

Health Monitoring System

Using ECG and PPG Techniques...

Submitted By~

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Objective

IoT In Health Monitoring

Introduction

Health Data

IoT In Health Monitoring

Objective

• **Continuous health monitoring is essential for people with chronic diseases as it allows for early detection of changes.**

• **Electrocardiogram (ECG) and Photoplethysmography (PPG) are two important techniques used in health monitoring.**

• **Detects abnormal heart rhythms, which can be a sign of a heart problem.**

Introduction



Literature Review

ECG Technique

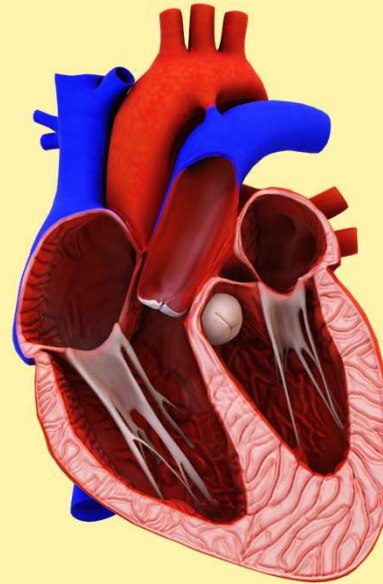
ECG BLOCK DIAGRAM

• **PPG is a non-invasive optical technique used to measure blood flow in the body.**

• **ECG is a diagnostic tool that records the electrical activity of the heart.**

Objective

- **To provide a continuous and non-invasive method for monitoring the cardiovascular health of an individual.**



IoT In Health Monitoring

Introduction

Literature Review

- **Designing a low cost health monitoring kit that can measure vital body signs like heart rate and oxygen level.**

Objective

IoT In Health Monitoring

Introduction

Literature Review

ECG Technique

Emergency Response

Personalized Tracking

Medication Adherence

Vital Sign Monitoring

IoT In Health Monitoring

Introduction

Literature Review

ECG Technique

ECG BLOCK DIAGRAM

ECG MODEL

- **Advances in Non-Invasive Technologies:** Portable healthcare services using non-invasive PPG and ECG technologies provide rapid monitoring of vital signs like heart rate and blood oxygen saturation [1–6].
- **PPG and ECG Integration:** Combining PPG (measuring blood volume changes) and ECG (recording heart's electrical activity) enhances cardiac monitoring, crucial for remote patient care and telemedicine [7–14].
- **Microcontroller Platforms:** Use of NodeMCU ESP8266 microcontroller with PPG and ECG sensors offers a compact, cost-effective solution for continuous health monitoring across various settings [15–16].
- **Health Monitoring Applications:** Devices with PPG and ECG functionalities aid in health management and chronic disease prevention by providing essential cardiovascular health information [17–18].
- **Research and Validation:** Development and rigorous testing of portable devices using PPG and ECG sensors, ensuring accuracy and applicability in real-world scenarios, including remote and emergency care [19].

Introduction

Literature Review

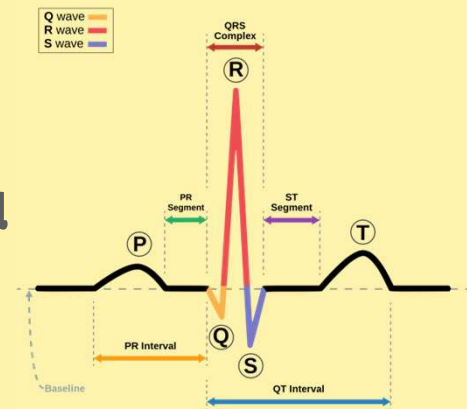
ECG Technique

ECG BLOCK DIAGRAM

ECG MODEL

PPG TECHNIQUE

- **ECG stands for Electrocardiogram.**
- **Measures electrical activity of the heart.**
- **Small metal electrodes are attached to the skin on the chest, arms, and legs.**
- **Electrodes detect the electrical signals produced by the heart**
- **Transmit them to a machine that records the signals as a graph.**
- **Graph determines the health of the heart and diagnose any problems that may be present.**



Literature Review

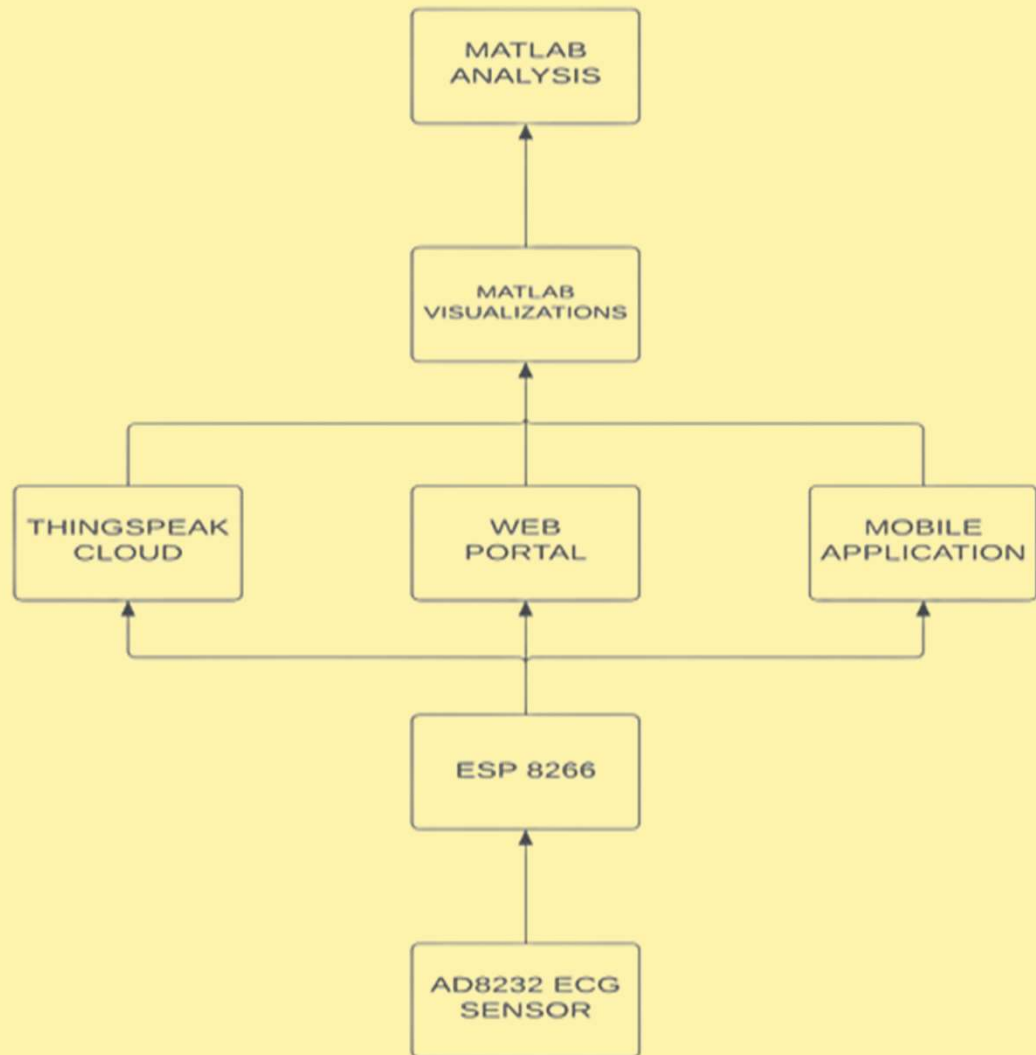
ECG Technique

ECG BLOCK DIAGRAM

ECG MODEL

PPG TECHNIQUE

PPG BLOCK DIAGRAM



ECG Technique

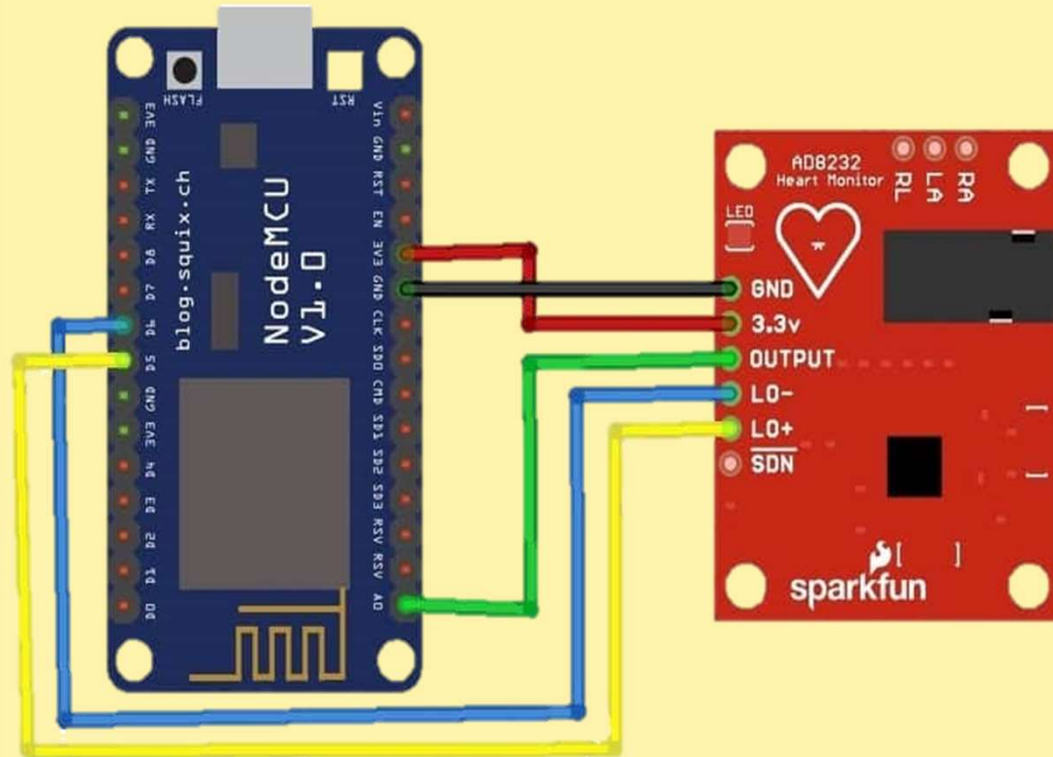
ECG BLOCK DIAGRAM

ECG MODEL

PPG TECHNIQUE

PPG BLOCK DIAGRAM

PPG MODEL



ECG BLOCK DIAGRAM

ECG MODEL

PPG TECHNIQUE

PPG BLOCK DIAGRAM

PPG MODEL

Components Used

- **PPG stands for Photoplethysmography.**
- **Measures blood flow in the body.**
- **A light source is shone onto the skin's surface, usually on the fingertip or wrist.**
- **The light is absorbed by the blood vessels and then reflected back.**
- **A photodiode detects the reflected light.**
- **The photodetector converts the changes in the light intensity into an electrical signal.**
- **Electrical signals are processed and analyzed to determine changes in blood volume.**



ECG MODEL

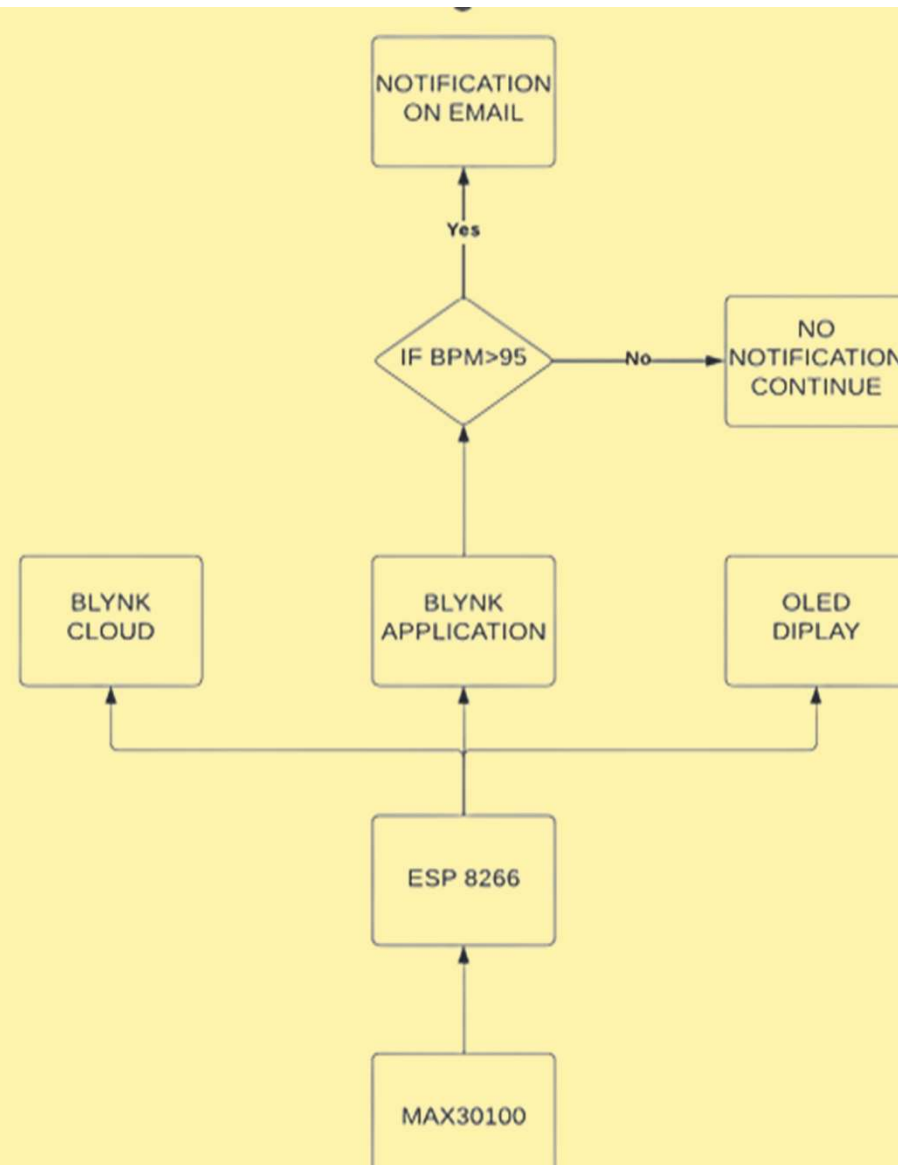
PPG TECHNIQUE

PPG BLOCK DIAGRAM

PPG MODEL

Components Used

ESP8266



PPG TECHNIQUE

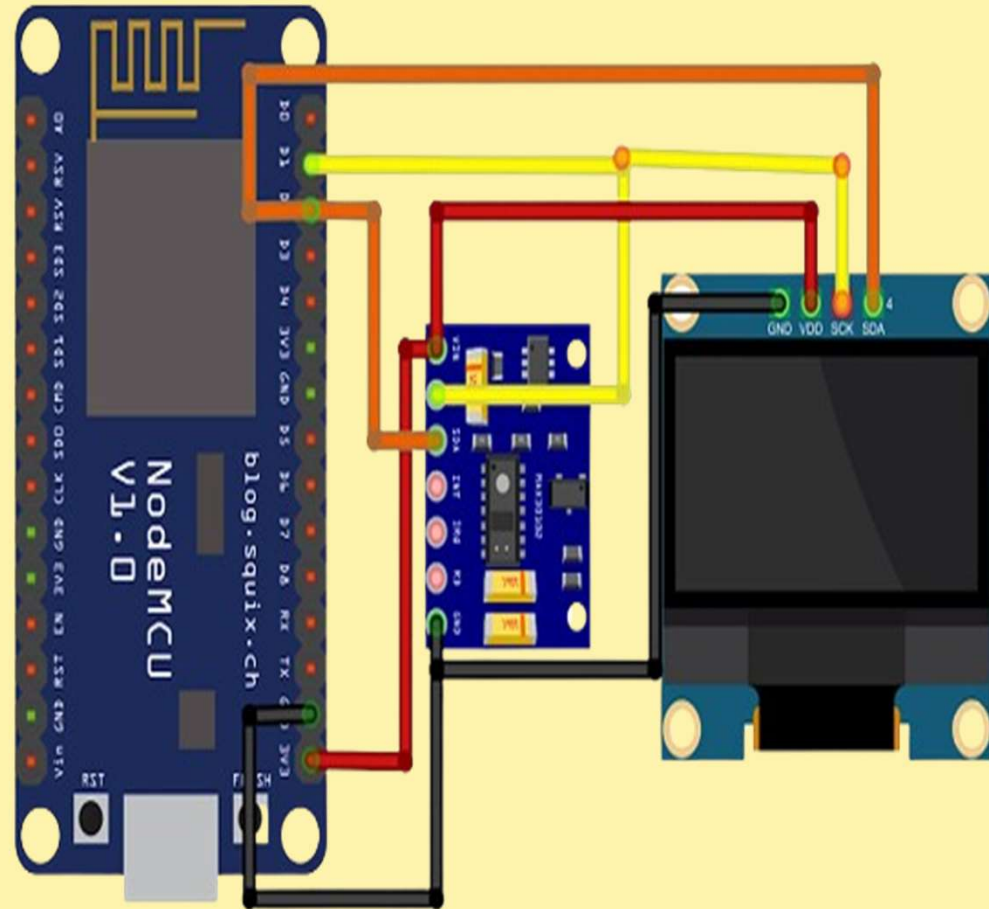
PPG BLOCK DIAGRAM

PPG MODEL

Components Used

ESP8266

TECHNOLOGY USED



PPG BLOCK DIAGRAM

PPG MODEL

Components Used

ESP8266

TECHNOLOGY USED

RESULTS

- **OLED Display**
- **MAX 30100**
- **Connecting Wires**
- **5v Charger or Power Bank**
- **AD8232 ECG Sensor**
- **NODEMCU ESP8266**

PPG MODEL

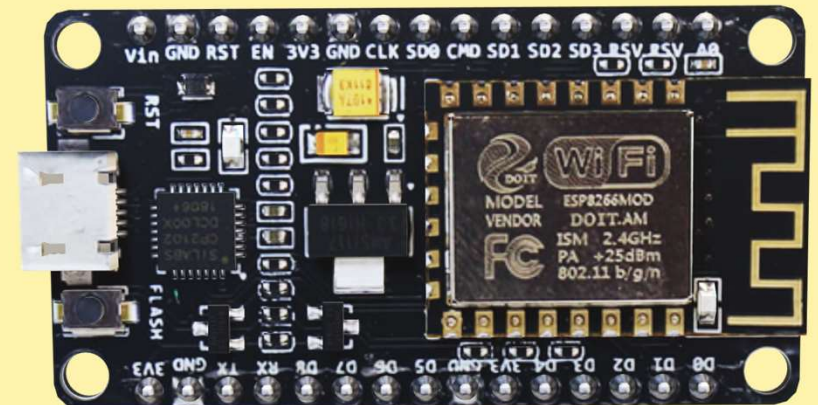
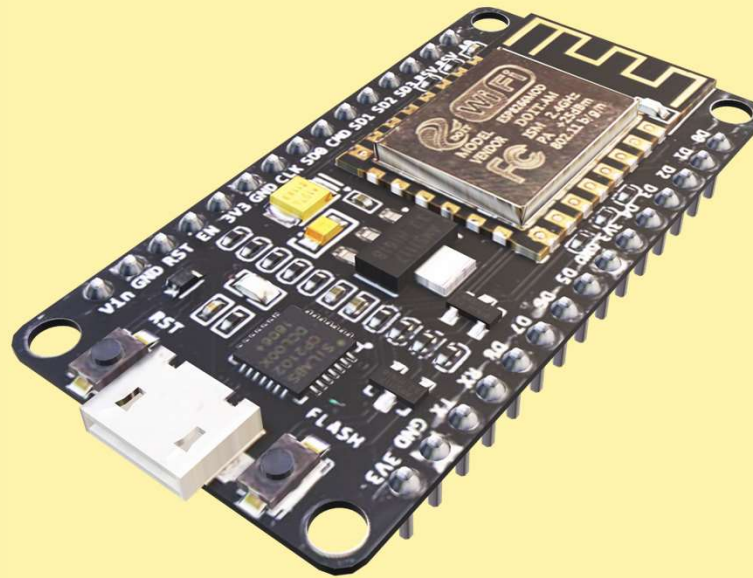
Components Used

ESP8266

TECHNOLOGY USED

RESULTS

Uses Of Health Monitoring



Components Used

ESP8266

TECHNOLOGY USED

RESULTS

Uses Of Health Monitoring

Target Audience

- **Arduino IDE**
- **Windows OS**
- **PPG Technique**
- **NODEMCU ESP8266**
- **ECG Technique**
- **Thingspeak**
- **BLYNK**
- **APPLICATION – FLUTTER**
- **WEB PORTAL – HTML, CSS, JAVASCRIPT**
- **DATABASE – FIREBASE**
- **MATLAB VISUALIZATION**
- **MATLAB ANALYSIS**

ESP8266

TECHNOLOGY USED

RESULTS

Uses Of Health Monitoring

Target Audience

CONCLUSION



How to Buy

ST

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, 2023

Health monitoring system

New here ?

SIGN UP

Sign in

Email

Password

LOGIN

Or Sign in with social platforms

G

reset_Email

FORGET PASSWORD!

Sign in

LOGIN

social platforms

G

PASSWORD!

Sign up

Name

Email

Password

SIGN UP

Or Sign up with social platforms

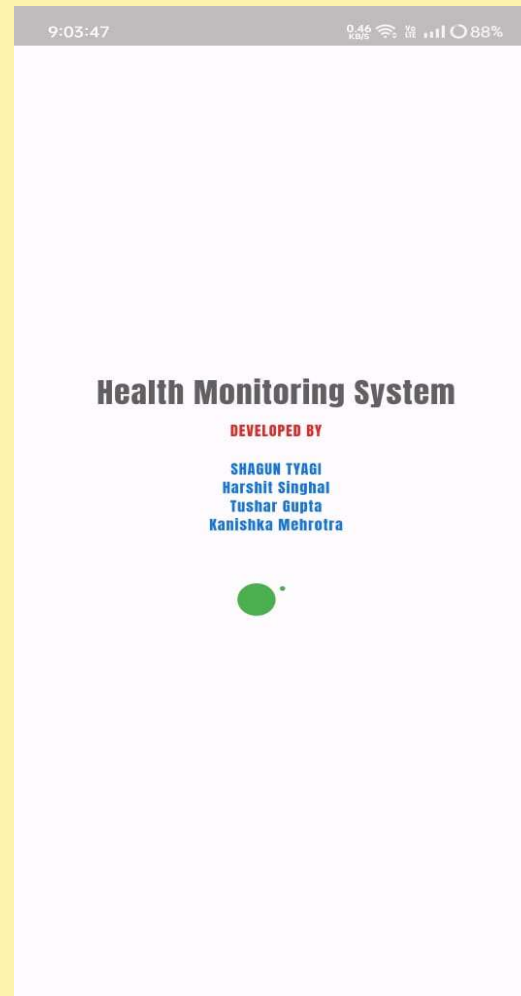
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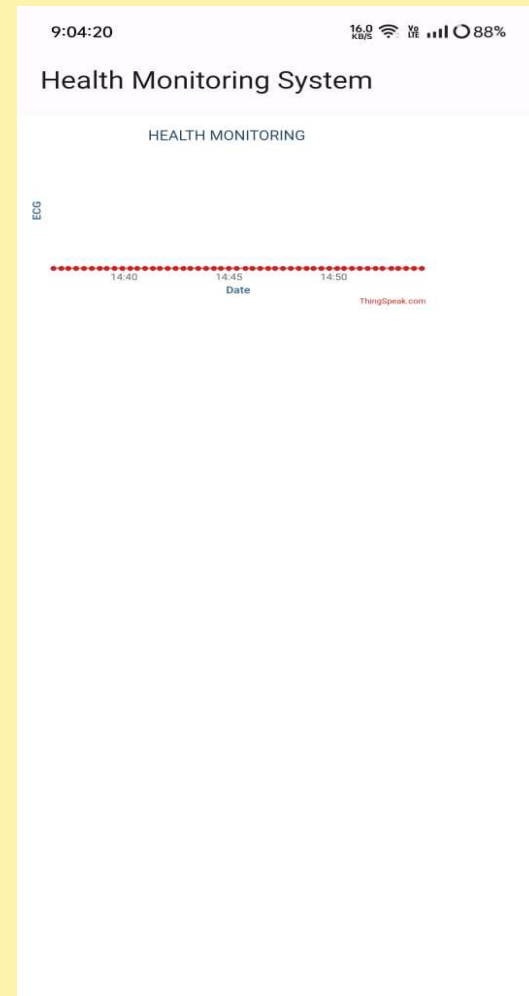
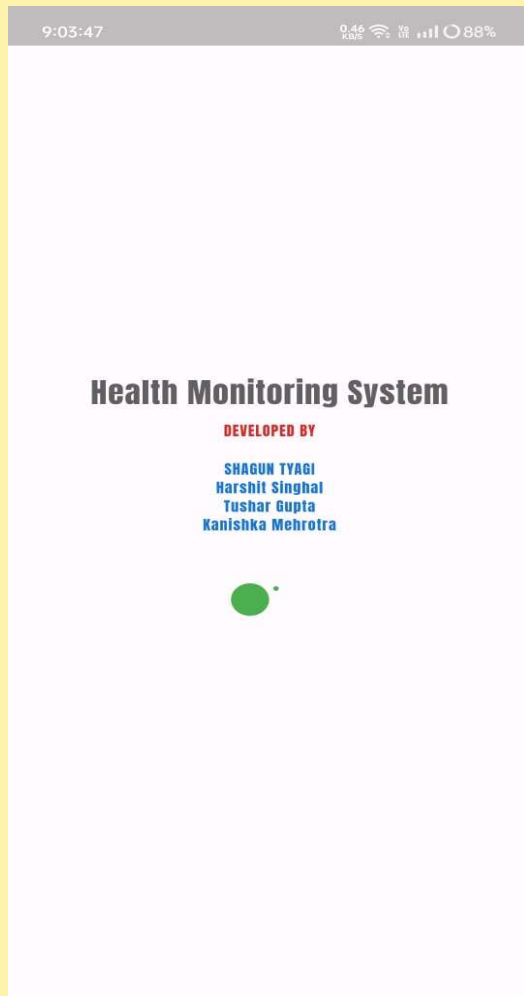
Health monitoring System

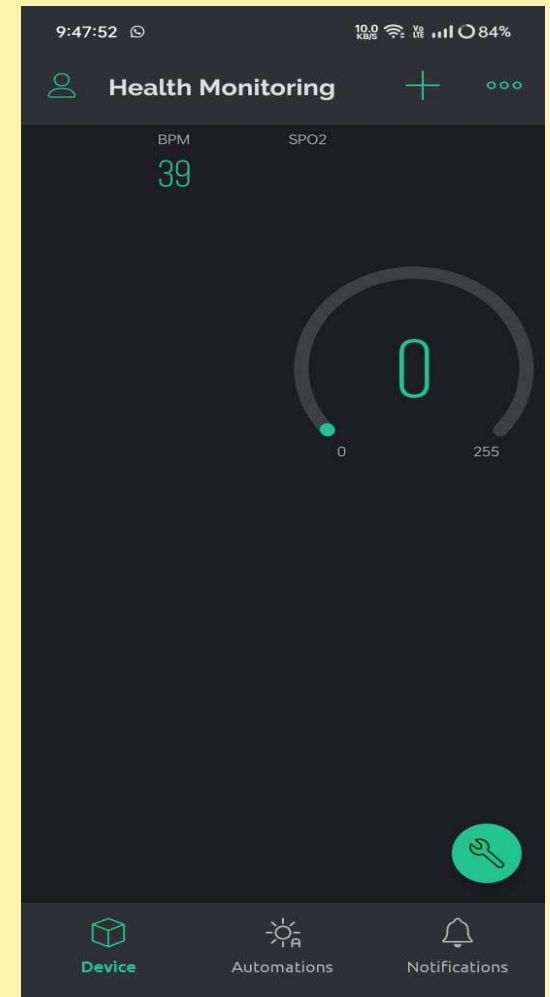
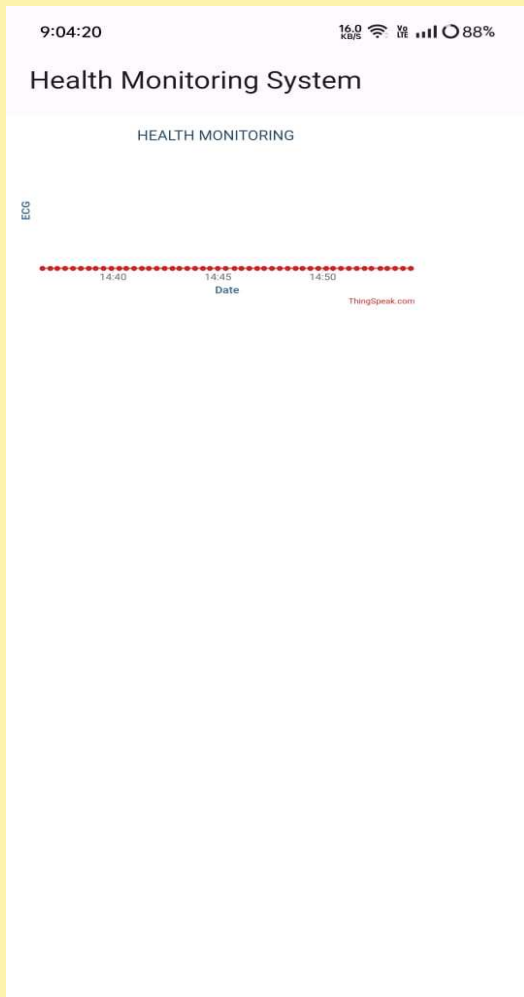
One of us ?

SIGN IN









ESP8266

TECHNOLOGY USED

RESULT

Uses Of Health Monitoring

Target Audience

CONCLUSION

Portable health monitoring systems combined with PPG and ECG technology have shown excellent results in measuring heart rate and blood oxygen levels. The system uses NodeMCU ESP8266 microcontroller along with AD8232 ECG and MAX30100 PPG sensors and undergoes rigorous testing to measure its performance.

Laboratory testing has shown that the system provides accurate heart rate measurements with a margin of error of less than ± 5 beats per minute (BPM) compared to standard medical devices . In addition, the blood oxygen saturation level is measured with high accuracy, with a difference of less than 2% compared to the measurement .

Table 1 summarizes the test results from laboratory evaluation

PARAMETER	MEASUREMENT	DEVIATION FROM STANDARD (%)
HEART RATE	78 BPM	± 3
SPO2	97%	± 1

The results show the accuracy and reliability of the structure of the healthcare system. Further validation studies will be conducted in clinical settings to confirm its suitability for practical use.

TECHNOLOGY USED

RESULT

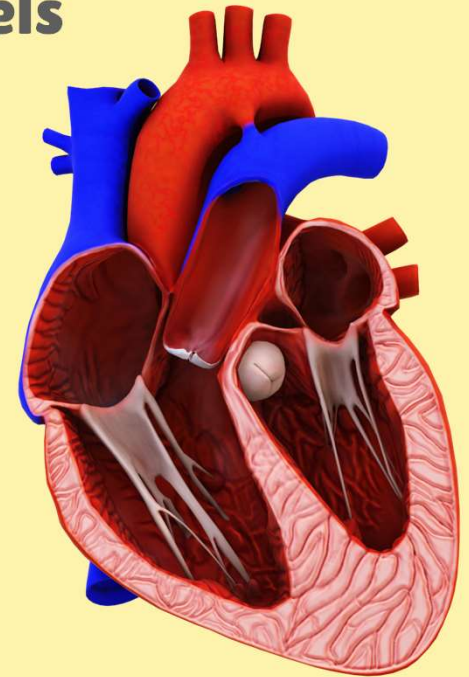
Uses Of Health Monitoring

Target Audience

CONCLUSION

Future Updates

- **Continuous monitoring of heart rate**
- **Detection of Arrhythmias (Irregular heartbeats)**
- **Monitoring of blood oxygen levels**
- **Tracking of physical activities**
- **Real– time monitoring**



RESULT

Uses Of Health Monitoring

Target Audience

- **Individuals with cardiovascular diseases**
- **Athletes and fitness enthusiasts**
- **Individuals with respiratory conditions**
- **Senior citizens**
- **People with chronic conditions**

CONCLUSION

Future Updates

REFERNCE



Uses Of Health Monitoring

Target Audience

CONCLUSION

Future Updates

REFERENCE

1. Real-Time Monitoring:

NodeMCU ESP8266 ensures real-time data transmission and remote monitoring using **AD8232 ECG** and **MAX30100 PPG** sensors.

2. User-Friendly Interface:

Blynk automation allows easy real-time visualization and remote management of health data via smartphones and web platforms.

3. Advanced Data Analysis:

MATLAB and **Thingspeak** integration provides advanced analysis of heart rate variability and oxygen levels, with centralized data storage.

4. Comprehensive Solution:

The system offers early detection of cardiac issues and personalized health management.

Target Audience

CONCLUSION

Future Updates

REFERENCE

- **Wearable technology with more advanced sensor**

- **Artificial and Machine Learning Algorithm**

- **Improve data privacy and security**

- **Predictive analysis**

CONCLUSION

Future Updates

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THANK YOU

