UC Davis Advanced RF Technologies Lab Internship on Wearable Radar Sensor for Long-term Cardiac Arrhythmia Monitoring

Technical Overview

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Overview

- Simple set up and data visual
- Easily adaptable with end user display, bluetooth configuration, and data transfer process
- A model of the heart sensor module
- Transfer of data from Arduino Uno Microcontroller board to mobile application via Bluetooth module
- Closely depicts the seamless data transfer and processing of what the real module will be like
- Visit research webpage for more information: https://ucdart.github.io/research/#cardiac
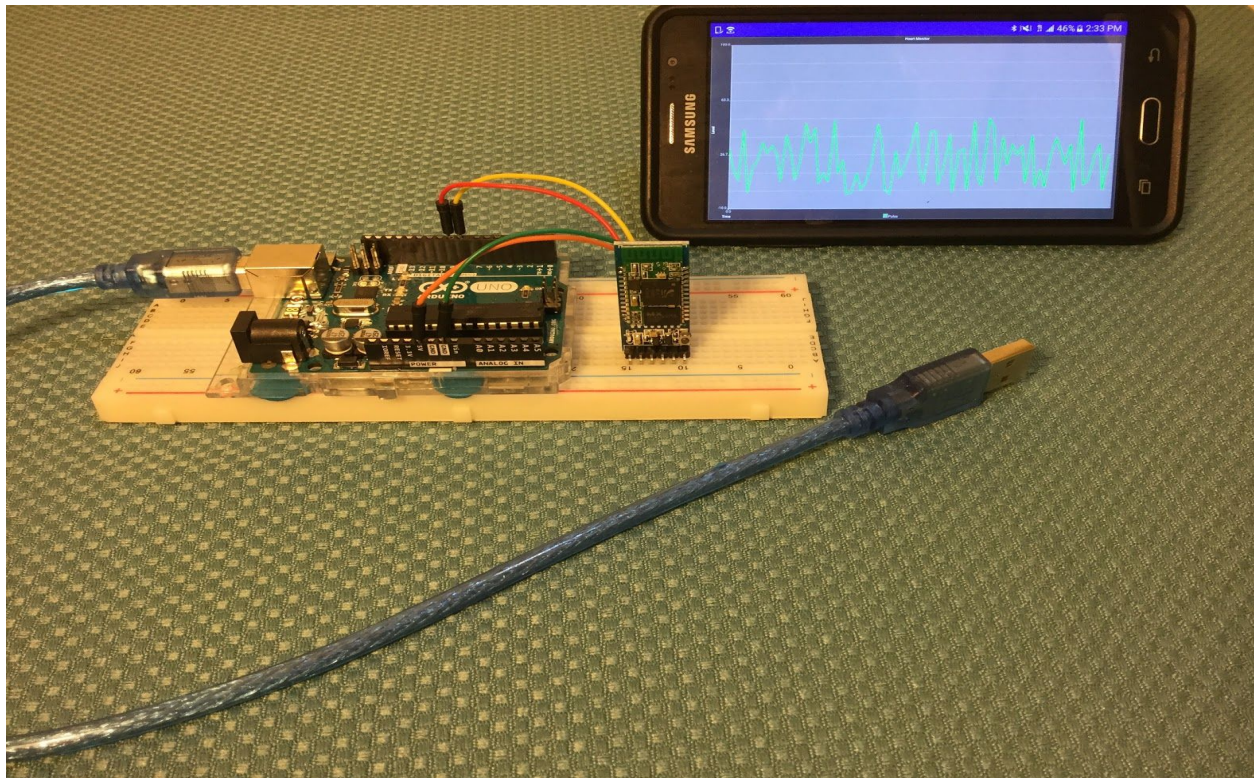
System: Arduino Uno Microcontroller, jump wires, standard issue USB 2.0 cable, Bluetooth HC-05 module, breadboard, mobile device

Technical Details

Arduino Uno Microcontroller

- Downloads and runs C programming files from the Arduino IDE (Integrated Development Environment)
- Generates randomized sequences of numeric data in a specified range
- Communicates with mobile device via Bluetooth
- Sends data at 200 Hz, the rate at which the real module will function in
- Wide versatility with sensor integration
- Utilizes built-in timer to send data rapidly with precision
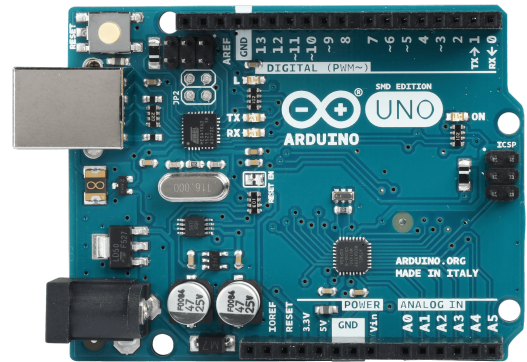
Bluetooth HC-05 Module

- Core component in the communication between Arduino and mobile device
- LED feature to signal different stages of connection
- Can send and receive data in real time
- Power range of 3.6 - 6.0 V
- Pin Connections: STATE, RXD, TXD, GND, VCC, EN
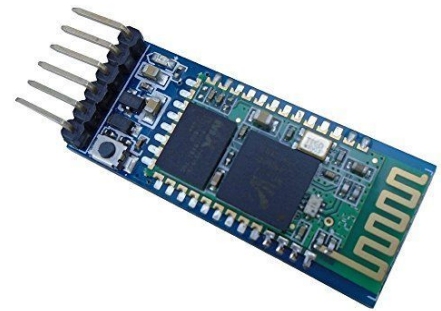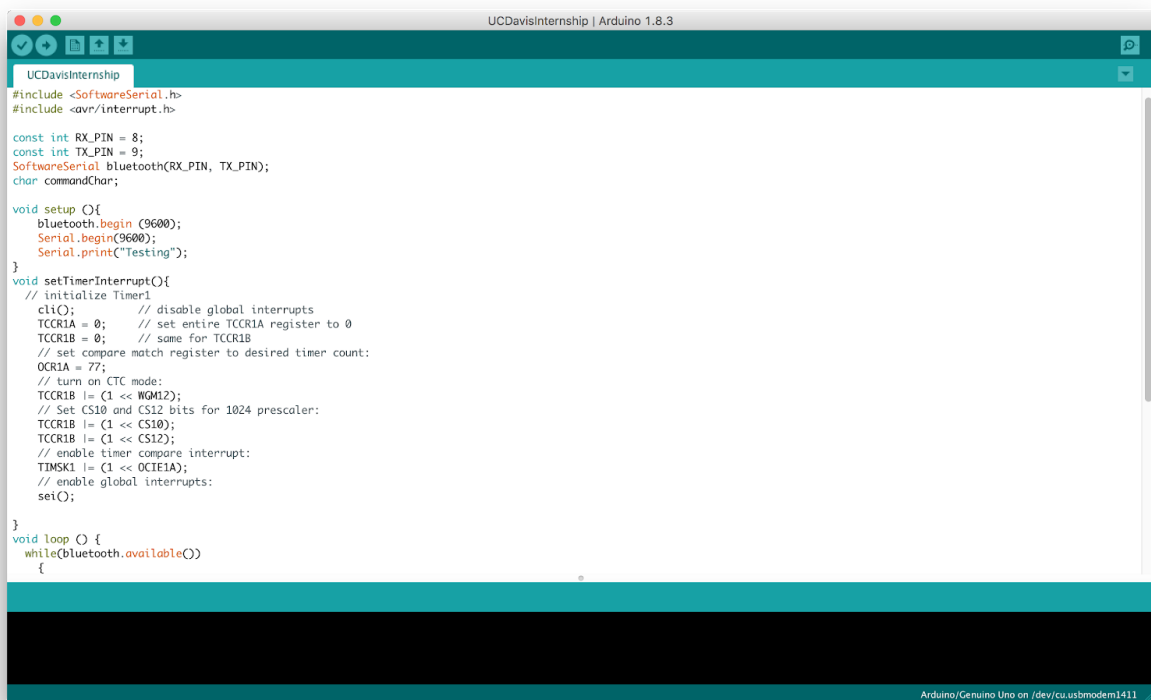
Mobile Application & Data Visualization

- Seamless data processing and display at 200 Hz
- Uses Bluetooth to communicate with Arduino Uno and HC-05 module
- Sends and Receives data
- Stop feature to pause graphing
- Flexible display
- User Interface is to be integrated.
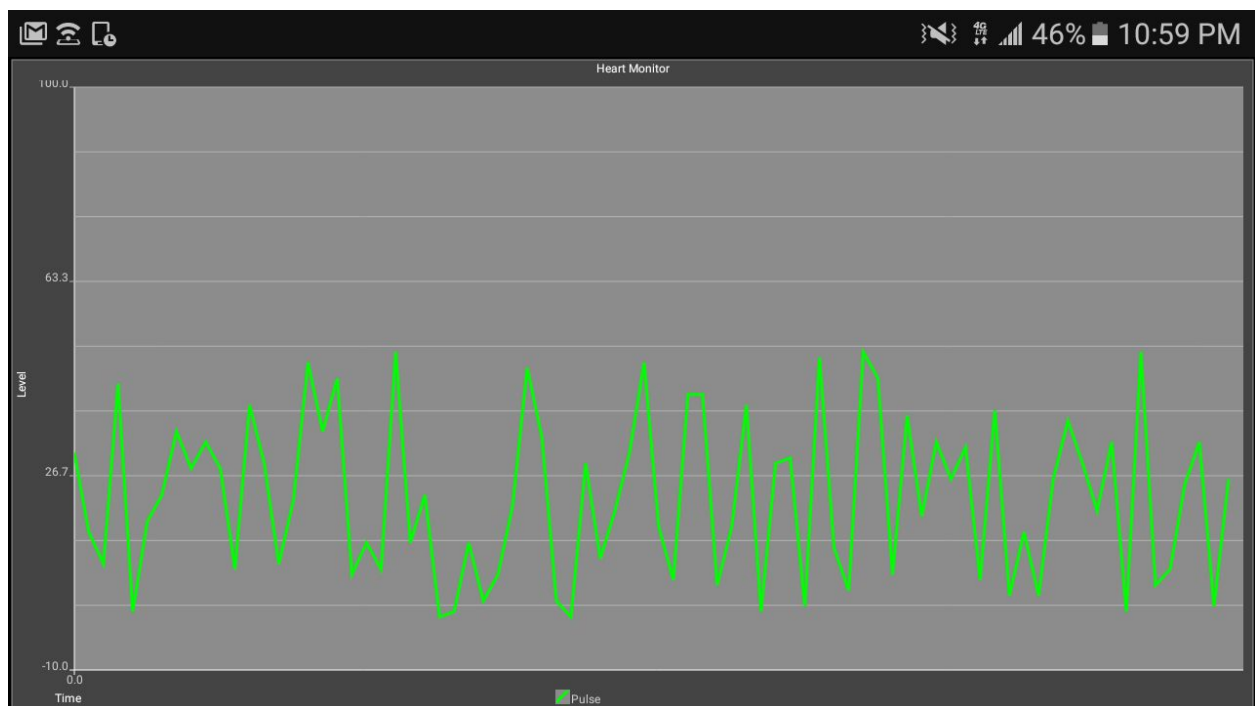
- *App Screenshot*

Arduino IDE & Development

- C/ C++ Compiler
- Main default functions: setup, loop
- Flexible with vast libraries for hardware configuration such as Bluetooth modules.
- Shows output console and error logs
- Timer to send data at precise rate of 200 Hz
- Continuously listens for bluetooth connection availability and request from mobile device

View code: https://github.com/chung1007/2017-UCD-DART-Internship/blob/master/UCDavisInternship.ino

Android Mobile Application Development

- Built on IntelliJ and is capable of advanced code completion, refactoring, and code analysis.

- Java programming language

- XML format for display

- Class to continuously listen for bluetooth availability from Arduino

- Instantly starts to receive stream of data after connection

- Graphs Arduino data in real time

- Logs errors and log messages in real time
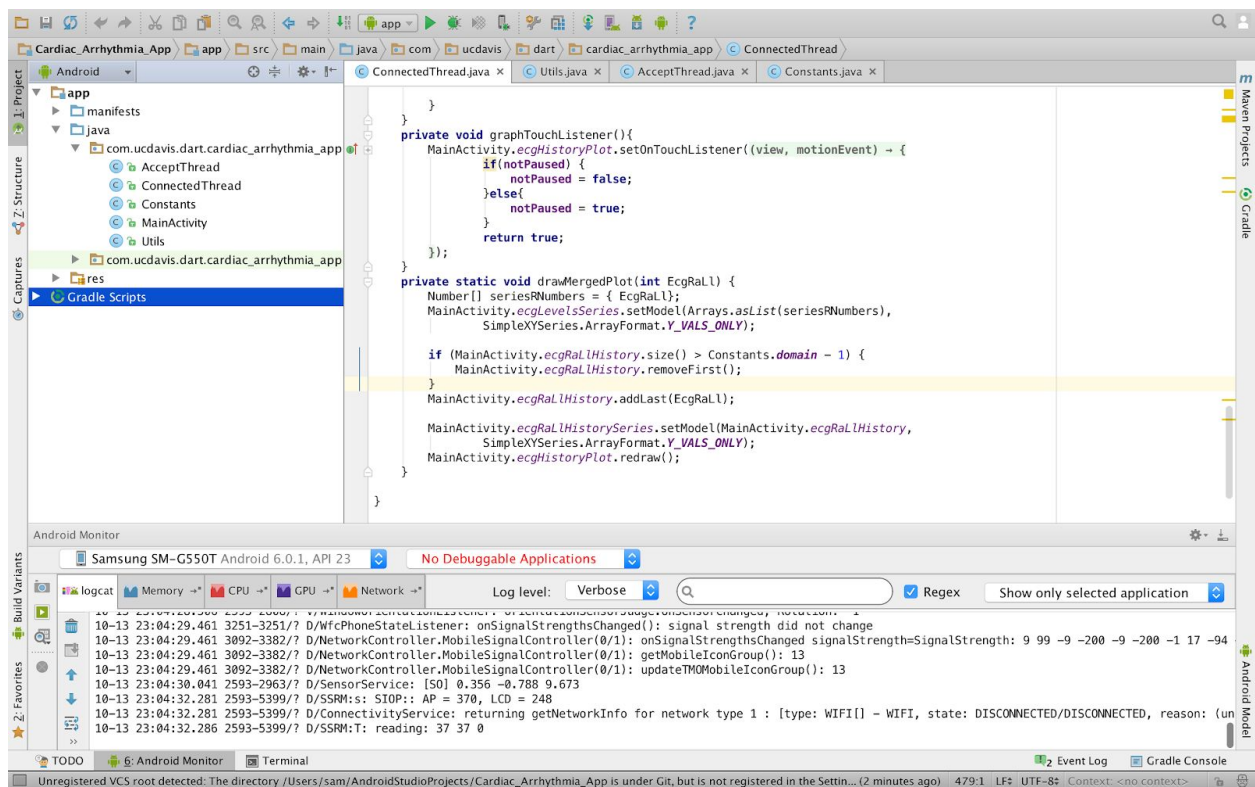
View code:

https://github.com/chung1007/2017-UCD-DART-Internship/tree/master/app/src/main/java/com/ucdavis/dart/cardiac_arrhythmia_app