AISSMS

INSTITUTE OF INFORMATION TECHNOLOGY

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A

PROJECT REPORT ON

IOT BASED HEART ATTACK DETECTION & HEART RATE MONITOR

SUBMITTED TO THE SAVITRIBAI PHULE PUNE UNIVERSITY, PUNE

IN THE PARTIAL FULFILLMENT FOR THE AWARD OF THE DEGREE OF

BACHELOR OF ENGINEERING
IN
ELECTRONICS AND TELECOMMUNICATION

BY

Ishwari.R.Malwade	**72162969F**
Abhishek.S.Patil	**72024037K**
Snehal.C.Sutar	**72162998K**

UNDER THE GUIDANCE OF

Ms.S.O.Ahire

ACADEMIC YEAR: 2022-23

CERTIFICATE

"*PROJECT TITLE*"

IOT BASED HEART ATTACK DETECTION & HEART RATE MONITOR

Submitted by

Ms. Ishwari.R.Malwade (72162969F)

Mr.Abhishek.S.Patil (72024037K)

Ms.Snehal.S.Sutar (72162998K)

is the record of bonafide work carried out by them in partial fulfillment of the requirement for the award of the Degree of **Bachelor of Engineering (Electronics and Telecommunication),** as prescribed by the Savitribai Phule Pune University in the Academic Year 2022-2023.

This project report has not been earlier submitted to any other Institute or Universityfor the award of any degree.

Ms.S.O.Ahire
Internal Guide

Department of E&TC Engg.

Dr.M.P.Sardey
Head of Department

Department of E&TC Engg.

External Examiner

Dr.P.B.Mane
Principal
AISSMS Institute Of Information Technology, Pune.

Date : .

Department of Electronics and Telecommunication Engineering

Vision

To provide quality education in Electronics & Telecommunication Engineering with professional ethics.

Mission

To develop technical competency, ethics for professional growth and a sense of social responsibility among students.

Program Educational Objectives

The Program Educational Objectives (PEOs) are as follows:

1. To provide graduates of the program with pertinent skills to boost employability and all- round development.
2. To empower graduates of the program to exhibit professionalism and adopt lifelong learning in the emerging areas of technology.
3. To prepare graduates of the program to evolve as socially committed entrepreneur's sensitive to the needs of the society.

Program Specific Outcomes

Graduates will be able

1. Apply domain specific knowledge to develop electronics and telecommunication systems/applications.
2. Select different software tools, test and measurement equipment and use them efficiently for system solution.

Department of Electronics and Telecommunication Engineering

Program Outcomes

Graduates will be able to

1. Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
   [**Engineering knowledge]**

2. Identify, formulate, research literature, and analyse complex engineering problem searching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.[**Problem analysis]**

3. Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations. [**Design/development of solutions]**

4. Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions. [**Conduct investigations of complex problems]**

5. Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations. [**Modern tool usage]**

6. Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilitie

relevant to the professional engineering practice. [**The engineer and society]**

7. Understand the impact of theprofessional engineering solutions in societal and environmental contexts,and demonstrate the knowledge of, and need for sustainable development. [**Environment and sustainability]**

8. Apply ethical principles and commit to professional ethics andresponsibilities and norms of the engineering practice. [**Ethics]**

9. Function effectively as an individual, and as amember or leader in diverse teams, and in multidisciplinary settings. [**Individual and team work]**

10. Communicate effectively on complex engineering activitieswith the engineering community and with society at large, such as, being ableto comprehend and write effective reports and design documentation, makeeffective presentations, and give and receive clear instructions. [**Communication]**

11. Demonstrate knowledge andunderstanding of the engineering and management principles and applythese to one's own work, as a member and leader in a team, to manageprojects and in multidisciplinary environments. [**Project management and finance]**

12. Recognize the need for, and have the preparation andability to engage in independent and life-long learning in the broadest contextof technological change. [**Life-long learning]**

ABSTRACT

In today's world, many people are losing their lives due to heart attacks and the shortage of specialist doctors available to take immediate action. Hence this system provides the implementation of heart rate monitoring and controlling of a patient. For this, we have used the technology called the "internet of things" to detect and monitor the heart rate of a patient. In this system, the patient will be equipped with the hardware consisting of sensors and other devices for measuring the heartbeat along with the notification unitto notify and provide data in real-time. The heartbeat sensor with advance measuring technique will calculate the heartbeat of the patient, and transmit it over the internet that can be easily accessed by the patient itself and the doctors through different electronic devices such as tablets, phones, and computers. The heartbeat limits are set on a system that informs about the high and low rate of heartbeat. It also provides continuous data for analyzing the chance of an attack on a patient.

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Acknowledgement

It is my great pleasure in expressing sincere and deep gratitude towards my guide **Ms.S.O.Ahire ,**Assistant Professor Electronics & Telecommunication Engineering Department for her/his valuable guidance and constant support throughout this work and help to peruse additional studies in IOT (Internet Of Things) and Automation (domain of project).

We take this opportunity to thank Head of the Department **Dr.M.P.Sardey** and Project coordinator **Ms.S.O.Ahire ,**and all staff members of department of Electronics &Telecommunication Engineering AISSMS IOIT, Pune, for cooperation provided by them in many ways.

The motivation factor for this work was the inspiration given by our honorable principal **Dr. P.B.Mane.**

Lastly I am thankful to those who have directly or indirectly supported for our work.

Sign	Sign	Sign
Ishwari Malwade	**Abhishek Patil**	**Snehal Sutar**

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1.INTRODUCTION

The Heart is an important organ in the human body. It is used to pump blood and oxygen in the entire body through the circulatory system, keeping the functionality of the body organized. As the pollution in the environment is increasing and also the food habits of the people becoming worse due to which rate of heart attack has been increased. It has been found that about 1 million people die due to heart diseases every year. A Heart attack generally occurs when a particular part of the heart dies resulting in the blockage of blood flow to the heart muscle. It has been observed that a heart attack takes 3 attempts to kill people and is considered to be a serious medical emergency and needs immediate medical action. Many people are losing their lives due to the heart attack which is the major issue to think over.

As in the advancement of technology, it is possible to reduce the death rates by controlling the heart attacks. The IoT (internet of things) which is the most emerging technology has brought a tremendous change in the field of health care. The IoT provides the connectivity to several devices that can transmit data over the network without human interference. The "things" can be any physical objects present in the world along with the human being. In this technology, each device or object in the network is assigned a unique identifier to exchange real-time data and this data can be accessed with ease. IoT uses sensors and actuators for the communication between the physical objects or devices. With the help of these devices pulse rate of a human can be gathered and observed frequently to prevent the heart attack. It is always not possible for the patient to be treated by a doctor when needed because of the busy schedule of the doctor. So this methodology of integrating sensors with IoT environment makes it possible to monitor and manage the patient remotely.

The parameters like heart rate, heart rate variability, the temperature needs to measured regularly to ensure the safety of the patient. Some of the control constraints are set in these devices which alerts the doctor as well as relatives of the patient whenever violated through the internet.

1.1 Problem Statement:

Nowadays numerous persons are mislaying their life owing to heart attack and shortage of medical attention to patient at correct stage. Hence, in this project we are implementing heart rate monitoring and heart attack recognition system using IoT.

1.2 Motivation:

Healthcare facilities are persistently advancing to more readily serve the requirements of patients, specialists and staff. To meet administrative objections for patient's fulfilments operational productivity and clinical procedure of care, a cutting edge emergency clinic must have IoT advances all through the system so that the patient having serious condition get proper treatment remotely.

2.LITERATURE REVIEW

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 runningthe 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 witha 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 soundway 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-electrojoint 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 cannot 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 motion controlled 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.

3AIM AND OBJECTIVES

3.1Aim

The Heart Rate Monitoring system is developed using IOT Technology with an objective of detecting the heartbeat of the patient in order to monitor the risk of heart attack and also the regular check-up. Body health monitoring is very important to us.

3.2Objectives

- The main objective of the system is to implement heart rate monitoring and heart attack recognition system using IoT.
- To extend the benefits of Internet with remote control ability, data sharing, constant connectivity and so on.
- To save the lives of many humans.
- To detect and monitor the heart rate of a patient.
- To notify and provide data in real-time.
- To reduce the death rates by controlling the heart attacks.

3.3Methodology

The two circuits have been taken into use:

1. Transmitting circuit
2. Receiver circuit

The transmitting circuit makes use of an automatic voltage regulator (AVR) micro-controller which is connected to the digitalize monitoring screen. For operating the circuit is provided with a 12v power supply using a transformer. The buzzer and the LED light is used in the receiver circuit to provide the alert message in the case when the heartbeat rate crosses the threshold value. The light is measured through the ear by making the light to be blink through the transmission of the light through the light reliant resistor. LM358 op-AMP is used to collect the heart rate sensor reading which is used by the heartbeat unit based on the motion of blood to the fingertip. As the light intensity reaches 100%, it starts emitting when the structure equipped on IRTX towards the blood cells with 100% intensity. After this, the light reflects RX with 100% -x from it. Here the x is heartbeat rate. The data collected from this process is sent to the server so that in case of emergency immediate action can be taken. The digital form of output is connected to the micro-controller to compute then heartbeat in the form of a beat per minute (BPM). This data gathered is displayed on the LCD and the information is kept safe in the control room for future analysis.

3.4 Specifications of the System

3.4.1 Hardware Specifications

- **Pulse Sensor**

  For controller, the pulse sensor is plug and play heart rate sensor. It can be utilized by any persons who want to simply include live heart rate information into their developments. The sensor displays the movement of blood through the finger and is intended to give numerical output of heart beat once a finger is positioned on it.

Fig: 3.4.1.a Pulse Sensor(Sensors& transducers)

- **Microcontroller (ATMEGA 328)**

  Atmega 328 is an eight (8) bit micro-controller. It can handle the data sized of up to eight (8) bits. It is an AVR based micro-controller. Its built in internal memory is around 32KB. It operates ranging from 3.3V to 5V. It has an ability to store the data even when the electrical supply is removed from its biasing terminals.

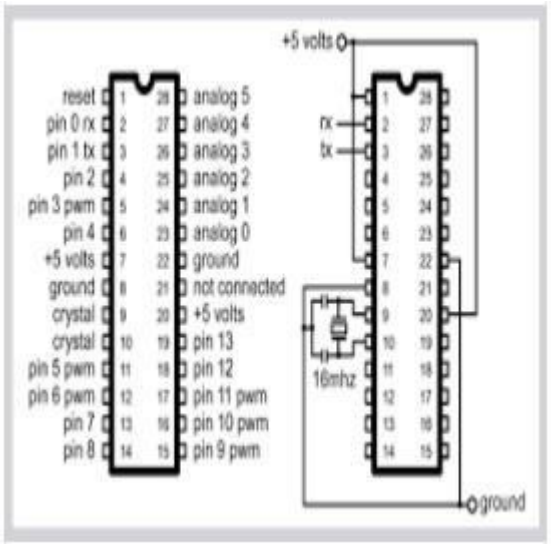


Fig: 3.4.1.b ATMEGA 328 Board(ATMEGA DATASHEET Summery)

- **GSM Module**

  It is a complete Quad-band GSM Module which can be embedded easily used by customer or hobbyist. GSM Module provides an industry-standard interface. It delivers GSM/GPRS 850/900/1800/1900MHz performance for voice, SMS, Data with low power consumption.

Fig: 3.4.1.c GSM Module

- **LCD Display**

The term LCD stands for liquid crystal display. It is one kind of electronic display module used in an extensive range of applications like various circuits & devices like mobile phones, calculators, computers, TV sets, etc. These displays are mainly preferred for multi-segment light-emitting diodes and seven segments. The main benefits of using this module are inexpensive; simply programmable, animations, and there are no limitations for displaying custom characters, special and even animations, etc.

Fig: 3.4.1.d LCD Display

3.4.2 Software Specifications

ARDUINO software is used

HOW TO START WITH ARDUINO SOFTWARE

1. | Get an Arduino or Genuino board and USB cable. ...
2. | Download and install the Arduino Software (IDE) ...
3. | Connect the board. ...
4. | Install the board drivers. ...
5. | Launch the Arduino Software (IDE) ...
6. | Open the blink example. ...
7. | Select your board. ...
8. | Select your serial port.

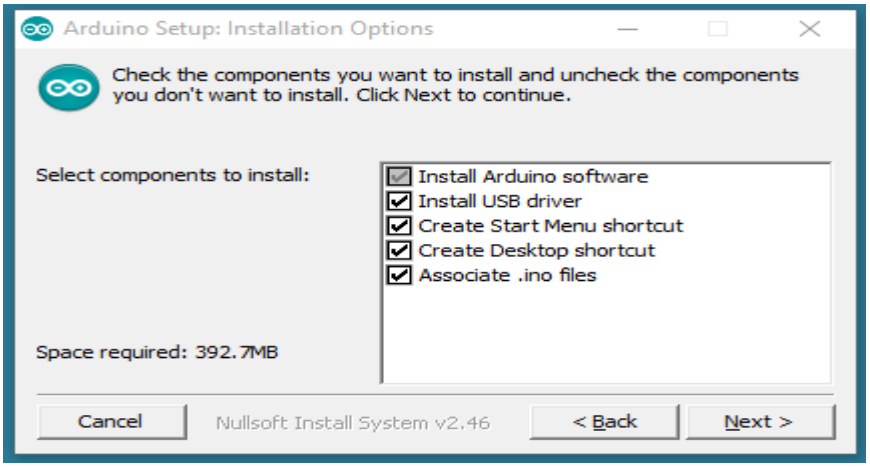
1. Get an Arduino or Genuino board and USB cable

In this tutorial, we assume you're using an Arduino or Genuino Uno or an Arduino or Genuino Mega 2560. If you are using a retired board as Arduino Duemilanove, Nano or Diecimila please refer to the driver installation instructions end of this document. If you have another board, read the corresponding page linked in the main getting started page.

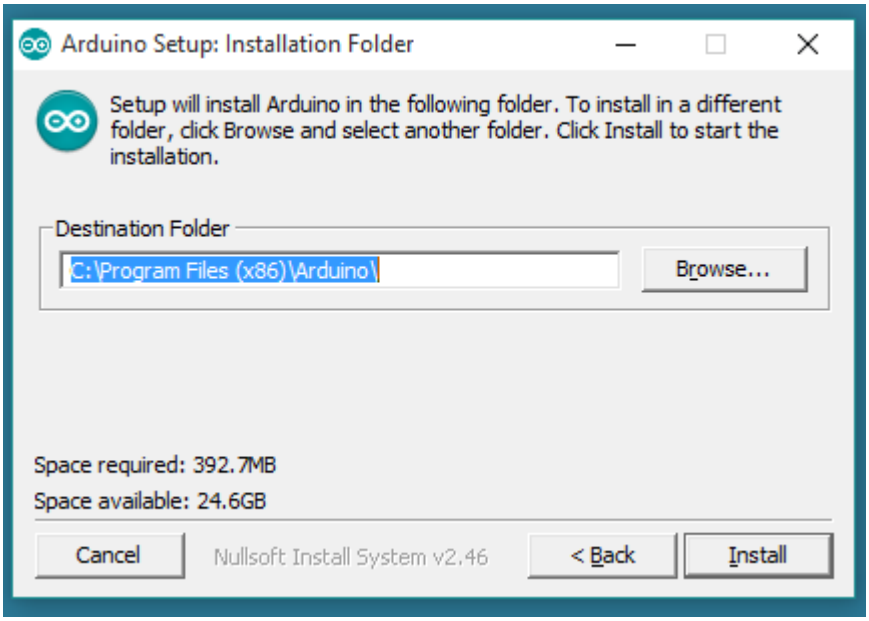
2. Download and install the Arduino Software (IDE)

Get the latest version from the download page. You can choose between the Installer (.exe) and the Zip packages. We suggest you use the first one that installs directly everything you need to use the Arduino Software (IDE), including the drivers. With the Zip package you need to install the drivers manually.

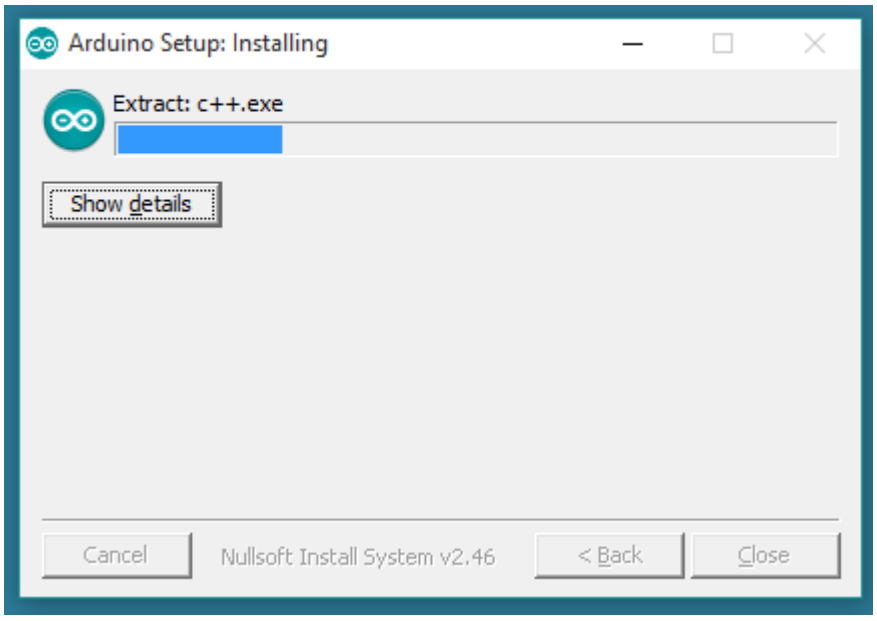
When the download finishes, proceed with the installation and please allow the driver installation process.



Choose the components to install



Choose the installation directory (we suggest to keep the default one)



The process will extract and install all the required files to execute properly the Arduino Software (IDE)

3. Connect the board

The USB connection with the PC is necessary to program the board and not just to power it up. The Uno and Mega automatically draw power from either the USB or an external power supply. Connect the board to your computer using the USB cable. The green power LED (labelled PWR) should go on.

4. Install the board drivers

If you used the Installer, Windows - from XP up to 10 - will install drivers automatically as soon as you connect your board.

If you downloaded and expanded the Zip package or, for some reason, the board wasn't properly recognized, please follow the procedure below.

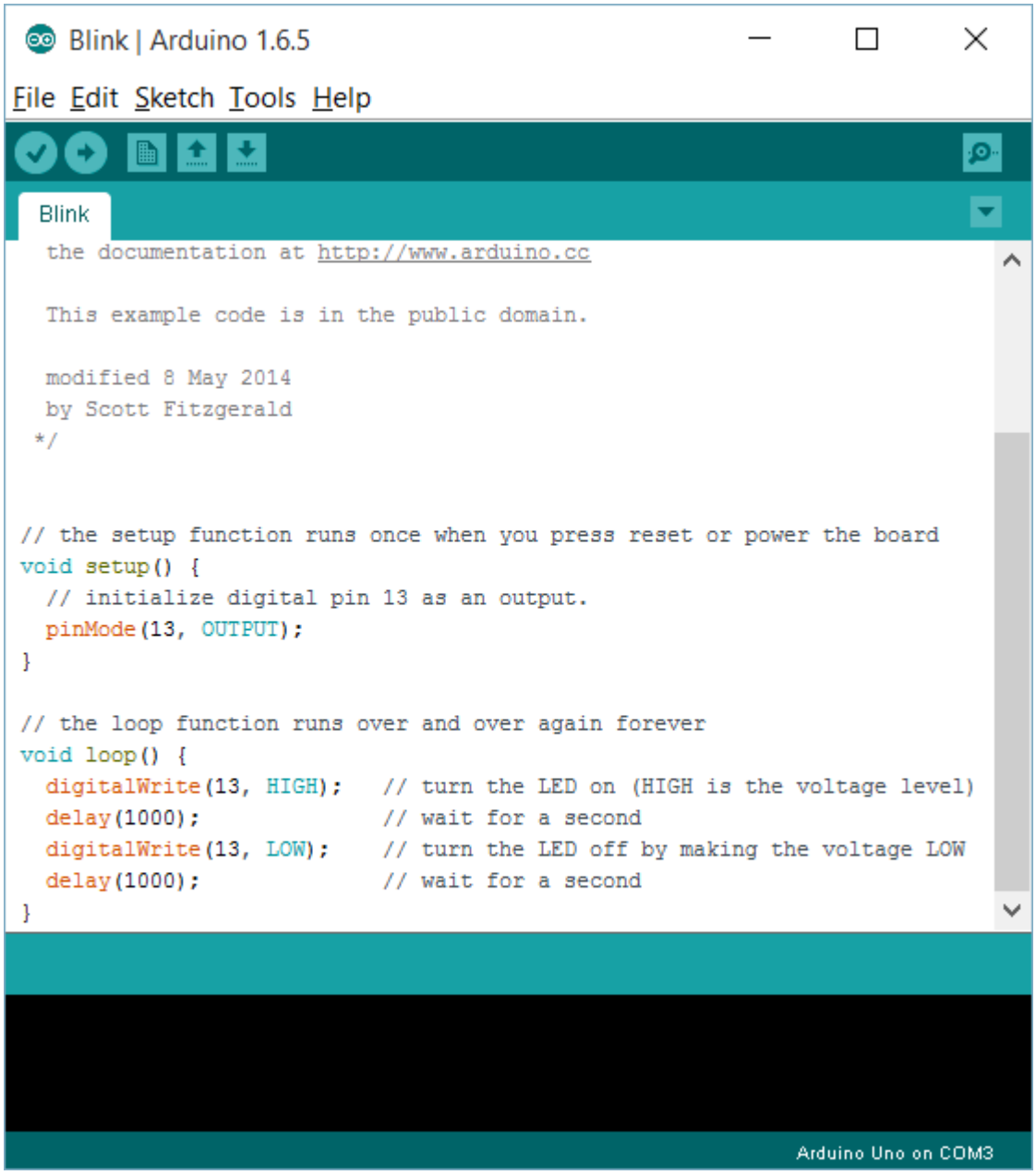
- Click on the Start Menu, and open up the Control Panel.
- While in the Control Panel, navigate to System and Security. Next, click on System. Once the System window is up, open the Device Manager.
- Look under Ports (COM & LPT). You should see an open port named "Arduino UNO (COMxx)". If there is no COM & LPT section, look under "Other Devices" for "Unknown Device".
- Right click on the "Arduino UNO (COmxx)" port and choose the "Update Driver Software" option.
- Next, choose the "Browse my computer for Driver software" option.
- Finally, navigate to and select the driver file named "arduino.inf", located in the "Drivers" folder of the Arduino Software download (not the "FTDI USB Drivers" sub-directory). If you are using an old version of the IDE (1.0.3 or older), choose the Uno driver file named "Arduino UNO.inf"
- Windows will finish up the driver installation from there.

5. Launch the Arduino Software (IDE)

Double-click the Arduino icon (arduino.exe) created by the installation process. (Note: if the Arduino Software loads in the wrong language, you can change it in the preferences dialog.

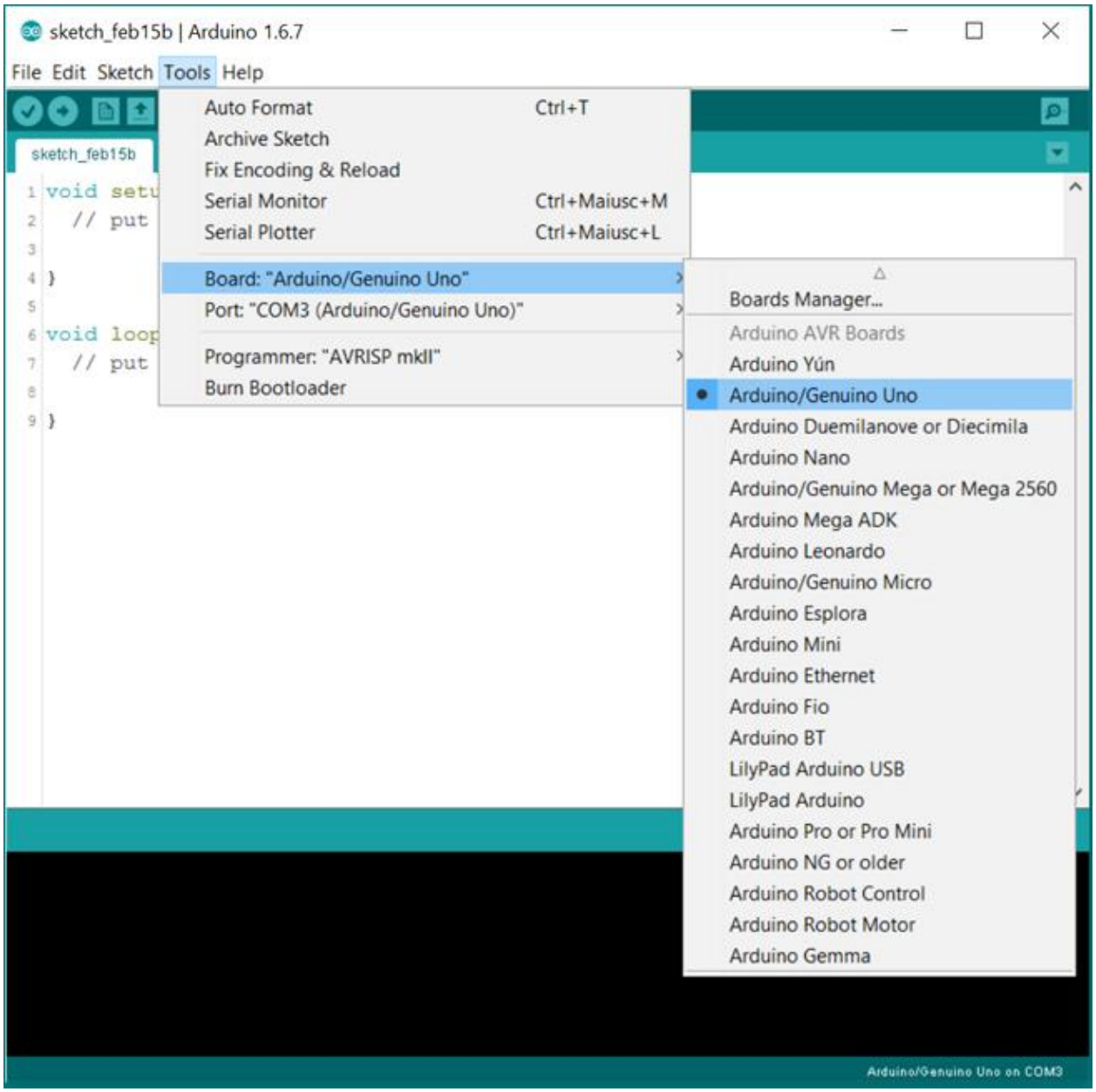
6. Open the blink example

Open the LED blink example sketch: File > Examples >01.Basics > Blink.



7. **Select your board**

You'll need to select the entry in the Tools > Board menu that corresponds to your Arduino or Genuino board.



8. Select your serial port

Select the serial device of the board from the Tools | Serial Port menu. This is likely to be COM3 or higher (COM1 andCOM2 are usually reserved for hardware serial ports). To find out, you can disconnect your

board and re-open the menu; the entry that disappears should be the Arduino or Genuino board. Reconnect the board and select that serial port.

9. Upload the program

Now, simply click the "Upload" button in the environment. Wait a few seconds - you should see the RX and TX leds on the board flashing. If the upload is successful, the message "Done uploading." will appear in the status bar.

A few seconds after the upload finishes, you should see the pin 13 (L) LED on the board start to blink (in orange). If it does, congratulations! You've gotten Arduino or Genuino up-and-running

PROTEUS

What Is Proteus??

Basically PROTEUS is also a simulating software but it helps you attach many components with the Arduino. Like resistors, capacitors, LEDs, LCDs, keypads, ICs etc. and these are just few that I have named in general. It has a complete library and you will find everything that you will ever need. You can design your complete circuit and then simulate it to view the final output. This means that after perfecting your project on the programming side in KEIL, you'll need to simulate it on PROTEUS to determine the output of the hardware components and change it if need be. This will completely ensure your project's success.

USE

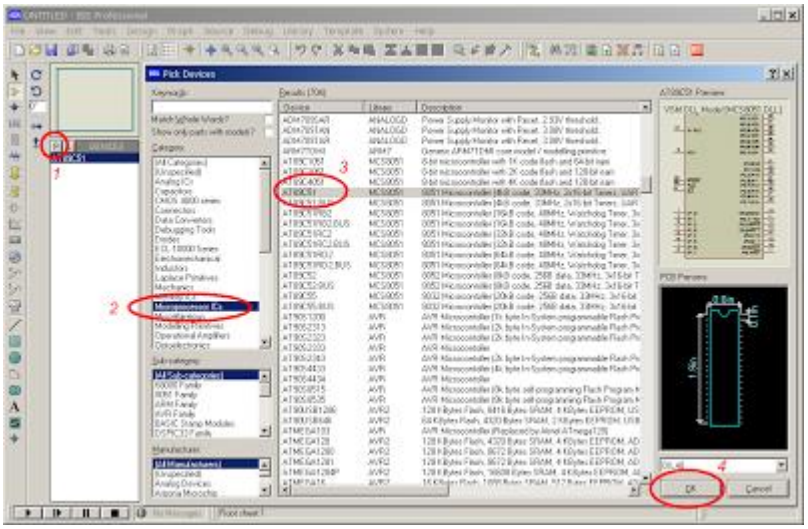
PROTEUS is designed to be user-friendly and you will get the hold of it instantly. There is no need to worry about some complex configuration / settings prior to simulation. Here are the basic steps.

- Place your components from the library
- Connect them accordingly
- Load HEX file (if Arduino is involved)
- Simulate the circuit

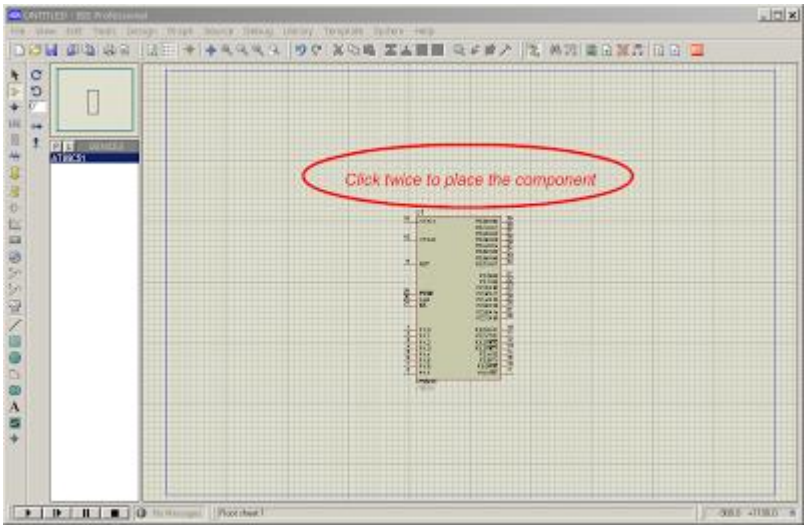
UNDERSTAND EACH STEP IN DETAIL

1. PLACING COMPONENTS

- Click the "Pick from library (P)" button as shown in the figure
- Select any category
- Select item from the list
- Click OK

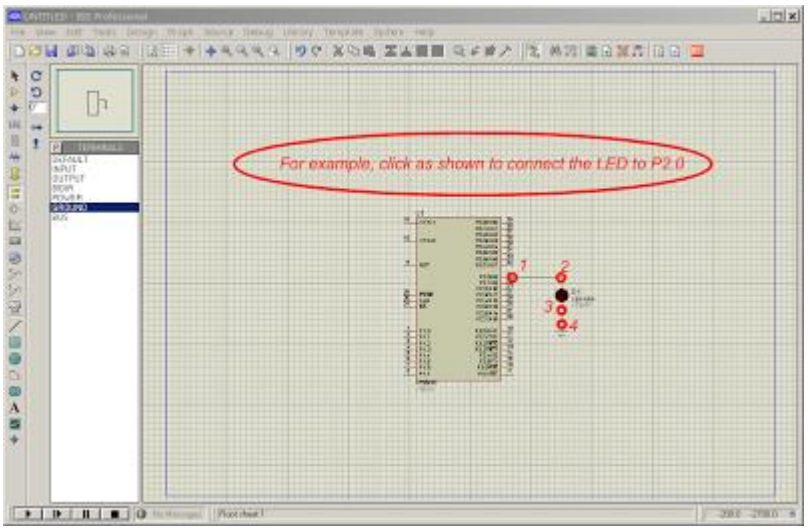


- After selecting component, click anywhere in the design area to select it and then click again to place it



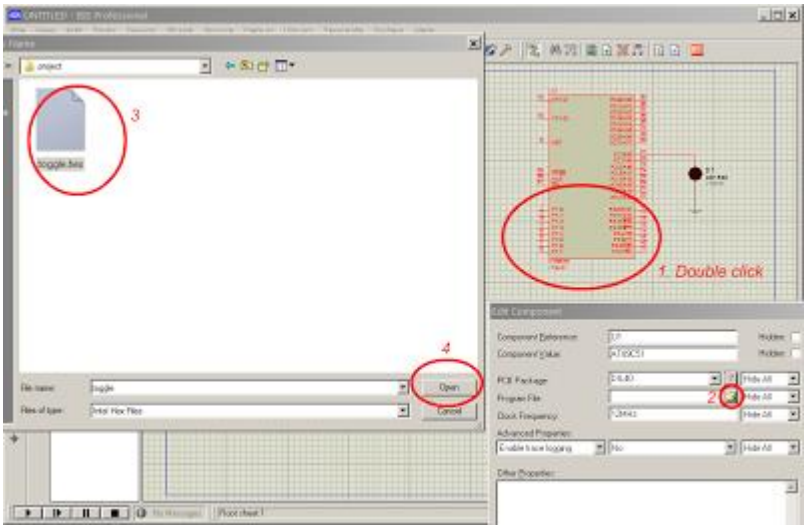
2. CONNECTING COMPONENTS

- Place all the required components
- Connect the desired nodes by clicking at starting and ending points



3. LOAD HEX FILE

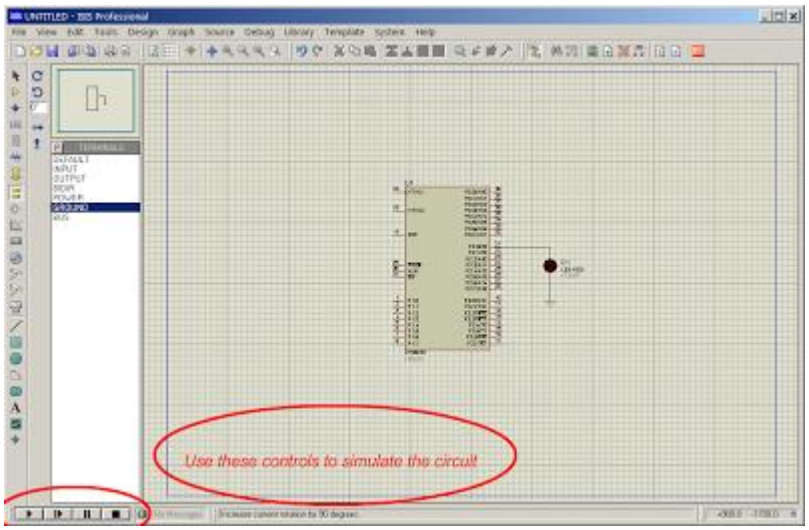
- Double click the Arduino component to open its properties
- Browse for the HEX file as shown and select it



And don't worry, in PROTEUS, there is no need to provide the RESET circuit or crystal oscillator to the Atmega 328. It will work just fine even without it. The frequency can be adjusted in the properties window as well.

4. SIMULATING THE CIRCUIT

- The controls at the left-bottom corner will help you simulate the circuit in real time



The above picture is the complete circuitry for testing an LED on P2.0 like toggling (ON / OFF) through programming but we will get to that part later on. At this point, you will just see the LED glow if you have programmed it to be always ON.

Like this developer done design on Proteus before starts working on Hardware.

4.BLOCK DIAGRAM OF THE SYSTEM AND ITS EXPLANATION

4.1 BLOCK DIAGRAM:

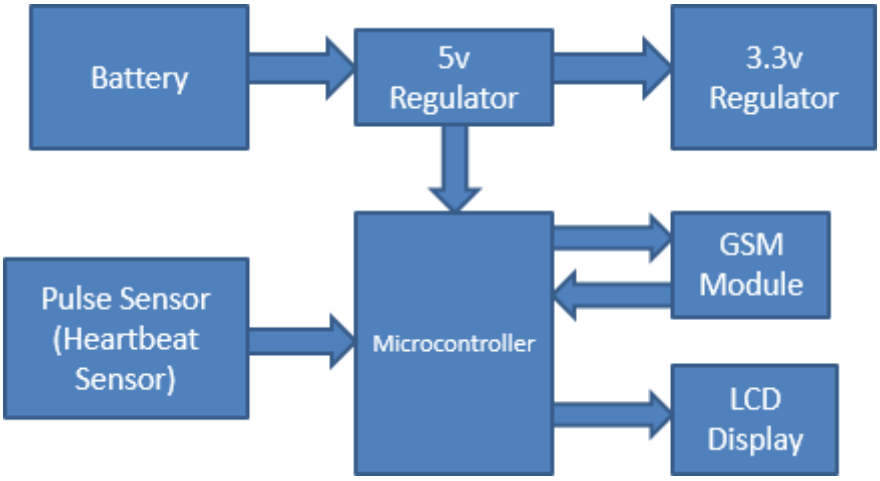


Fig: 4.1 Block Diagram

4.2 DESCRIPTION

The proposed system has eminence of detecting heart attack with help of observing heart rate based on internet of thing. Our method uses a pulse sensor, Atmega 328 and a Wi-Fi module. After setting up the system, the pulse sensor will start sensing heart rate readings and will display the heartbeat of person on LCD screen. Also, with the use of Wi-Fi module it will transmit the data over internet. System allows a set point which can help in determining whether a person is healthy or not by checking his/her heartbeat and comparing it with set point. After setting these limits, the system will startmonitoring the heart rate of patient and immediately the heart rate goes above or belowthe certain limit the system will send an alert message.

As a part of this project we are implementing an android application model that will track the heartbeat of particular patient and monitor it correctly and give the emergency message on chances of heart attack.

5.Code

5.1 Code

```
// Include Libraries
#include "Arduino.h"
#include "pulse-sensor-arduino.h"
#include "LiquidCrystal.h"


// Pin Definitions
#define HEARTPULSE_PIN_SIG    A3
#define LCD_PIN_RS          7
#define LCD_PIN_E  6
#define LCD_PIN_DB4         2
#define LCD_PIN_DB5         3
#define LCD_PIN_DB6         4
#define LCD_PIN_DB7         5
#define SIM800L_SOFTWARESERIAL_PIN_TX  10
#define SIM800L_SOFTWARESERIAL_PIN_RX  11




// Global variables and defines

// object initialization
PulseSensor heartpulse;
LiquidCrystal
lcd(LCD_PIN_RS,LCD_PIN_E,LCD_PIN_DB4,LCD_PIN_DB5,LCD_PIN_DB6,LCD_PIN_DB7);


// define vars for testing menu
const int timeout = 10000;       //define timeout of 10 sec
char menuOption = 0;
long time0;

// Setup the essentials for your circuit to work. It runs first every time your circuit is powered with electricity.
void setup()
{
   // Setup Serial which is useful for debugging
   // Use the Serial Monitor to view printed messages
   Serial.begin(9600);
   while (!Serial) ; // wait for serial port to connect. Needed for native USB
   Serial.println("start");

   heartpulse.begin(HEARTPULSE_PIN_SIG);
   // set up the LCD's number of columns and rows
   lcd.begin(16, 2);
```

```
    menuOption = menu();

}

// Main logic of your circuit. It defines the interaction between the components you selected. After setup, it runs over and over again, in an eternal loop.
void loop()
{


    if(menuOption == '1') {
    // Heart Rate Pulse Sensor - Test Code
    //Measure Heart Rate
    int heartpulseBPM = heartpulse.BPM;
    Serial.println(heartpulseBPM);
    if (heartpulse.QS == true) {
    Serial.println("PULSE");
    heartpulse.QS = false;
    }
    }
    else if(menuOption == '2') {
    // LCD 16x2 - Test Code
    // Print a message to the LCD.
    lcd.setCursor(0, 0);
    lcd.print("Circuito Rocks !");
    // Turn off the display:
    lcd.noDisplay();
    delay(500);
    // Turn on the display:
    lcd.display();
    delay(500);
    }
    else if(menuOption == '3')
    {
    // Disclaimer: The QuadBand GPRS-GSM SIM800L is in testing and/or doesn't have code, therefore it may be buggy. Please be kind and report any bugs you may find.
    }

    if (millis() - time0 > timeout)
    {
        menuOption = menu();
    }

}



// Menu function for selecting the components to be tested
// Follow serial monitor for instrcutions
char menu()
{
```

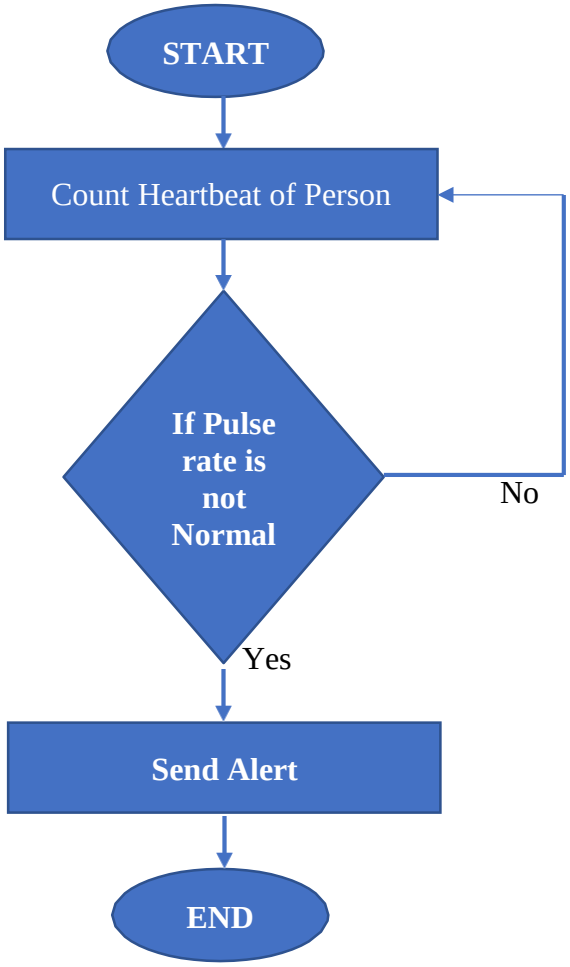
```
  Serial.println(F("\nWhich component would you like to test?"));
  Serial.println(F("(1) Heart Rate Pulse Sensor"));
  Serial.println(F("(2) LCD 16x2"));
  Serial.println(F("(3) QuadBand GPRS-GSM SIM800L"));
  Serial.println(F("(menu) send anything else or press on board reset button\n"));
  while (!Serial.available());

  // Read data from serial monitor if received
  while (Serial.available())
  {
    char c = Serial.read();
    if (isAlphaNumeric(c))
    {

      if(c == '1')
                Serial.println(F("Now Testing Heart Rate Pulse Sensor"));
          else if(c == '2')
                Serial.println(F("Now Testing LCD 16x2"));
          else if(c == '3')
                Serial.println(F("Now Testing QuadBand GPRS-GSM SIM800L - note that this component doesn't have a test code"));
      else
      {
        Serial.println(F("illegal input!"));
        return 0;
      }
      time0 = millis();
      return c;
    }
  }
}
```

6.SYSTEM DESIGN

6.1 FLOW CHART OF THE SYSTEM



6.1 CIRCUIT DESIGN

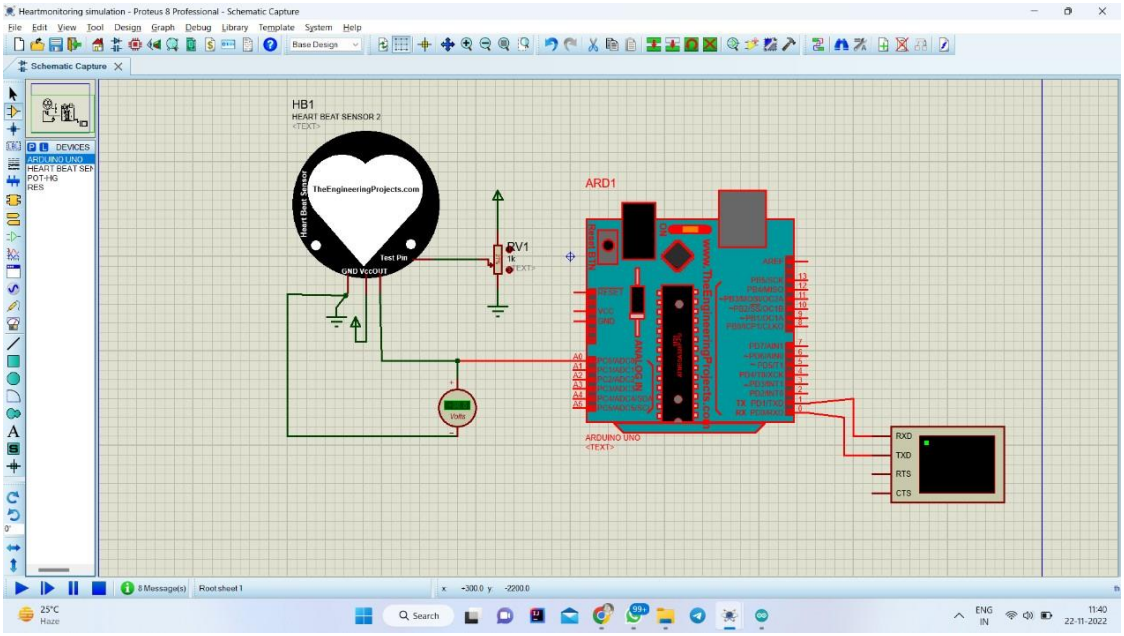


Fig: 6.1 Circuit Design

7.SOFTWARE DESIGN

7.1 SIMULATION

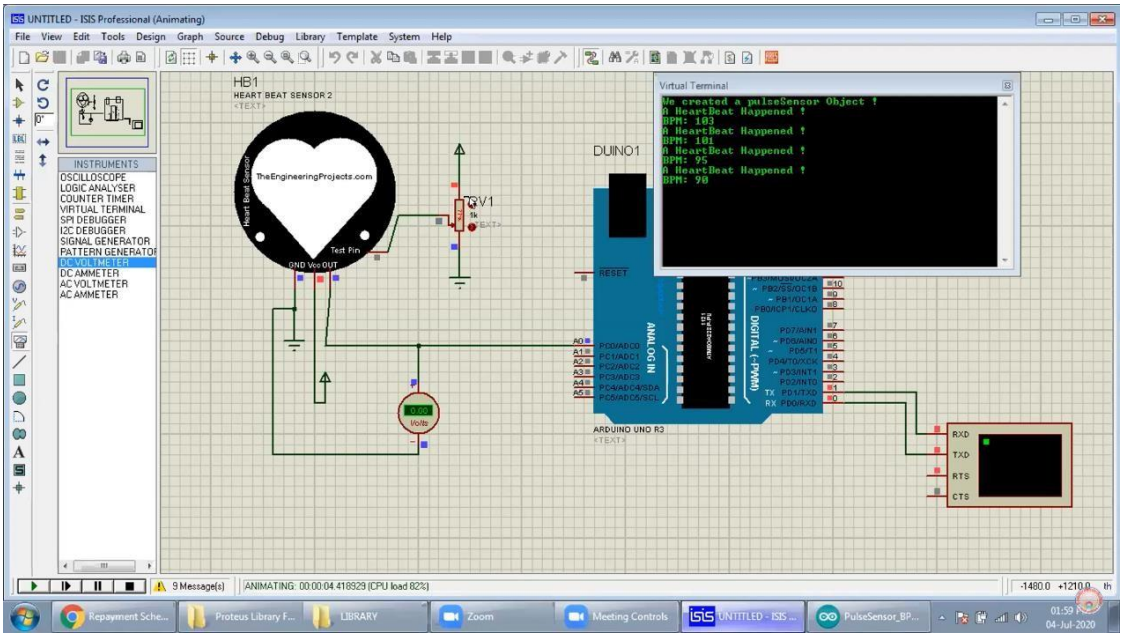


Fig: 7.1 Simulation Result

8. RESULT AND DISCUSSION

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.

In this exploration we have attempted to propose a total project on detecting heart attack by monitoring the heartbeat of person. The heart beat sensor which is interfaced with microcontroller senses the heartbeat of person and transmits them over GSM module. System allows setting limits of heart beat. After setting these limits person can start monitoring the heart beat and whenever the person's heart beat goes above certain set point they can get an alert on high heart beat and also about chances of heart attack. Also the system alerts for lower heartbeat.

9. CONCLUSION

Wireless and mobile technologies are key components that would help enable patients suffering from chronic heart diseases to live in their own homes and lead their normal life, while at the same time being monitored for any cardiac events. This will not only serve to reduce the burden on the resources of the healthcare center but would also improve the quality of healthcare sector.

In this project, the heart beat rate of the patient will be sensed. When the implant detects a heartbeat rate, it will alert the microcontroller which in turn will automatically send the message and provide the patient's condition so that the patient will be given medical attention within the first few critical hours, thus greatly improving his or her chances of survival.

10.REFERENCES

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APPENDIX

A1	Bill of material.
A2	Important Datasheets, Application notes
A3	Project participation certificates.

COST ESTIMATION

Table1. Component list

SR. NO	COMPONENT	SPECIFICATION	REQUIRED QUANTITY	PRICE
1.	Atmega 328	Power Source : DC Material : Silicon	1	1150/-
2.	Pulse Sensor	-	1	250/-
	LCD	-	1	450/-
	LCD Board	-	1	350/-
3.	Cable	-	As per required	300/-
4.	GSM Module	-	1	1150/-
4.	Total Cost	--	--	3,650/-