

PREGNANCY MONITORING APP FOR PATIENT DOCTOR CONSULTING AND APPOINTMENTS

Submitted in partial fulfillment of the requirements for the award of
Bachelor of Technology degree in Biomedical Engineering.

By

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DEPARTMENT OF BIOMEDICAL ENGINEERING

SCHOOL OF BIO AND CHEMICAL ENGINEERING

SATHYABAMA

INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)

Accredited with Grade "A" by NAAC | 12B Status by UGC | Approved by AICTE
JEPPIAAR NAGAR, RAJIV GANDHI SALAI, CHENNAI - 600 119

MARCH -2021



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BONAFIDE CERTIFICATE

This is to certify that this Project Report is the bonafide work of **Balamurugan G (37240014), Brabin Raj P (37240016)** who have done the project work as a team who carried out the project entitled “**Pregnancy monitoring app for patient doctor consultancy and appointments**” under my supervision from **October 2020 to March 2021**

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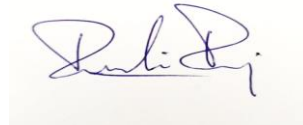
DECLARATION

We, **Balamurugan G (37240014)** and **Brabin Raj P (37240016)** hereby declare that the Project Report entitled “**Pregnancy Monitoring App for Patient Doctor Consultancy and Appointments**” done by us under the guidance of **Dr. J. Prem Kumar**, Department of Biomedical Engineering at Sathyabama Institute of Science and Technology is submitted in partial fulfillment of the requirements for the award of Bachelor of Technology degree in Biomedical Engineering.

DATE:

PLACE:

1.



2.



SIGNATURE OF THE CANDIDATES

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We wish to express our thanks to all **Teaching and Non-teaching** staff members of the **Department of Biomedical Engineering** who were helpful in many ways for the completion of the project.

ABSTRACT

In India, over four million children will be born in hospitals by 2020, with a little more than 277 thousand being born at home. the general data shows a growing trend of institutional deliveries at hospitals or primary health centres, compared to ones reception. It indicated an improvement in India's efforts at improving maternity care facilities. This also means the growing need of doctors and health care workers to effectively monitor and carter to the requirements of the pregnant women. so as to beat these problems and supply proper monitoring of the pregnant women our project aims at developing an application for monitoring the guts rate and temperature of the pregnant women which is measured using the suitable sensors. An efficient real time microcontroller is employed to process the knowledge and a Wi-Fi gateway is employed to transmit the information wirelessly. Mobile applications for both patients and also the doctor employing a javascript framework react native. The doctors mobile application displays both the center rate and blood heat of all the pregnant patients under his/her supervision for live monitoring. The doctor may also book appointments for the patient. The pregnant women is notified of the appointments. Thus, this project helps in taking care of pregnant women at the correct time and to avoid difficulties.

Key words: pregnancy, primary health centre, temperature, mobile application

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LIST OF ABBREVIATION

IOT	Internet of Things
NODEJS	Node Java Script
RTOS	Real Time Operating System
HW	Hardware
SW	Software
CPU	Central Processing Unit
BHS	British Hypertension Society
RAM	Random Access Memory
IDE	Integrated Development Environment
UNICEF	United Nations Children's Fund
MQTT	Message Queuing Telemetry Transport
QEEG	Qualitative Electroencephalography
ELSA	English Longitudinal Study of Ageing
WHMSs	Wearable Health-Monitoring Systems
EEPROM	Erasable Programmable Read Only Memory
HTML	Hypertext Markup Language
CSS	Cascading Style Sheets
IDE	Integrated Development Environment
NGO	Non-Governmental Organisations

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CHAPTER -1

INTRODUCTION

1.1 GENERAL:

In the nine months after COVID-19 was declared a virus in March, India is estimated to have the highest number of births, with over 20 million babies predicted to change their lives. state within the country between March and December, in keeping with a top UN body. The United Nations Children's Fund (UNICEF) cautioned that stressed health networks and service delays were putting pregnant mothers and babies born during the pandemic at risk across the world. An estimated 116 million babies are born under the shadow of COVID-19 pandemic, UNICEF said on Wednesday, sooner than Mother's Day, observed on May 10. Since COVID-19 was declared an outbreak on March 11, these babies are expected to change states for up to 40 weeks. The very best numbers of births within the 9 months since the pandemic was declared are expected to occur in India, where 20.1 million babies are projected to change state between March 11 and December 16. China (13.5 million), Nigeria (6.4 million), Pakistan (5 million), and Indonesia (4 million) are the other countries estimated to have the most births during this period, according to the study.

1.2 TECHNOLOGIES USED:

1.2.1 EMBEDDED SYSTEM

Software that is intended to execute a specific task, either as a stand-alone device or as part of a larger system. At An embedded system is a microprocessor-based computer hardware system with the core is an integrated circuit designed to carry out computation for real-time operations.

Between a single microcontroller to a suite of processors with attached peripherals and networks, and from no user interface to sophisticated graphical user interfaces, the complexity ranges from simple to complex. An embedded system's complexity varies greatly depending on the purpose for which it was constructed.

Embedded systems account for up to 98 percent of all microprocessors produced. Microcontrollers or digital signal processors (DSP), application-specific integrated circuits (ASIC), field-programmable gate arrays (FPGA), GPU hardware, and gate arrays are all included in embedded systems. These processing devices provide modules for dealing with electrical and/or mechanical interfacing. Programming instructions for embedded devices, also known as firmware, are contained in read-only memory or flash memory chips and run on computers with minimal hardware resources. Peripherals bind embedded systems to the outside world, connecting input and output machines.

1.2.1.1 Structure of embedded systems

The basic structure of an embedded system includes the subsequent components:

Sensor: The sensor measures and converts the physical quantity to an electrical signal, which might then be read by an embedded systems engineer or any musical instrument. The calculated quantity is stored in memory by a sensor.

A-D Converter: An digitizer converts the analog signal sent by the sensor into a digital signal.

Processor & ASICs: Processors assess the information to live the output and store it to the memory.

D-A Converter: A data converter changes the digital data fed by the processor to analog data

Actuator: An actuator compares the D-A Converter's output to the same output stored, then stores the allowed output.

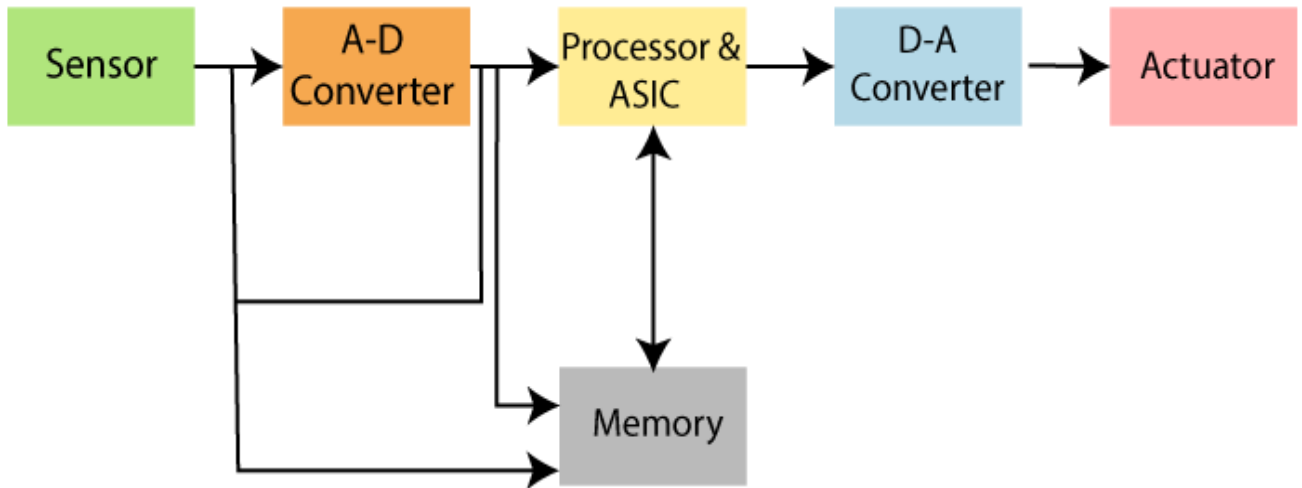


Figure 1.1: Structure of embedded systems

1.2.1.2 Benefits of using embedded systems

- Small size and faster to load
- More specific to at least one task
- Easy to manage
- Low cost
- Spend less resources
- These software is devoted to 1 device so performance is sweet and use less resources like memory and micro-processors

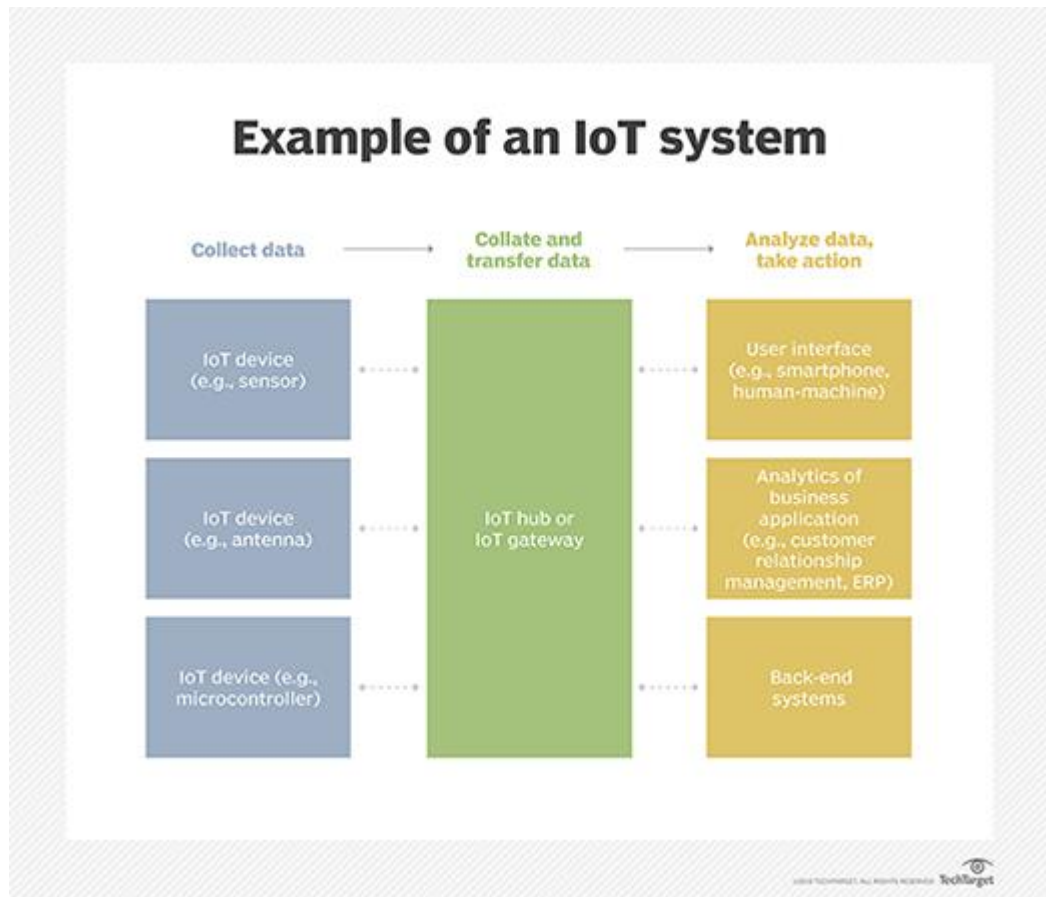
1.2.2 INTERNET OF THINGS (IOT)

The internet of things, or IoT, is a network of interconnected electronic systems, mechanical and digital computers, organisms, creatures, and individuals with unique identifiers (UIDs) and the ability to share data without needing human-to-human or human-to-computer interaction. A human with a heart monitor implant, a farm animal with a biochip transponder, a vehicle with built-in sensors to warn the driver when tyre pressure is low, or some other natural or man-made object that can be given an IP address that can transmit data over a network are both examples of objects in the internet of things. IoT is increasingly being used by businesses in a number of sectors.

A thing within the web of things are often someone with a monitor implant, a eutherian with a biochip transponder, an automobile that has built-in sensors to alert the thrust when tire pressure is low or the opposite natural or man-made object that will be assigned an IP address and is during a position to transfer data over a network. Organizations around a wide range of sectors are increasingly turning to IoT to maximise efficiency, better understand consumers in order to provide better customer experience, improve decision-making, and increase the value of their businesses.

1.2.2.1 How IoT works

An IoT ecosystem is made up of web-enabled smart devices that collect, transmit, and function on data from their surroundings using embedded processors, sensors, and communication hardware. By linking to an IoT gateway or other edge node, IoT sensors can exchange the sensor data they receive. Data can then be transmitted to the cloud to be analysed.or analyzed locally. Sometimes, these devices communicate with other related devices and act on the data they get from each other. While humans will communicate with the devices to line them up, send them orders, and so on, the devices do the majority of the work without human interaction. or access the information. The connectivity, networking and communication protocols used with these web-enabled devices largely depend upon the precise IoT applications



deployed.

Figure1.2 Examples of an IoT System

1.2.2.2 Benefits of IoT

The internet of things offers variety of advantages to organizations, enabling them to:

- Monitor their overall business processes
- Improve the customer experience
- Save time and money
- Enhance employee productivity
- Integrate and adapt business models
- Make better business decisions
- Generate more revenue.

1.2.3 React native app development:

Cross-platform development has become an excellent alternative to totally native mobile app development. You build different Android and iOS

applications using the native mobile development technique. The cross-platform development allows you to chop expenses and save time by using the identical code across both platforms. The React Native framework may be a rising mobile solution and is taken into account the longer term of cross-platform mobile app development. React Native is an open-source framework that enables to create a mobile app with only JavaScript. it absolutely was introduced by Jordan Walke, a Facebook technologist, as a brand new technology for easier development and a stronger user experience. the most distinctive of this framework is that React Native apps function a bit like native apps. They don't differ from apps built on Java, Objective-C or Swift and that they use the identical UI building blocks as native iOS or Android apps. But with React Native, building a mobile app is far faster and fewer expensive.

Community matters

React Native is an open-source platform. which means all documentation associated with this technology is open for everybody and is on the market free to everyone in React Native community. There's a good advantage to employing a community-driven technology. as an example, if you face any issue associated with React Native development, anyone can get help from community experts or find information online.

Reusable code & pre-built components

This is probably the foremost important advantage of React Native. With the convenience of this framework, developers don't have to build a separate mobile app for every platform, as almost 90 percent of React Native code may be reused between iOS and Android.

Simplified UI

React Native is all about the mobile UI. Comparing this framework to AngularJS or MeteorJS, it's more sort of a JavaScript library than a framework.

It's important to form a sequence of actions when building a mobile app, and React Native makes an implementing order just perfect. additionally, user interfaces designed in React Native are more responsive, decrease load time, and supply a smoother feel.

Third-party plugin support

The React Native framework remains advancing, so it would lack some components within the core framework. To fill this gap, React Native provides two sorts of third-party plugins: native modules and JavaScript modules.

1.2.4 MQTT

MQTT (MQ Telemetry Transport or Message Queuing Telemetry Transport) is a lightweight, publish-subscribe network protocol that transfers messages between computers. It is an open OASIS and ISO standard. MQTT can be used for any network protocol that has ordered, lossless, bi-directional connections; however, it is most often used with TCP/IP. it's designed for connections with remote locations where a "small code footprint" is required or the network bandwidth is proscribed.

The MQTT protocol defines two kinds of network entities: a message broker and variety of clients. An MQTT broker may be a server that receives all messages from the clients then routes the messages to the suitable destination clients. An MQTT client is any system that runs a MQTT library and connects to a MQTT broker over a network (ranging from a microcontroller to a full-fledged server).

Information is organized in a very hierarchy of topics. When a publisher features a new item of information to distribute, it sends a sway message with the info to the connected broker. The broker then distributes the data to any clients that have subscribed to it topic. The publisher doesn't must have any data on the quantity or locations of subscribers, and subscribers, in turn, don't must be configured with any data about the publishers.

If a broker receives a letter on a topic on which there are no existing customers, the broker discards it unless the message's publisher specifies otherwise as a retained message. A retained message may be a normal MQTT message with the retained flag set to true. The broker stores the last retained message and also the corresponding QoS for the chosen topic. The retained message is sent to each customer who subscribes to a topic pattern that suits the subject of the retained message. The broker stores just one retained message per topic. This permits new subscribers to a subject to receive the foremost current value instead of looking ahead to the subsequent update from a publisher.

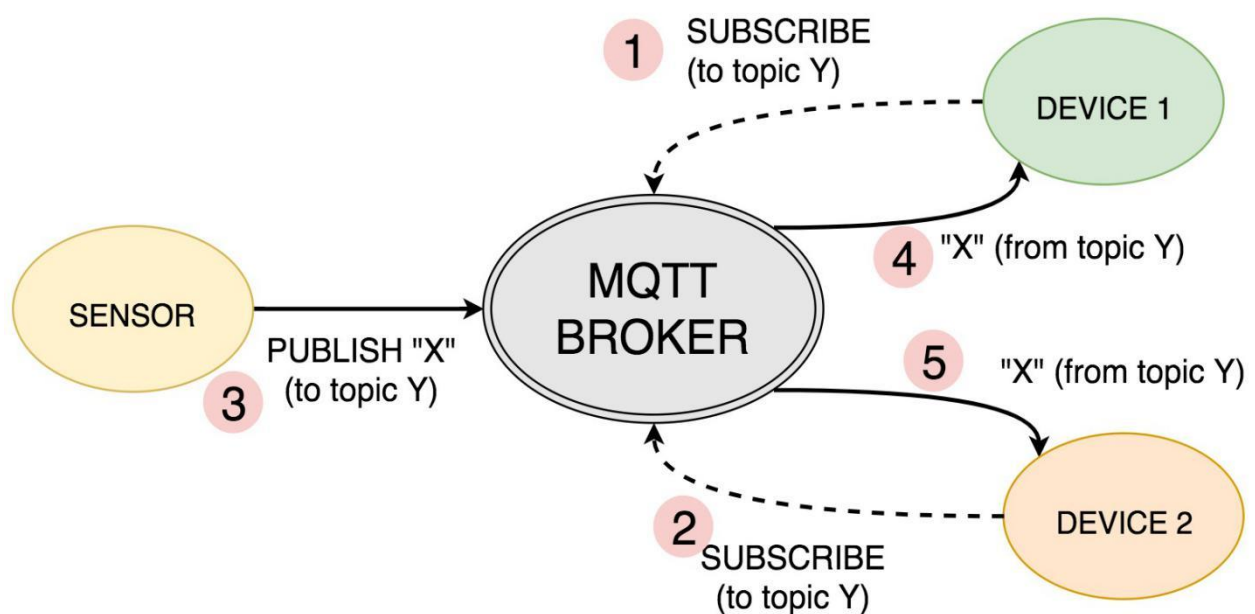


Figure:1.3 MQTT architecture diagram

When a publishing client first connects to the broker, it can found a default message to be sent to subscribers if the broker detects that the publishing client has unexpectedly disconnected from the broker. Clients only interact with a broker, but a system may contain several broker servers that exchange data supported their current subscribers' topics. A minimal MQTT control message may be as little as two bytes of information. an impression message can carry nearly 256 megabytes of information if needed. There are fourteen defined message types accustomed connect and disconnect a client from a broker, to publish data, to acknowledge receipt of knowledge, and to supervise the connection between client and server. For data transfer, MQTT uses the TCP

protocol. A variant, MQTT-SN, is employed over other transports like UDP or Bluetooth. MQTT sends link credentials in plain text format without any encryption or authentication features. This may be provided by using TLS to encrypt and protect the transferred information against interception, modification or forgery. The default unencrypted MQTT port is 1883. The encrypted port is 8883.

1.3 OBJECTIVES

- To measure the heart rate and body temperature of a patient using sensors.
- To display the patient condition to the doctor using a mobile application.
- To enable booking by the doctor using the mobile application and intimate pregnant women.

CHAPTER - 2

LITERATURE SURVEY

2.1 INTRODUCTION:

The following shows survey did for health monitoring systems. The most popular of the existing techniques is been discussed as follows.

2.2 LITERATURE SURVEY:

Piyush Sharma *et al*, (2020) Heart rate is a crucial physiological parameter to assess the cardiac condition of a personal and is traditionally determined by attaching multiple electrodes on the chest of a subject matter to record the electrical activity of the center. The installation and handling complexities of such systems doesn't prove feasible for a user to undergo a long-term monitoring within the home settings. A small-sized, battery-operated wearable display is placed on the suprasternal notch at neck to record acoustic signals containing information about breathing and cardiac sounds. the guts sounds obtained are heavily corrupted by the respiratory cycles and other external artifacts. This paper presents a unique algorithm for reliably extracting the guts rate from such acoustic recordings, keeping in mind the constraints posed by the wearable technology. The technique creates a signal's Hilbert energy envelope by measuring its instantaneous characteristics, and is then used to segment and label a cycle into S1 and S2 sounds based on their timing characteristics. The algorithm is evaluated on a dataset of 13 subjects with a total data duration of 75 hours, and it achieves an accuracy of 94.34 percent and an RMS error of 0.04 percent. three.96 bpm and a coefficient of correlation of 0.93 with relevancy an ad device in use.As compared to the standard scenario, robust efficiency was observed around the corners with just a 4% difference.The system is used to monitor only one parameter, hence cannot be used for multiple purposes.

Pholpat Durongbhan *et al.*,(2019) Alzheimer's disease (AD) accounts for 60-70% of all cardiomyopathy cases, and clinical diagnosis at its early stage is extremely difficult. As several new drugs progressing to modify disease progression or alleviate symptoms are being developed, to assess their efficacy, novel robust biomarkers of brain function are urgently required. The aim of this research is to look at a routine for identifying such biomarkers using qualitative electroencephalography review (QEEG). This paper suggests a method for supervised classification that makes use of EEG signals to classify healthy controls (HC) and AD participants. The framework consists of information augmentation, feature extraction, K Nearest Neighbour (KNN) classification, quantitative evaluation and topographic visualization. Considering the human brain either as a stationary or a phase space, both frequency-based and time-frequency-based features were tested in 40 participants. a) The proposed method are able to do up to 99% classification accuracy on short (4s) eyes open EEG epochs, with the KNN algorithm that has best performance in comparison to alternative machine learning approaches; b) The features extracted using the wavelet transform produced better classification performance compared to the features supported FFT; c) within the spatial domain, the temporal and parietal areas offer the most effective distinction between healthy controls and AD. The proposed framework can effectively classify HC and AD participants with high accuracy, meanwhile offering identification and localization of great QEEG features. The proposed framework can effectively classify HC and AD participants with high accuracy, meanwhile offering identification and localization of great QEEG features. The system proposes only for Alzheimer disease and not for lifestyle ailments.

Hui Yang *et al.* (2019) The system proposes only for Cardiomyopathy in older age could be a major health concern with the rise within the aging population. Preventive measures to stop or delay cardiomyopathy symptoms are of utmost importance. during this study, an outsized and wide range of things from multiple domains were investigated employing a large

nationally-representative sample of older people from the English Longitudinal Study of Ageing (ELSA). Seven machine learning algorithms were implemented to create predictive models for performance comparison. a straightforward model ensemble approach was wont to combine the prediction results of individual base models to further improve predictive power. A series of important factors in each domain area were identified. Alzheimer disease and not for lifestyle ailments. Cardiomyopathy in later life has emerged as a significant public health challenge in recent years with continuing increases in life expectancy. Strategies for preventing or alleviating cardiomyopathy symptoms in older people are much needed. In this study, a wide variety of factors (over 400 variables) from multiple domains, from a large nationally representative sample of older people (ELSA), were explored to identify characteristics associated with cardiomyopathy in older adults (Hui Yang et al., 2019). A wide variety of factors (over 400 variables) from multiple domains, from a large nationally representative sample of older people (ELSA). The system is not accurate in determination of the parameters, hence is not recommended for general use.

Fasih Haider et al (2016) Speech processing may be used to improve scientific methods for automatically predicting and tracking the progression of Alzheimer's disease. While previous studies have employed acoustic (speech) features for characterization of Alzheimer's cardiomyopathy, these studies focused on some common prosodic features, often together with lexical and syntactic features which require transcription. We present a close study of the predictive value of purely acoustic features automatically extracted from spontaneous speech for Alzheimer's cardiomyopathy detection, from a computational paralinguistic perspective. The effectiveness of several state-of-the-art paralinguistic feature sets for Alzheimer's detection were assessed on a balanced sample of Cardiomyopathy Bank's Pitt spontaneous speech dataset, with patients matched by gender and age. The feature sets assessed were the extended Geneva minimalistic acoustic parameter set (eGeMAPS), the emobase feature set, the Compare 2013 feature set, and new

Multi-Resolution Cochleagram (MRCG) features. Furthermore, we introduce a replacement active data representation (ADR) method for feature extraction in Alzheimer's cardiomyopathy recognition. Results show that classification models based solely on acoustic speech features extracted through our ADR method can do accuracy levels such as those achieved by models that employ higher-level language features. Results show that classification models based solely on acoustic speech features extracted through our ADR method can do accuracy levels akin to those achieved by models that employ higher-level language features. The system uses clinical machines making it too expensive for real time applications.

Ting-Ying Li *et al*, (2019) Because of the worldwide aging population, more and more elders suffer from cardiomyopathy problem. Nowadays, it's an inconvenient and time-consuming process for medical doctors to diagnose elders who live independently with possible cardiomyopathy because the method imposes an oversized quantity of diagnostic questions from a checklist that has to be answered by elders themselves or their caregivers either directly or after a long-term observation. so as to assist doctors to form this diagnostic process easier, this text proposes a supporting system that may quickly estimate the likelihood for an elder of getting cardiomyopathy supported 2 to 4 hours monitoring of a behavioral test done by the elder. During the test, the elder only has to perform certain activities selected from the so-called instrumental activities of daily living (IADL) in a very smart home environment, and their movement trajectories are extracted from motion sensors deployed within the smart home environment and be analyzed to seek out a possible correlation with the indoor wandering patterns. A machine learning algorithm is chosen to hold out the classification task, namely, into cardiomyopathy and no cardiomyopathy groups, supported our proposed features of the aforementioned wandering patterns. Two data sets are employed for performance evaluation, where the primary one is 232 elders including seven cardiomyopathy, whereas the second is collected by ourselves from a senior center, which is 30 elders including nine cardiomyopathy. In this system two

data sets are employed for performance evaluation making the system much accurate. The system requires longer time for observation, making the system to delay the training heavily.

Wei-Hsin Wang¹ *et al.*,(2018) An impaired cognitive ability is a vital indicator of cardiomyopathy-related disease. Accordingly, this study utilizes 12 inertia-related features, 19 gait-related features, and a pair of balance-related features to research the gait performance of subjects while performing single-task and dual-task walking tests and balance tests. The features most closely correlated with the cognitive ability of the topics are extracted via a correlation analysis (CA) method and a sequential forward floating selection (SFFS) algorithm, respectively. The extracted features are then used to predict the Cognitive Assessment Screening Instrument (CASI) and Mini status Examination (MMSE) variant the themes using three different prediction models, namely a rectilinear regression model, a nonlinear regression model, and a feedforward neural network (FNN) model. It is shown that the optimal prediction performance (i.e., prediction error = 7.89 ± 5.86 for the CASI score and prediction error = 3.21 ± 2.86 for the MMSE score) is obtained using the SFFS feature selection method and the FNN model. Patients with Alzheimer's disease tend to show a poor balance and gait performance while walking. Accordingly, this study has proposed a method for predicting the cognitive ability (CASI and MMSE scores) of potential cardiomyopathy sufferers based on the inertia and gait features obtained in single-task and dual-task walking tests and balance tests. In this system two data sets are employed for performance evaluation making the system much accurate. The system uses SFFS algorithm in which once a value is retained it can never be altered.

Hiroki Tanaka¹ *et al.*,(2017) A new approach to automatically detect cardiomyopathy. although some works have detected cardiomyopathy from speech and language attributes, most have applied detection using picture descriptions, narratives, and cognitive tasks. during this paper, we propose a replacement computer avatar with spoken dialog functionalities that produces spoken queries supported the mini-mental state examination, the Wechsler

memory scale-revised, and other related neuropsychological questions. We recorded the interactive data of spoken dialogues from 29 participants (14 cardiomyopathy and 15 healthy controls) and extracted various audiovisual features. We tried to predict cardiomyopathy using audiovisual features and two machine learning algorithms (support vector machines and logistic regression). We show that support vector machines outperformed logistic regression, and that they divided the participants into two classes with 0.93 detection efficiency, as calculated by the extracted features. by the areas under the receiver operating characteristic function. We also newly identified some contributing features, e.g., gap before speaking, the variations of fundamental, voice quality, and therefore the ratio of smiling. We developed a replacement computer avatar with spoken dialog functionalities. We registered 29 people and extracted behavioural characteristics from them. The analysis results showed that several features effectively distinguished between cardiomyopathy and healthy controls. The analysis results showed that several features effectively distinguished between cardiomyopathy and healthy controls. The system is inefficient and is not recommended for the development of real time applications.

Bruce Wallace *et al.*, (2017) A one-year study of 12 patients with moderate cardiomyopathy in an adult day program who played a completely unique whack-a-mole game-based measurement instrument for cognitive behavior and performance. The ongoing measurement of cognition and changes related to cardiomyopathy may be a challenge for healthcare providers. Measurement methods supported a tablet-based instrument are proposed. Partnership with the adult day program greatly eased recruitment: well-nigh 1 eligible participant joined our study, compared to 1 in five, or lower, for previous studies with similar populations. There are three unique aspects to the planning of our game: first, it's two distinct targets requiring different actions, which increases the cognitive processing for the users; second, each level is systematically more difficult; third, it records and analyzes player performance. The results show that the patients' game performance improves over the primary few

weeks; this means that they're learning the sport and retaining ability gains from week-to-week, suggesting some procedural learning continues to be intact. Over the year, 4 participants showed cognitive decline, 4 were stable and three improved supported their Monumental State Exam (MMSE) score. Two measures are proposed supported level progression within the sessions and mole hit performance. the amount progression measure identifies declining participants with one false negative (FN) and one false positive error. Two measures are proposed supported level progression within the sessions and mole hit performance. The system is too expensive for large scale usage.

Mohammad Kachuee, *et al*,(2016) Continuous pressure monitoring can provide invaluable information about individuals' health conditions. However, blood pressure is typically assessed with cumbersome cuff-based devices, preventing constant monitoring. This work presents an efficient algorithm, supported the heartbeat time of arrival (PAT), for the continual and cuff-less estimation of the Systolic pressure (SBP), Diastolic vital sign DBP), and Mean blood pressure (MAP) values. Methods: The suggested framework calculates BP values by analysing critical signals and removing two types of features: physiological parameters and whole-based representations of important signals. Finally, the regression algorithms are employed. For the BP estimation. Although the proposed algorithm works reliably with none need for calibration, an optional calibration procedure is additionally suggested, which could improve the system's accuracy even further. Results: The proposed method is evaluated on a pair of thousand subjects using the Association for the Advancement of Medical Instrumentation (AAMI) and thus nation Hypertension Society (BHS) standards. the tactic complies with the AAMI standard within the estimation of DBP and MAP values. In terms of the BHS protocol, the results are grade A for DBP estimation and grade B for MAP estimation. The method complies with the AAMI standard within the estimation of DBP and MAP values. The results of the BHS protocol were grade A for the estimation of DBP and

grade B for the estimation of MAP. The system is only useful to measure one parameter that is blood pressure of a patient.

Lijun Zhang *et al.*, (2015) Parkinson's disease (PD) is a chronic neurodegenerative condition characterised clinically by muscle weakness (bradykinesia, rigidity, tremor, and postural instability) and pathologically by dopaminergic neuron deficiency in the substantia nigra of the ganglia basale. A growing body of evidence suggests that cognitive deficits can occur in people with Parkinson's disease, even though they aren't demented. Substantia nigra (SN) atrophy has been reported in PD and will be associated with cognitive decline. Using high-resolution T1-weighted brain MRI and detailed cognitive activity from 71 non-demented PD and 48 control subjects matched for age, gender, and education, this study examined cortical thickness in non-demented PD subjects and elucidated its contribution to cognitive disability. Cortical thickness was compared between groups employing a flexible hierarchical multivariate Bayesian model, which accounts for correlations between brain regions. Correlation analyses were performed among brain areas and cognitive domains in addition, which showed significant group differences within the PD population. PD patients had substantial age-adjusted cortical thinning in inferior and superior parietal regions, as well as superior frontal, superior temporal, and precuneus areas (posterior chance > 0.9) when compared to controls. The left precentral and lateral occipital, as well as the right postcentral, middle frontal, and fusiform regions (posterior chance > 0.9), showed cortical thinning. Set shifting ($p=0.005$) and random stability ($p=0.02$), all of which were linked to the aforementioned cortical thinning regions ($p < 0.05$), were substantially decreased cognitive ability in PD patients. Patients with Parkinson's disease have slightly lower cognitive capacity in executive functions such as set shifting ($p=0.005$) and random resilience ($p=0.02$), all of which were linked to the aforementioned cortical thinning regions ($p < 0.05$). The system is only used to monitor patient affected by Parkinson disease.

Mitsuru Yoneyama *et al*, (2015) Accelerometry-based gait analysis may be a promising approach in obtaining insightful information on the gait characteristics of patients with neurological disorders like cardiomyopathy and Parkinson's disease (PD). so as to enhance its practical use outside the laboratory or hospital, it's required to style new metrics capable of quantifying ambulatory gait and their extraction procedures from long-term acceleration data. This paper describes a gait analysis approach that was created specifically for this purpose. Our system relies on one trunk-mounted accelerometer and analytical algorithm for the assessment of gait behavior which will be context-dependent. The algorithm consists of the detection of gait peaks from acceleration data and also the analysis of multimodal patterns within the relationship between gait cycle and vertical gait acceleration. a collection of six new measures will be obtained by applying the algorithm to a 24-h motion signal. to look at the performance and utility of our method, we recorded acceleration data from 13 healthy, 26 PD, and 26 mild cognitive impairment or cardiomyopathy subjects. Each patient group was further classified into two, comprising 13 members each, in step with the severity of the disease, and therefore the gait behavior of the five groups was compared. We found that the conventional, PD, and MCI/cardiomyopathy groups show characteristic walking patterns which might be distinguished from each other by the developed gait measure set. It is found that the normal, PD, and MCI/cardiomyopathy groups show characteristic walking patterns which can be distinguished from one another by the developed gait measure set. The system only supports patients affected by Parkinson disease and hence is not recommended for real time applications.

Alexandros Pantelopoulos and Nikolaos G. Bourbakis, Wearable health-monitoring systems (WHMSs) represent the new generation of healthcare by providing real-time unobtrusive monitoring of patients' physiological parameters through the deployment of several on-body and even intrabody biosensors. Although several technological issues regarding WHMS still need to be resolved in order to become more applicable in real-life scenarios, it is expected that continuous ambulatory monitoring of vital signs will enable proactive personal health management and better treatment of patients suffering from chronic diseases, of the elderly population, and of emergency situations. In this paper, we present a physiological data fusion model for multi-sensor WHMS called Prognosis. The proposed methodology is based on a fuzzy regular language for the generation of the prognoses of the health conditions of the patient, whereby the current state of the corresponding fuzzy finite-state machine signifies the current estimated health state and context of the patient. The operation of the proposed scheme is explained via detailed examples in hypothetical scenarios. Finally, a stochastic Petri net model of the human-device interaction is presented, which illustrates how additional health status feedback can be obtained from the WHMS' user.

A stochastic Petri net model of the human-device interaction is presented, which illustrates how additional health status feedback can be obtained from the WHMS' user. The system proposes to only measure one parameter from the blood making it not usable for extensive real time applications.

Sakari Junnila *et al*, We propose a general purpose home area sensor network and monitoring platform that is intended for e-Health applications, ranging from elderly monitoring to early homecoming after a hospitalization period. Our monitoring platform is multipurpose, meaning that the system is easily configurable for various user needs and is easy to set up. The system could be temporarily rented from a service company by, for example, hospitals, elderly

service providers, specialized physiological rehabilitation centers, or individuals. Our system consists of a chosen set of sensors, a wireless sensor network, a home client, and a distant server. We evaluated our concept in two initial trials: one with an elderly woman living in sheltered housing, and the other with a hip surgery patient during his rehabilitation phase. The results prove the functionality of the platform. However, efficient utilization of such platforms requires further work on the actual e-Health service concepts.

The results prove the functionality of the platform. However, efficient utilization of such platforms requires further work on the actual e-Health service concepts. The system does not measure any parameter of the patient it is based out of assumptions.

Foad Dabiri *et al*, The improvement in processor performance through continuous breakthroughs in transistor technology has resulted in the proliferation of lightweight embedded systems. Advances in wireless technology and embedded systems have enabled remote healthcare and telemedicine. While medical examinations could previously extract only localized symptoms through snapshots, now continuous monitoring can discretely analyze how a patient's lifestyle affects his/her physiological conditions and if additional symptoms occur under various stimuli. We demonstrate how medical applications in particular benefit from a hierarchical networking scheme that will improve the quantity and quality of ubiquitous data collection. Our Telehealth networking infrastructure provides flexibility in terms of functionality and the type of applications that it supports. We specifically present a case study that demonstrates the effectiveness of our networked embedded infrastructure in an *in vivo* pressure application. Experimental results of the *in vivo* system demonstrate how it can wirelessly transmit pressure readings measuring from 0 to 1.5 lbf/in² with an accuracy of 0.02 lbf/in². The challenges in biocompatible packaging, transducer drift, power management, and *in vivo* signal transmission are also discussed. This research brings researchers a step closer to continuous, real-time systemic

monitoring that will allow one to analyze the dynamic human physiology. This research brings researchers a step closer to continuous, real-time systemic monitoring that will allow one to analyze the dynamic human physiology. The system is very complicated to arrive at results making it not feasible for real time applications.

James Y. Xu *et al*, Large-scale activity monitoring is a core component of systems aiming to improve our ability to manage fitness, deliver care, and diagnose conditions. While much research has been devoted to the accurate classification of motion, the challenges arising from scaling to large communities have received little attention. This paper introduces the problem of scaling, and addresses two of the most important issues: enabling robust large-scale ground-truth acquisition and building a common database for systems comparison. This paper presents a voice powered mobile acquisition system with efficient annotation tools and an extendable online searchable activity database with 331 datasets totaling over 700 h with 8 sensing modalities and 15 activities. This paper presents a voice powered mobile acquisition system with efficient annotation tools and an extendable online searchable activity database with 331 datasets totaling over 700 h with 8 sensing modalities and 15 activities. This system takes longer duration for training making it not feasible for real time applications.

2.3 DISADVANTAGES IN EXISTING SYSTEM:

- The existing system is not reliable, hence is not recommended for real time applications.
- The existing system only focuses on the heart rate measurement of a patient.
- Does not give any solution for training pregnant patients.

CHAPTER - 3

AIM AND SCOPE

3.1 EXISTING SYSTEM:

Heart rate is a vital physiological parameter to assess the cardiac condition of a person and is traditionally determined by attaching multiple electrodes on the chest of a subject to record the electrical activity of the heart. The implementation and managing complexity of such applications make long-term surveillance in the home settings impractical for a customer. A small-sized, battery-operated wearable acoustic impulses containing information about breathing and heart sounds are captured by the suprasternal notch in the ear. The respiratory cycles and other external objects heavily contaminate the data.

This paper proposes a novel algorithm for accurately extracting the heart rate from such acoustic measurements while taking into account the wearable technology's limitations. Using a clock's pacing characteristics cardiac cycle, the technique builds the Hilbert energy envelope of the signal by measuring its instantaneous characteristics in order to fragment and distinguish it into S1 and S2 sounds. The algorithm is put to the test on a dataset of 13 people, approximate data length of 75 hours and achieved an accuracy of 94.34%, an RMS error of three. 96 bpm and a correlation coefficient of 0.93 with relevancy an advert device in use.

3.2 DISADVANTAGES OF EXISTING SYSTEM:

- The existing system is not reliable, hence is not recommended for real time applications.
- The existing system only focuses on the heart rate measurement of a patient.
- Does not give any solution for training pregnant patients.

3.3 PROPOSED SYSTEM:

Over four million children were born in India in the fiscal year 2020, with a little more than 277 thousand being born at home the data shows a growing trend of institutional deliveries at hospitals or primary health centres, compared to ones reception. This meant that India's plans to upgrade maternity care services have improved. This also means the growing need of doctors and health care workers to effectively monitor and cater to the requirements of the pregnant women. so as to beat these problems and supply proper monitoring of the pregnant women our project aims at developing an application for monitoring the guts rate and blood heat of the pregnant women which is measured using the suitable sensors. An efficient real time microcontroller is employed to process the data and a Wi-Fi gateway is employed to transmit the information wirelessly. Mobile applications for both patients and also the doctor employing a javascript framework react native. The doctors mobile application displays both the center rate and blood heat of all the pregnant patients under his/her supervision for live monitoring. The doctor also can book appointments for the patient. The pregnant women is notified of the appointments. Thus, this project helps in taking care of pregnant women at the correct time and to avoid difficulties.

3.4 ADVANTAGES:

- Cheap and Effective Solution for monitoring the pregnant women.
- Uses sensors to identify and predict two parameters body temperature and heart rate
- Easy for Doctors to monitor pregnant women

3.5 APPLICATIONS:

- Used for test centers
- Used in NGO.

- Used in day care centers
- Used in hospitals.

CHAPTER - 4

MATERIALS AND METHODS

DETAILED DESIGN OF THE PROJECT:

This chapter describes the overall detailed design of the project. It also describes each module.

4.1 BLOCK DIAGRAM:

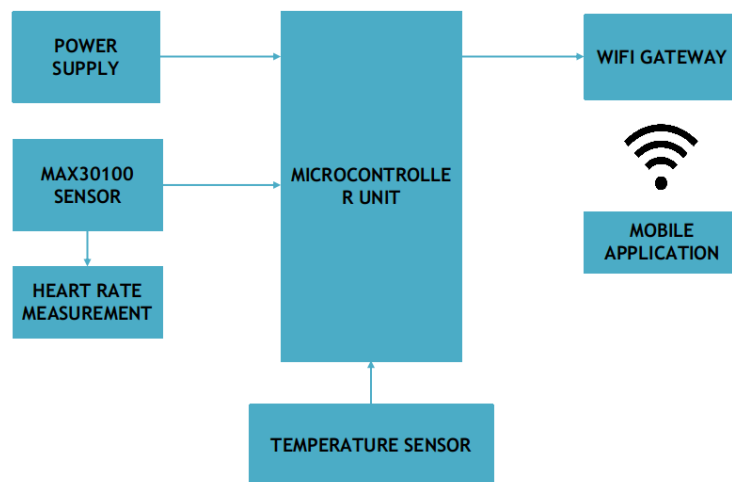


Figure 4.1 Block diagram

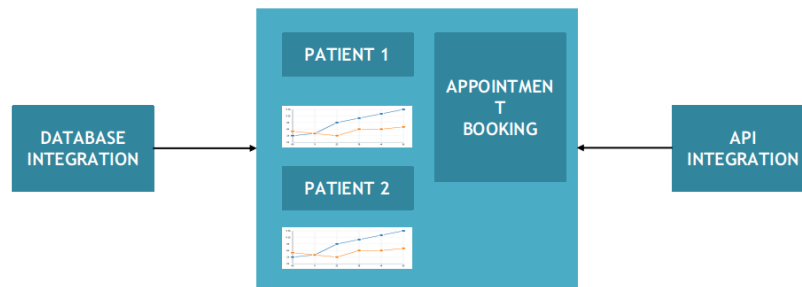


Figure 4.2: Doctor web application

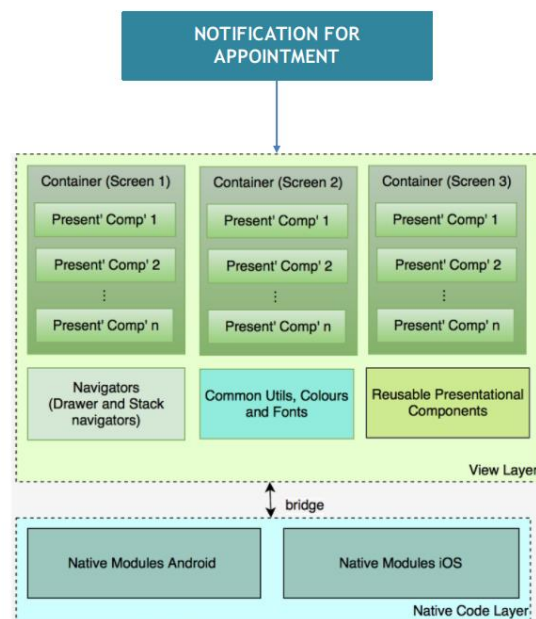


Figure 4.3: Patient mobile application

4.2 WORKING:

The project aims at developing an application for monitoring the heart rate and body temperature of the pregnant women which is measured using the appropriate sensors. An efficient real time microcontroller is used to process the information and a Wi-Fi gateway is used to transmit the data wirelessly.

Mobile applications for both patients and the doctor using a javascript framework react native. The doctors mobile application displays both the heart rate and body temperature of all the pregnant women under his/her supervision for live monitoring. The doctor can also book appointments for the patient. The pregnant patient is notified of the appointments. Thus, this project helps in taking care of pregnant women at the right time and to avoid difficulties.

4.3 MODULES DESCRIPTION:

- Power supply module
- Microcontroller module
- Heart rate sensor
- Temperature sensor
- Gateway module
- Mobile application module

4.3.1 POWER SUPPLY MODULE:

The power supply circuit consists of transformer which is 230v step right down to 12v. In this circuit 4 diodes are used to form bridge rectifier which delivers pulsating dc voltage & then fed to capacitor filter the output voltage from rectifier is fed to filter to eliminate any A.C components present even after rectification.

The filtered DC voltage is given to regulator to provide 12v constant DC voltage. 230V AC power is converted into 12V AC (12V RMS value wherein the peak value is around 17V), but the desired power is 5V DC; for this purpose, 17V AC power must be primarily converted into DC power then it may be stepped all the way down to the 5V DC. AC power is converted into DC using one in all the ability electronic converters called as Rectifier. There are differing kinds of rectifiers, like half-wave rectifier, rectifier and bridge rectifier. because of the benefits of the bridge rectifier over the half and full wave rectifier, the bridge rectifier is usually used for converting AC to DC.

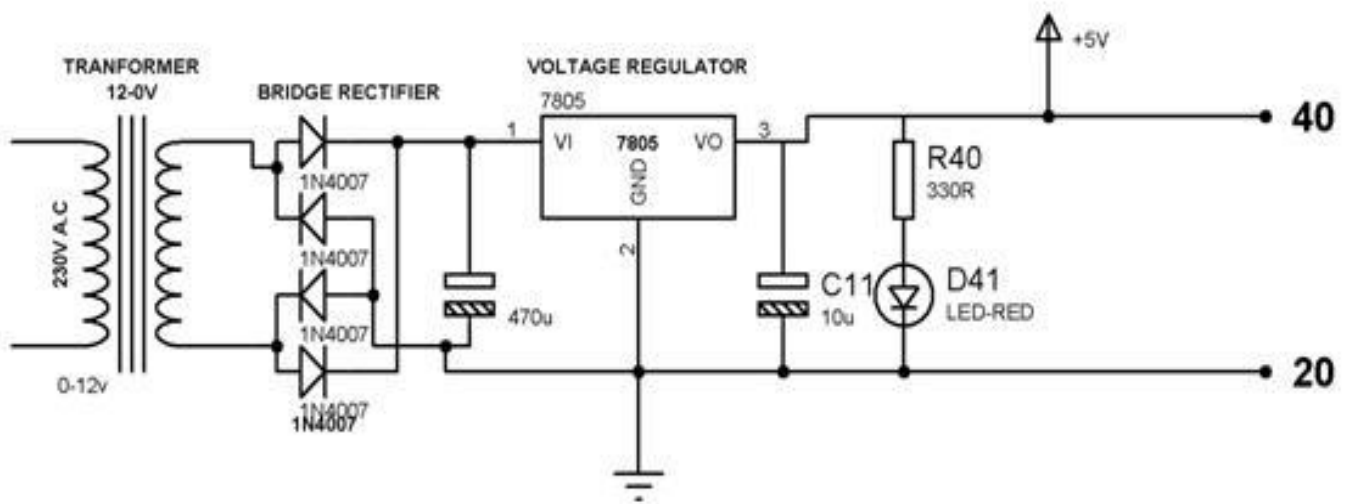


Figure: 4.4 Power supply

4.3.2 MICROCONTROLLER MODULE

The ATmega-328 is a difficult Virtual RISC (AVR) microcontroller. It supports the information up to eight (8) bits. ATmega-328 has 32KB internal built-in memory. This micro-controller incorporates a lot of other characteristics. you must even have a glance at Introduction to PIC16F877a (it's a PIC Microcontroller) so compare functions of those two Microcontrollers. Electrically Erasable Programmable Read Only Memory (EEPROM) is available on the ATmega 328. (EEPROM) is an acronym for electrically erasable This property indicates that if the microcontroller's electrical supply is removed, the microcontroller will still store information and provide data after the electrical supply is restored. Furthermore, the ATmega-328 has a 2KB Static Random Access Memory (SRAM) (SRAM). Other characteristics are explained later. The ATmega 328 has a number of features that make it the most common computer on the market today. These features incorporates advanced RISC architecture, good performance, low power consumption, real timer counter having separate oscillator, 6 PWM pins, programmable Serial USART, programming lock for software security,

throughput up to twenty MIPS etc. ATmega-328 is usually utilized in Arduino.

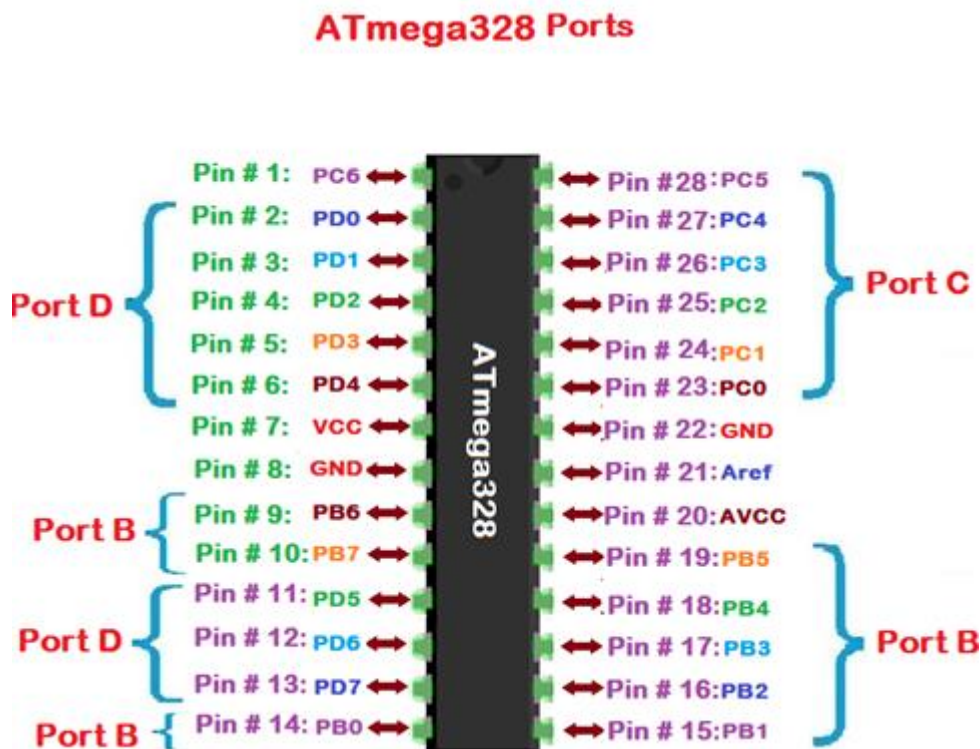


Figure: 4.5 Atmega 328

4.3.3 HEART SENSOR

MAX30100 is a sensor that combines a pulse oximeter and a heart rate monitor. It's an optical sensor that gets the information by emitting two wavelengths of sunlight from two LEDs – one red and the other infrared – and then measuring the absorbance. of pulsing blood through a photodetector. This particular LED colour combination is optimized for reading the info through the tip of one's finger. it's fully configurable through software registers and also the digital output data is stored in a very 16-deep FIFO within the device. It has an I2C digital interface to speak with a number microcontroller.

Ambient light cancellation (ALC), 16-bit sigma delta ADC, and patented discrete time filter make up the pulse oximetry subsystem in the MAX30100. it's an ultra-low-power operation which makes it ideal for battery operated systems.

The MAX30100 needs a power supply that is between 1.8 and 3.3 volts.

Wearable devices, fitness assistant devices, medical tracking devices, and

other devices often use it. The MAX30100 is powered by 1.8V. and 3.3V power supplies and might be powered down through software with negligible standby current, permitting the ability supply to stay connected the least bit times.



Figure: 4.6MAX30100 sensor

4.3.4 TEMPERATURE SENSOR:

The DHT11 digital temperature and humidity sensor may be a simple, low-cost option. Through a capacitive humidity sensor and a thermistor, it monitors the ambient air and spits out a digital signal on the data pin (no analogue input pins needed). It's easy to use, but data collection necessitates careful scheduling. The sole real downside of this sensor is you'll only get new data from it once every 2 seconds.

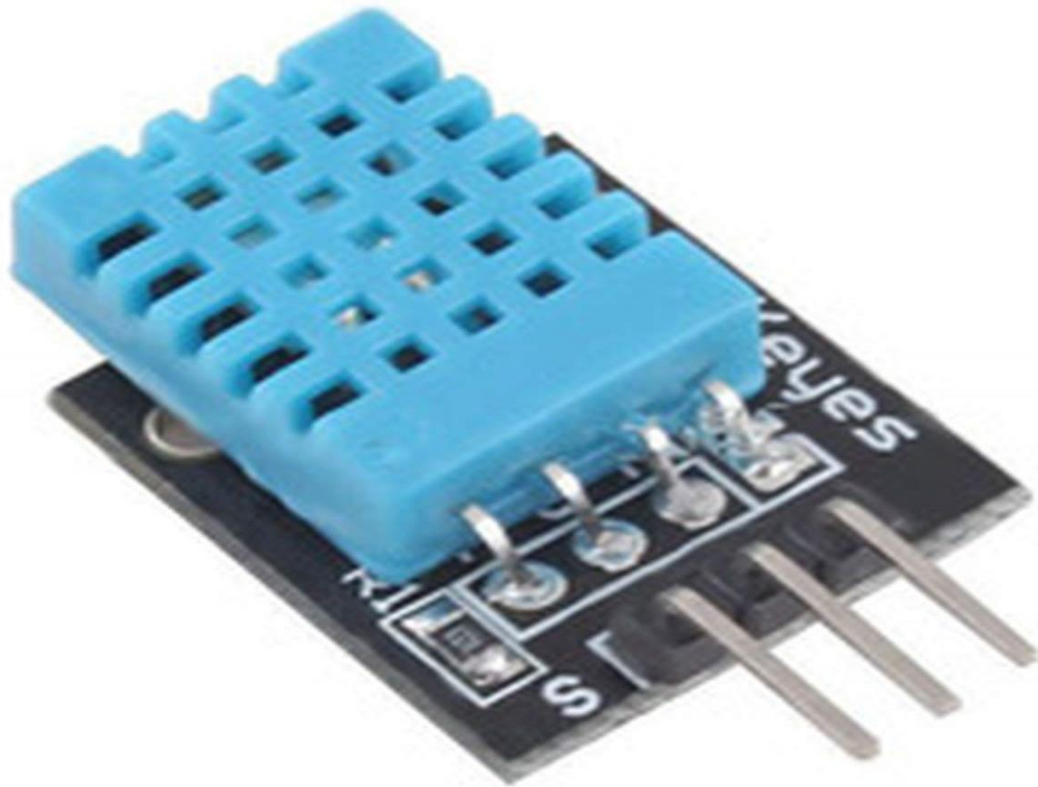


Figure: 4.7 DHT11 sensor

4.3.5 GATEWAY SENSOR:

Espressos, a Shanghai-based Chinese maker, also produces the ESP8266, a low-cost Wi-Fi chip with complete TCP/IP stack and MCU (microcontroller unit) capabilities. The ESP-01 processor, produced by a third-party designer, Ai-Thinker, first brought the chip to the attention of western makers in August 2014. This small module uses Hayes-style instructions to assist microcontrollers in connecting to a Wi-Fi network and making simple TCP/IP connections. However, there was very little English-language literature on the chip and the commands it recognised at the time. The very low price and also the indisputable fact that there are only some external components on the module which suggested that it could eventually be very inexpensive in volume, attracted many hackers to explore the module, chip, and also the software thereon, still on translate the Chinese documentation. The ESP8285 is an

ESP8266 with 1 MiB of built-in flash that can link to Wi-Fi through single-chip devices.

The successor to those microcontroller chips is that the ESP32. Manufacturers can use the ESP8266 (currently ESP8266EX) chip to create wirelessly networkable microcontroller modules. More specifically, ESP8266 could be a system-on-a-chip (SoC) with capabilities for two.4 GHz Wi-Fi (802.11 b/g/n, supporting WPA/WPA2), general-purpose input/output (16 GPIO), Inter-Integrated Circuit (I²C), analog-to-digital conversion (10-bit ADC), Serial Peripheral Interface (SPI), I²S interfaces with DMA (sharing pins with GPIO), UART (on dedicated pins, plus a transmit-only UART may be enabled on GPIO2), and pulse-width modulation (PWM). Espressif's "L106" processor core is based on Tensilica's Diamond Standard 106Micro 32-bit processor controller core and operates at 80 MHz (or overclocked to 160 MHz). It has a 64-kilobyte boot ROM, a 64-kilobyte instruction RAM, and a 96-kilobyte data RAM. External non-volatile storage will be accessed through SPI.

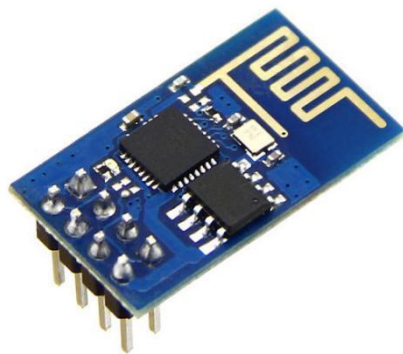


Figure 4.8 ESP8266 module

4.3.6 Mobile application module:

In this project react native is used for mobile app development. React Native may be a framework that builds a hierarchy of UI components to create the JavaScript code. it's a collection of components for both iOS and Android platforms to make a mobile application with a native look and feel. Mobile development has witnessed unprecedented growth. in keeping with statistics,

mobile applications will generate an estimated 188 billion U.S. By 2020, app stores, ads, and in-app sales will generate billions of dollars in revenue. Single and business consumers expect high-quality applications that work flawlessly, have several screens, are easy to use, and are well-designed. On the opposite side, high-performing, good quality native apps are very time-consuming to develop compared to cross-platform apps that provide faster development but compromise on performance and support. React Native seems to be a viable solution for building high-quality apps in a very short time with the identical performance and user-experience standards that native apps provide.

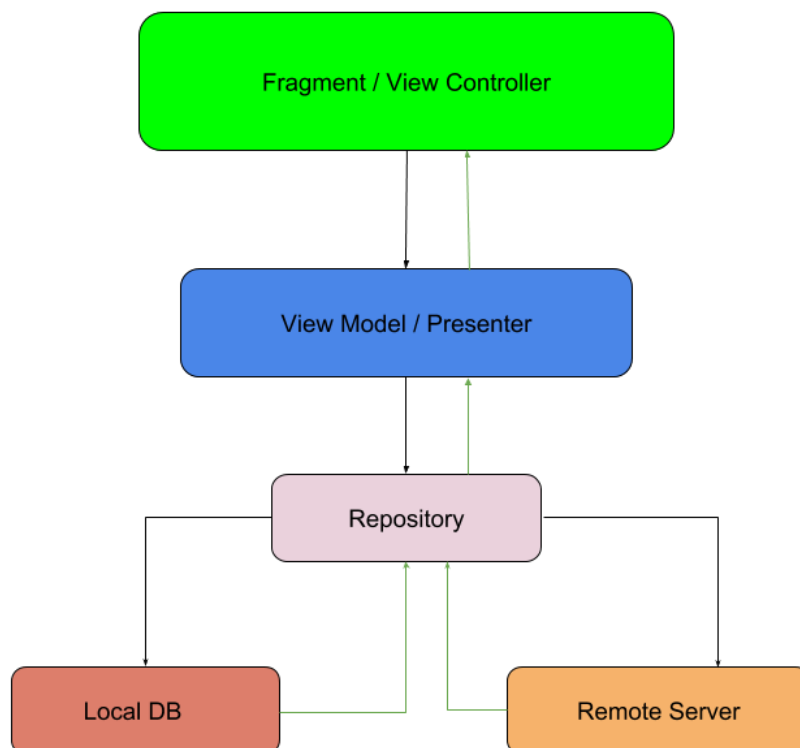


Figure 4.9: Mobile App Development

React Native's architecture aids us in structuring a project for a multi-platform smartphone device by encapsulating the business logic in a reusable and maintainable sub-module. In some projects, we are able to see that the containers may well be important to be within the core module but that depends on the

applications. React Native uses different mechanisms to form an efficient, consistent and reusable visual identity for the applications.

4.4 SOFTWARE USED:

4.4.1 VISUAL STUDIO

In this project the Microsoft visual studio is employed as an IDE.

Visual Studio Programming incorporates the ease of use of an ASCII text editor with advanced development features such as IntelliSense code completion and debugging.

First and foremost, it's an editor that gets out of your way. The delightfully frictionless edit-build-debug cycle means less time fidgeting with your environment, and longer executing on your ideas.

Visual Studio Code supports macOS, Linux, and Windows - so you'll be able to hit the bottom running, irrespective of the platform.

At its heart, Visual Studio Code features a lightning fast ASCII text file editor, perfect for day-to-day use. With support for many languages, VS Code helps you be instantly productive with syntax highlighting, bracket-matching, auto-indentation, box-selection, snippets, and more. You can access the code with ease thanks to intuitive keyboard shortcuts, simple customization, and community-contributed keyboard shortcut mappings.

For serious coding, you'll often get pleasure from tools with more code understanding than simply blocks of text. IntelliSense code completion, rich semantic code interpretation and navigation, and code refactoring are all integrated into Visual Studio Code. When the scripting becomes difficult, the rough turn to debugging. Debugging is usually the one feature that developers miss most in an exceedingly leaner coding experience, so we made it happen. Visual Studio Code includes an interactive debugger, so you'll be able to step through ASCII text file, inspect variables, view call stacks, and execute commands within the console.

VS Code also combines with create and scripting applications to help you complete basic tasks faster. VS Code has support for Git so you'll work with

source control without leaving the editor including viewing pending changes diffs. Customize any feature to your taste and add as many third-party plugins as you like. Although most scenarios run "out of the box" with no setup, we allow you to customise your VS Code experience to suit your needs. unique needs.

VS Code includes enriched built-in support for Node.js development with JavaScript and TypeScript, powered by the identical underlying technologies that drive Visual Studio. Web technologies such as JSX/React, HTML, CSS, SCSS, Less, and JSON are all well-represented in VS Code.

Architecturally, Visual Studio Code combines the most effective of web, native, and language-specific technologies. VS Code uses Electron to merge web technology like JavaScript and Node.js with native app speed and adaptability. VS Code makes use of the same industrial-strength HTML-based editor that powers Other projects include the "Monaco" cloud editor, Internet Explorer's F12 Tools, among others. Additionally, VS Code uses a tools service architecture that permits it to integrate with many of the identical technologies that power Visual Studio, including Roslyn for .NET, TypeScript, the Visual Studio debugging engine, and more.

A public extensibility model in Visual Studio Code allows developers to create and use plugins, as well as configure their edit-build-debug experience.

4.4.2 Android Studio:

In this project android studio is employed because the environment for mobile application development.

Android Studio is Google's official integrated programming environment (IDE), based on JetBrains' IntelliJ IDEA software and developed specifically for Android development. [8] it's obtainable In 2020, it will be available for use on Windows, macOS, and Linux operating systems, as well as as a subscription-based service. It's a supplement for Eclipse Android Development Tools (E-ADT), the main IDE for creating native Android applications. On May 16, 2013, at the Google I/O meeting, Android Studio was revealed. It was in an early access test stage starting with version 0.1 in May 2013, and moved into

beta stage starting with version 0.8 in June 2014. 'The' first stable build was released in December 2014, ranging from version 1.0.

For example, Android Studio 3.0 or later supports Kotlin and "all Java 7 language features and a subset of Java 8 language features," and Android Studio 3.0 or later supports "all Java 7 language features and a subset of Java 8 language features." of Java 8 language features," also as Java, C++, et al with extensions, like Go; and Android Studio 3.0 or later supports Kotlin and "all Java 7 language features and a subset of Java 8 language features." Features of the language that change counting on the All Java 9 features that are backported from external programmes are referred to as "platform edition." Although IntelliJ states that Android Studio supports all released Java versions in addition to Java 12, it is uncertain how much support Android Studio has for Java versions prior to Java 12. It's unclear to what extent Android Studio supports Java versions up to Java 12 at this point (the documentation mentions partial Java 8 support). Android supports a minimum of certain new language functionality up to Java 12.

Features:

- Android-specific refactoring and fast fixes
- Lint tools to grab results, accessibility, version compatibility, and other issues
- Gradle-based construct help
- Template-based wizards to create common Android designs and components
- ProGuard integration and app-signing capabilities
- A drag-and-drop UI component editor, as well as the option to preview templates on different screen setups.

- Built-in support for Google Cloud Platform, allowing convergence with Firebase Cloud Messaging (formerly 'Google Cloud Messaging') and Google App Engine.
- Support for Android Wear applications
- Use the Android Virtual Device (Emulator) to run and debug applications studio.

4.4.3 ARDUINO

In this project the Arduino software is employed.

Beginners will find the Arduino app simple to use, but experienced users will find it versatile. It's compatible for Mac, Windows, and Linux. It is used by teachers and students to make low-cost science instruments, to demonstrate chemistry and physics concepts, and to get students interested in programming and robotics. Designers create immersive projects, while performers and artists use it to create installations and test experimental musical instruments. Makers, of course, use it to make many of the projects exhibited at the Maker Faire, for instance. Arduino could be a key tool to find out new things. Anyone - youngsters, hobbyists, musicians, programmers - can get started tinkering by following the step-by-step directions in a kit or exchanging ideas with other Arduino members online. For physical computing, there are a variety of other microcontrollers and microcontroller platforms to choose from. Similar features can be found in Parallax Basic Stamp, Netmedia's BX-24, Phidgets, MIT's Handyboard, and a slew of other programmes. All of those tools condense the complicated aspects of microcontroller programming into a user-friendly bundle. While Arduino simplifies the method of operating with microcontrollers, it has one benefit over other frameworks for instructors, students, and interested amateurs:

- In comparison to other microcontroller architectures, Arduino boards are comparatively inexpensive. The least expensive Arduino module will be

constructed by hand, and even pre-assembled Arduino modules will cost less than \$50.

- Cross platform - The Arduino Software (IDE) is compatible with Windows, Macintosh OSX, and Linux. The majority of microcontroller systems are only compatible with Windows.
- The Arduino Software (IDE) is a simple, straightforward programming environment that is easy to use for beginners while still being versatile enough for experienced users to take advantage of. It's useful for teachers when the Processing programming environment is assisted, so students learning to programme in that environment are familiar with how the Arduino IDE works.
- Free source and extensible applications - The Arduino software is available as open source tools that advanced programmers can extend. C++ libraries will be added to the language, and those interested in learning more about the technical specifics should move from Arduino to the AVR C programming language on which it is based. Similarly, if you want to, you can use AVR-C code directly in your Arduino programmes.
- The designs for the Arduino boards are written under a clever Commons licence, allowing professional circuit designers to create their own version of the module, expanding and upgrading it. And beginner users can build the breadboard version of the module to learn how it works and save money..

CHAPTER 5

RESULTS AND DISCUSSION

The below image shows the complete hardware setup of the project:

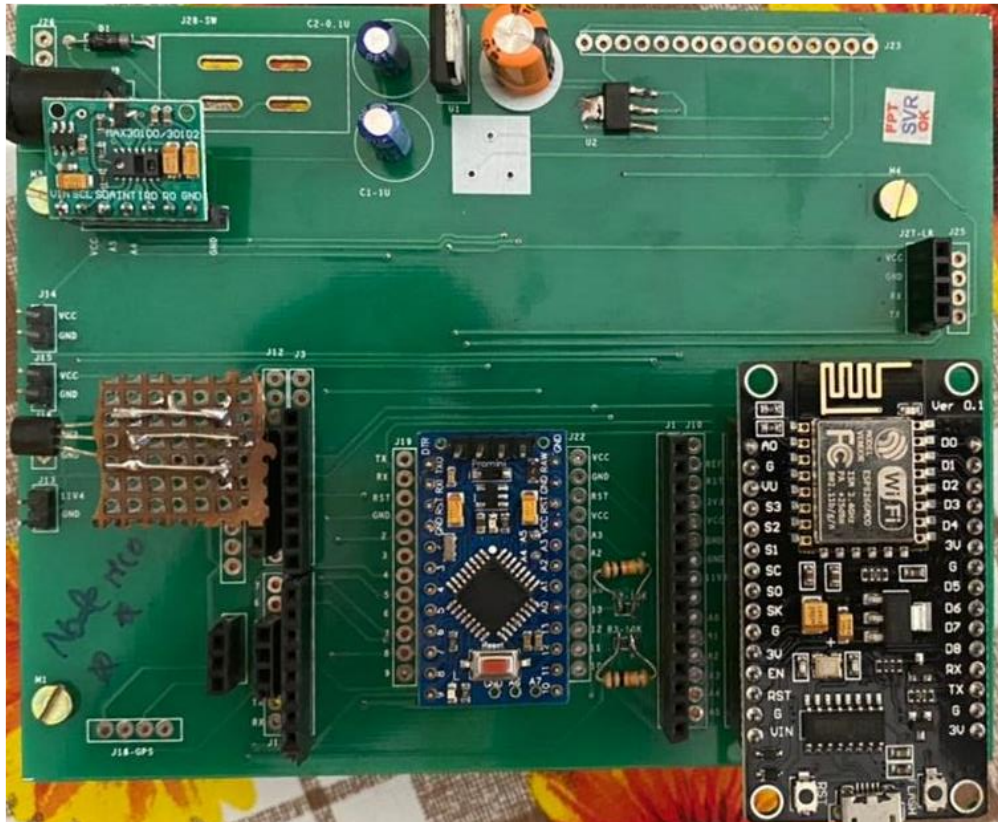


Figure 6.1: Hardware setup of the project

A mobile application using a javascript framework react native is developed. The below image shows the login page of the react native application:

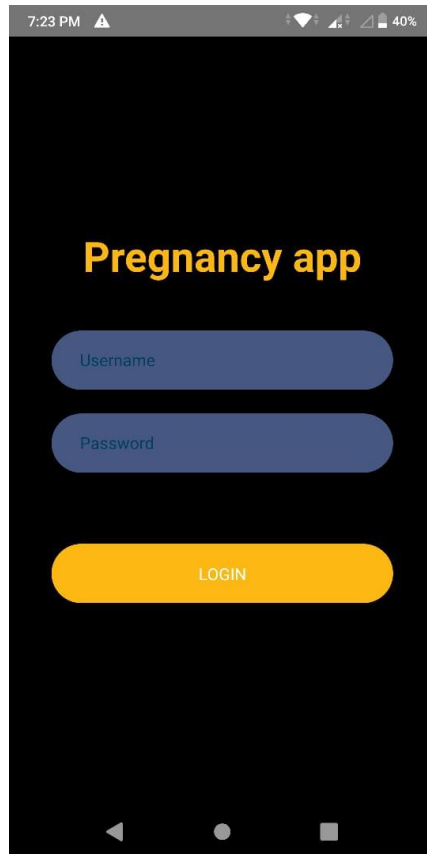


Figure 6.2: Login page of the mobile application

The below image shows the doctor home page viewing on successful login:

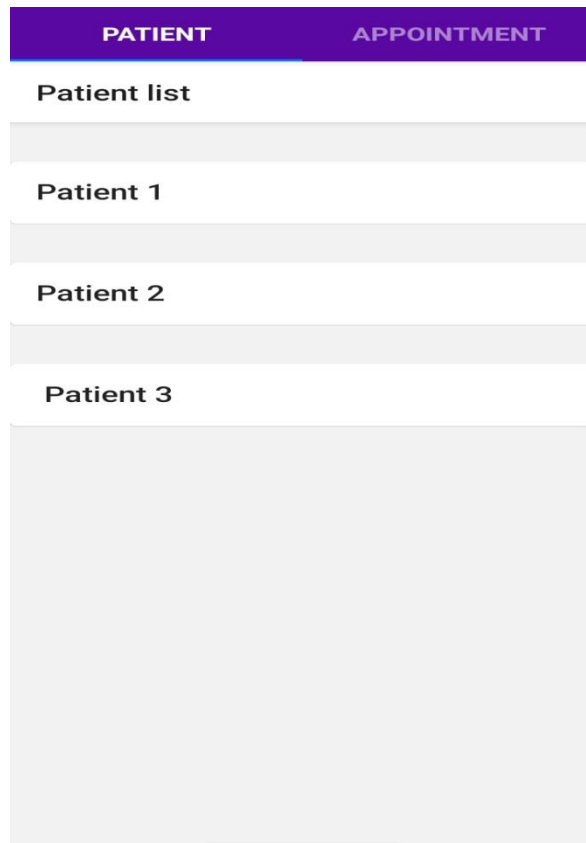
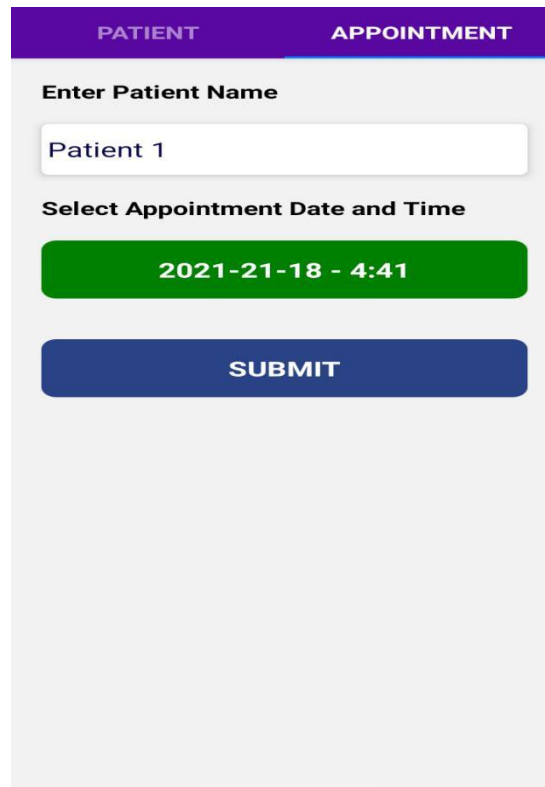


Figure 6.3: Doctor page of the mobile application

The below image shows the patient appointment booking page of the mobile application:



The image shows a mobile application interface for patient appointment booking. It features a purple header with two tabs: 'PATIENT' and 'APPOINTMENT'. Below the header, there is a section titled 'Enter Patient Name' with a text input field containing 'Patient 1'. This is followed by a section titled 'Select Appointment Date and Time' with a green button displaying '2021-21-18 - 4:41'. At the bottom of this section is a blue button labeled 'SUBMIT'.

Figure 6.4: Patient appointment booking page

The below image shows the patient health status page of the mobile application:

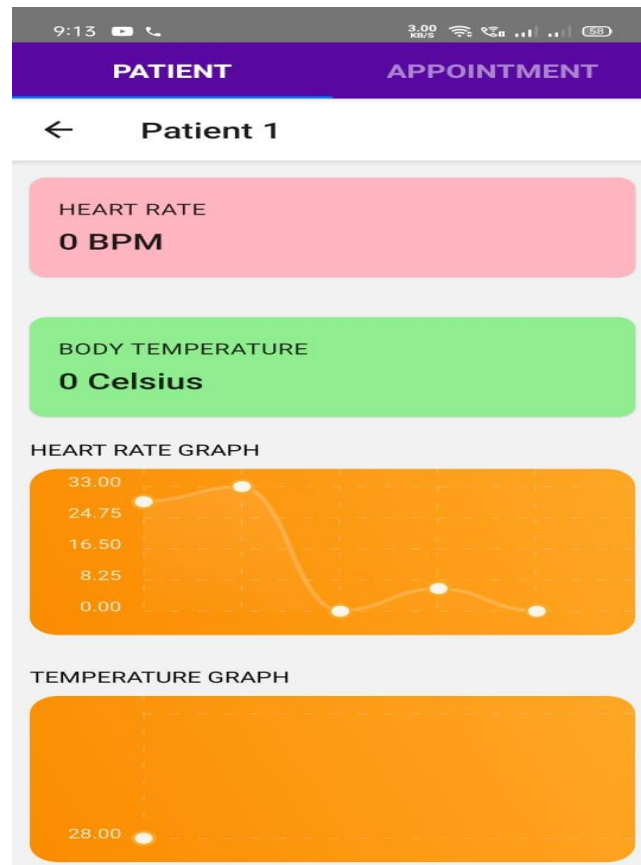


Figure 6.5: Patient health status page

The below image shows the patient to view his /her upcoming scheduled appointments:

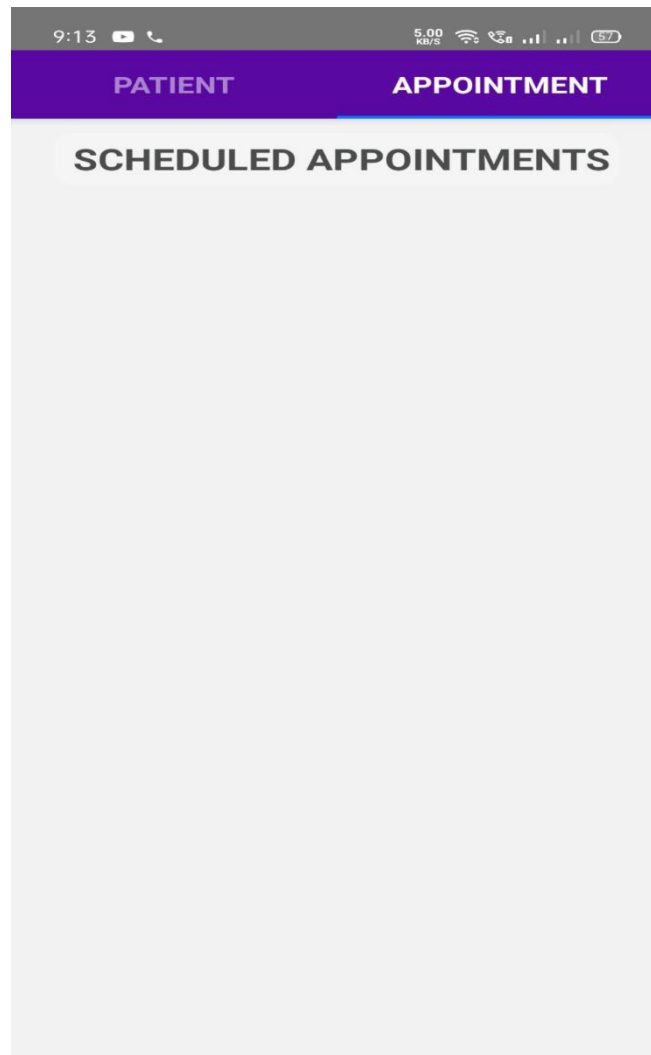


Figure 6.6: Scheduled appointment page

CHAPTER 6

SUMMARY AND CONCLUSION

6.1 SUMMARY

This project proposes a mobile application development for pregnant women monitoring system to develop as a consumer electronics product with low computational cost and high accuracy outcomes for automatically monitoring and recognizing the critical parameters of patients living alone. Moreover, this system can be utilized for all patients monitoring and is also very promising for real-time applications because of the fast processing time. It is useful for diseased patients.

6.2 CONCLUSION

The web application for pregnant women monitoring system implemented in this project can be further developed to use as a product in real time it can be further analyzed for higher accuracy. Thus, by implementing this in real time will help all the diseased patients to predict the disease presence at the earlier stage.

REFERENCES

- [1] Alexandros Pantelopoulos; Nikolaos G. Bourbakis, "Prognosis—A Wearable Health-Monitoring System for People at Risk: Methodology and Modeling"
- [2] Bruce Wallace , Senior Member, IEEE, Frank Knoefel, Rafifik Goubran, Fellow, IEEE, Philippe Masson, Amanda Baker, Brianna Allard, Victor Guana, and Eleni Stroulia,"Detecting Cognitive Ability Changes in Patients With Moderate Cardiomyopathy Using a Modified "Whack-a-Mole" Game,IEEE Transactions On Instrumentation And Measurement,Vol.0018-9456,2017.
- [3] Fasih Haider, Member, IEEE, Sofifia de la Fuente and Saturnino Luz, Member, IEEE,"An Assessment of Paralinguistic Acoustic Features for Alzheimer's Cardiomyopathy Recognition in Spontaneous Speech",IEEE Journal of Selected Topics in Signal Processing,Vol. 14, No. 8, August 2016.
- [4] Foad Dabiri; Tammara Massey; Hyduke Noshadi; Hagop Hagopian; C. K. Lin; Robert Tan; Jacob Schmidt; Majid Sarrafzadeh," A Telehealth Architecture for Networked Embedded Systems: A Case Study in In Vivo Health Monitoring"
- [5] Hiroki Tanaka¹ , Hiroyoshi Adachi² , Norimichi Ukita³ , Manabu Ikeda⁴, Hiroaki Kazui⁴ , Takashi Kudo² , And Satoshi Nakamura¹ , (Fellow, IEEE),"Detecting Cardiomyopathy Through Interactive Computer Avatars",IEEE Transactions And Content Mining,Vol.2168-2372,2017.
- [6] Hui Yang, Peter A. Bath,"The Use of Data Mining Methods for the Prediction of Cardiomyopathy: Evidence from the English Longitudinal Study of Aging", IEEE Journal of Biomedical and Health Informatics, Vol.2168-2194, 2019.

James Y. Xu; Greg J. Pottie; William J. Kaiser,” Enabling Large-Scale Ground-Truth Acquisition and System Evaluation in Wireless Health”

[7] Lei Clifton; David A. Clifton; Marco A. F. Pimentel; Peter J. Watkinson; Lionel Tarassenko,” Gaussian Processes for Personalized e-Health Monitoring With Wearable Sensors”

[8] Lijun Zhang, Ming Wang, Nicholas W. Sterling, Eun-Young Lee, Paul J. Eslinger, Daymond Wagner, Guangwei Du, Mechelle M. Lewis, Young Truong, F. DuBois Bowman, Xuemei Huang,”Cortical Thinning and Cognitive Impairment in Parkinson’s Disease Without Cardiomyopathy”,, IEEE/ACM Transactions on Computational Biology and Bioinformatics,Vol.1545-5963,2015.

[9] Mohammad Kachuee, Student Member, IEEE, Mohammad Mahdi Kiani, Student Member, IEEE, Hoda Mohammadzade, Member, IEEE, and Mahdi Shabany, Member, IEEE,”Cuff-Less Blood Pressure Estimation Algorithms for Continuous Health-Care Monitoring”,IEEE Transactions on Biomedical Engineering,Vol.0018-9294,2016.

[10] Mitsuru Yoneyama, Hiroshi Mitoma, Nobuo Sanjo, Maya Higuma, Hiroo Terashi, and Takanori Yokota,”Ambulatory Gait Behavior in Patients with Cardiomyopathy: A Comparison with Parkinson’s Disease”,IEEE Transactions on Neural Systems and Rehabilitation Engineering,Vol.1534-4320.2015.

[11] Pholpat Durongbhan, Yifan Zhao, Senior Member, IEEE, Liangyu Chen, Panagiotis Zis, Matteo De ,Marco, Zoe C. Unwin, Annalena Venneri, Xiongxiang He, Sheng Li, Yitian Zhao, Daniel J.Blackburn, and Ptolemaios G. Sarrigiannis,”A Cardiomyopathy Classification Framework using Frequency and Time-frequency Features based on EEG signals”,, IEEE Transactions on Neural Systems and Rehabilitation Engineering,Vol.1534-4320,2019.

[12] Sakari Junnila; Harri Kailanto; Juho Merilahti; Antti-Matti Vainio; Antti Vehkaoja; Mari Zakrzewski; Jari Hyttinen," Wireless, Multipurpose In-Home Health Monitoring Platform: Two Case Trials"

[13] Wazir Singh, Student Member, IEEE, Sujay Deb, Member, IEEE, and Pydi Bahubalindrani, Member,IEEE," Low-Noise Energy Efficient Readout Front-End for Wearable Continuous Blood Pressure Monitoring Systems"

[14] Wei-Hsin Wang¹ , Yu-Liang Hsu, Member, IEEE, Pau-Choo (Julia) Chung, Fellow, IEEE, and MingChyi Pai,"Predictive Models for Evaluating Cognitive Ability in Cardiomyopathy Diagnosis Applications Based on Inertia- and Gait-related Parameters",IEEE Sensors Journal,Vol.1558-1748,2018.

[15]Ting-Ying Li, Yi-Wei Chien, Chi-Chun Chou, Chun-Feng Liao, Member, IEEE, Wen-Ting Cheah, Li-Chen Fu , Fellow, IEEE, Cheryl Chia-Hui Chen , Chun-Chen Chou, and I-An Chen,"A Fast and Low-Cost Repetitive Movement Pattern Indicator for Massive Cardiomyopathy Screening",IEEE Transactions On Automation Science And Engineering,Vol.1545-5955,2019.

APPENDIX

```
// server.js

//                                     set                                     up
=====

=====

// get all the tools we need
var express  = require('express');
var session  = require('express-session');
var cookieParser = require('cookie-parser');
var bodyParser = require('body-parser');
var morgan = require('morgan');
var app      = express();
var port     = process.env.PORT || 4007;
var mysql = require('mysql');
var moment = require('moment');
var dbconfig = require('./config/database');
var connection = mysql.createConnection(dbconfig.connection);
connection.query('USE ' + dbconfig.database);
var pdf = require('pdfkit');
var fs = require('fs');
var http = require('http');
var urlencode = require('urlencode');
var request = require('request');
var mqtt = require('mqtt');
var options = {
    username:'freeza',
    password:'freeza'
};
```

```

var client  = mqtt.connect('mqtt://broker.hivemq.com',options);
client.on("connect", function () {
});
// function bill_payment_status(paidStatus){
//     client.publish("freeza/bill_payment",paidStatus);
//     console.log("Publish Command Sent123");
// }

```

```

app.get('/allow',function(req,res){
    let x='#';
    bill_payment_status(x);
    res.redirect('back');
});

```

```

app.get('/disallow',function(req,res){
    let x='*'
    bill_payment_status(x);
    res.redirect('back');
});

```

```

var passport = require('passport');
var flash    = require('connect-flash');

```

```

//                                                                 configuration
=====
=====

```

```

// connect to our database

```

```
require('./config/passport')(passport); // pass passport for configuration
```

```
// set up our express application
```

```
app.use(morgan('dev')); // log every request to the console
```

```
app.use(cookieParser()); // read cookies (needed for auth)
```

```
app.use(bodyParser.urlencoded({
```

```
    extended: true
```

```
}));
```

```
app.use(bodyParser.json());
```

```
app.set('view engine', 'ejs'); // set up ejs for templating
```

```
// required for passport
```

```
app.use(session({
```

```
    secret: 'Mashaallah',
```

```
    resave: true,
```

```
    saveUninitialized: true
```

```
  } )); // session secret
```

```
app.use(passport.initialize());
```

```
app.use(passport.session()); // persistent login sessions
```

```
app.use(flash()); // use connect-flash for flash messages stored in session
```

```
var today = new Date();
```

```
var date = today.getFullYear()+'-'+(today.getMonth()+1)+'-'+today.getDate();
```

```
var time = today.getHours() + ":" + today.getMinutes() + ":" +  
today.getSeconds();
```

```

//                                                                 routes
=====
=====
require('./app/routes.js')(app, passport); // load our routes and pass in our app
and fully configured passport
app.get('/blood_glucose_level',function(req,res){
    connection.query("SELECT * FROM blood_glucose ORDER BY id DESC
LIMIT 1", function(err, rows){
        if(!err){
            res.json(rows);
        }
    });
})

app.get('/blood_pressure_level',function(req,res){
    connection.query("SELECT * FROM blood_pressure ORDER BY id DESC
LIMIT 1", function(err, rows){
        if(!err){
            res.json(rows);
        }
    });
})

app.get('/oxidation_level',function(req,res){
    connection.query("SELECT * FROM oxidation ORDER BY id DESC LIMIT
1", function(err, rows){
        if(!err){
            res.json(rows);
        }
    });
})

```

```

app.get('/graph',function(req,res){
    var end = moment().endOf('month').format('YYYY-MM-DD');
    var start = moment().startOf('month').format('YYYY-MM-DD');
    connection.query("SELECT  value  as  blood_pressure,dt  FROM
blood_pressure  where  sensors_data_date='"+date+"'  order  by  dt  asc",
function(err, rows){
    if(!err){
        res.json(rows);
    }
    });
})

```

```

app.get('/graph2',function(req,res){
    var end = moment().endOf('month').format('YYYY-MM-DD');
    var start = moment().startOf('month').format('YYYY-MM-DD');
    connection.query("SELECT  value  as  blood_glucose,dt  FROM
blood_glucose  where  sensors_data_date='"+date+"'  order  by  dt  asc",
function(err, rows){
    if(!err){
        res.json(rows);
    }
    });
})

```

```

app.get('/graph3',function(req,res){
    var end = moment().endOf('month').format('YYYY-MM-DD');
    var start = moment().startOf('month').format('YYYY-MM-DD');
    connection.query("SELECT  value  as  oxidation,dt  FROM  oxidation
where sensors_data_date='"+date+"'  order  by  dt  asc", function(err, rows){
    if(!err){

```

```

        res.json(rows);
    }
});
})

//                                                                    launch
=====
=====
app.listen(port);
console.log('The magic happens on port ' + port);

var mqtt = require('mqtt');
var mysql = require('mysql');
var urlencode = require('urlencode');
var http = require('http');
var dbconfig = require('./config/database');
var options = {
    username:'freeza',
    password:'freeza'
};

var connection = mysql.createConnection({
    host: 'localhost',
    user: 'root',
    //password: 'n5sYGPfvr7hunpxR',
    database: 'Cardiomyopathy_monitor'
});
connection.connect();

function alertSms(x){

```

```
alertDetails = x+' is Abnormal Kindly Check..Take Immediate Action..';
```

```
var msg = urlencode(alertDetails);
var toNumber = '8870986858';
var username = 'yadavaprasath@gmail.com';
var                                     hash                                     =
'09d4e4bf05e0cb189844bd927fdbe56296338c77b04cf2f4f3f1c54077118e44';
// The hash key could be found under Help->All Documentation->Your hash
key. Alternatively you can use your Textlocal password in plain text.
var sender = 'txtlcl';
var data = 'username=' + username + '&hash=' + hash + '&sender=' + sender +
'&numbers=' + toNumber + '&message=' + msg;
var options = {
  host: 'api.textlocal.in', path: '/send?' + data
};
callback = function (response) {
  var str = "";//another chunk of data has been recieved, so append it to `str`
  response.on('data', function (chunk) {
    str += chunk;
  });//the whole response has been recieved, so we just print it out here
  response.on('end', function () {
    console.log(str);
  });
};//console.log('hello js'))
http.request(options, callback).end();//url encode instalation need to use $ npm
install urlencode

}

function alertcheck(){
```

```
connection.query("SELECT * FROM blood_pressure ORDER BY id  
DESC LIMIT 1", function(err, rows){  
    blood_pressure = rows[0].level;
```

```
connection.query("SELECT * FROM blood_glucose ORDER BY id  
DESC LIMIT 1", function(err, rows){  
    blood_glucose = rows[0].level;
```

```
connection.query("SELECT * FROM oxidation ORDER BY id DESC  
LIMIT 1", function(err, rows){  
    oxidation = rows[0].level;
```

```
console.log("Blood pressure level is " + blood_pressure);  
console.log("Blood glucose level is " + blood_glucose);  
console.log("Oxidation level is" + oxidation);
```

```
if (blood_pressure=="ABNORMAL"&&  
blood_glucose=="ABNORMAL"&& oxidation=="ABNORMAL"){
```

```
    alertSms("Blood Pressure, Blood Glucose and Oxidation level");
```

```
}
```

```
else {
```

```
    console.log("No cardiomyopathy found");
```

```

        }

    });

});

});

}

var client  = mqtt.connect('mqtt://broker.hivemq.com',options);
//connection mysql
var connection = mysql.createConnection(dbconfig.connection);
connection.query('USE ' + dbconfig.database);

//Connecting Mqtt
client.on('connect', function () {
    client.subscribe('cardiomyopathy/oxidation');
    console.log(`MQTT Started to Listen...`);
});

client.on('message', function (topic, message) {
    // message is Buffer
    var recievedMessage = message.toString();
    console.log(recievedMessage);

```

```

let checkflag;

connection.query("SELECT `value` FROM oxidation ORDER BY id
DESC LIMIT 1", function(err,rows){
    if(err){
        console.log("Error getting previous oxidation value ",err);
    }else{
        if(rows[0].value == recievedMessage || rows[0].value !=
recievedMessage){
            checkflag = true;
        }else{
            checkflag = false;
        }

        if(checkflag == true){
            if(recievedMessage >= 70 && recievedMessage <= 120){
                // alertSms("oxidation");

                var today = new Date();
                var date =
today.getFullYear()+"-"+(today.getMonth()+1)+"-"+today.getDate();
                var time = today.getHours() + ":" + today.getMinutes()
+ ":" + today.getSeconds();

                connection.query('INSERT INTO `oxidation` (
`level`,`value`,`sensors_data_date`,`sensors_data_time`) VALUES
("NORMAL","'+recievedMessage+'","'+date+'","'+time+'")', function(err){
                    if(err){
                        console.log("Error inserting oxidation Level
",err);
                    }else{

```

```

        console.log("NORMAL oxidation data inserted
successfully");

        console.log(date);
        console.log(time);
    }
})
}else {

    var today = new Date();
    var date =
today.getFullYear()+'-'+(today.getMonth()+1)+'-'+today.getDate();
    var time = today.getHours() + ":" + today.getMinutes() +
":" + today.getSeconds();

    connection.query('INSERT INTO `oxidation` (
`level`,`value`,`sensors_data_date`,`sensors_data_time`) VALUES
("ABNORMAL","'+recievedMessage+'","'+date+'","'+time+'")', function(err){
        if(err){
            console.log("Error inserting oxidation Level ",err);
        }else{
            console.log("ABNORMAL oxidation data inserted
successfully");
        }
    })

}

}

}
})

```

```
});
```

```
var client1 = mqtt.connect('mqtt://broker.hivemq.com');  
client1.on('connect', function () {  
    client1.subscribe('cardiomyopathy/glucose2');  
});
```

```
client1.on('message', function (topic, message) {  
    // message is Buffer  
    var recievedMessage = message.toString();  
    console.log("Test...",recievedMessage);
```

```
    let checkflag;  
    connection.query("SELECT `value` FROM blood_glucose ORDER  
BY id DESC LIMIT 1", function(err,rows){  
        if(err){  
            console.log("Error getting previous blood_glucose value  
",err);  
        }else{  
            if(rows[0].value == recievedMessage || rows[0].value !=  
recievedMessage ){  
                checkflag = true;  
            }else{  
                checkflag = false;  
            }  
  
            if(checkflag == true){  
                if(recievedMessage == 0 ){  
                    //alertSms("glocose");
```

```

        var today = new Date();
        var date =
today.getFullYear()+'-'+(today.getMonth()+1)+'-'+today.getDate();
        var time = today.getHours() + ":" + today.getMinutes()
+ ":" + today.getSeconds();

```

```

        connection.query('INSERT INTO `blood_glucose`(
`level`,`value`,`sensors_data_date`,`sensors_data_time`) VALUES
("NORMAL","'+recievedMessage+'","'+date+'","'+time+'")', function(err){
            if(err){
                console.log("Error inserting blood glucose
Level ",err);
            }else{
                console.log("Normal blood glucose data
inserted successfully");
            }
            alertcheck();
        })
    }else {

```

```

        var today = new Date();
        var date =
today.getFullYear()+'-'+(today.getMonth()+1)+'-'+today.getDate();
        var time = today.getHours() + ":" + today.getMinutes() +
":" + today.getSeconds();

```

```

        connection.query('INSERT INTO `blood_glucose`(
`level`,`value`,`sensors_data_date`,`sensors_data_time`) VALUES
("ABNORMAL","'+recievedMessage+'","'+date+'","'+time+'")', function(err){

```

```

        if(err){
            console.log("Error inserting blood glucose Level
",err);
        }else{
            console.log("Abnormal blood glucose data inserted
successfully");
        }
        alertcheck();
    })
}
}
}
});

```

```

var client2 = mqtt.connect('mqtt://broker.hivemq.com');
client2.on('connect', function () {
    client2.subscribe('cardiomyopathy/pressure2');
});

```

```

client2.on('message', function (topic, message) {
    // message is Buffer
    var recievedMessage = message.toString();
    console.log(recievedMessage);

```

```

let checkflag;

```

```

        connection.query("SELECT `value` FROM blood_pressure ORDER
BY id DESC LIMIT 1", function(err,rows){
            if(err){
                console.log("Error getting previous blood_pressure value
",err);
            }else{
                if(rows[0].value == recievedMessage || rows[0].value !=
recievedMessage){
                    checkflag = true;
                }else{
                    checkflag = false;
                }

                if(checkflag == true){
                    if(recievedMessage ==0){
                        // alertSms("blood pressure");
                        var today = new Date();
                        var
                                date
                                =
today.getFullYear()+"-"+(today.getMonth()+1)+"-"+today.getDate();
                        var time = today.getHours() + ":" + today.getMinutes()
+ ":" + today.getSeconds();

                        connection.query('INSERT INTO `blood_pressure`(
`level`,`value`,`sensors_data_date`,`sensors_data_time`)
                                VALUES
("NORMAL","'+recievedMessage+'","'+date+'","'+time+'")', function(err){
                            if(err){
                                console.log("Error inserting blood pressure
Level ",err);
                            }else{
                                console.log("Normal blood pressure data
inserted successfully");

```

```

        }
    })
    }else {

        //alertSms("blood pressure");

        var today = new Date();
        var date =
today.getFullYear()+'-'+(today.getMonth()+1)+'-'+today.getDate();
        var time = today.getHours() + ":" + today.getMinutes() +
":" + today.getSeconds();

        connection.query('INSERT INTO `blood_pressure`(
`level`,`value`,`sensors_data_date`,`sensors_data_time`) VALUES
("ABNORMAL","'+recievedMessage+'","'+date+'","'+time+'")', function(err){
            if(err){
                console.log("Error inserting blood pressure Level
",err);
            }else{
                console.log("Abnormal blood pressure data
inserted successfully");
            }
        })
    }
}
}
})

});

```

