

Mini Project report on(bold 14)

NAME OF THE MINI PROJECT (bold Capital 18)

Submitted by (bold 12)

Name of student (bold 16)



Focus on Excellence (bold 12)

**Department of Electronics & Communication Engineering
FEDERAL INSTITUTE OF SCIENCE AND TECHNOLOGY (FISAT)[®]
Angamaly-683577, Ernakulam(bold 14)**

Affiliated to(12)

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY (bold 14)

Thiruvananthapuram-695016 (12)

2022 (bold 12)

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FEDERAL INSTITUTE OF SCIENCE AND TECHNOLOGY (FISAT)®
(bold capital 14)

Mookkannoor(P.O), Angamaly-683577 (14)



Focus on Excellence(12)

CERTIFICATE (bold capital 14)

This is to certify that the Mini project report titled **Name of the MINI PROJECT (bold 14)** submitted by **Name of the student**, towards partial fulfillment of the requirements for the award of the degree of **Bachelor of Technology** in Electronics and Communication Engineering is a record of bonafide work carried out by **him/her** during the academic year 2022.

Project Guide

Head of the Department

Internal Examiner

External Examiner

Place: Mookkannoor

Date:

ACKNOWLEDGEMENT (bold 16)

ABSTRACT (bold 16)

(One paragraph in italics 12)

LIST OF FIGURES (bold 16)

Fig. No.	Fig. Name	Page No.
3.1	Block Diagram	7

LIST OF TABLES(bold 16)

Table. No.	Table. Name	Page No.
4.1	List of components	14

ABBREVIATIONS(bold 16**)**

OCR : Optical Character Recognition

Chapter 1

INTRODUCTION

It includes introduction to your MINI PROJECT.

ACKNOWLEDGEMENT

CONTENTS

Chapter 1

INTRODUCTION

- Our system aims to harness the power of cutting-edge electronics and communication technologies to provide a comprehensive solution for early detection and swift response to cardiac emergencies.
- By integrating sensors capable of monitoring vital signs in real-time, coupled with intelligent algorithms, we aim to detect subtle physiological changes indicative of a heart attack with high accuracy and reliability.
- Main target audience is the elderly population that are unable to leave their houses be it due to physical or circumstantial inability.

CHAPTER 2

OBJECTIVE

- **To Develop a cardiac alert system which help the heart patients for early detection.**
- **If the person having a symptom of heart attack ,the alert will be send to emergency services through mail,alarm.**
- **This helps for the heart patients to potentially saving lives through early intervention**

CHAPTER 3

METHODOLOGY

- ECG sensor with specification AD8232 will help to identify the electrical variations in the heart.
- This can be done by using lead electrodes which is attached to a person's body.
- This output of ECG sensor is connected to arduino as input.
- Heart pulse sensor is used to identify the pulse rate and that is displayed in the LCD display and that is connected to arduino
- The arduino can be processed by machine learning algorithm.
- If a person having symptom of heart attack ,then an alert is send to an emergency service .This can be done by connecting a GSM module which is connected to arduino.

CHAPTER 4

LITERATURE SURVEY

[2] IOT based heart attack detection and heart rate monitoring system.
Authors (Arun Prasath., Mohamed Arif., S Srinivasan)

- The technology involved in this systems are IOT connectivity, this also include cloud computig ,i.e,utilization of cloud-based platforms for data storage,processing and analysis ,enabling scalability and accessibility of the system.
- Future scope involved is to develop a wearable devices for continuous monitoring,include telemedicine method ie,integration with telemedicine platforms for remote consultation and diagnosis.
- Advantages are:Early detection of heart abnormalities, alert mechanisms to notify emergency services...

[1] Three lead ECG and heartrate variability using AD8232

Authors(Thunga DivyaSree;Raveea Manasi B;Siddharth Battacharya;Rajesh Kumar M)

- The technology involves in this paper is that capturing and processing the electrical activity of the heart to monitor heartrate and defect abnormalities.
- The future scope involved in this technology is that having potential application in remote patient monitoring,early detection of cardiac abnormalities.
- This paper also includes the advantages of AD8232 chip.

Advantages are: Compact Size,High performance,Ease of integration,
Cost-effectiveness

[3] Pattern recognition of ECG signal to detect heart disorders
Authors(Srinivasa Reddy Dasarapalli;Ramesh Kumar
Panneerselvem;Sainadh Annavarapu)

- The technology involved in this paper is that signal processing techniques to extract features from ECG signal,followed by machine learning algorithm.
- The future scope involved developing real detection systems, and exploring the potential of artificial intelligence integrating wearable devices for continuous monitoring.
- Advantages are:Efficiency is more,Accessibility is more,Robustness

[4] Analysis of diagnostic parameters of heart diseases and prediction of heart attack. Authors (Gnaneswari G)

- The technology involved in this paper is that data analytics,machine learning applications in healthcare.
- The future scope included is that development of real-time monitoring devices allowing early detection and intervention.It also include enhanced predictive models for timely prediction.
- Advantages are: Early prediction,Reduced healthcare cost, Accessible healthcare

CHAPTER 5

WORK DONE

STUDY ON ECG

- ECG wave consists of :
 1. P wave:Represents atrial depolarisation,signaling and contraction of the atria.
 2. QRS complex:Reflects ventricular depolarisation,indicating the contraction of the ventricles.It consists of Q,R, and S waves. Atrial repolarization also takes place in QRS complex.
 3. T wave:Represents ventricular repolarisation,indicating the recovery of the ventricles.
- PR interval : .12 - .20 seconds. Anything more than this could indicate another dysrhythmia such as heart blocks.
- QRS Complex interval: .06 - .12 seconds, anything more than this could indicate a dysrhythmia such as PVC.
- PVC(Premature Ventricular Contract) : It is the extra heart beats that begin in one of the heart's two lower pumping chambers (ventricles). Occasional PVC are not life threatening for normal people, but causes problems to heart disease people.

STUDY ON AD8232 ECG SENSOR

- It is designed to capture a single channel ECG Signal,suitable for heart rate monitoring and rhythmic analysis
- Provides clean signal acquisition,minimizing inference for improved signal quality
- Operates with low power requirements,making it suitable for battery-powered and portable applications.
- It has simplified interface and compatible with standard ECG electrodes facilitating quick integration into medical devices and systems.

■ STUDY ON HEARTRATE

- Heart rate ,often measured in beats per minute(BPM),is the times the heart contracts or beats within a minute.
- Normal heart rate of an adult is 60-100 BPM. A very fit person could have a heart rate of 40-100 BPM.
- Heart rate above 100BPM is called tachycardia and below 60BPM are called bradycardia.
- It is a vital physiological parameter that reflects the cardiovascular system's activity.
- Heart rate is commonly measured using sensors that detect the pulsatile blood flow.One common method is photoplethysmography(PPG),which uses light to monitor blood volume changes in tissues.
- When the heart pumps blood ,it causes slight variations in the amount of light absorbed by the tissues ,allowing sensor to detect these changes and calculate heart rate.

STUDY ON HEART RATE SENSOR

- The primary function of a heart rate sensor is to measure the heart rate, expressed in bpm.
- It detects the electrical signals generated by the heart's contractions and converts them into a digital signal.
- Heart rate sensors provide real-time feedback on the user's heart rate.
- Information can help users adjust their activity levels, track their fitness progress, and identify potential health issues.

CHAPTER 6

RESULT

- Implemented the design inorder to identify the heartpulse rate using heartpulse rate sensor.
- The heartpulse rate sensor is connected with arduino.
- The measured heartpulse rate is displayed in the LCD display.
- Collected the datasets of ECG and train it using KNN and Random forest algorithms.

CHAPTER 7

ALGORITHMS USED

- KNN ALGORITHM (K -Nearest Neighbors)
- Import the datasets based on our target (collected the datasets of ecg from kaggle.)
- Preprocess the data in order to handle missing values,normalize/standardize the features to ensure fair comparisons.
- Divide the datasets into testing and training subsets in order to train and test the datasets.
- Determine the value of K(numbers of neighbors) and select a suitable distance metric .

- Train the models by using datasets.
- Select the k nearest neighbors based on calculated distances.
- Predict the labels for testing data.
- Assess the performance of KNN model using appropriate evaluation metrics such as accuracy,precision.
- Once the model's performance is satisfactory,deploy it to make predictions on new ,unseen data.

■ RANDOM FOREST ALGORITHM

- Collect the datasets on our target.
- Done data preprocessing of single image.
- Perform functions inorder to load and preprocess the images from a particular locations.
- Split the data into test and train sets to evaluate the performance of the classifier.
- Initialize random forest classifier which employs an ensemble learning approach by combining predictions from multiple decision trees.
- This ensemble technique helps to improve the overall predictive accuracy and generalization performance of the model.
- Calculate the testing and training accuracies.

CHAPTER 8

MERITS

- High performance in capturing accurate and reliable ECG signals.
- Low power consumption.
- Sensor comes in a compact form factor.
- The sensor typically operates over a wide range of voltages and temperatures.
- It is designed for ease of use, with simple interfacing and minimal external components required for operation.
- Provides flexibility in capturing single-lead or multi-lead ECG signals.

CHAPTER 9

DEMERITS AND SOLUTIONS

- Movement and motion artifacts can affect the quality of ECG signals. - To reduce motion artifacts, users can ensure that the sensor is securely attached to the body.
- The AD8232 sensor may be susceptible to noise and interference from external sources. - Proper shielding and grounding techniques can help minimize noise and interference. Additionally, users can implement signal processing algorithms.
- Electrode Placement Sensitivity - use conductive gel or adhesive electrodes to improve electrode-skin contact and reduce impedance.

CHAPTER 10

CONCLUSION

- The project aims to enhance healthcare monitoring .By integrating advanced sensor technologies we provide a comprehensive solution for early detection of potential cardiac events.
- The real-time data collection and analysis,coupled with instant location sharing,empower timely intervention,ultimately contributing to improved patient outcomes and the overall well-being of individuals at risk of heart-related issues.

CHAPTER 11

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