Remote Patient Monitoring Application for Android

Client Profile (Under NDA) was seeking a remote patient monitoring system, a healthcare domain product. They had an idea of building a product which will integrate seamlessly with advanced electronic healthcare devices and gather patient's medical information periodically and send it to remote locations for live and analytical monitoring.

Project Need

The project's objective was to develop a mobile application which will collect data from electronic devices, display the same and sync the important information to server. A web application was to be developed for displaying the collected information at remote locations.

How we achieved it

We suggested using native application development for Android based devices and PHP, Zend framework for developing the web application and associated web-services.

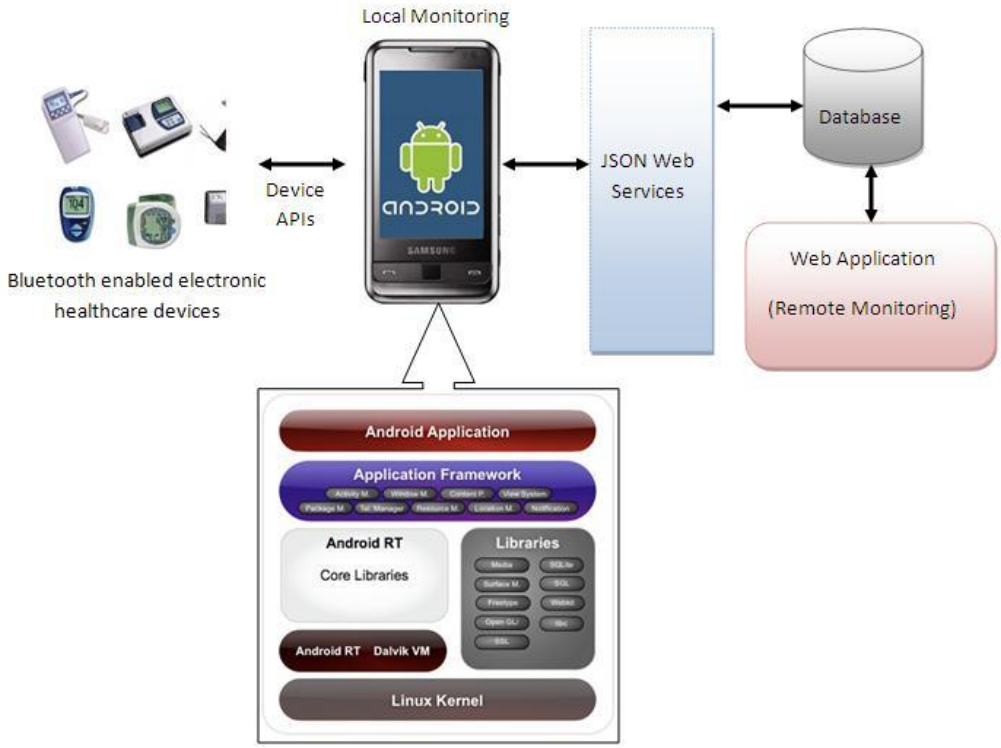
We used SCRUM methodology to develop the entire product.

Development Approach

Instead of traditional Waterfall approach of documenting the requirements and then getting into the software development life cycle, we used Agile SCRUM methodology for faster development:

- Customer prepared Product backlog with appropriate priorities and assigned a Product Owner to the project.
- e-Zest formed a team and appointed the SCRUM Master to analyze the Product backlog and conduct Sprint planning.
- Sprint 1 scope was estimated and finalized and approved by the Product owner.
- Sprint 1 was then initiated and both Android and Web teams worked together to achieve the end deliverables
- On completion of Sprint 1, a review session with customer was conducted.
- Based on the Sprint 1 review feedback and the next priority items in the Product backlog, Sprint 2 scope was estimated and finalized.
- This process continued for 4 sprints until all the items from the Product backlog were implemented.
- The product was then released for beta testing

High Level Architecture



Business Benefits

The developed application allows patients and care takers in the hospitals to monitor the health status of the patient using the easy to understand UI developed for Android application. Alerts, reminders and emergency notifications for vital measurements help doctors to take timely decisions in emergency situations. Doctors can monitor the patient's status at all the time using the web interface at any remote location as android application keeps syncing the test data using the web services with application server. Web app also works as reporting tool where one can view all the history for the patient's test performed over the period. High level goal will be achieved when patient's at remote places can be monitored without physical presence of the specialist professionals at given locations.

Devices Integrated (Phase 1):

FORA d15: The FORA D15b is dual function: blood glucose and blood pressure meter is designed for monitoring blood glucose and blood pressure levels. It has an oversize display with large numbers. The arm cuff adjusts to fit the users arm for comfortable inflation.**Device features**

- Large LCD display and readout.
- Comfortable arm cuff (9.4" – 13.8" std, optional 12.7" – 17.3").
- Blood pressure accuracy: ± 2%. Heart rate accuracy: ± 4%
- 352 test memory sets with date & time.
- Bluetooth data output capability.
- Code set by code card included with strips.
- Keytone warning over 240 mg/dL blood sugar.
- Requires only 0.7 µL blood sample and 7 seconds to test

Used for:

- Blood Glucose Measurement
- Blood Pressure Measurement

Zephyr HxM BT: The HxM™ BT combines Zephyr's patented BioHarness™ smart-fabric heart rate technology used in high-end professional markets, with speed and distance in a small, comfortable consumer device.**Device features**

- Heart Rate range 30 240 BPM
- Other parameters Heart R-R, Speed, Distance, Strides

Used for:

- Heart Rate Measurement
- RR Interval Measurement

High Level Feature list:

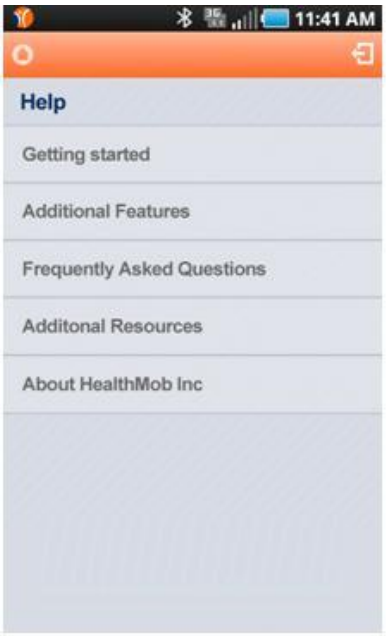
***Mobile Application**:*

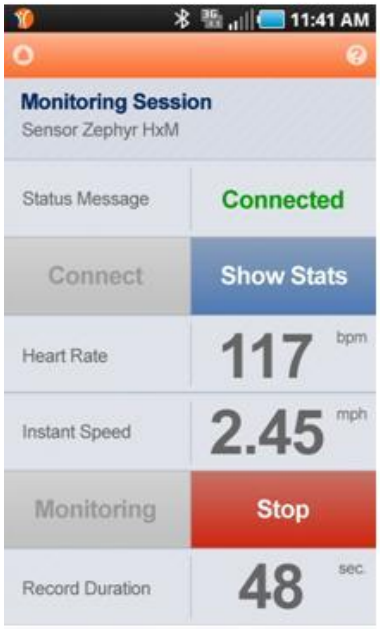
- User Authentication
- Patient's health monitoring calendar scheduled by doctor
- Health Monitoring
    - Blood Glucose Measurement
    - Blood Pressure Measurement
    - Heart Rate Measurement
    - RR Interval Measurement
- Notations (patient experience) while taking measurements
- Help Section

Web Application (Remote Monitoring):

- Patient Search
- Vital Signs (Set thresholds for each measurable parameter)
- Sessions (details for each parameter measured as per the calendar)
- Set Calendar for patients
- Notations (patient's experience while recording the readings)
- Graphs
- Stats
- Messages (Instructions for patients)
- Demographics

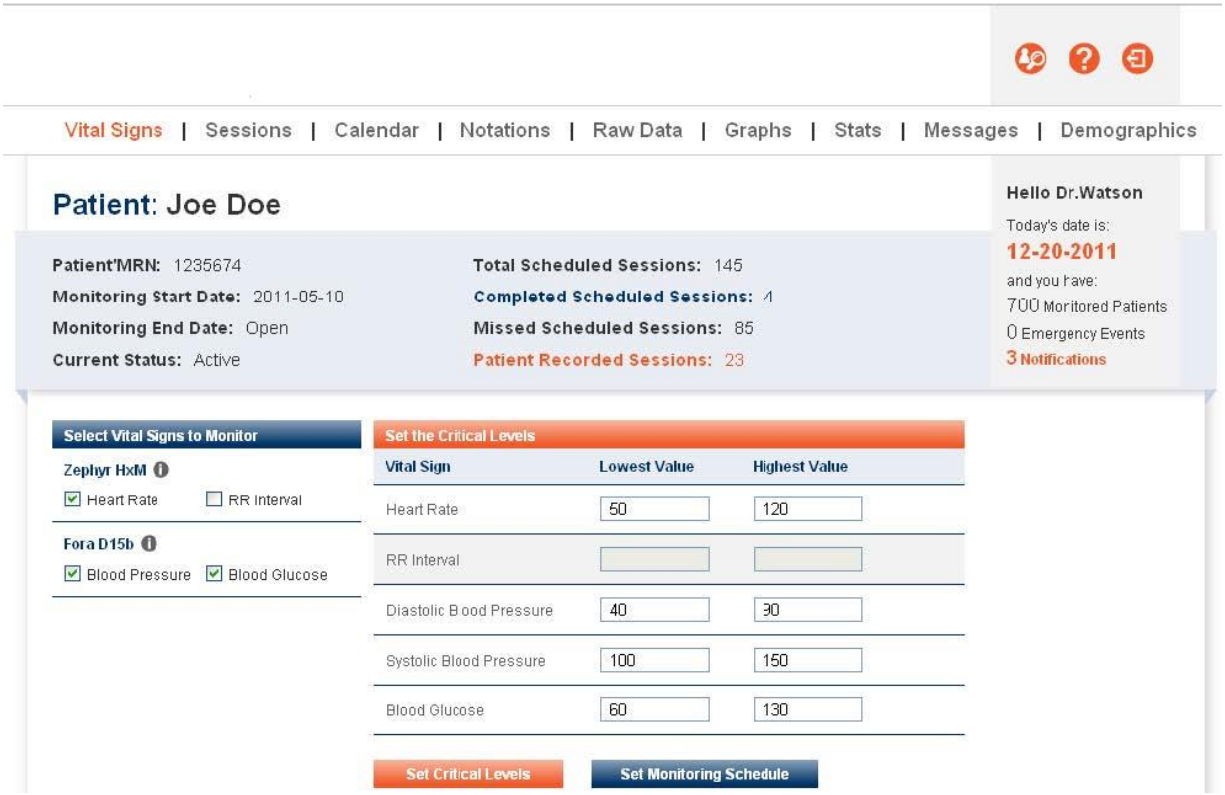
Mobile UI Screens:





Web Portal UI Screens:

- Doctor can set the threshold values to trigger a notification/alert for each patient.



- Data obtained from the electronic devices for each measurable parameter during a session.