

13016207: Computer Organization and Assembly Language

Year 2 Semester 1/2019

Final Project

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CRDM



Cardiac Rhythm Diagnosis
Machine (CRDM)

Outline

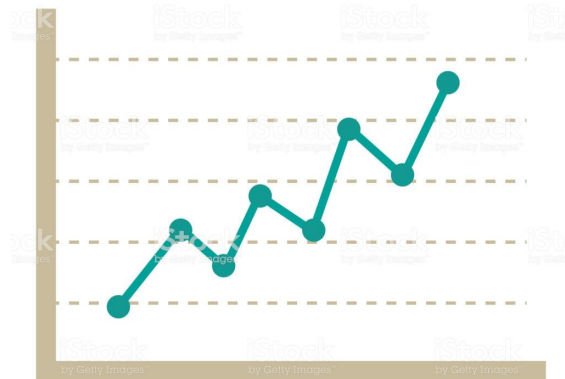


- i. Main Features
- ii. Background/Theory/Technology
- iii. Main Flow Chart
- iv. Experiment Results
- v. Photos
- vi. Conclusion

Main Features



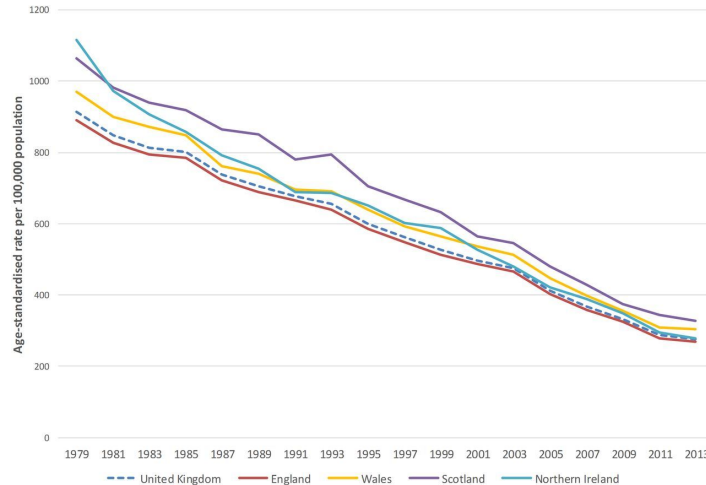
- Measuring heart rate pulse and display value appeared in matplotlib graph.
- Anywhere machine usable (Must have an internet connection)



Background and Objective



Background



Aim and Objectives

Heart disease is easier to treat when detected early, so we decided to invent a technology that help doctor examine and diagnose patients heart anywhere and anytime by electrocardiograph via internet connection from CRDM device.

Theory

There are many types of heart disease that affect different parts of the organ and occur in different ways, but most of them show a minor symptom before it gets more dangerous. Majority of patients would be aware that they might get heart diseases so patients may see a doctor right away to examine their heart. However, when patients are in hospital, some symptoms may not disappear yet. They could not spend too much time in hospital waiting until the symptom appears for a doctor to identify which type of specific heart disease the patients have. Most importantly, we could not predict when the symptoms would show up again, so we provide patients a CRDM to help them recognize their heart rate and examine the cardiac cycle graph.

Theory



Patients can use our device If patients have these heart disease symptoms:

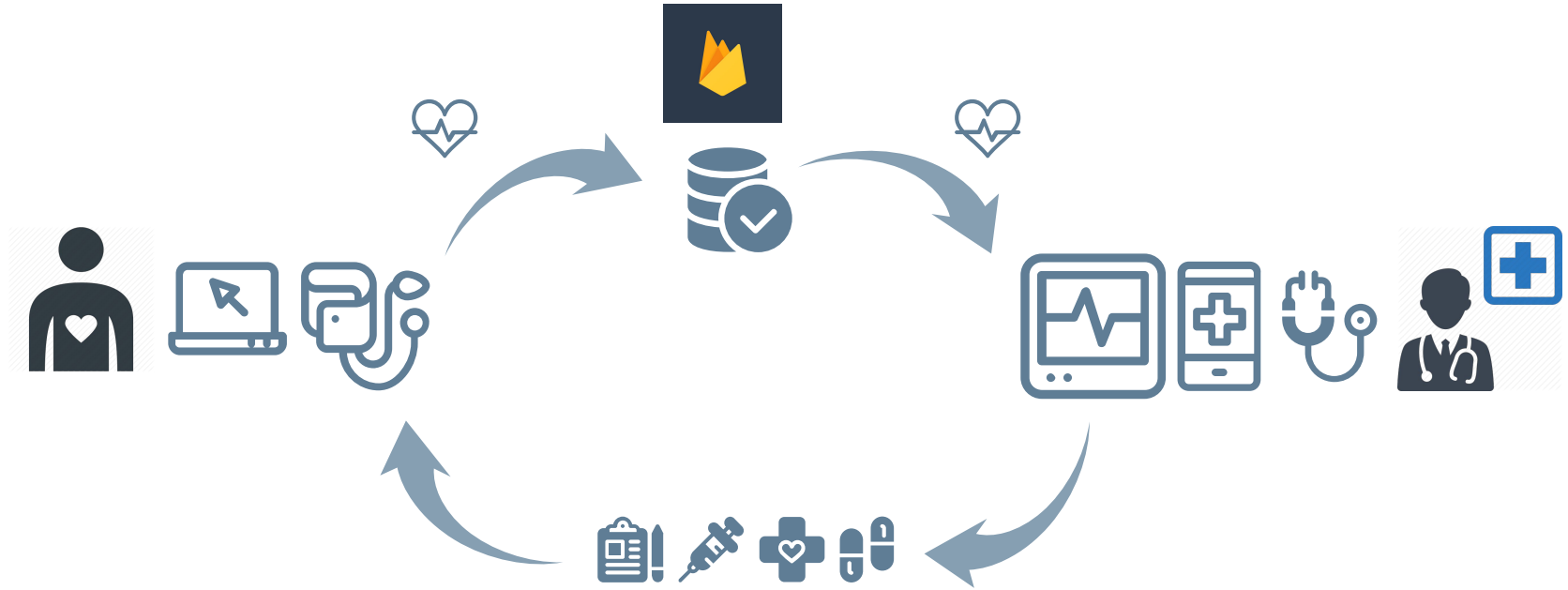
- ☐ Chest pain
- ☐ Shortness of breath
- ☐ Fainting

Next, CRDM device will push the data of ECG up on database

Then, from doctor's smartphone or laptop devices that already installed our application will constantly pull data from database in real time and show it on application, such that doctor can observe and recognize patients heart symptoms from anywhere and anytime.

Finally, doctor can give medical instruction including advices to the patients and may proceed the next step of medical treatment if needed.

Theory



Tools



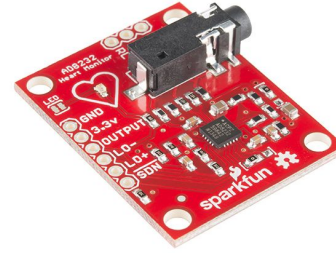
Raspberry pi 3

- Power supply for Arduino
- Arduino IDE
- Visual Code
- Control LED



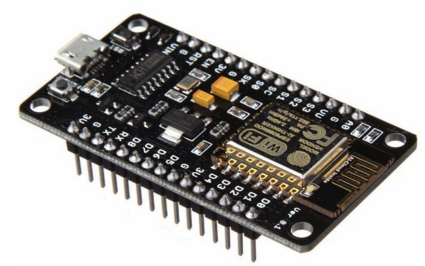
Arduino Uno

- connect AD8232 with Raspberry pi3
- power supply for AD8232



AD8232

a cost-effective board used to measure the electrical activity of the heart. This electrical activity can be charted as an ECG or Electrocardiogram and output as an analog reading.



Node MCU

- consist of ESP8266 wifi enabled chip.
- connecting to wifi
- pushing data into Firebase

Tools



Biomedical Sensor Pad

- measure ECG.
- short-term monitoring of Neurofeedback and Biofeedback.
- They are to be used once because of integrated, latex-free gel.
- can be pushed on or removed from the electrode lead.



Sensor Cable and Electrode Pads

- three conductor sensor cable with electrode pad leads.
- including audio jack connector on one end with snap style receptacles for biomedical sensor pads.



LED

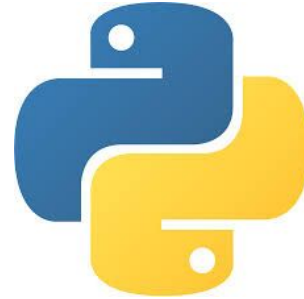
- Red LED indicates that the data is invalid.

Technology Stack



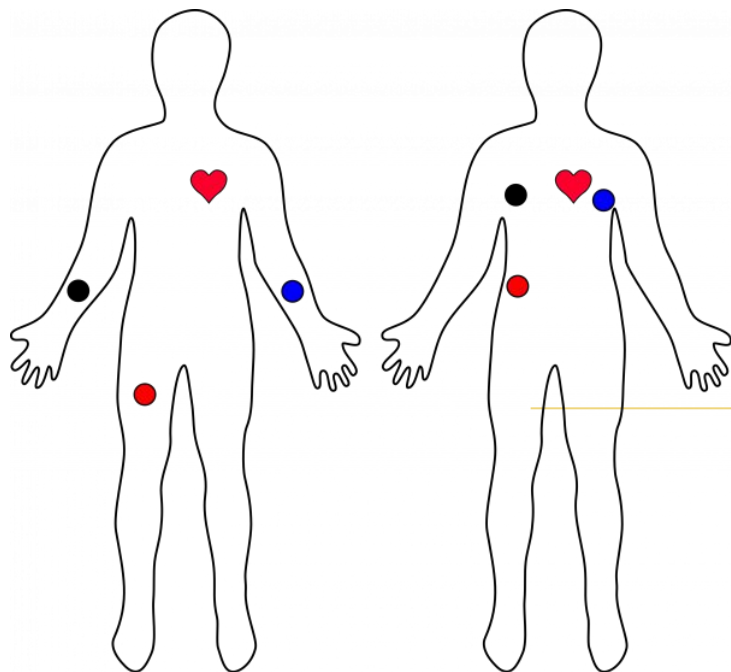
Firebase

- Store and sync data with NoSQL cloud database.
- a cloud-hosted database.
- synchronized in real time



Python IDE

- Query and handling data from Firebase
- Plotting Graph by Matplotlib library
- Control Red LED blinking



Single-Lead, Heart Rate Monitor

FUNCTIONAL BLOCK DIAGRAM

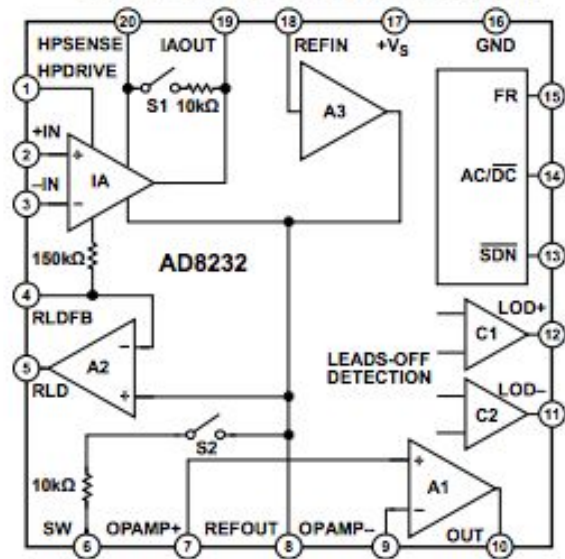
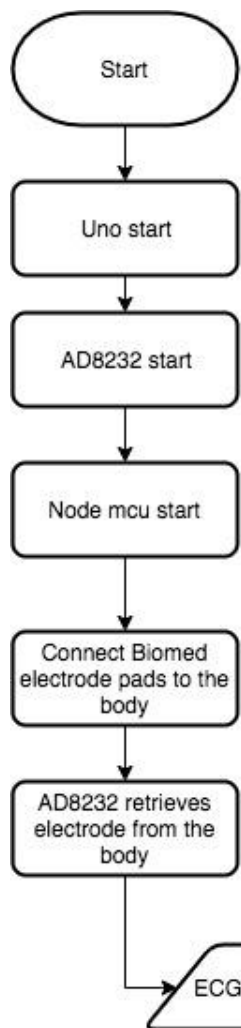
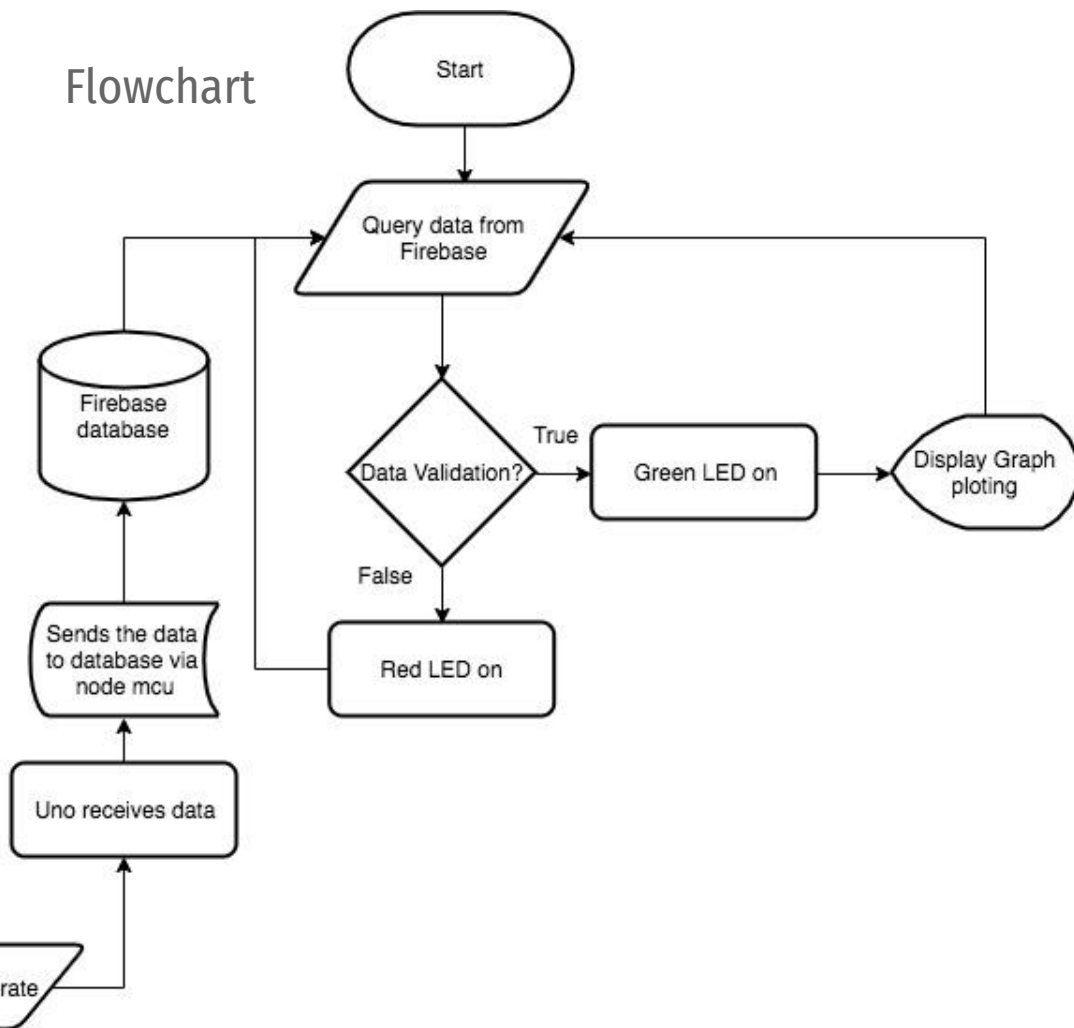


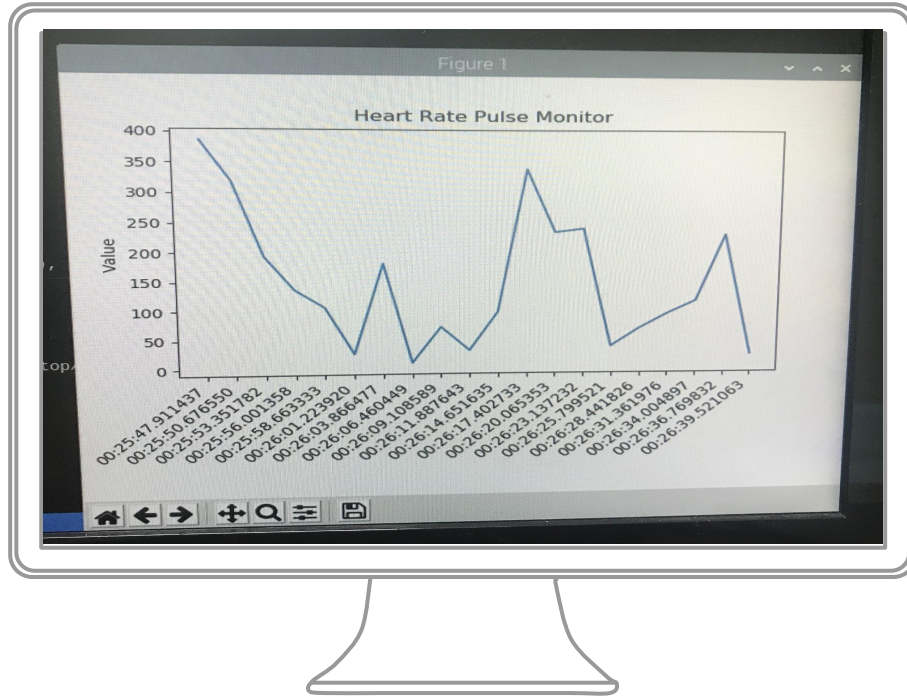
Figure 1.



Flowchart



Experiment Results



Desktop base

Graph will be plotted if data are valid, otherwise, Red LED will be blink. The graph indicates patient heart rate pulse from time to time but there is a problem which Python can't access the database as fast as expect. Result is that the graph will plot slower than the data posted on database.

Conclusion

The project associated with Arduino, Node MCU and Raspberry Pi3 using for measure patient heart rate pulse. It appears that we've use Firebase as our database on the internet and query data with python programming language. Arm assembly language is constructed to blink LED which python is the one that execute the command. Problem will occur if we've a problem from the internet as LED will shown to us. Also, one major problem is that we can slowly accessed database. We can't fix it except we have to use our own database and internet socket. Others output is as our expectation which we are happy about that. We've gain a skill to program from one more languages to communicate with other (As a function or others but not an object). Connecting hardware with software also an important knowledge. Also sending some information to the internet is a huge benefit to use for our future.

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