



ANNIVERSARY

MISR INTERNATIONAL UNIVERSITY

Dec 13, 2017



HEART ATTACK PREDICTION

BY: LAILA AMIN, FATMA ELZAHRAA ELSAYED,
LOBNA AHMED, LOBNA AMGAD

1

Supervised by : Dr Tarek Gaber
Eng. Youssef Mobarak.

INTRODUCTION

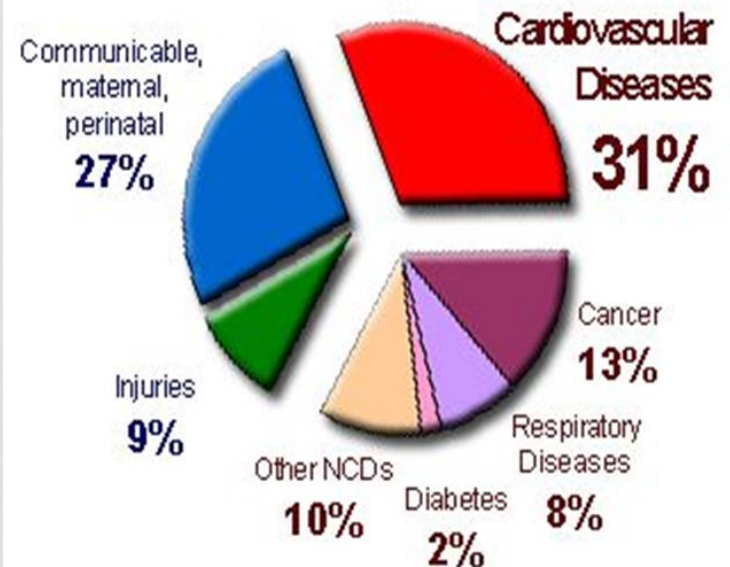


MOTIVATION

WHO-> in 2015, 17.5 million people died because of cardio vascular disease

WHO->in 2016, 80% of all CVD deaths are due to heart attacks.

Global Causes of All Deaths



RELATED WORK 1: A REAL TIME PATIENT MONITORING SYSTEM FOR HEART DISEASE PREDICTION

aim to provides a solution for heart diseases by monitoring heart rate and blood pressure and reduce the time before treatment.

Techniques and Algorithms used:

- Random Forest algorithm

Results: Accuracy-> 84.8%.

Limitation: Doctor side is a web interface which is not remotely.

RELATED WORK 2

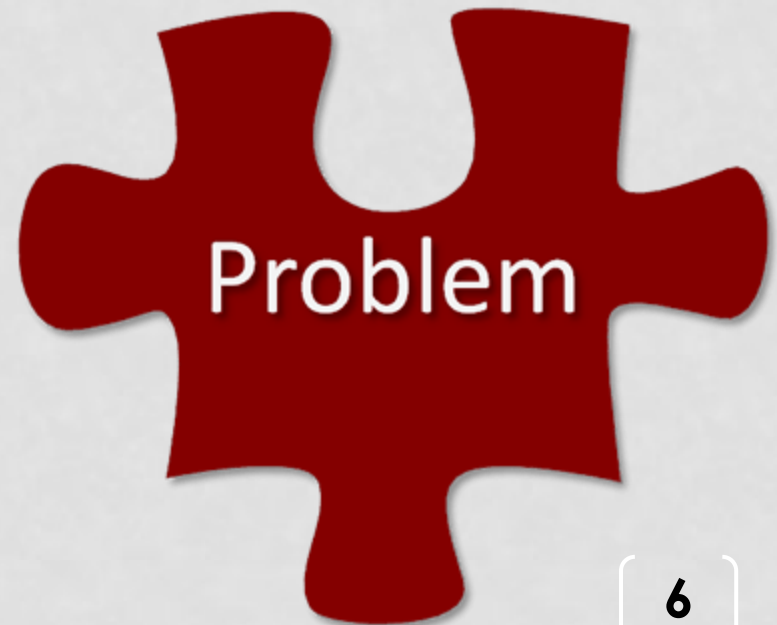
ECG MONITORING SYSTEM IN HOSPITALS.

Results : it only gives an alarm in case of heart failure.

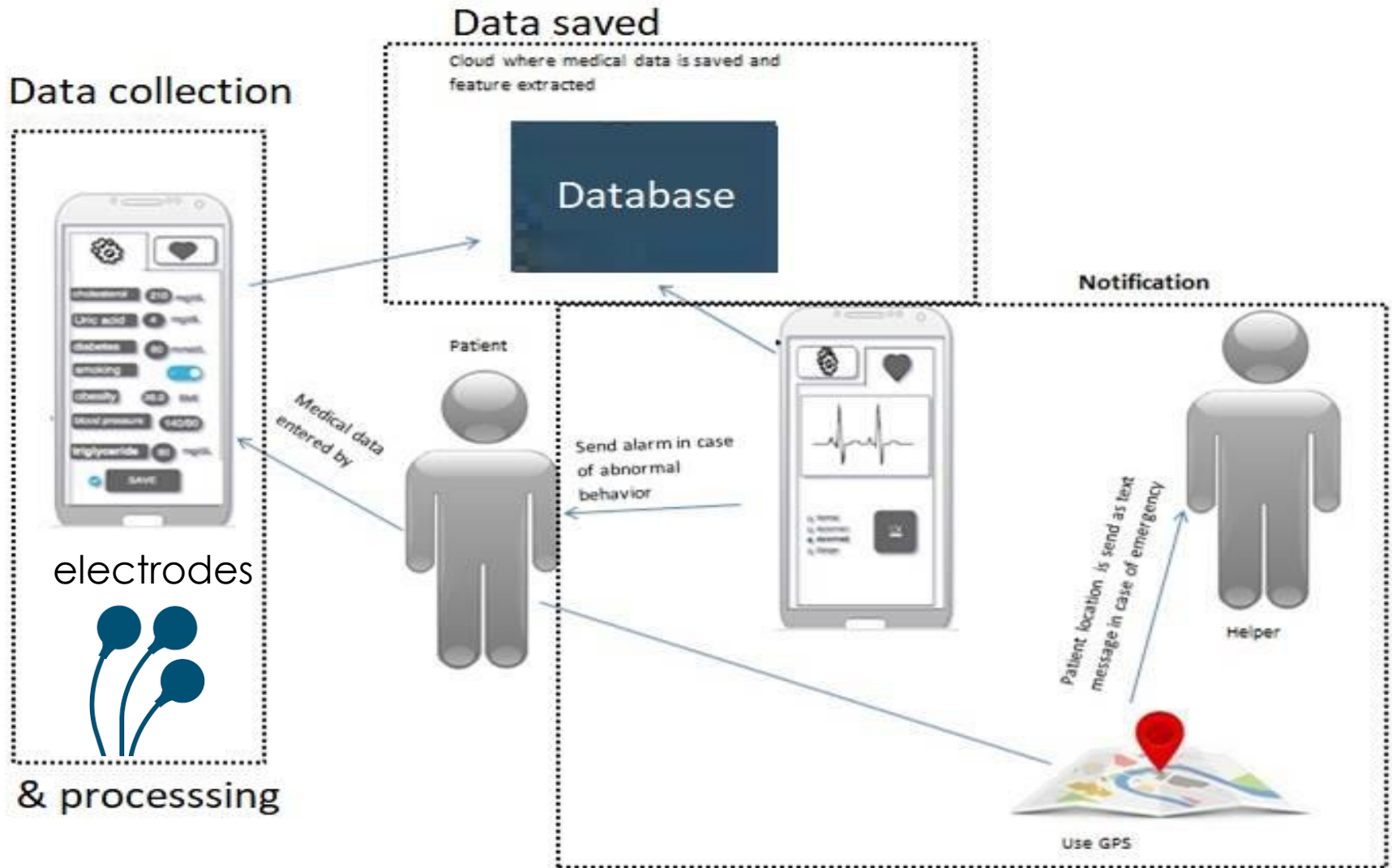
Limitation: The ECG device does not predict heart attack, it only gives an alarm if the patient has heart failure. Moreover, its not portable.

PROBLEM DEFINITION

Detection of **heart attack** with **high accuracy** occurred from any abnormal behaviour of the **ECG signals**.



SYSTEM OVERVIEW



SYSTEM OVERVIEW(1/3)

Data collection

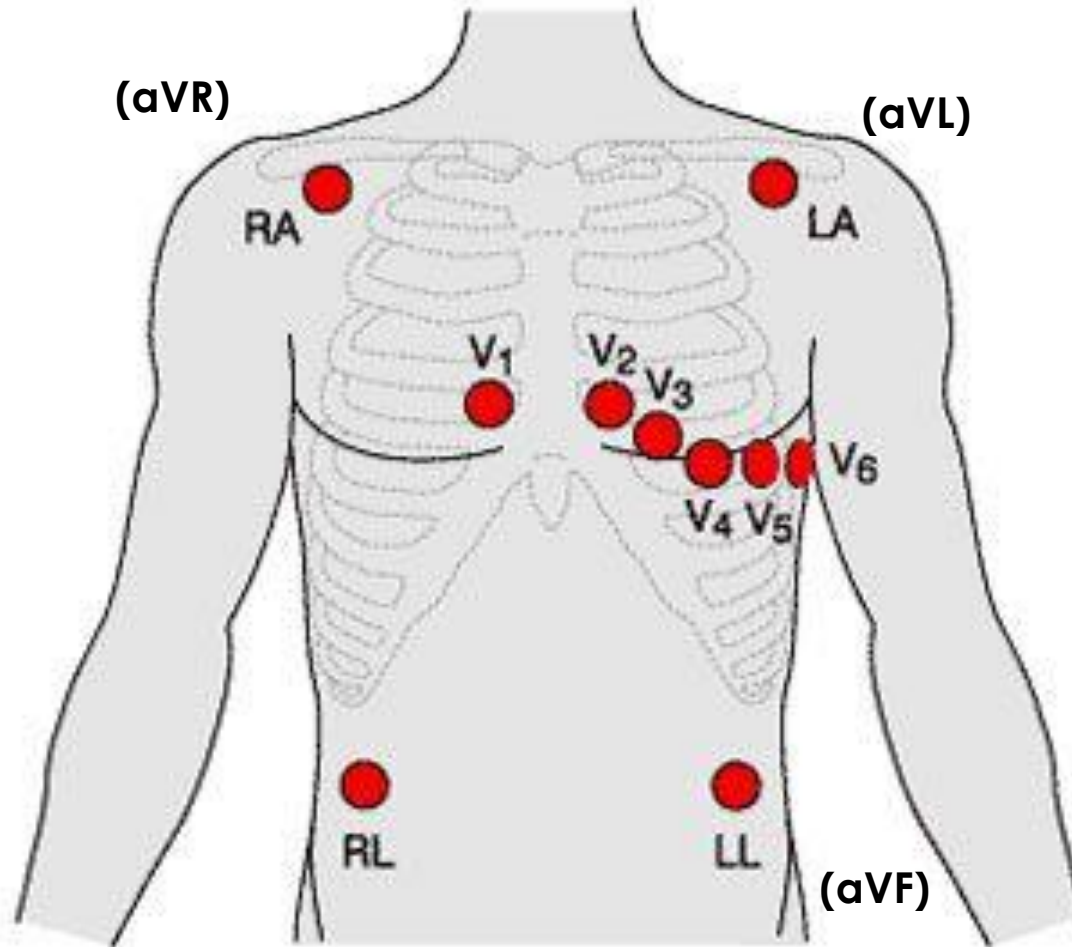
1. ECG signals from the sensor
(later slides..)

2. Medical data entered by the user which are:

- Personal information (Age, Gender, Weight, height)
- Smoking status
- Diabetes
- Blood pressure
- Cholesterol level
- Family medical history

ELECTRODES ON PATIENTS

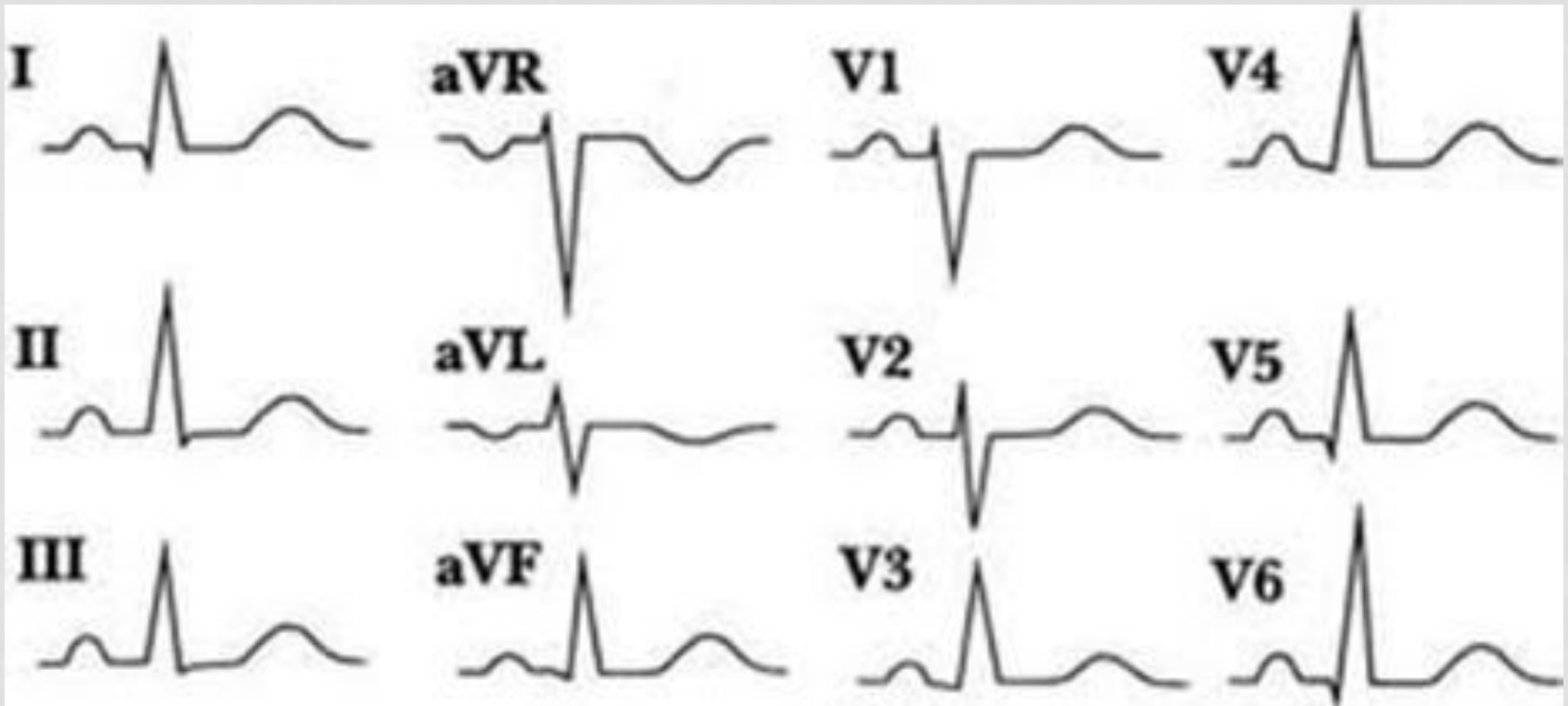
Reading the ECG signals (10 electrodes with 12 measurements)



ECG MEASUREMENTS

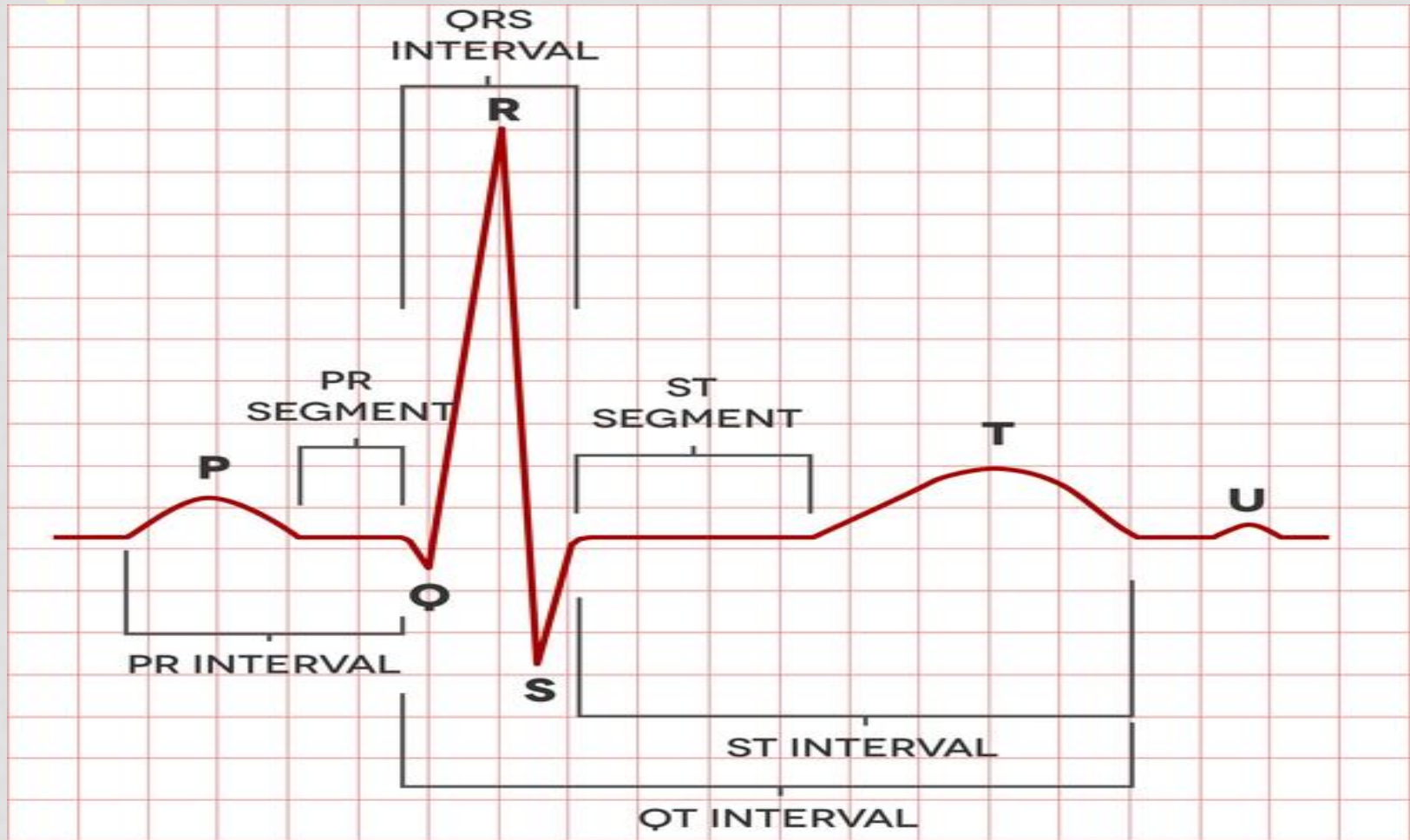
Limb leads

Precordial leads



Each lead's normal differs from the other

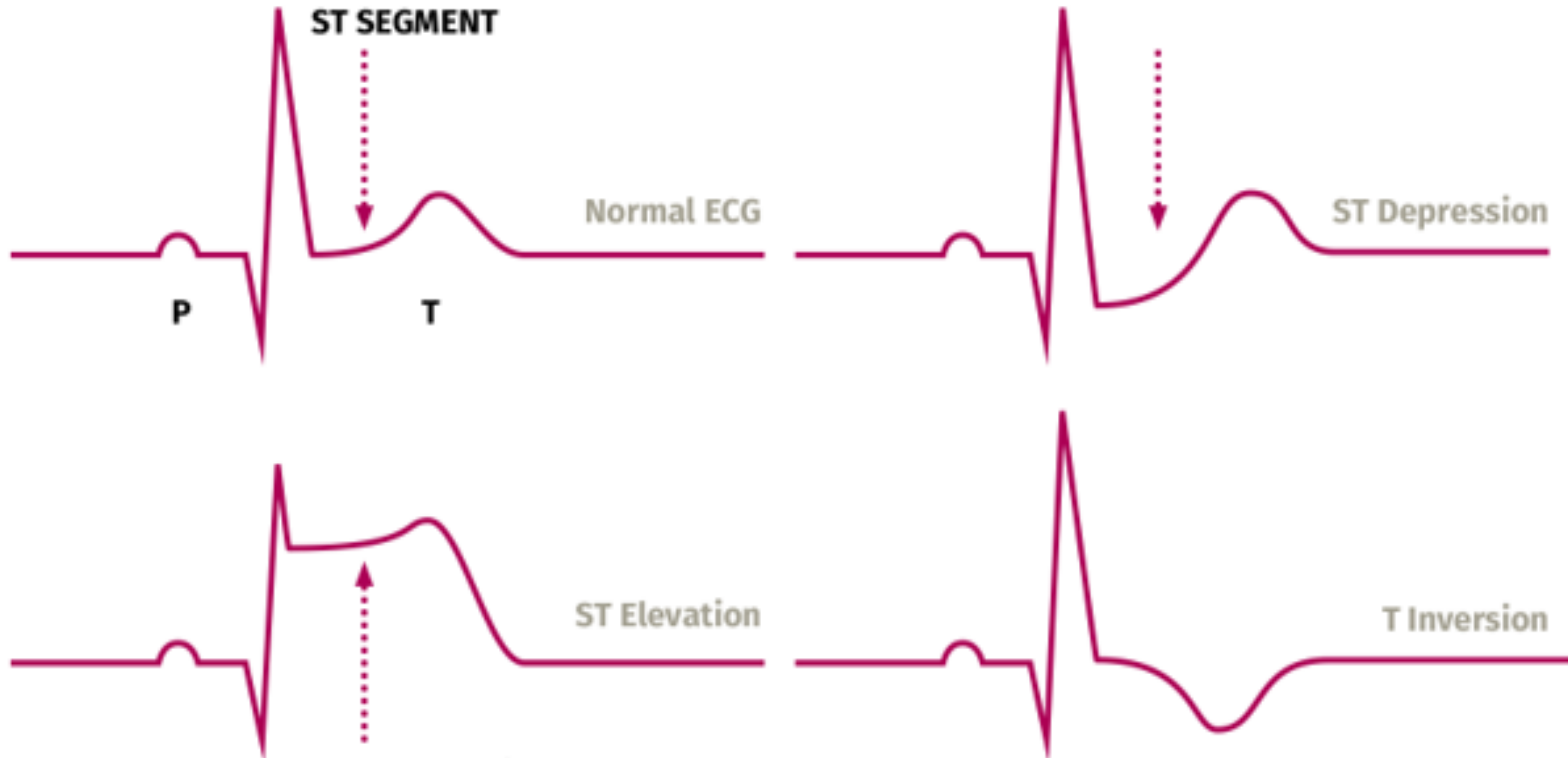
NORMAL HEARTBEAT PULSE



CHANGING IN THE HEART BEAT PATTERNS.

COMMON ABNORMAL PATTERNS

Some heart beat patterns that happen before heart attack (Angina)



SYSTEM OVERVIEW(2/3)

Processing (1/2) : DTW (dynamic time warping)

Used for measuring similarity between two temporal sequences, which may vary in speed.

SYSTEM OVERVIEW(2/3)

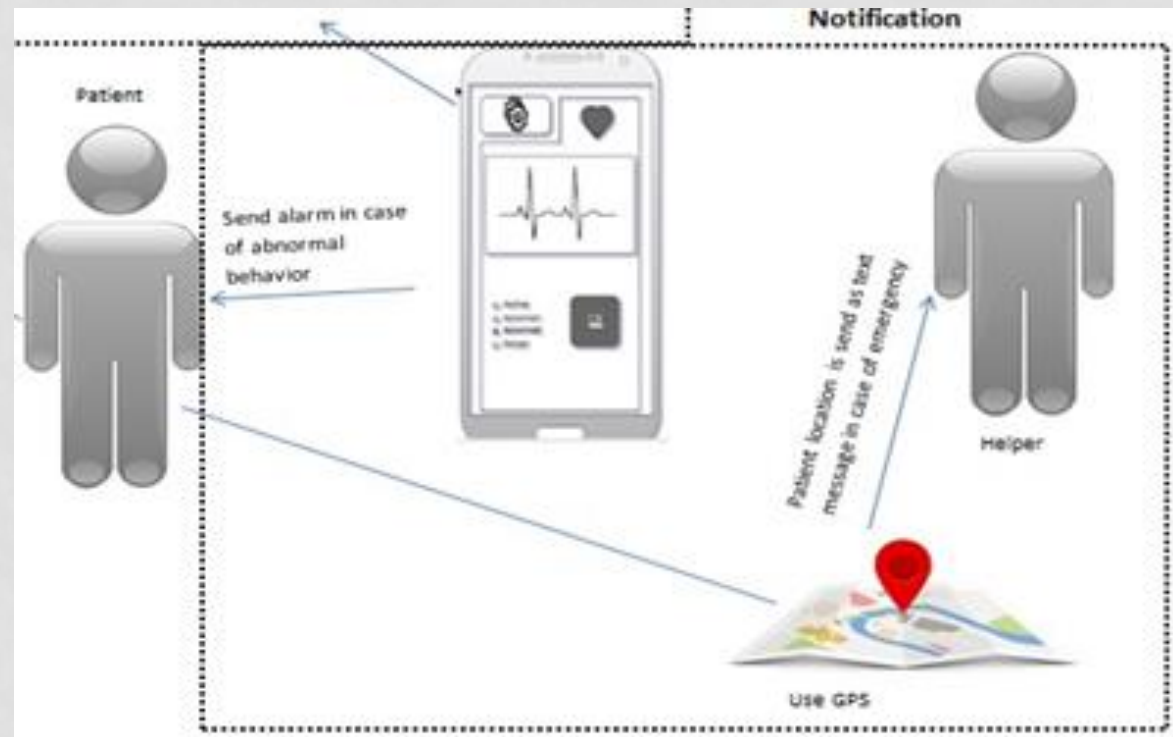
Processing (2/2) : Classifiers

Parameter	Decision Tree	KNN	Naïve Bayes
Effectiveness on	Large data	Small data	Huge data
Speed	Complex and time consuming	faster	faster
Dataset	It can deal with noisy data	It can't deal with noisy data	It can deal with noisy data
Accuracy	High accuracy	Provides high accuracy	For obtaining good results it requires a very large number of records

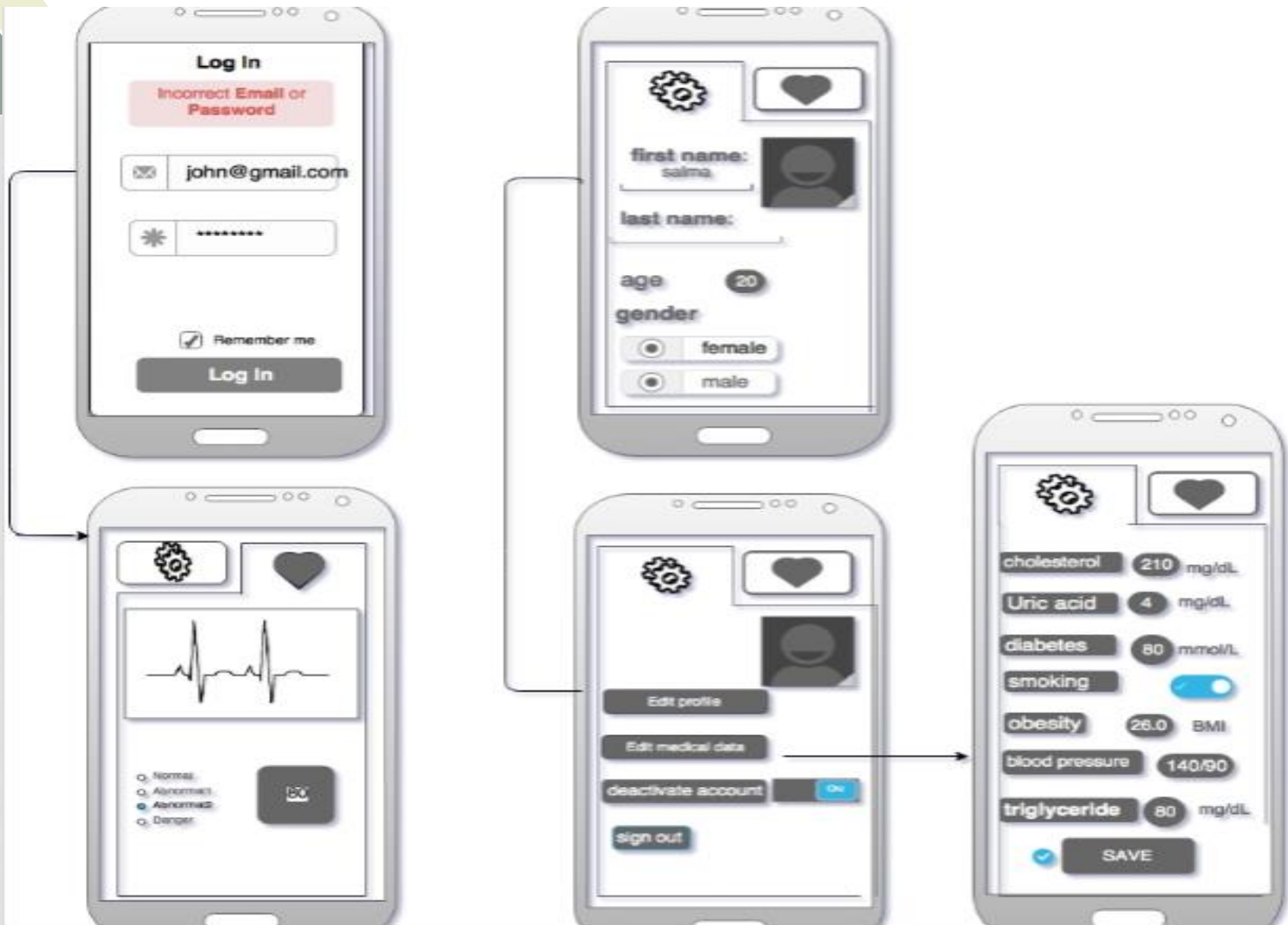
SYSTEM OVERVIEW(3/3)

Notification:

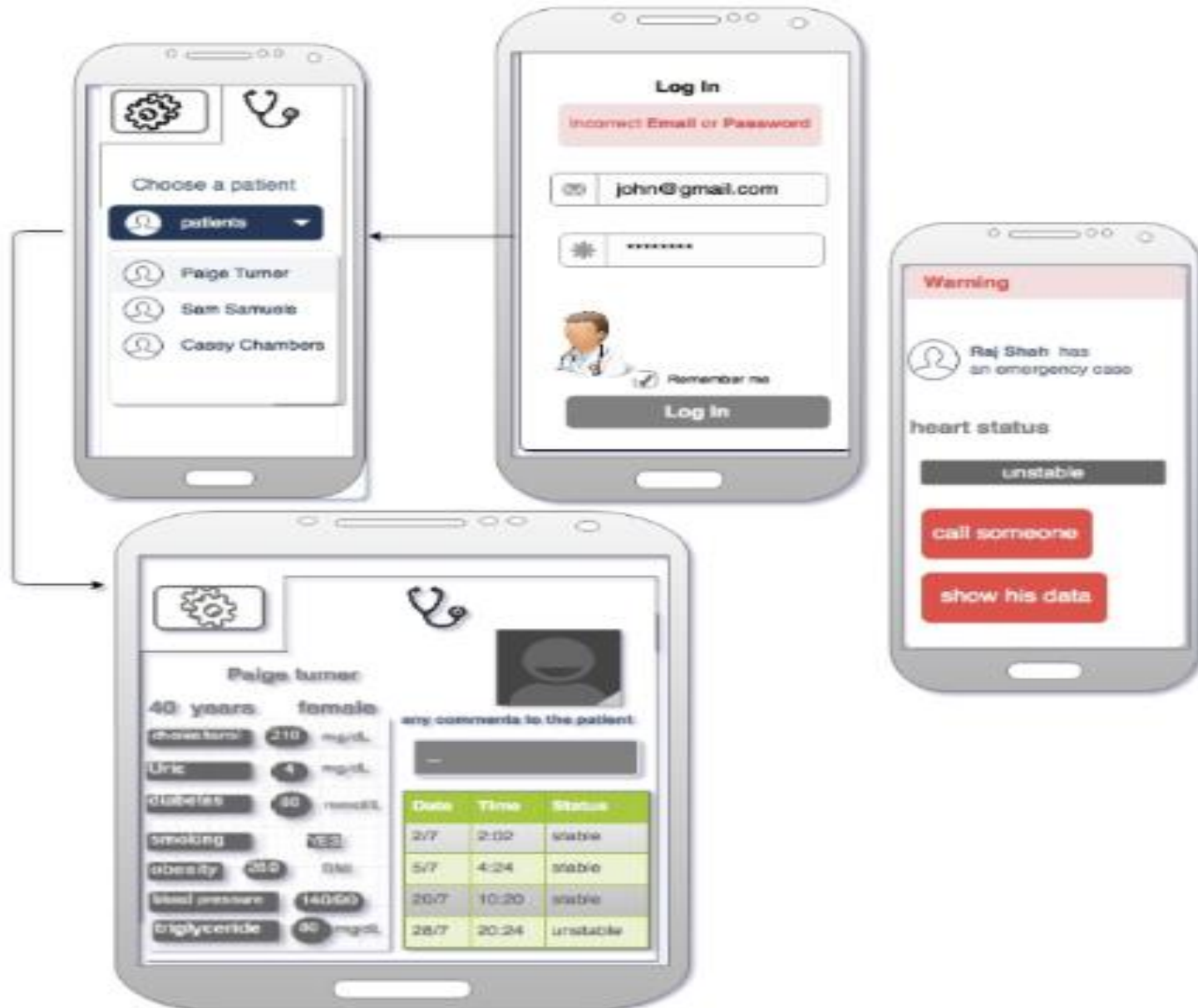
If any abnormal behavior happened in the ECG signal, an alert will be send to the helper with the patient's data in addition to his/her location using GPS



PATIENT WIREFRAME



OBSERVER WIREFRAME



DEMO

NetBeans IDE 8.1

File Edit View Navigate Source Refactor Run Debug Profile Team Tools Window Help

Start Page x DTW.java x knnTest.java x NaiveB.java x

```
double accumulatedDistance = 0.0;
90
91 double[][] d = new double[n][m]; // local distances (distance between two points el fel seq1 w seq2)
92 double[][] D = new double[n][m]; // global distances (kol el matrix)
93
94 for (int i = 0; i < n; i++) {
95     for (int j = 0; j < m; j++) {
96         //d[i][j] = distanceBetween(seq1[i], seq2[j]);
97         d[i][j] = (seq1[i] - seq2[j])*(seq1[i] - seq2[j]); //the distance between two points
98     }
99 }
100
101 D[0][0] = d[0][0];
102
103 for (int i = 1; i < n; i++) {
104     D[i][0] = d[i][0] + D[i - 1][0];
105 }
106
107 for (int j = 1; j < m; j++) {
108     D[0][j] = d[0][j] + D[0][j - 1];
109 }
110
111 for (int i = 1; i < n; i++) {
112     for (int j = 1; j < m; j++) {
113         accumulatedDistance = Math.min(Math.min(D[i-1][j], D[i-1][j-1]), D[i][j-1]);
114         accumulatedDistance += d[i][j]; //shn el local fel el distance between two points
115         D[i][j] = accumulatedDistance;
116     }
117 }
118 accumulatedDistance = D[n - 1][m - 1];
119
120 int i = n - 1;
121
```

compute - Navigator x

Members <empty>

DTW

- DTW(float[] sample, float[] template)
- compute()
- getDistance(): double
- getIndexOfMinimum(double[] array): int
- main(String[] args)
- reversePath(int[] path)
- toString(): String + Object
- K: int
- Xvalue: int
- Yvalue: int
- b: Button
- m: int
- n: int

Notifications

Screencastify - Screen Video Recorder is sharing a window. Stop sharing Hide

91:9 | INS

EXPECTED CONTRIBUTION

- Prediction of heart attack with **high** accuracy
- System can do his main functionality even in **offline mode** due to the limitation of network connection in all Egypt places
- The system will be on both languages English and Arabic to meet the needs of the **majority** in Egypt



CONCLUSION

Using ECG sensor and smartphone device we proposed a solution for predicting heart attack which making sever problems for large number of people in Egypt.



Thank you!
ありがとうございました

TESTING

After communicating with many heart hospital , we are going to test our application on their heart patient , and we will compare our results with the hospital's ECG .