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FIU Computing & Information Sciences

Biosensing Ver 2.0

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Android

Texas Instruments

Problem

- People who require constant monitoring for medical reasons, such as the elderly and those with heart problems
- People who visit the doctor frequently and need accurate health data

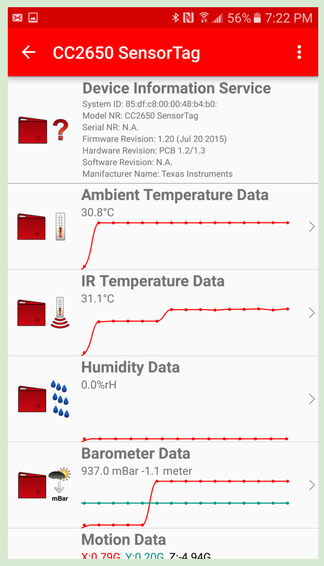
Solution

- Develop an Android application to communicate with biosensing device through Bluetooth Low-Energy technology and display useful data and graphs
- Build a database to store biosensor data, such as temperature, heart rate, etc.

Current System

T.I. SimpleLink: an Android app developed by Texas Instruments that can connect to a Bluetooth Low-Energy (BLE) device and display raw data

- Not user-friendly
- Does not store data
- Graphs are unhelpful



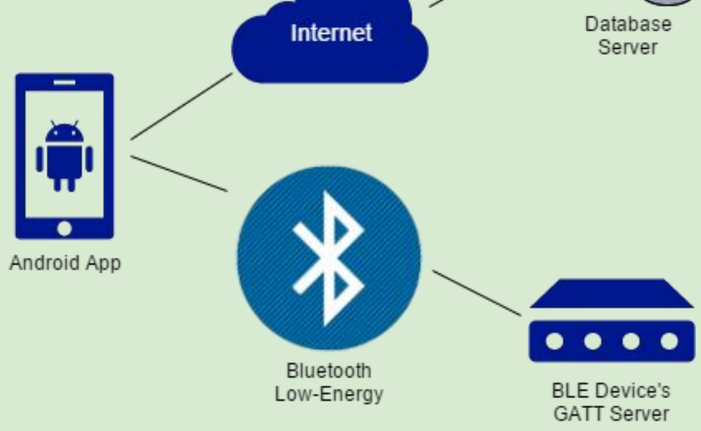
Requirements

App must support the following actions:

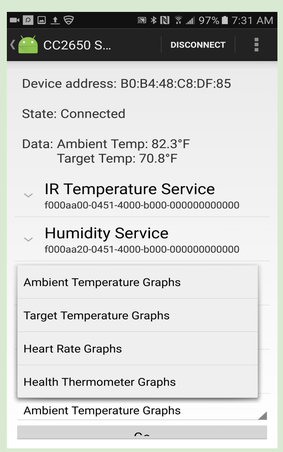
- Scan for nearby BLE devices
- Connect to selected BLE device
- Manage biosensors on device
- Display live biosensor data
- Store\Retrieve biosensor data in database
- Display line graphs with data in user-specified range
- Display real-time line graphs

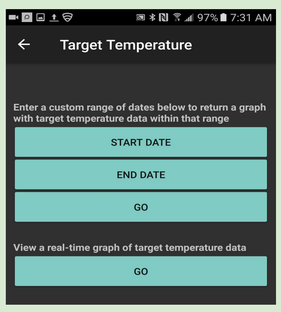
System Design

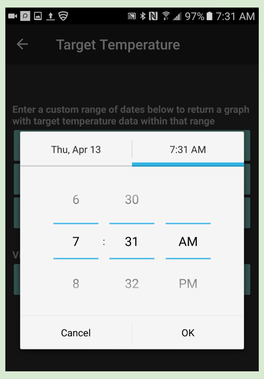
Client/Server Architecture

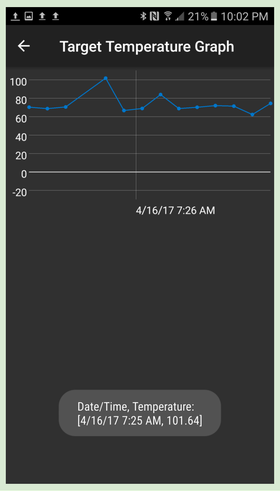


Screenshots









Implementation

Java

Android

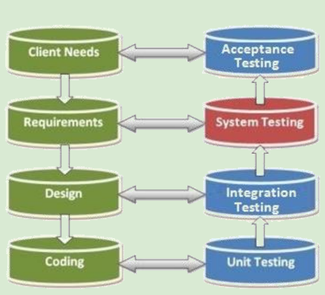
Microsoft SQL Server

Bluetooth 4.0 Low Energy

Verification

Unit Test

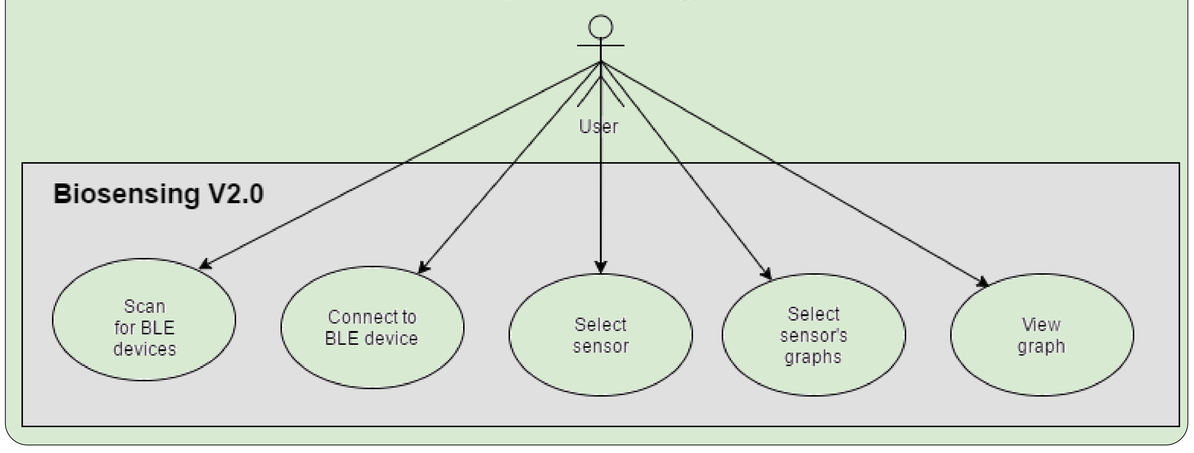
- Test case ID: 208-001
- Description/Summary of Test:
  - Test if Android app formats BLE device data and displays it correctly.
- Pre-condition:
  - Android app is connect to BLE device and the app can gather data from it.
- Expected Results:
  - Android app displays formatted BLE data.
- Actual Result:
  - The data collected from the BLE device was formatted correctly.
- Status (Fail/Pass):
  - Pass.



System Test

- Test Case ID: 229-001
- Purpose: To test if the mobile app can connect to a BLE biosensing device's sensors, store the data it collects in a server, and display graphs with data pulled from the server
- Preconditions:
  - Android application package installed on mobile device
  - SQL Server running on same local network as mobile device
  - A BLE biosensing device (such as the T.I. SensorTag) is nearby and turned on
- Expected Result:
  - The app connects to the device's temperature sensor and pushes the data to the server every 30 seconds
  - The app displays a user-given range of temperature data in a line graph
- Actual Result:
  - The app successfully connects to the T.I. SensorTag's temperature sensor and pushes temperature data to the server every 30 seconds.
  - The app successfully displays a line graph with temperature data within the range of date and times the user specifies
- Status (Fail/Pass):
  - Pass

Object Design



Summary

- Responsible for developing a native Android app
- App collects data from BLE biosensing device, stores data in database server, and displays data
- Useful graphs that show ranges of biosensor data
- Coded in Java in Android Studio; database is built using MS SQL Server 2016

Acknowledgement

**The material presented in this poster is based upon the work supported by Dr. Shekhar Bhansali.
This project would not have been possible without the contributions of my partner, Galo Romero.**