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Smart Medical Assistant using Wearable Device

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Abstract - *More than 2 million people are at high risk of having medical-related incidents like heart-related problems mostly leading to death due to delay in emergency medical attention. So, it will be helpful if there was a way of monitoring the events before the occurrence of a health crisis. Also, there is a need for a personal assistant which would provide solutions to the medical problems of a person. The implementation will be in 5 modules. Heart attack prediction Module will collect real-time data from the wearable band. This data will be used to predict the occurrence of heart attack and accordingly send alert to the Alert Module. Alert Module sends alert to the nearby hospital along with the user's details and the user's current location. Mobile Application Module provides a feature where the user is provided with the diagnosis of symptoms entered by the user. Web Application Module provides a platform where the hospital administrator may accept the user's emergency help request. It provides an interface between the mobile application and web application.*

Keywords: **Heart Attack Prediction Module, Alert Module, Personal Assistant Module, Wearable device**

1. INTRODUCTION

Nowadays, due to the current lifestyle, people are less concerned about their health which results in a further increase in health issues. According to the present scenario, people prefer to consume junk foods due to work pressure which is unhealthy and it leads to obesity. Between the busy hours of work and managing house and family, people rarely find time to focus on their health. Due to technological development and environmental factors, people suffer because of stress which will affect their health. Health is something that changes daily.

Any action that we take impacts our body in some of the other ways. Considering the current environmental changes, regular health monitoring is of prime importance. To ensure that we are healthy, we need to monitor our health regularly.

A Personal Health Monitoring system would be the right choice as it can help users in managing their health status daily. We aim to propose a system consisting of a wearable device for regular health monitoring. The device will continuously sense the temperature and pulse rate of the user, also keeping track of the user's location as well as the date and time. If the user's temperature or pulse rate crosses the set threshold, the device will notify the user with the location of nearby hospitals. In situations when the critical level is crossed, the user's relatives will be alerted about his/her deteriorating condition with the user's current location.

2. EXISTING SYSTEM

Nowadays, many fitness monitoring devices are available in the market which is capable of monitoring user's fitness level and notifying him/her accordingly. But measuring only physical fitness is not sufficient, continuous health monitoring is also needed for better living. There are many embedded systems[3] present which monitor either temperature or pulse rate of user for better notification, but measuring a combination of both will get us more detail and precise information about person's current health condition.

There is some system which is an area or person-specific like "IOT based Wearable Health Monitoring System for Pregnant Ladies"[9]," Health Companion Device using IoT and Wearable Computing" [1] and "Safety Wristband for active security network"[4].

Existing systems provide only notification about fitness and health conditions but the report of daily and monthly variations is needed for better diagnosis which is absent in many of the existing systems.

3. SYSTEM IMPLEMENTATION

The system being developed has the following modules:

3.1 Hardware Module (Wearable device):

Wearable device contains a PPG sensor, a temperature sensor for real-time monitoring of heart rate and body temperature.

3.2 Web Application Module:

The web application will take a user's current medical status along with his location value (latitude & longitude) and will provide service accordingly

3.3 Heart Attack Prediction Module:

Heart Attack Prediction Module will take the user's real-time values (heart rate and temperature) and will determine the occurrence of heart attack using a machine learning algorithm.

3.4 Mobile Application Module:

The mobile application consists of two applications – Patient Heath application and Ambulance application. Patient Health application contains the user's saved data like height, weight, age, gender, etc. It also provides a feature where the user enters the symptoms and accordingly application will provide a preventive action (first aid based). Ambulance application shows the current location of the ambulance when requested for it.

3.5 API Functions Module:

API Module provides an interface between web application and mobile application. API Module consists of various defined methods that are interacting while web application and mobile application.

4. METHODOLOGY

4.1 Pre-processing

Input for prediction is taken from the wearable device. The wearable device senses heart rate and temperature using sensors and sends data to a server which is used as input for classifier class.

4.2 Classifier class

This class predicts the occurrence of heart attack using Naive Bayes Text Classification. Text classifier is a simple (naive) classification method based on Bayes rule. It depends on an awfully easy illustration of the document (called the bag of words representation).

$$P(W = w_i | Y = y) = \frac{count(W = w_i \ \& \ Y = y) + mp}{count(Y = y) + m}$$

4.3 Alert module

When the classifier class detects an abnormality it then passes the control to the alert model. Alert module gets a notification and sends an emergency request along with the user's location to a nearby hospital. Google API's is used to search for nearby hospital and an ambulance is sent accordingly.

4.4 Update Ambulance location class

The class continuously updates the location of the ambulance. It uses Google API to show the current location of the ambulance on its way to the person who asked for help.

4.5 Diet Plan class

This class calculates the BMI of the user according to the values stored in the application and suggests a Diet Plan accordingly by accessing a dataset.

4.6 Get Hospital class

This class searches for the hospital near to the user requesting for help. It uses Google API to search nearby hospital by using the user's latitude and longitude values.

The following figure Fig. 1 shows the system architecture:

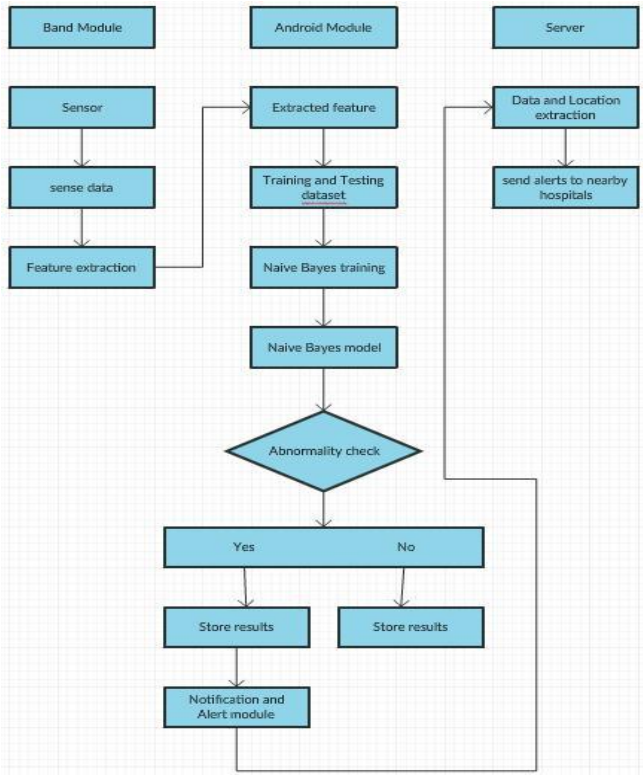


Fig - 1: System Architecture

5. UML DIAGRAMS

5.1. Class Diagram

The class diagram shows a static view of the system. All the classes, their attributes and the methods in each class. Following figure fig. 5.1 shows the classes in the system and their dependency on other classes of the system.

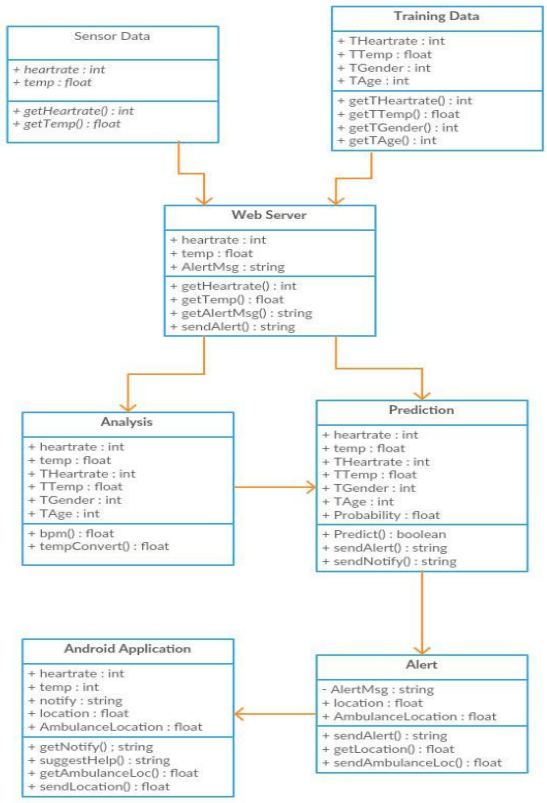


Fig - 2: Class Diagram of System

5.2. Activity Diagram

Activity Diagram represents the dynamic behaviour of the system. Activity diagram exhibits the flow from one activity to another activity. The activity is delineated as associate degree operation of the system. Activity diagrams don't seem to be solely used for visualizing the dynamic nature of a system; however, they're additionally accustomed construct the practicable system by exploitation forward and reverse engineering techniques. Following figure fig - 3 shows an activity diagram of our system:

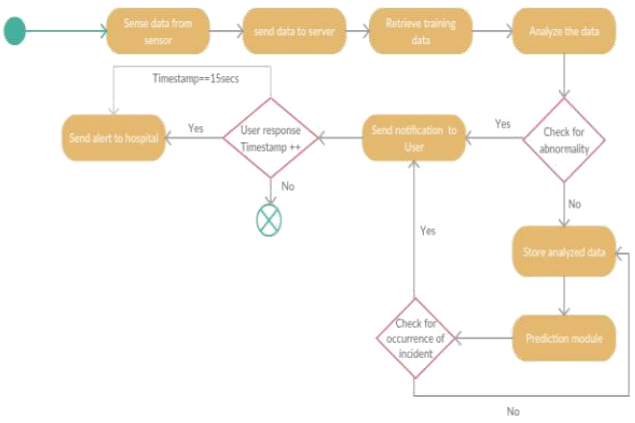


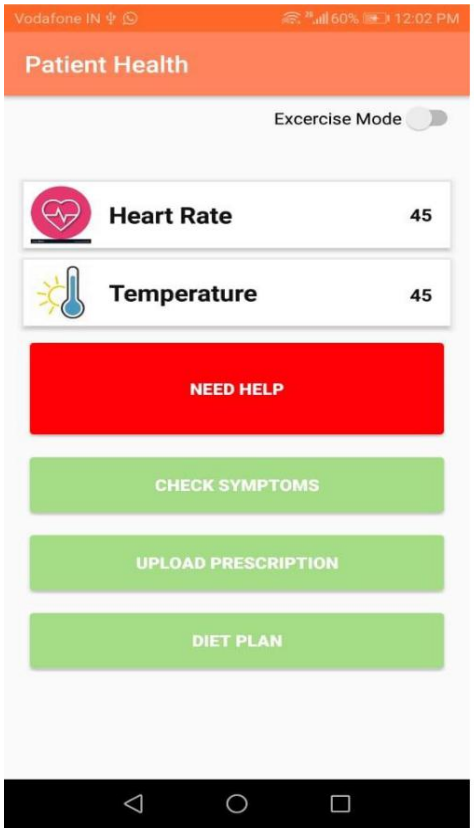
Fig - 3: Activity Diagram of System

6. RESULTS AND DISCUSSION

6.1 User Login

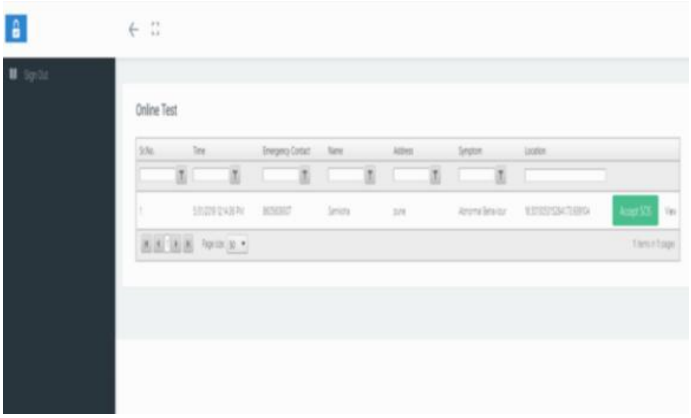
Snapshot - 1: User Login (Android)

6.2 User Dashboard



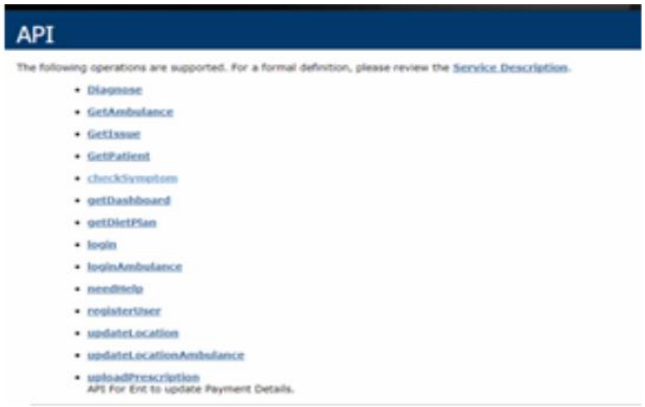
Snapshot - 2: User Dashboard (Android)

6.3 Hospital Dashboard



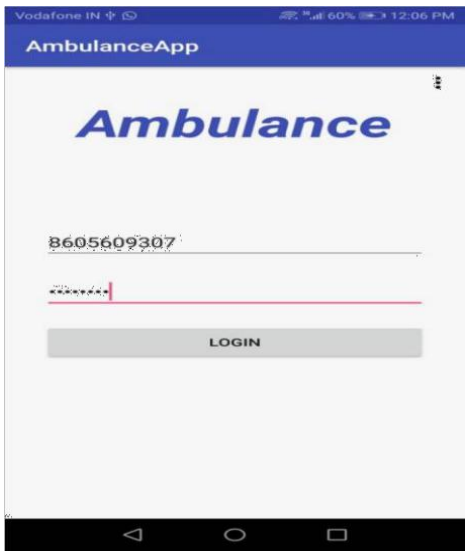
Snapshot - 3: Hospital Dashboard (Web Application)

6.4 API's



Snapshot - 4: Hospital Dashboard (Web Services)

6.5 Ambulance Application



Snapshot - 5: Ambulance App (Android)

6.6 Conclusion

Smart Medical Assistant helps in the detection of a medical emergency (heart abnormality) using a wearable device. It uses technology to provide immediate help by notifying the nearby hospitals about the user's location. It also assists the user in providing first-aid based help on the symptoms provided by the user. The application also helps the user maintain a healthy lifestyle by providing a feature of Diet Plan. It eases the work of the user and reduces the risk of heart failures to some extent by providing immediate medical assistance.

REFERENCES

1) Chaitali Kulkarni, Himani Karhade, Sonali Gupta, Prashant Bhende"Health Companion Device using IoT And Wearable Computing"2016InternationalConference on Internet of Things and Applications (IOTA) Maharashtra Institute of Technology, Pune, India 22 Jan - 24 Jan 2016.

2) Supriya Kale, Pravin Patil, Satendra Mane "IOT based Wearable Biomedical Monitoring System "International Conference on Trends in Electronics and Informatics ICEI 2017

3) Butean, C. Buduleci, A. David, A. Daian, "Auxilum Medicine: a cloud-based platform for real-time monitoring medical devices", 20th International Conference on Control Systems and Science, 2015.

4) Jesús Blanco Rodríguez de Guzmán, Andrés García Higuera, Javier de las Morenas de la Flor Autolog group, School of Industrial Engineering. University of Castilla" Safety Wristband for Active Security Network" Smart SysTech, July 1-2, 2014 in Dortmund, Germany.

5) M. U. Ahmed, M. Bj¨orkman, and A. Cauˇsevic, et al. An overview on the internet of things for health monitoring systems. In IoT Technologies for HealthCare, 2015.

6) F. Samie and L. Bauer and C.-M. Hsieh et al. Online binding of applications to multiple clock domains in shared FPGA-based systems. In DATE, pp. 25–30, 2015.

7) Review", 2016 IEEE 40th Annual computer software and application conference, DOI 10.1109/COMPSAC.2016.8.

8) V.Santhi K.Ramya, APJ.Tarana, G.Vinitha "IOT Based Wearable Health Monitoring System for Pregnant Ladies Using CC3200" International Journal of Advanced Research Methodology in Engineering & Technology, ISSN 2456 6446 Volume 1, Issue 3, May 2017