



DESIGN DEVELOPMENT AND IMPLEMENTATION OF ANDROID-BASED ELECTROCARDIOGRAM READER

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Abstract: Heart disease is the number one cause of death in the world. Heart disease is one of the most common diseases and one of the highest causes of death in Indonesia (Ministry of Health, 2017). Health disease isn't easy to detect because it can't be seen physically, requiring a tool to monitor heart condition, i.e. Electrocardiogram (ECG). Although the result of electrocardiogram measurement is time graph to voltage called electrocardiogram (ECG), it can analyze and identify patient's heart condition automatically, only displaying seven criteria in interpreting Electrocardiogram (ECG) result, i.e. Heart Rate, Rhythm, P Wave, P-QRS Distance (PR Interval), QRS Complex (PR Interval), QRS Complex, S_T Segment and T Wave. Therefore, it requires specialist ability to interpret the result of measurement of heart muscle activity. That's why there are many cases of heart disease which are treated late, because analysis takes a long time. Despite obtaining ECG data, it's difficult to know information in ECG record result. To read ECG record, one must have experience and knowledge on health disease and its symptoms. Manual extraction of important information of signals in ECG is very inefficient due to the amount of data to observe.

Keyword: Heart Disorder, Electrocardiogram, Android, Heart Rate, QRS

1. INTRODUCTION

. Heart disease is the number one cause of death in the world. Heart disease is one of the most common diseases and one of the high cause of death in Indonesia (Ministry of Health, 2017). Health disease isn't easy to detect because it can't be seen physically. One should be aware of heart disease and immediately take measures to treat it because it happens suddenly, almost all patients have no previous complaint, and the patients generally look very healthy, requiring a tool to monitor heart condition, i.e. Electrocardiogram (ECG).

ECG can record the 'electrical' activities of the heart. Coronary blockage in the heart with 'ischemia' causes disturbance in the heart's 'electrical' activities which are detected by 'electrocardiogram'. ECG also can record various disorders of the electrical activities of the heart. ECG can determine the possibility of heart defect with 40% accuracy using sound waves to produce heart image. During the process, doctor can determine all parts of heart walls have normal contribution in pumping the heart. Weakly moving part may have been damaged during heart attack or

receive too little oxygen. This may indicate coronary artery or other conditions. ECG examination can record the 'electrical' activities of the heart. Coronary blockage in the heart with 'ischemia' causes disturbance in the heart's 'electrical' activities which are detected by 'electrocardiogram'. ECG also can record various disorders of the electrical activities of the heart.

2. RELATED WORKS

2.1 Heart

The definitions of heart disease and heart attack are different. Heart attack is a condition which causes the heart to not work at all.

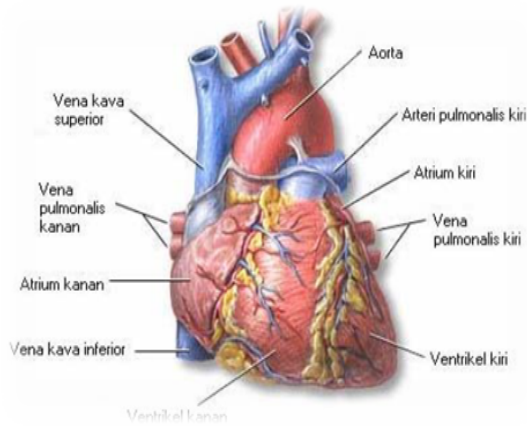


Fig 1. Heart

This condition usually happens suddenly and is often referred to as heart failure. The causes of heart failure vary, but the main cause is usually blocked blood supply to cardiac muscles because the blood vessels which usually deliver blood to the cardiac muscles are blocked or hardened due to fat and cholesterol, or chemicals, e.g. excessive usage of drugs which contain Phenylpropanolanin (ppa) which is often found in drugs such as Decolgen, and nicotine. (source:wikipedia). However, **heart disease** is a dangerous often lead to death of the patients. Patients often know about their heart diseases too late, therefore they receive treatment too late.

2.2 Heart Rhythm

Heart rhythm is within normal range if it has sinus rhythm which comes from impulse located near the mouth of vena cava superior in the right atrium of the heart. Sinus rhythm is a rhythm which has q wave which is followed by QRS complex. The distance between the same waves is similar and regular. So, sinus rhythm is p wave and every p wave must be followed by QRS complex. Meanwhile, non-sinus rhythm has no QRS complex after P wave or no P wave at all.

2.3 Interpretation of ECG Examination Result

1 Morphology of ECG Wave

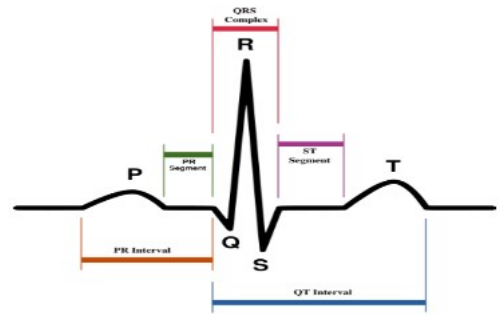


Fig 2. Morphology of ECG Wave

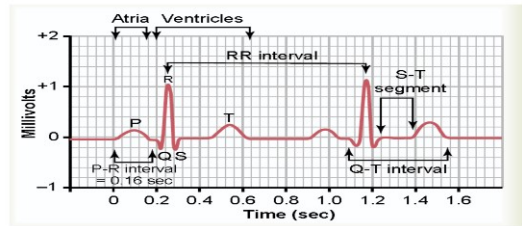


Fig 3. Morphology of ECG Wave

3. DESIGNING SYSTEM

3.1 Designing System

Use Case Diagram

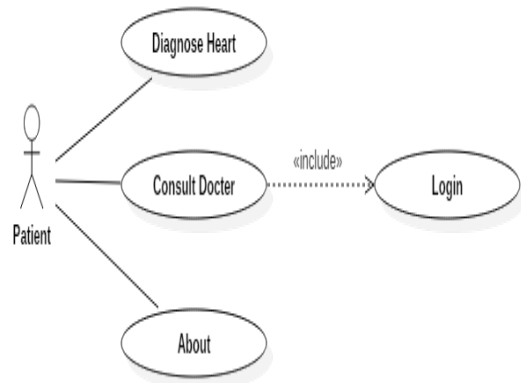


Fig 4 : Use Case Diagram

Activity Diagram

Activity diagram login describes *login* process by *user* to enter a system. It's shown in the figure of activity diagram below

Activity Login.

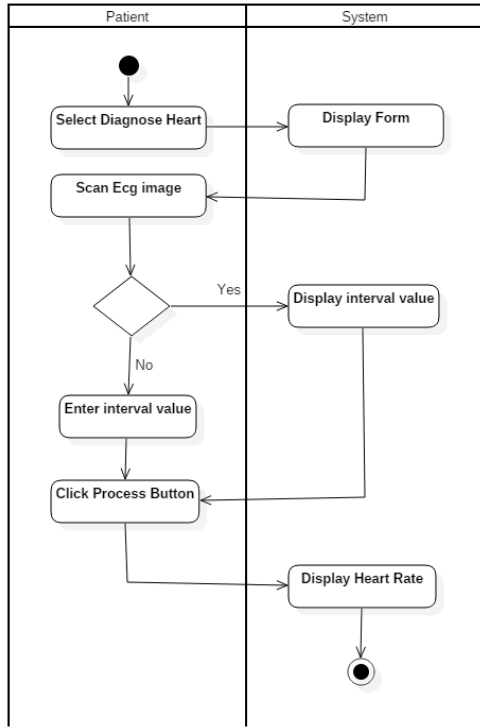


Fig 5. Activity Diagram of Diagnose Heart

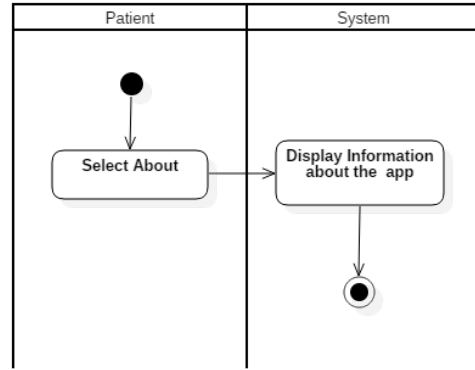


Fig. 7 Activity Diagram of About

3.2 System Testing



Fig.8 Initial Display of the Application

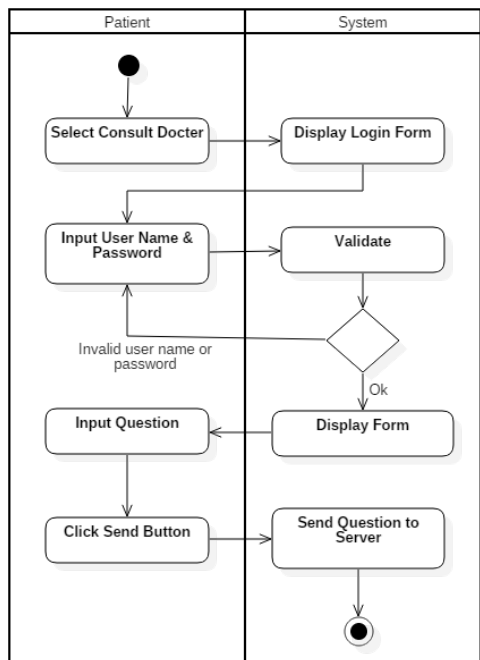


Fig 6. Activity Diagram of Consult Doctor

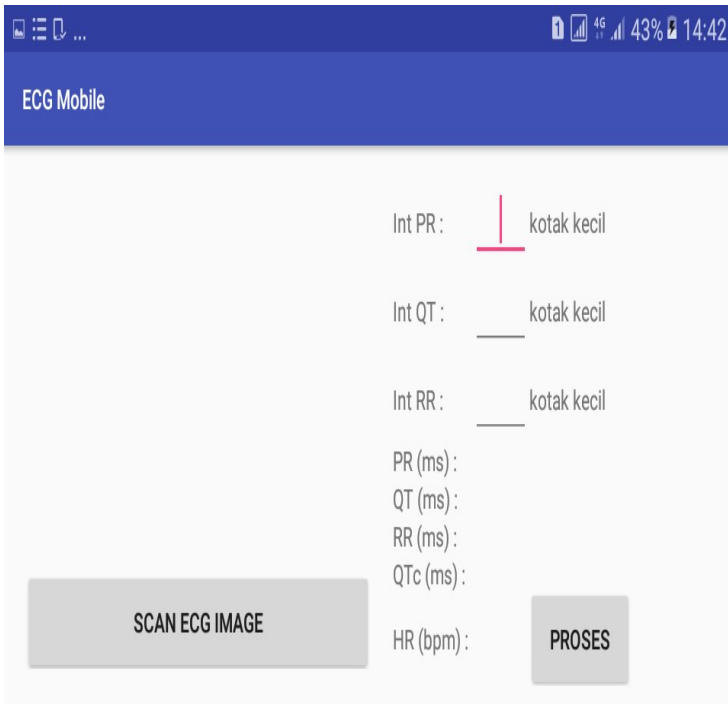


Fig. 9 Display of Heart Diagnosis



Fig. 12. Display of About Application

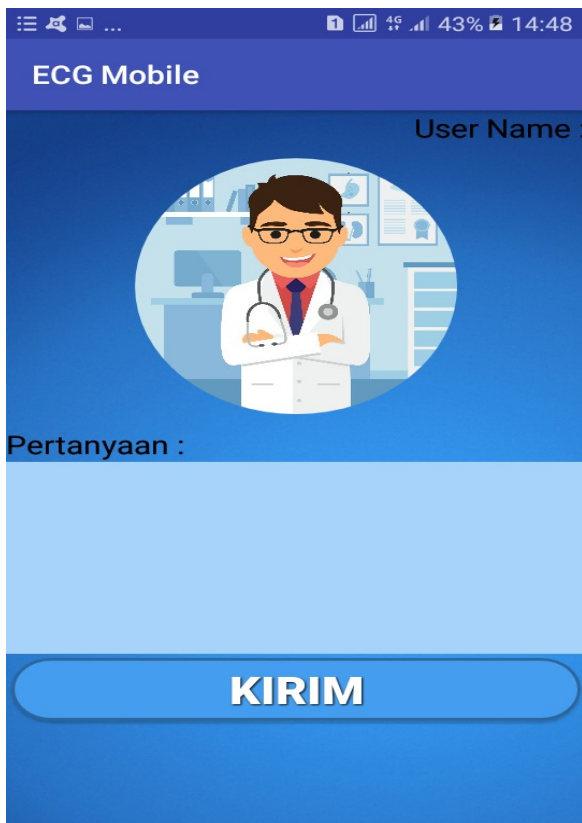


Fig 11. Display of Consult Doctor

3. CONCLUSION

Representation of heart rate wave was obtained by developing design and implementing android -based electrocardiogram reader

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