Smart Bandage Quick Start Manual Rev. 1

1 Demonstrating the Smart Bandage

To demonstrate Smart Bandage functionality first ensure that either the battery is charged, or a micro USB cable is connected to the device. If using a battery use a header jumper to jump the two 0.1" header pins next to the battery terminal. Note that charging from USB will only work when the power supply is limited to 200mA or less.

Once the Smart Bandage is powered the lights on the detachable debug board will flash (if attached). Green lights flash while the MCU communicates with a specific sensor, while the blue lights flash while Bluetooth is Enabled.

Install the Smart Bandage.apk from the releases section of the GitHub Repository onto on Android device with Android version 5 or 6. Enable Bluetooth on the device and wait for the bandage to enter Bluetooth mode. When it does, click the "Scan" button to detect the bandage. Select the bandage and click "Connect" in the list. Once this process is performed the app will automatically connect to the device and upload to the web service when the bandage is available. Test this by placing a hand over the temperature sensors while the lights flash green. Hold until the blue light appears and you should see the value reflected in the app when you click on the device in the connected devices view on the app.

2 Smart Bandage Communication Module PCB and Sensor FPCB

Included in the project are the Eagle CAD files for the Smart Bandage, these can be used to order board from PCB manufacturers, make hardware revisions, and develop an understanding of how the connections are made on the board.

Required Components:

1. Eagle CAD 6.6.0+
2. Smart Bandage Eagle CAD libraries
3. Knowledge of PCB design and best practices
4. Solder Reflow Oven, solder paste, solder stencils

3 Programming the TI CC2640 Microcontroller Unit (MCU)

As of Revision 1, the MCU is the TI CC2640 with built-in Bluetooth Low Energy stack. In order to modify or change the functionality of the Smart Bandage, the programmer must have an understanding or C, memory allocation, pointers and I2C protocol.

Required:

1. Knowledge of C
2. TI Code Composer Studio (CCS): http://www.ti.com/tool/ccstudio

3. TI BLE Stack for CC26xx v32.2.01.00.44423 or greater
4. TI-RTOS for CC26xx v32.2.15.00.17 or greater
5. CC26xxware v2.23.00.16374 or greater
6. A SWD programmer such as the XDS100 included on the CC2650 development kit

Install all of the prerequisites and open TI Code Composer Studio. Begin by setting a global environment variable (in the IDE properties) of `TI_DIR` where the value is your TI installation directory (likely C:\ti)

Once the software is installed compile it, and connect the programmer/debugger to the computer. Then connect the pins on the JTAG header to the programmer. The required pins are: 3.3V, GND, Reset, TCK, TMS. Once connected, start by programming the Bluetooth Stack project by right clicking it and selecting "Run As->Code Composer Project". The code should program, but it will not be able to debug because no symbols are defined for main. This is expected. Now right click the main project and select "Run As->Code Composer Project". The code should now run properly.

4 THE ANDROID APPLICATION

The android application is used as an intermediary between the Smart Bandage and the web server, its purpose is to read the data that has been made available through the Bluetooth characteristics and transform it into human readable form. The data is then passed to the web server via http post requests.

Required:

1. Android Studio 1.0+
2. Android SDK 23
3. Knowledge of Android Programming
4. Knowledge of Android Bluetooth stack
5. Familiarity with Android Services and Persistent Storage Method
6. Android Phone with Android 5.1.1+ that supports BLE

5 THE WEB APPLICATION

The web application is designed to make it easy for Health Care professional to view patient data. Its purpose is data visualization. Required:

1. Local web server hosting mysql 5.6+
2. familiarity with PHP 5, javascript, hTML, CSS
3. Twitter Bootstrap 3 http://getbootstrap.com/
4. ChartJS for graphing http://www.chartjs.org/
5. Extract the contents of the webserver folder to the web server.
6. copy sql_connect_sample.php file from topdir folder into the parent directory of website and rename to "sql_connect.php"
7. fill in your database connection parameters
8. run "smartbandagesetup.sql" followed by "initialize.sql" on the phpMyAdmin to create the mysql tables and create some basic users.