing ECG and patient clinical data. This paper proposes a heart detection and monitoring system using Arduino and Raspberry Pi 3. An AD8232 heart rate sensor module is interfaced to the Arduino board, and Arduino board serially communicates to the raspberry pi board. NEO6MV2 GPS module is interfaced to PL2303 USB to TTL for performing a function of USB to UART in between the raspberry pi and GPS. The software sketch we used here is python to control the entire system and to store all the sensor data in the cloud using the HTML and Wi-Fi. It offers security and facility for retrieving all the sensor information, and subject heart condition can monitor from at any time and any place in the world over the internet or mobile phone. This design system which is very helpful to patients produces, if there are any, changes in the condition of the health. We have to immediately alert the corresponding doctor or the referring

physician for further treatment processes and notifications about the medicines, location change, etc. Lei Song et al.

[11] of Institute of Interdisciplinary Information Sciences, proposes technologies wherein sensors that are portable and can be put on as well as devices such as mobiles can help maintain a record of the user. It screens the ongoing body states, stores, or sends the outcome to remote relatives or specialists. Along these lines, it can either help individuals to give more consideration to the ignored wonder, for example, the sign of hazardous sickness, or on the other hand help individuals to issue alarm ready when crisis occurs. To coax out the innovative favourable circumstances that difficulties and challenges, this paper displayed an overview on the best in class of well-being detecting advancements utilizing body sensor systems and cell phones. It additionally directs rundown what's more, examination of related detecting frameworks and calculations, to uncover the advancement lines in each subarea. Ufoaroh S.U et al.

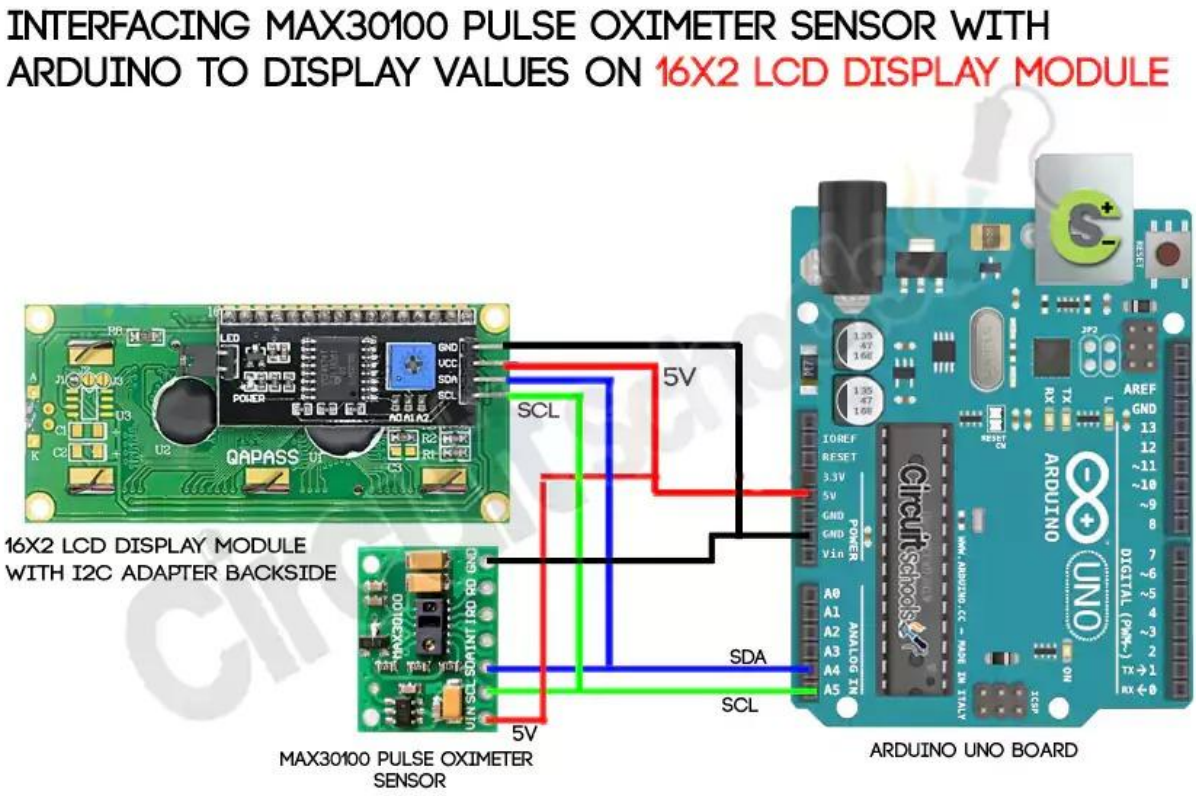
[12] presents a system equipped for giving continuous remote checking of the heartbeat with enhancements of a caution and SMS alert. This venture goes for the plan and usage of a minimal effort yet productive and adaptable heartbeat checking and ready framework utilizing GSM innovation. It is structured so that the beat rate is detected and evaluated by the sensors used that send the signs to the control unit and the results are shown on a LCD, it at that point continues to caution by an alert and SMS sent to the cell phone of the restorative master or wellbeing work force, if and just if the limit estimation of the heartbeat rate is maximally surpassed.

3. PROPOSED SYSTEM

The health monitoring system emerges as an upcoming technology to change the traditional management of patients. Moreover, this solution reduces the cost of healthcare and helps the hospital to improve the treatment process, and provides a remote health monitoring system. This system comprises a wearable wireless device like a bracelet with sensors that are paired with an application for a doctor to access medical information.

These days we have an increased number of heart diseases including an increased risk of heart attacks. Our proposed system users sensors that allow detecting the heart rate of a person using heartbeat sensing even if the person is at home and checks for the possibility of occurring attack. The sensor is then interfaced to a microcontroller that allows checking heart rate readings and transmitting them over internet. The user may set the high as well as low levels of heart beat limit. After setting these limits, the

system starts monitoring and as soon as the patient heartbeat goes above a certain limit, the system sends an alert to the controller which then transmits this over the internet and alerts the doctors as well as concerned users. Also the system alerts for lower heartbeats. Whenever the user logs on for monitoring, the system also displays the live heart rate of the patient. Thus concerned ones may monitor heart rate as well get an alert of heart attack to the patient immediately from anywhere and the person can be saved on time.



Components Required:

- Pulse Oximater and heart ratsensor
- Arduino Uno
- LCD
- PCB
- Potentiometer
- Resistors
- SCR
- Buzzer
- LED
- Connecting wires

Pulse Oximeter MAX30100

What is Pulse Oximeter?

Pulse Oximeters are low cost non-Invasive medical sensors used to continuously measure the Oxygen saturation (SPO2) of haemoglobin in blood. It displays the percentage of blood that is loaded with oxygen.

Principle of Pulse oximeter

The principle of pulse oximetry is based on the differential absorption characteristics of oxygenated and the de-oxygenated hemoglobin. Oxygenated hemoglobin absorbs more infrared light and allows more red light to pass through. Whereas Deoxygenated hemoglobin absorbs more red light and allowing more infrared light to pass through.

What's inside the Sensor?

Each pulse oximeter sensor probe contains two light emitting diode one emitting red light and the other emitting near infrared light, it also has a photo-detector. The photo-detector measures the intensity of transmitted light at each wavelength. And using the differences in the reading the blood oxygen content is calculated. The probe is placed on a suitable part of the body, usually a fingertip or ear lobe.

Pulse Oximeter MAX30100 / MAX30102 is a cheap one and quite popular among hobbyists. Unfortunately, the cheapest module boards (which are sold by thousands on Aliexpress) contain new MAX30102 modules and old modules with discontinued MAX30100 chip since they are assembled on the same boards.

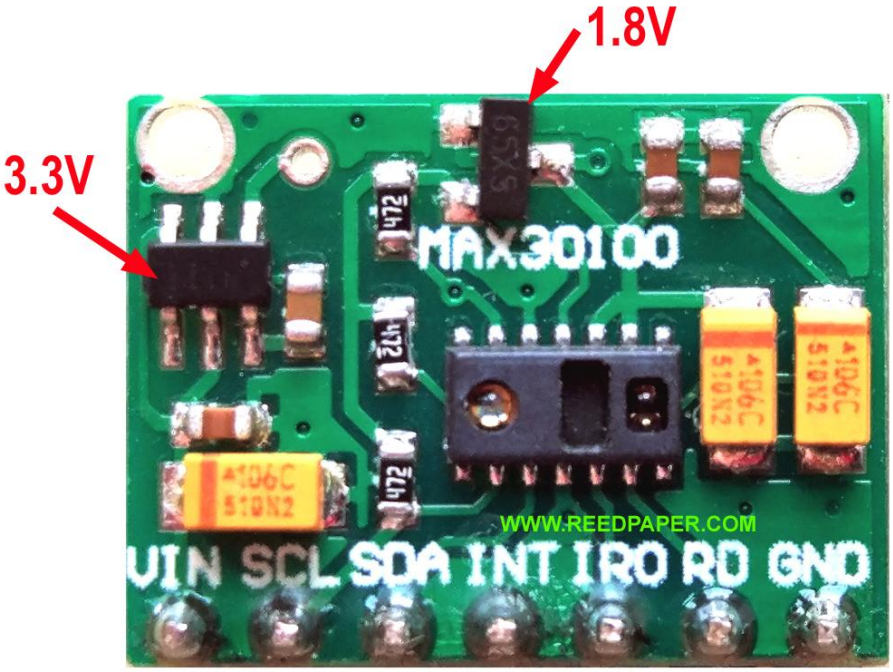


Fig.

1. Module board MAX30100 / MAX30102 from Aliexpress

If you ordered the board shown in Fig. 1 – my congratulations, you have problems with power circuits. The sensor chip requires two separated supply voltages:

1,8V for ADC and sensor logic (1,7V – 2,0V)3,3V for green and IR LEDs of sensor (3,1V – 5,25V)

Carefully look at the circuit of the module (Fig. 2). It involves two linear voltage regulators – U2 and U3. The first one make a + 3.3V from + 5V (or simply passes through the power supply + 3.3V). The second regulator is connected to the output of the first and generates supply voltage + 1.8V. It would seem that everything is correct? Really?

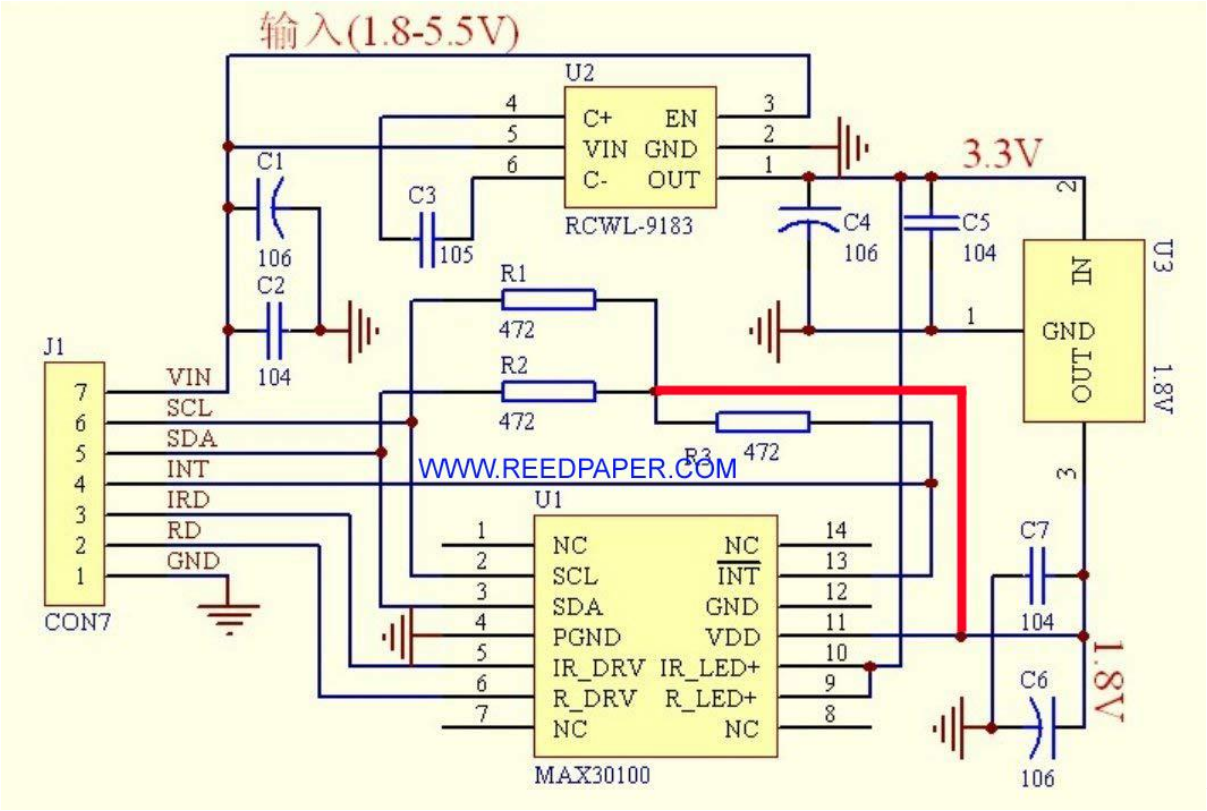


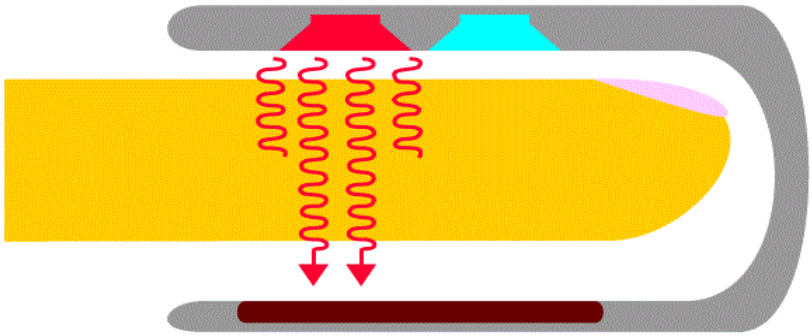
Fig. 2. Schematic diagram of MAX30100 / MAX30102

Now take a closer look at the pull-up resistors 4.7k for SCL, SDA and INT signal lines (a thick red line). They are connected to the supply + 1.8V!!! If such a module is connected to a 5V logic of Arduino board – it will not be visible on the I2C bus because the logic levels are too low. However, even with a 3V logic board the I2C bus will work unstably.

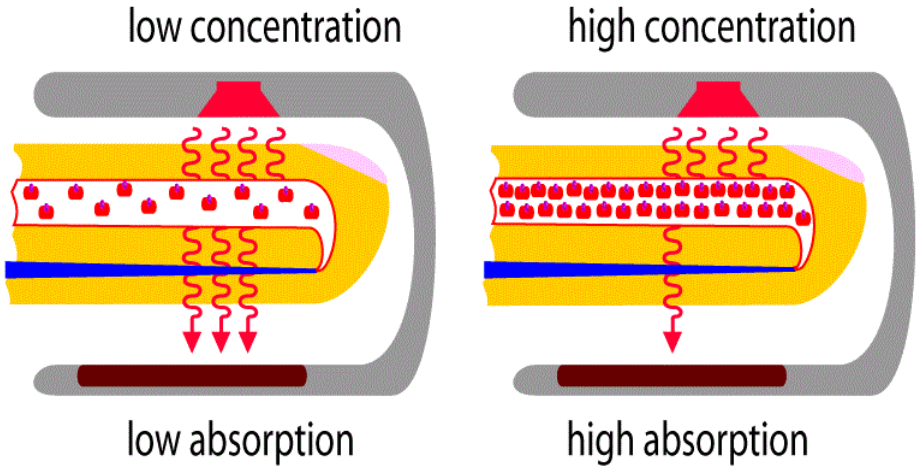
This error can easily be fixed as shown in Fig. 3. It is enough to cut the path in the place of the red cross and make a jumper as shown by the yellow line. The jumper does not need an insulated wire. You can take a tinned strand from a stranded wire. The board is covered with a protective mask and there is no short circuit to the copper pour.

How does Pulse Oximeter Works?

Oxygen enters the lungs and then is passed on into blood. The blood carries oxygen to the various organs in our body. The main way oxygen is carried in our blood is by means of hemoglobin. During a pulse oximetry reading, a small clamp-like device is placed on a finger, earlobe, or toe.



Small beams of light pass through the blood in the finger, measuring the amount of oxygen. It does this by measuring changes in light absorption in oxygenated or deoxygenated blood.



MAX30100 Pulse Oximeter

The sensor is integrated pulse oximetry and heart-rate monitor sensor solution. It combines two LED's, a photodetector, optimized optics, and low-noise analog signal processing to detect pulse and heart-rate signals. It operates from 1.8V and 3.3V power supplies and can be powered down through software with negligible standby current, permitting the power supply to remain connected at all times.

Features

1. Consumes very low power (operates from 1.8V and 3.3V
2. Ultra-Low Shutdown Current (0.7µA, typ)
3. Fast Data Output Capability
4. Interface Type: I2C

Working of MAX30100 Pulse Oximeter and Heart-Rate Sensor

The device has two LEDs, one emitting red light, another emitting infrared light. For pulse rate, only infrared light is needed. Both red light and infrared light are used to measure oxygen levels in the blood.When the heart pumps blood, there is an increase in oxygenated blood as a result of having more blood. As the heart relaxes, the volume of oxygenated blood also decreases. By knowing the time between the increase and decrease of oxygenated blood, the pulse rate is determined.It turns out,

oxygenated blood absorbs more infrared light and passes more red light while deoxygenated blood absorbs red light and passes more infrared light. This is the main function of the MAX30100: it reads the absorption levels for both light sources and stores them in a buffer that can be read via I2C communication protocol.

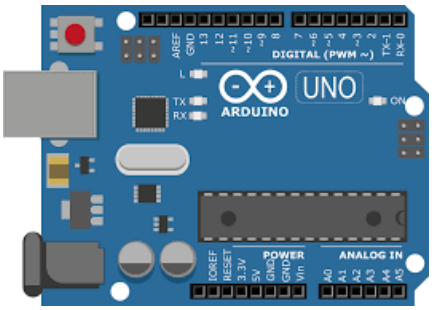
Arduino uno

ATmega328Arduino Uno Board Working and Its Applications

The Arduino Uno is one kind of microcontroller board based on ATmega328, and Uno is an Italian term which means one. Arduino Uno is named for marking the upcoming release of microcontroller board namely Arduino Uno Board 1.0. This board includes digital I/O pins-14, a power jack, analog i/ps-6, ceramic resonator-A16 MHz, a USB connection, an RST button, and an ICSP header. All these can support the microcontroller for further operation by connecting this board to the computer. The power supply of this board can be done with the help of an AC to DC adapter, a USB cable, otherwise a battery. This article discusses what is an Arduino Uno microcontroller, pin configuration, Arduino Uno specifications or features, and applications.

What is Arduino Uno ATmega328?

The ATmega328 is one kind of single-chip microcontroller formed with Atmel within the megaAVR family. The architecture of this Arduino Uno is a customized Harvard architecture with 8 bit RISC processor core. Other boards of Arduino Uno include Arduino Pro Mini, Arduino Nano, Arduino Due, Arduino Mega, and Arduino Leonardo.



Arduino Uno ATmega328

The features of Arduino Uno ATmega328 includes the following.

- The operating voltage is 5V
- The recommended input voltage will range from 7v to 12V
- The input voltage ranges from 6v to 20V
- Digital input/output pins are 14
- Analog i/p pins are 6
- DC Current for each input/output pin is 40 mA
- DC Current for 3.3V Pin is 50 mA
- Flash Memory is 32 KB
- SRAM is 2 KB
- EEPROM is 1 KB
- CLK Speed is 16 MHz

How to Use an Arduino Uno?

Arduino Uno can detect the surroundings from the input. Here the input is a variety of sensors and these can affect its surroundings through controlling motors, lights, other actuators, etc. The ATmega328 microcontroller on the Arduino board can be programmed with the help of an Arduino programming language and the IDE (Integrated Development Environment). Arduino projects can communicate by software while running on a PC.

Arduino Programming

Once the Arduino IDE tool is installed in the PC, attach the Arduino board to the computer with the help of USB cable. Open the Arduino IDE & select the right board by choosing Tools–>Board..>Arduino Uno, and select the right Port by choosing Tools–>Port. This board can be programmed with the help of an Arduino programming language depends on Wiring.

To activate the Arduino board & flash the LED on the board, dump the program code with the selection of Files–> Examples..>Basics..>Flash. When the programming codes are dumped into the IDE, and then click the button 'upload' on the top bar. Once this process is completed, check the LED flash on the board.

High Voltage Protection of USB

The Arduino Uno board has a rearrangeable poly fuse that defends the USB port of the PC from the over-voltage. Though most of the PCs have their own inner protection, the fuse gives an additional coating of safety. If above 500mA is given to the USB port, then the fuse will routinely crack the connection until the over-voltage is removed.

Physical Characteristics

The physical characteristics of an Arduino board mainly include length and width. The printed circuit boardof the Arduino Uno length and width are 2.7 X 2.1 inches, but the power jack and the USB connector will extend beyond the previous measurement. The board can be attached on the surface otherwise case with the screw holes.

Applications of Arduino Uno ATmega328

The applications of Arduino Unoinclude the following.

- Arduino Unois used in Do-it-Yourself projects prototyping.
- In developing projects based on code-based control
- Development of Automation System
- Designing of basic circuit designs.

Features of the Arduino Uno Board**:**

- It is an easy USB interface. This allows interface with USB as this is like a serial device.
- The chip on the board plugs straight into your USB port and supports on your computer as a virtual serial port. The benefit of this setup is that serial communication is an extremely easy protocol which is time-tested and USB makes connection with modern computers and makes it comfortable.
- It is easy-to-find the microcontroller brain which is the ATmega328 chip. It has more number of hardware features like timers, external and internal interrupts, PWM pins and multiple sleep modes.

- It is an open source design and there is an advantage of being open source is that it has a large community of people using and troubleshooting it. This makes it easy to help in debugging projects.
- It is a 16 MHz clock which is fast enough for most applications and does not speeds up the microcontroller.
- It is very convenient to manage power inside it and it had a feature of built-in voltage regulation. This can also be powered directly off a USB port without any external power. You can connect an external power source of upto 12v and this regulates it to both 5v and 3.3v.
- 13 digital pins and 6 analog pins. This sort of pins allows you to connect hardware to your Arduino Uno board externally. These pins are used as a key for extending the computing capability of the Arduino Uno into the real world. Simply plug your electronic devices and sensors into the sockets that correspond to each of these pins and you are good to go.
- This has an ICSP connector for bypassing the USB port and interfacing the Arduino directly as a serial device. This port is necessary to re-bootload your chip if it corrupts and can no longer used to your computer.
- It has a 32 KB of flash memory for storing your code.
- An on-board LED is attached to digital pin 13 to make fast the debugging of code and to make the debug process easy.
- Finally, it has a button to reset the program on the chip
- An on-board LED is attached to digital pin 13 to make fast the debugging of code and to make the debug process easy.
- Finally, it has a button to reset the program on the chip

Electro-mechanical buzzer

A buzzer is in the mechanical form of a small rectangular or cylindrical housing, with electrical connection for direct mounting on rigid printed circuit, or with electrical connection consisting of flexible electrical son. In the latter case, the buzzer has two small brackets. The loudness of such a component is about 85 dB / cm (note that it does not specify the sound level meter - as for HP, as a business perspective, it would seem probably too little power. As for sweets which are given the price per 100g and not for one kilogram).

It requires a DC voltage to operate, it should generally be between 3 V and 28 V, depending on the model. A buzzer designed to operate at 6 V generally works very well for any supply voltage between 4 V and 8 V, and a buzzer designed to operate at 12 V can work perfectly at a voltage between 6 V and 28 V (see characteristics given by the manufacturer for not making stupidity). There are also buzzers that work directly on the AC mains 230 V. This type of buzzer is convenient to use, because unlike piezoelectric buzzers simple (simple piezoelectric transducers without associated electronics), it has no

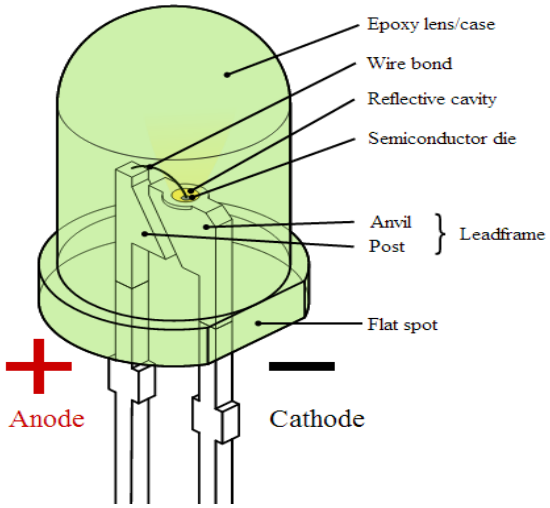
work, except of course the eventual control stage which will enable it. He provides a simple DC voltage and presto, it sounds.

Simple Piezo-electric:- A buzzer (transducer) piezoelectric requires an AC voltage to operate, a few volts to several tens of volts (3V to 30V for example). It presents an optimal resonance frequency a few kHz (between 1 kHz and 5 kHz in general, eg, 2 kHz, 2.8 kHz or 3 kHz). It is this type of transducer that can be found on the back of the watch with an alarm function.

LED'S

A light-emitting diode (LED) is a semiconductor light source. LEDs are used as indicator lamps in many devices and are increasingly used for other lighting.

The LED consists of a chip of semiconducting material doped with impurities to create a *p-n junction*. As in other diodes, current flows easily from the p-side, or anode, to the n-side, or cathode, but not in the reverse direction. Charge-carriers—electrons and holes—flow into the junction from electrodes with different voltages. When an electron meets a hole, it falls into a lower energy level, and releases energy in the form of a photon.



The wavelength of the light emitted, and thus its color depends on the band gap energy of the materials forming the p-n junction. In silicon or germanium diodes, the electrons and holes recombine by a non-radiative transition, which produces no optical emission, because these are indirect band gap materials. The materials used for the LED have a direct band gap with energies corresponding to near-infrared, visible, or near-ultraviolet light.

LED development began with infrared and red devices made with gallium arsenide. Advances in materials science have enabled making devices with ever-shorter wavelengths, emitting light in a variety of colors.

LEDs are usually built on an n-type substrate, with an electrode attached to the p-type layer deposited on its surface. P-type substrates, while less common, occur as well. Many commercial LEDs, especially GaN/InGaN, also use sapphire substrate.

Most materials used for LED production have very high refractive indices. This means that much light will be reflected back into the material at the material/air surface interface. Thus, light extraction in LEDs is an important aspect of LED production, subject to much research and development.

LIQUID CRYSTAL DISPLAY (LCD)

The LCD panel used in this block interfaced with micro-controller through output port. This is a 16 character × 2Line LCD module, capable of display numbers, characters, and graphics. The display contains two internal byte-wide registers, one for commands (RS=0) and the second for character to be displayed (RS=1). It also contains a user programmed Ram area (the character RAM) character that can be formed using dot matrix that can be programmed to generate any desired. Two distinguished between these areas, the hex command byte will be signify that the display RAM address 00h is chosen.

LCD can add a lot to our application in terms of providing a useful interface for the user, debugging an application or just giving it a "professional" look. The most common type of LCD controller is the Hitachi 44780 which provides a relatively simple interface between a processor and an LCD. Using this inter is often not attempted by inexperienced designers and programmers because it is difficult to find good documentation on the interface, initializing the interface can be problem and the displays themselves are expensive.

Connection to a PC parallel port is mostly simple. These displays can handle eight bit input directly. They also need two extra lines to control which kind of data has just arrived and when the data is meant to be stable. Those signals are also called RS (Register Select, instruction or data register) and EN (enable).

So it has to control ten data lines (8 bits + RS + EN) and one common ground (GND) line, which make eleven lines to the parallel port. Data read back is not supported by the driver and so it does not require extra line for this. The following table shows the needed connection.

BLOCK DIAGRAM:

Fig 4.3: 16×2 LCD connection to microcontroller

The pin outs are as follows:

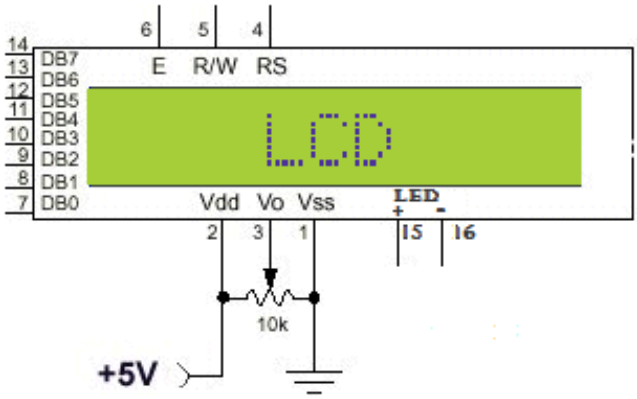


Fig:LCD Pin out

Pin No.	Name	Description
Pin no. 1	**VSS**	Power supply (GND)
Pin no. 2	**VCC**	Power supply (+5V)
Pin no. 3	**VEE**	Contrast adjust
Pin no. 4	**RS**	0 = Instruction input 1 = Data input
Pin no. 5	**R/W**	0 = Write to LCD module 1 = Read from LCD module
Pin no. 6	**EN**	Enable signal
Pin no. 7	**D0**	Data bus line 0 (LSB)
Pin no. 8	**D1**	Data bus line 1
Pin no. 9	**D2**	Data bus line 2
Pin no. 10	**D3**	Data bus line 3
Pin no. 11	**D4**	Data bus line 4
Pin no. 12	**D5**	Data bus line 5
Pin no. 13	**D6**	Data bus line 6
Pin no. 14	**D7**	Data bus line 7 (MSB)
Pin no. 15	**LED+**	Anode of LED for Backlit
Pin no. 16	**LED-**	Cathode of LED for Backlit

4. PIN CONFIGURATION OF ATMEGA328P ARDUINOUNO

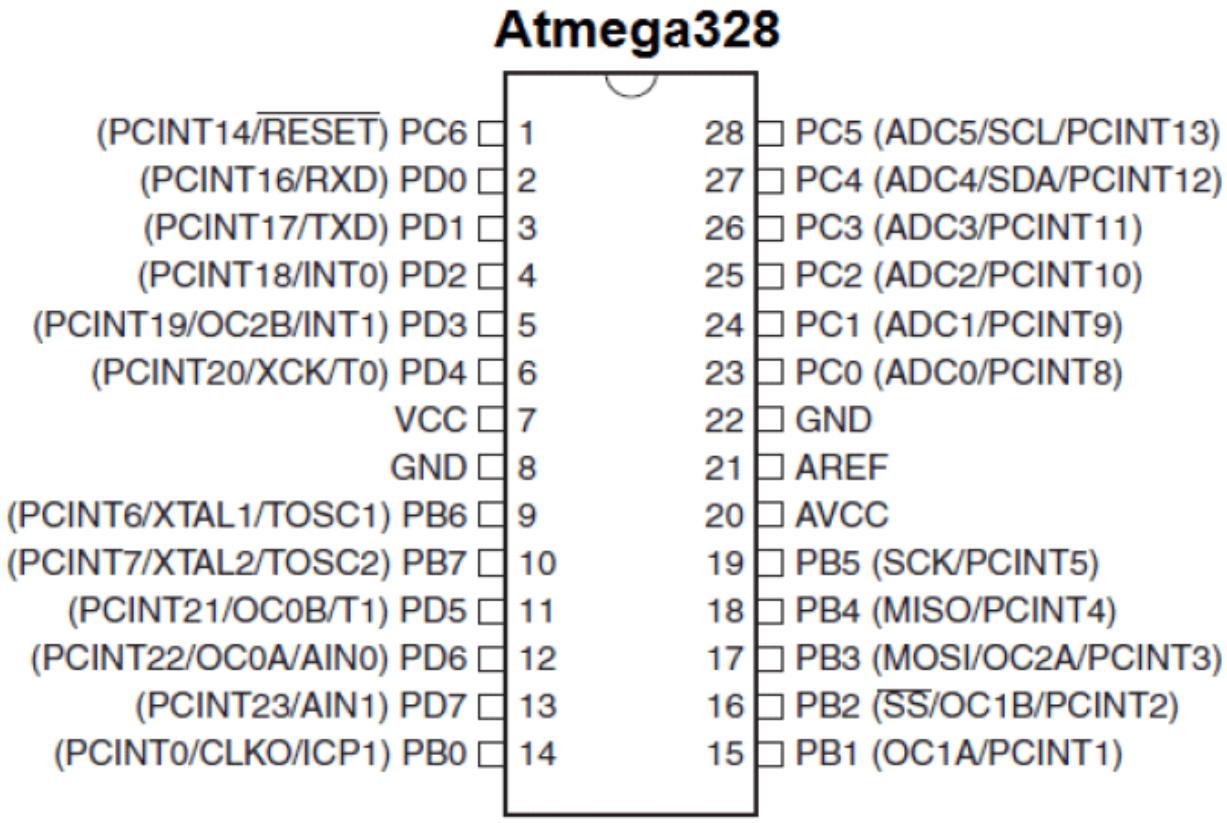
The Arduino Uno is the most popular Arduino model. When most people refer to Arduino, they refer to this board. Arduino Uno is a great choice for beginners and one of the most popular boards in the Arduino family. There are several updates forthe Arduino Uno; A recent revision is described below (Rev3 or R3). Arduino Uno ATmega328 based microcontroller. It has 14 optical I / O pins (six of which can be used as PWM output), six analog inputs, 16 MHz ceramic resonator, USB connection, power port, ICSP header and reset button on board. It comes with everything you needto start with a microcontroller; Connect it to a device with a USB cable or power it with a DC adapter or battery

Microcontroller	:	ATmega328
Operating Voltage	:	5V
Input Voltage (recommened)	:	7-12V
Input Voltage(limits)	:	6-20V
Digital I/O Pins	:	14(of which 6 provide PWMoutput)
Analog Input Pins	:	6
DC current per I/O Pin	:	40mA
DC current for 3.3V Pin	:	50mA
Flash Memory	:	32 KB(ATmrga328)
Used by bootloader		
SRAM	:	2 KB(ATmrga328)

EEPROM	:	1 KB(ATmrga328)
Clock Speed	:	16 MHz
Length	:	68.6 mm
Width	:	53.4 mm

Atmel's Atmega 328 microcontroller is a widely used microcontroller chip. It is an 8-bit microcontroller with 32 KB of flash memory, 1 KB of EEPROM and 2 KB of internal SRAM memory. One of the microcontrollers used in the iconic Arduino Dumilanov boards is the Atmega 328. Atmega168 or Atmega328 microcontroller chips are available on the Arduino Duemilanove board. The most sophisticated and improved of the Atmega328 chips. The Atmega328 has 32 KB of flash program memory and 2 KB of internal SRAM, compared to the Atmega168 16 KB of program flash memory and 512bytes of internal SRAM. The Atmega328 has 28 pins. It has 14 optical I / O pins, including six PWM output pins and six analog input pins. Twenty pins are used for I / O.

with their purpose As mentioned earlier, 20 pins serve as I / O ports. This ensures that it acts as aninlet and outlet for the circuit. Determines whether the device is input or output. The pins are 14 digital, 6 of which are capable of delivering PWM output. Analog input / output is supported by six pins. The crystal oscillator is connected to two rods. This is to give a clock pulse to the Atmega chip. Synchronization requires a clock pulse, so the connection between the Atmega chip and the computer connected to it occurs in real time. Save both pins Vcc and GND as power is required to run the chip. Since the Atmega328 is a low power processor, it only needs 1.8-5.5V power to run. Analog-to-digital converter (ADC) integrated into the Atmega328 chip. If not, Atmega328 cannot decode analog signals. The chip reads analog notes because it has ADC, so it has 6 analog input pins. Three pins are reserved for running the ADC. Each pins are described in the table below



With their purpose as mentioned earlier, 20 pins serve as I / O ports. This ensures that it acts as aninlet and outlet for the circuit. Determines whether the device is input or output. The pins are 14 digital, 6 of which are capable of delivering PWM output. Analog input / output is supported by six pins. The crystal oscillator is connected to two rods. This is to give a clock pulse to the Atmega chip. Synchronization requires a clock pulse, so the connection between the Atmega chip and the computer connected to it occurs in real time. Save both pins Vcc and GND as power is required to run the chip. Since the Atmega328 is a low power processor, it only needs 1.8-5.5V power to run. Analog-to-digital converter (ADC) integrated into the Atmega328 chip. If not, Atmega328 cannot decode analog signals. The chip reads analog notes because it has ADC, so it has 6 analog input pins. Three pins are reserved for running the ADC

AVCC, AREF and GND are acronyms for AVCC, AREF and GND. AVCC isa positive voltage power source for ADC. In order to function, the ADC needs its own power supply. Ground power source GND. AREF is the reference voltage used by the ADC to convert an analog signal to a digital value. Analogous voltages greater than or equal to the reference voltage are assigned a numeric value of 1, whereas the numerical value of the analog voltages is assigned less than or equal to the reference voltage. Since ADC Atmega328 is a 10-bit ADC, it converts the analog signal into a digital one, the AREF value serves as a surrogate for whether the digital signal is high or weak. As a result, this digital value serves as an image for the analog signal; It is also the value of its optical counter

CHAPTER- 5
SOFTWARE
5.1 Software introduction:

The Arduino IDE is part of the program that allows you to program your Arduino, from the download tab of the official Arduinowebsite, you can download a variety of Arduino IDEs. You must use the appropriate program for your operating system (Windows, iOS or Linux). Unzip the file until the download is complete.

5.1.1: Definition of Arduino IDE

Arduino IDE is a free and open source program for writing and compiling Arduino module code. It is the official Arduino software, which is very easy tocompile the code and even those who do not have the technology can get used to it. It runs on Java platform and is compatible with operating systems such as MAC, Windows and Linux. It has built-in functions and commands that can be used for debugging, writing and compiling in the environment. Arduino Uno, Arduo Mega, Arduo Leonardo, Arduo Micro and many other Arduo units are available. On board they both configured the microcontroller and identified the data in code form. The key code, also known as the graphic created on the IDE platform, will eventually generate a hex file, which will be ported and sent to the board controller. The IDE environment consists of two parts: the editor and the compiler. The editor is used to write the required code, while the compiler is used to compile the code and upload it to the Arduino module.

5.1.2 ABOUT IDE

The IDE ecosystem is divided into three distinct sections:

A. Menu bar

B. Text editor

C. Output component

A) Menu Bar: The top bar is called the menu bar and it has five different options, asshown below.

File - You can create a new window or open an existing one to write code.

At the end of the assembly it will show you the hex file it created for the final sketchto be sent to the Arduino board for the specific task you want to accomplish.

Edit - Used to copy and paste code and make changes to the font.

5.1.3 Sketch is a tool that allows you to compile and program.

Tools - Mostly used in search programs. The programmer component of this board isused to copy the boot loader to the new microcontroller.

Support - If you are not sure about the apps, there is a lot of help online from gettingstarted to troubleshooting.

5.1.4 Libraries:

Libraries help provide additional features to the Arduino module. By going to add a library and clicking on the sketch button in the menu bar, you have a selection oflibraries.

When you select Add Library and insert the appropriate library, the #include icon will appear at the top of the graphic. If I use the EEPROM library, DHT11 / 22 temperature sensors, LCD or I2C library in a text editor.

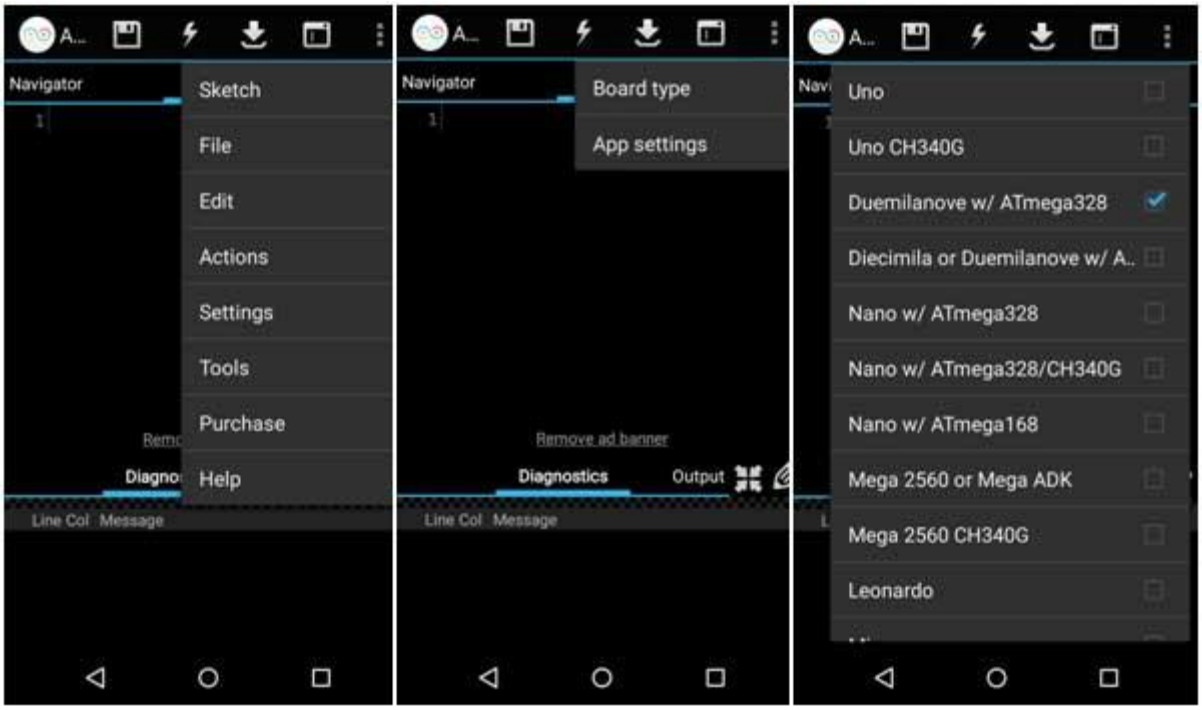
5.1.5: Making Pins Input or Output

Digital read and digital write commands are used to convert Arduino pins to inputs and outputs, respectively. These commands are text-responsive, which means you must type them as they appear

Start with the lowercase letter "d" and end with the capital "W" as you type. Digital Writing or Digital Writing does not call or answer any functions when writing.

Select the Arduino board

• To download the diagram, we must first select the appropriate board and port forthis operating system.
• We go to the "Board" section and select the board we want to work with. Similarly,serial and USB boards are assigned to COM1, COM2, COM4, COM5, COM7 andhigher. The USB serial interface can be found in the Windows Device Manager ports folder

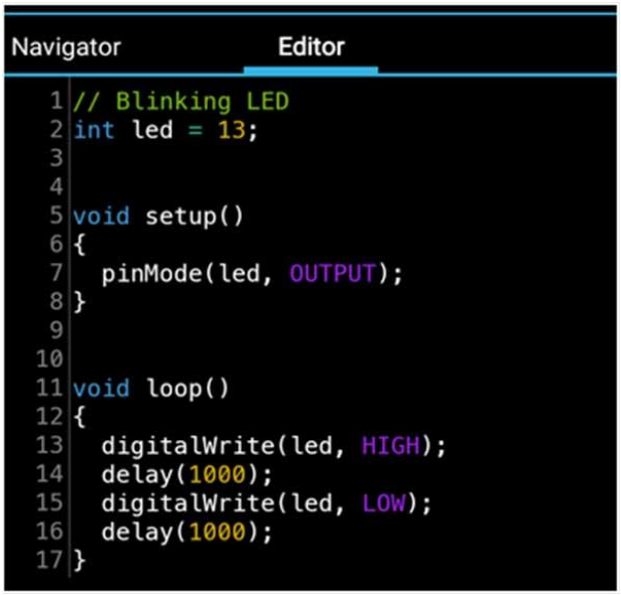


• The COM4 port we used for my device is shown by the Arduino Uno with the COM4 port in the lower-right corner of the board.
• And when both the board and the serial port are properly selected, verify in the upper left corner of the six-button section and then click the Upload button or go to the Drawing section to verify / assemble and then upload.
• The drawing is created in a text editor and stored as a file with the extension. (ino) Note that new Arduino modules can be reset immediately after the IDEsoftware has been compiled and loaded; Older versions, however, may require a physical reset on the device.
• The TX and RX LEDs flash on the board as the load code loads, indicating that the requested program is running successfully.
• Serial Monitor is a program that allows you to find out what's going on with your computer
• Boot loader is a program that allows you to start playing a file
• We can find the boot loader at the end of the Tools section. It is very convenient to burn the code directly through the console as this eliminates the need to purchase anadditional burner.

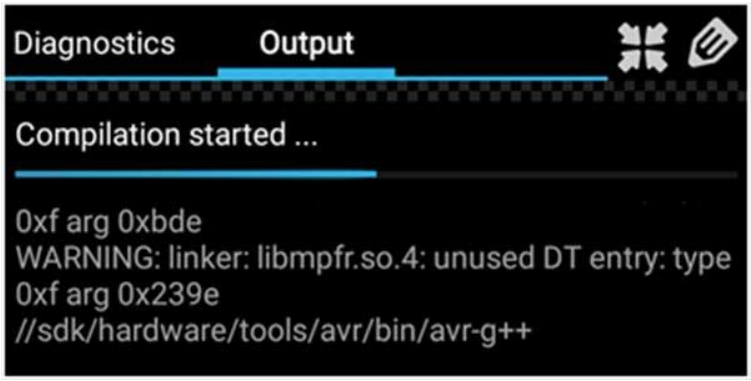
5.1.6 Arduino Uno Driver:

The good news: Drivers for nearly any Arduino are available for Windows. The badnews: Windows 8.1 really, really hates installing unsigned drivers like those suppliedfor the Uno by the Arduino team. Some tablets may provide provision to go intorecovery and allow unsigned drivers. The procedure to do that is

described here ().Note this may be nearly impossible with the Dell Venue 8 Pro and other tabletsenablingBitlocker to protect the main drive.



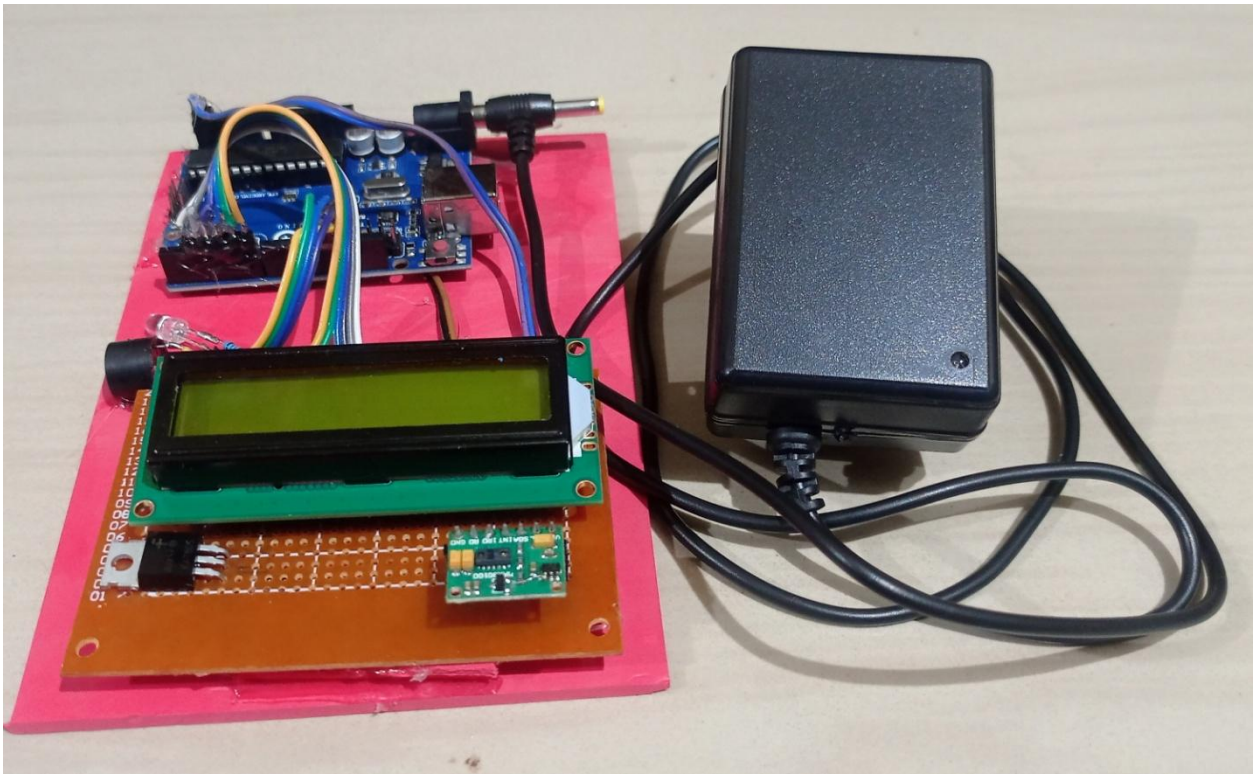
If you cannot use the method above to load the unsigned driver included with theArduino IDE and until there are signed drivers (which should install "normally"), thereis a workaround. This blog post () and the accompanying Youtube video () go throughthe steps of loading a signed driver. It installs as a Richochet Wireless USB Modemwhich is compatible with the Uno. If you use an Arduino device with FTDI such as Duemilanove or compatibles (NOTUNOs!), there are signed drivers for Windows Yes, these are hacks but easy ones. If the Arduino team publishes a signeddriver, the modem hack will no longer be needed.



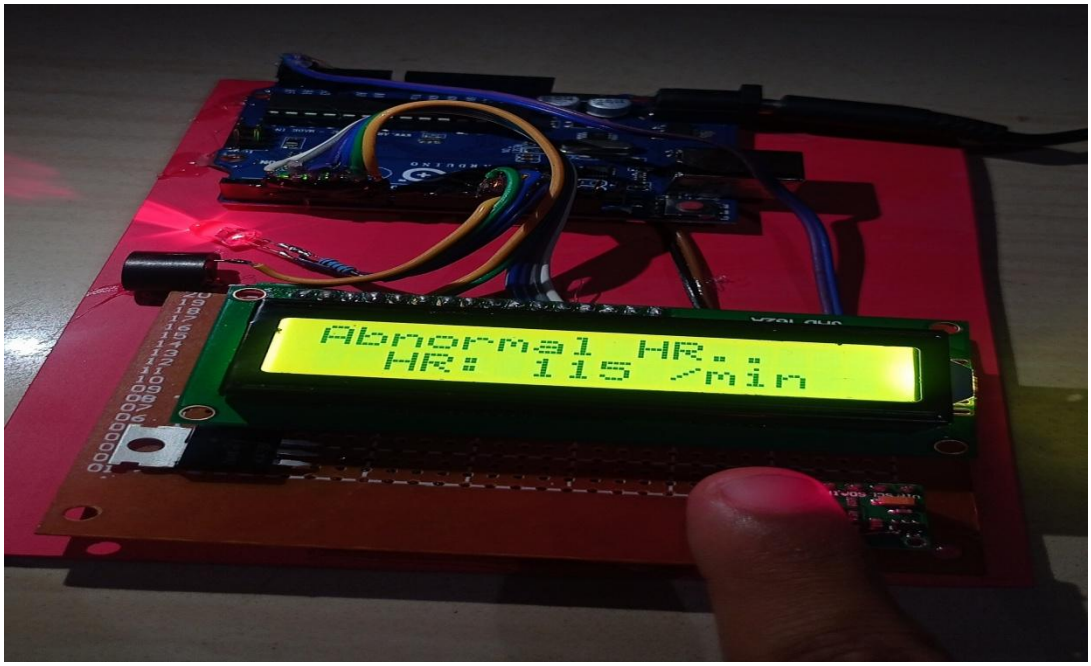
CHAPTER-6
RESULTS

6.1 Hardware Implementation

After setting up the system, check all the connections. Once the system is ready upload the source code. After uploading the code place the index finger on the heartbeat sensor. The heartbeat sensor will start monitoring the pulse rate. LCD is used for displaying the calculated pulse rate.



The system has configured maximum range of heart beat. Once the system starts measuring the Human heart beat, if it crosses the set limit then the system will send alert about heart rate. Also the system alerts for lower heart rate.



The reading from sensor will be uploaded to server where data will be store. The readings will be refreshed consistently giving the extension for constant seeing of the patient.

Nowadays we have an expanded danger of respiratory failures. This framework which assists with identifying the pulse of individual utilizing heartbeat detecting regardless of whether an individual is at home. This framework moreover helps for the emergency clinic observing framework, all patients

checked by a single individual in the server room. This framework which serves to measure internal heat level, heartbeat, beats of an individual, we will make this framework for creatures likewise with the goal that we can spare them. If this innovation will grow then we can recognize heart blockage through this innovation by our venture.

REFERENCES

1. Gowrishankar, S., M. Y. Prachita, and Arvind Prakash. "IoT based Heart Attack Detection, Heart Rate andTemperature Monitor."
2. Mallick, Bandana, and Ajit Kumar Patro. "Heart rate monitoring system using finger tip through arduino andprocessing software." International Journal of Science, Engineering and Technology Research (IJSETR) 5.1 (2016):
3. 84-89.
4. Patel, Shivam, and Yogesh Chauhan. "Heart attack detection and medical attention using motion sensing device-kinect." International Journal of Scientific and Research Publications4.1 (2014).
5. Aboobacker, Arith , Balamurugan, Deepak, Sathish "Heartbeat Sensing and Heart Attack Detection using Internet ofThings: IoT" International Journal of Engineering Science and Computing April 2017.
6. Ajitha, U., et al. "IOT Based Heart Attack Detection and Alert System." International Journal of Engineering andManagement Research (IJEMR) 7.2 (2017): 285-288.
7. Manisha, Mamidi, et al. "Iot on heart attack detection and heart rate monitoring." International Journal of Innovationin Engineering and Technology (IJIET).
8. Mayur, Suraj, Shubham, Nikhil "International Journal For Engineering Applications And Technology".
9. Yadav, Yashasavi, and Manasa Gowda. "Heart Rate Monitoring and Heart Attack Detection using WearableDevice." International Journal for technical research and Application (2016).
10. Ashrafuzzaman, Md, et al. "Heart attack detection using smart phone." International Journal Of TechnologyEnhancements And Emerging Engineering Research 1.2013 (2013): 23-27.
11. https://store.arduino.cc/usa/arduino-uno-rev3
12. http://www.theorycircuit.com/pulse-sensor-arduino/
13. http://www.instructables.com/id/Pulse-Sensor-With-Arduino-Tutorial/
14. http://play.fallows.ca/wp/projects/electronics-projects/understanding-nodemcu-esp8266-12e-limitations/
15. https://www.ibm.com/developerworks/library/iot-nodemcu-open-why-use/index.htm
16. Internet of things: internet of things,https://en.wikipedia.org/wi ki/internet_of_things.
17. Effective Ways to Use Internet of Things in the field of Medical and Smart Health Care: Kaleem ullah, Munamali Shah, Sijingzhang, IEEE Journal 2016.
18. Heartbeat Monitoring and heart attack detection, Mamidimanisha , Katakanneeraja, International Journal of Innovations in Engineering and Technology(IJIET).
19. Heartbeat Sensing and Heart Attack Detection using Internet of Things, International Journal of Engineering Science and Computing(IJESC).
20. Heart Rate monitoring And Heart Attack Detection Using Wearable Device, International Journal of Technical Research and Application(IJTRA). This preprint research paper has not been peer reviewed. Electronic copy available at: https://ssrn.com/abstract=3652736 Preprint no

21. Kashyap, S. (2016, August 26). 10 Real World Applications of Internet of Things (IoT) – Explained in Videos. Retrieved from https://www.analyticsvidhya.com/blog/2016/08/10-youtube-videos-explaining-the-real-world-applications-ofinternet-of-things-iot/
22. Lueth, K. L. (2016). IoT Analytics. Retrieved from iot-analytics.com: https://iot-analytics.com/10-internet-of-thingsapplications/
23. Mattern, F. F. (2010). From the Internet of Computers to the Internet of Things. Informatik-Spektrum, 107 - 121.
24. Rose, K., Eldridge, S., & Chapin, L. (2015, October). The Internet of Things: An Overview. Retrieved from www. internetsociety.org: https://www.internetsociety.org/sites/default/files/ISOC-IoT-Overview-20151014_0.pdf
25. Vermesan, O., &Friess, P. (2013). Internet of Things - Converging Technologies for Smart Environments and Integrated Ecosystems. In O. Vermesan, & P. Friess, 10 Real World Applications of Internet of Things (IoT) – Explained in Videos. River Publishers.