UberVest

Health Monitoring Vest

The UberVest Team

Hayden Ball - Hardware / Website

Filip Frahm - Data Analysis

Roy Hotrabhavnon - Hardware

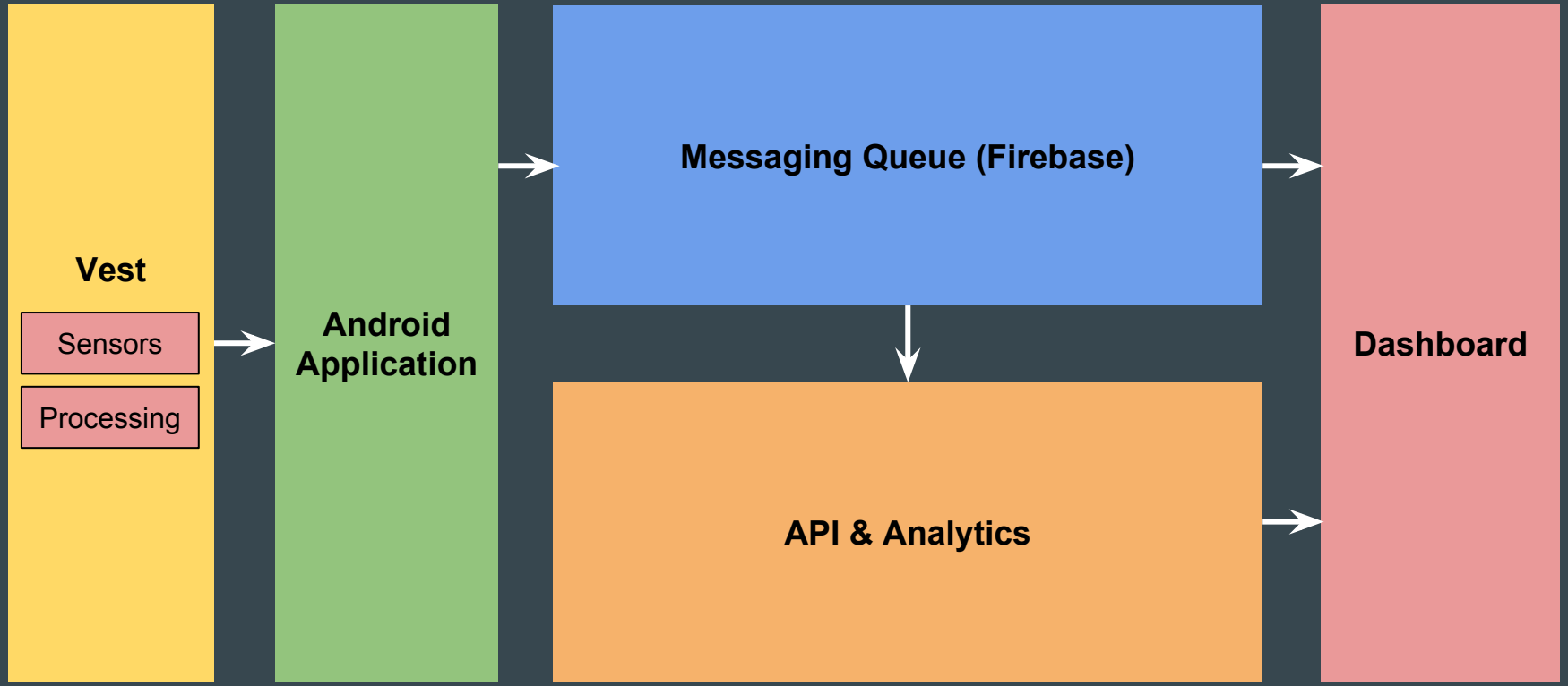
Milan Pavlik - API

Jonathan Redmond - Android (unlucky)

What is it?

- Wearable vest
- Monitors heart rate
- Monitors temperature
- Communicates to users mobile application
- Provides realtime information about the wearer

Architecture



Hardware

Two parts:

A compression shirt containing electrodes and sensors

A "brain" that includes analogue signal processing circuits and the NRF51 DK

Hardware

"Brain"

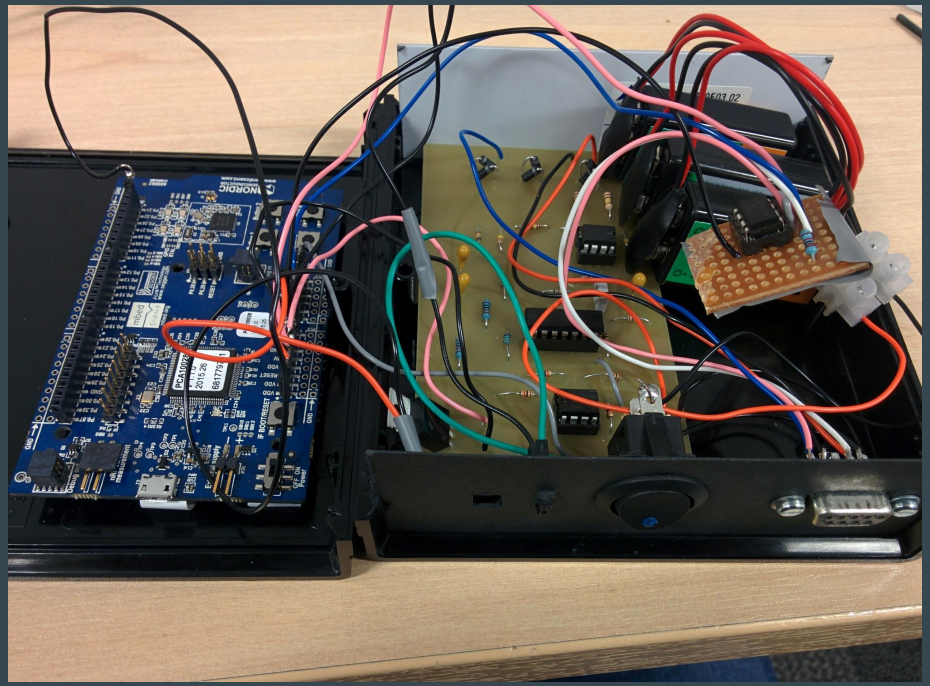
NRF51 DK

High gain differential amplifier with low pass filter for ECG

Buffer for temperature sensor

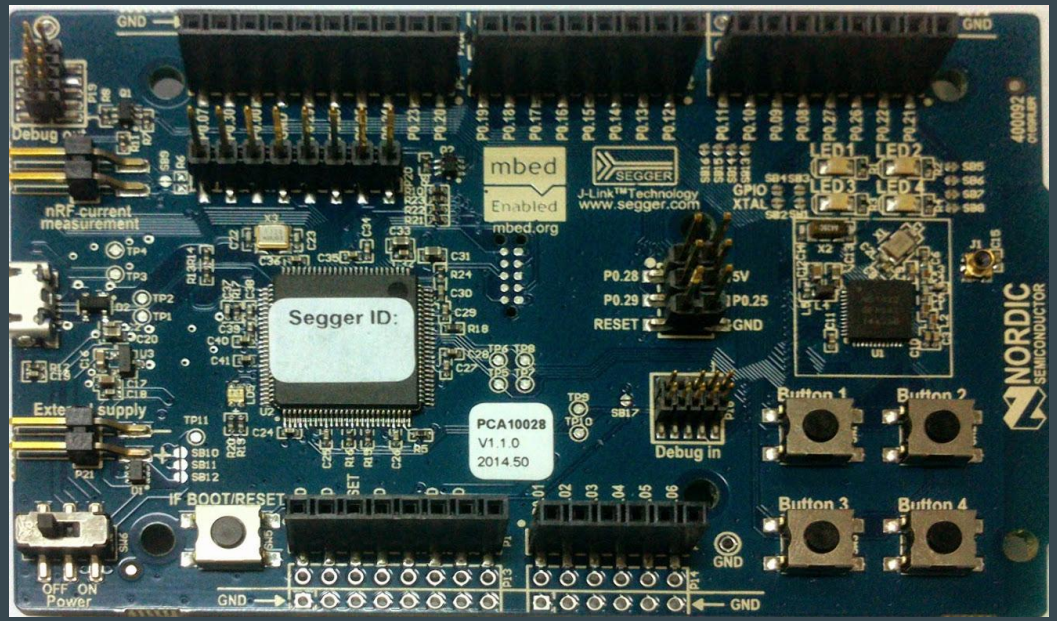
Hardware

NRF51 DK



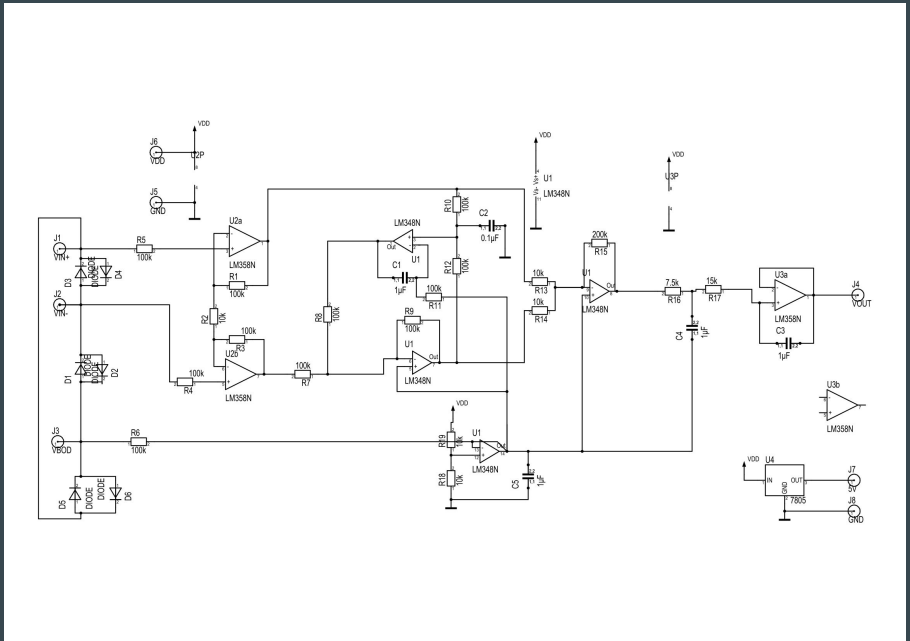
Hardware

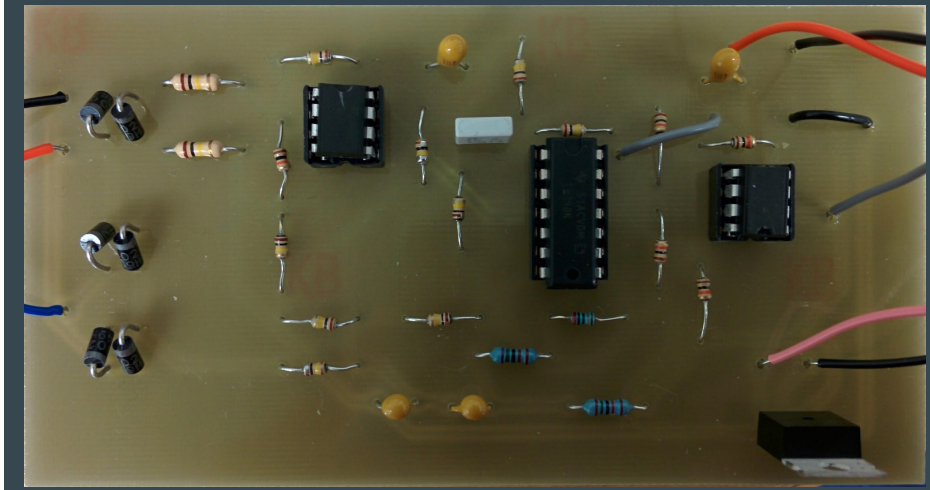
NRF51 DK



Hardware

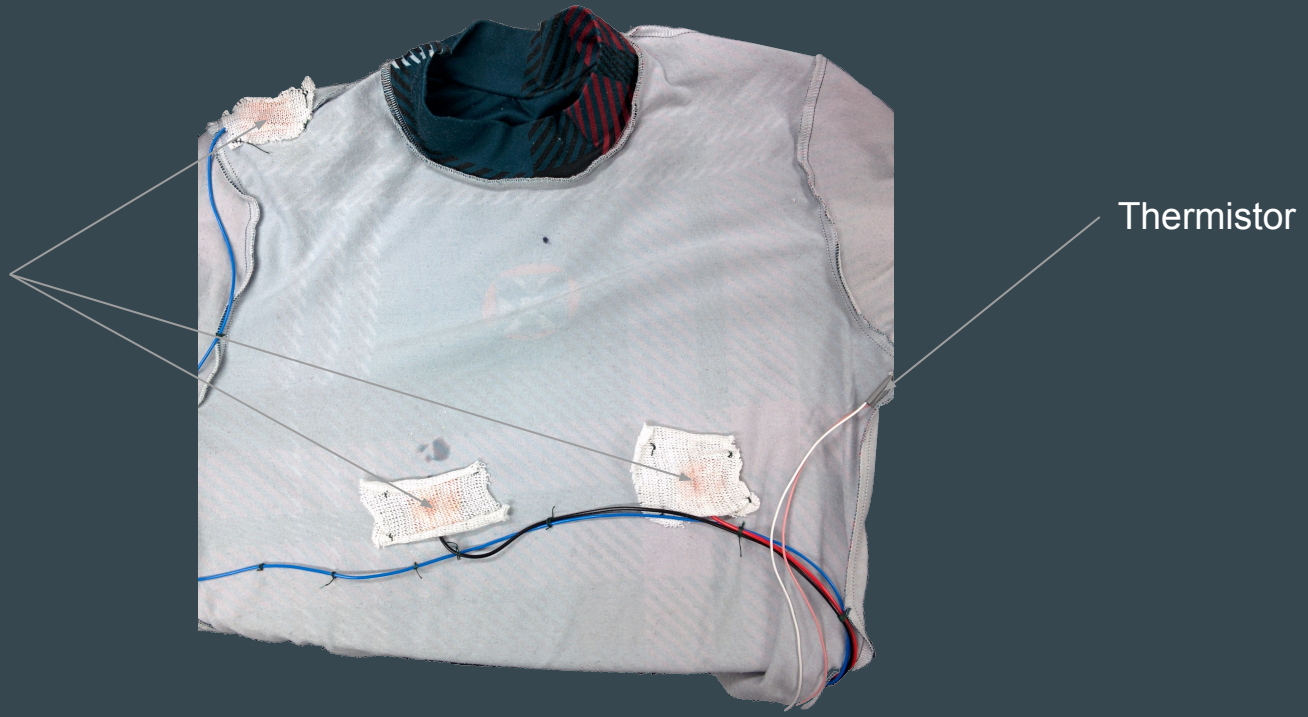
ECG Amplifier / Voltage Regulator





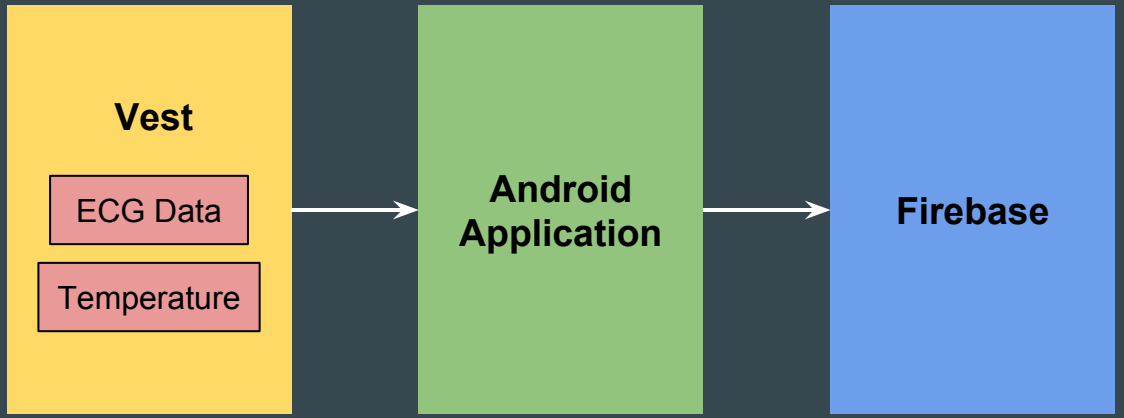
Hardware

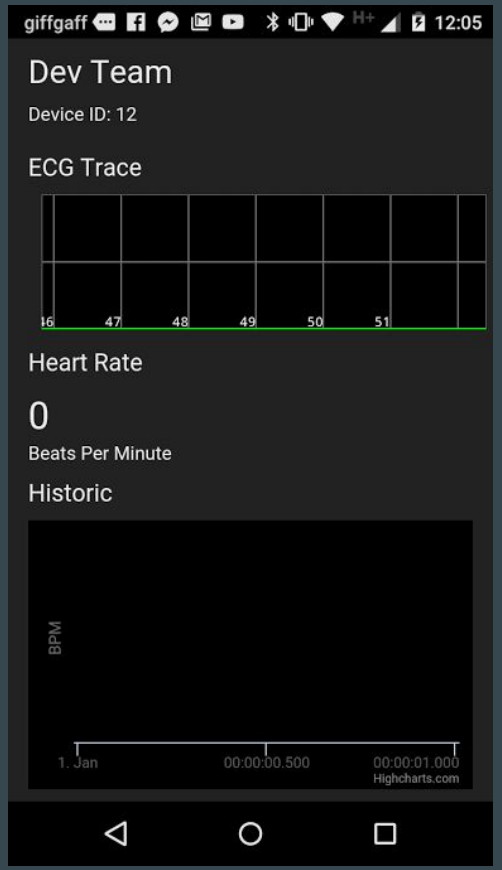
Compression Shirt



Mobile Application

- Simplistic UI for ease of use
- Detects changes in Bluetooth LE Characteristics
- Uploads the changes to Firebase
- Loads the website to allow live viewing of data





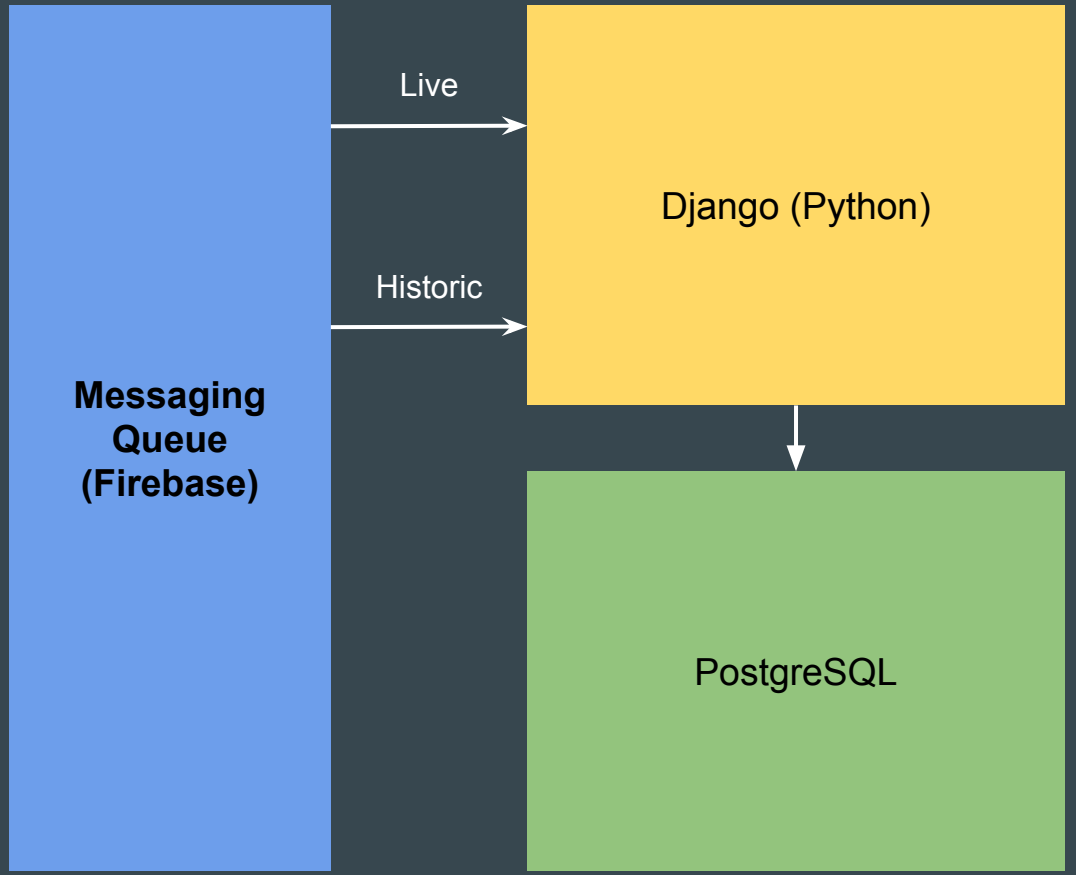
API - Infrastructure

- Django, PostgreSQL, Openshift
- Firebase
  - Scalability
  - Real time updates
  - NoSQL storage

API - Data

- Manage devices
- Data collection
- Data processing and analysis

- Live data
- Historic data



ECG Data Processing - BPM


```
{"1447759255322":187,
"1447759255361":185,
"1447759255365":185,
"1447759255409":230,
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"1447759255459":177,
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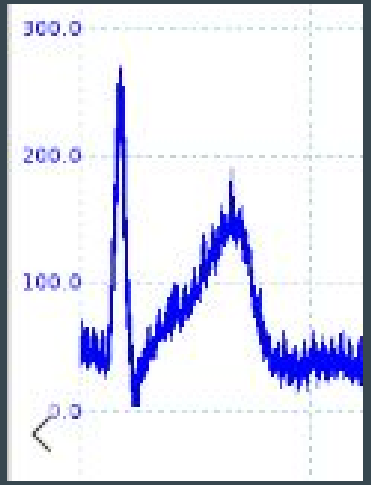

Assumption: beats are evenly spaced

BPM = 60/avg time in between beats

API - ECG Data Processing

1. Peak detection


```
{"1447759255322":187,
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"1447759255365":185,
"1447759255409":230,
"1447759255417":181,
"1447759255459":177,
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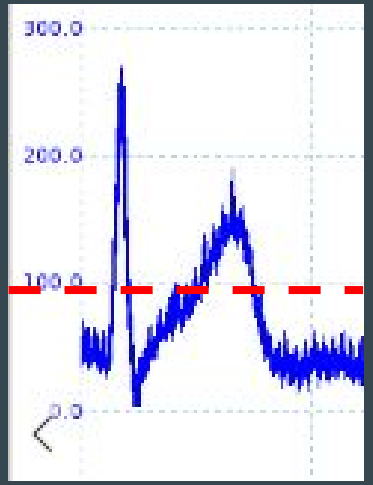

peak = 191

2. Gradient


```
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"1447759255365":185,
"1447759255409":230,
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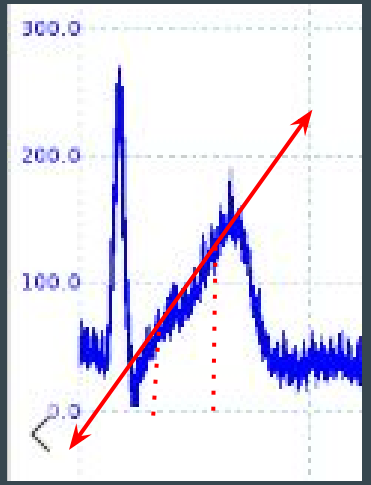
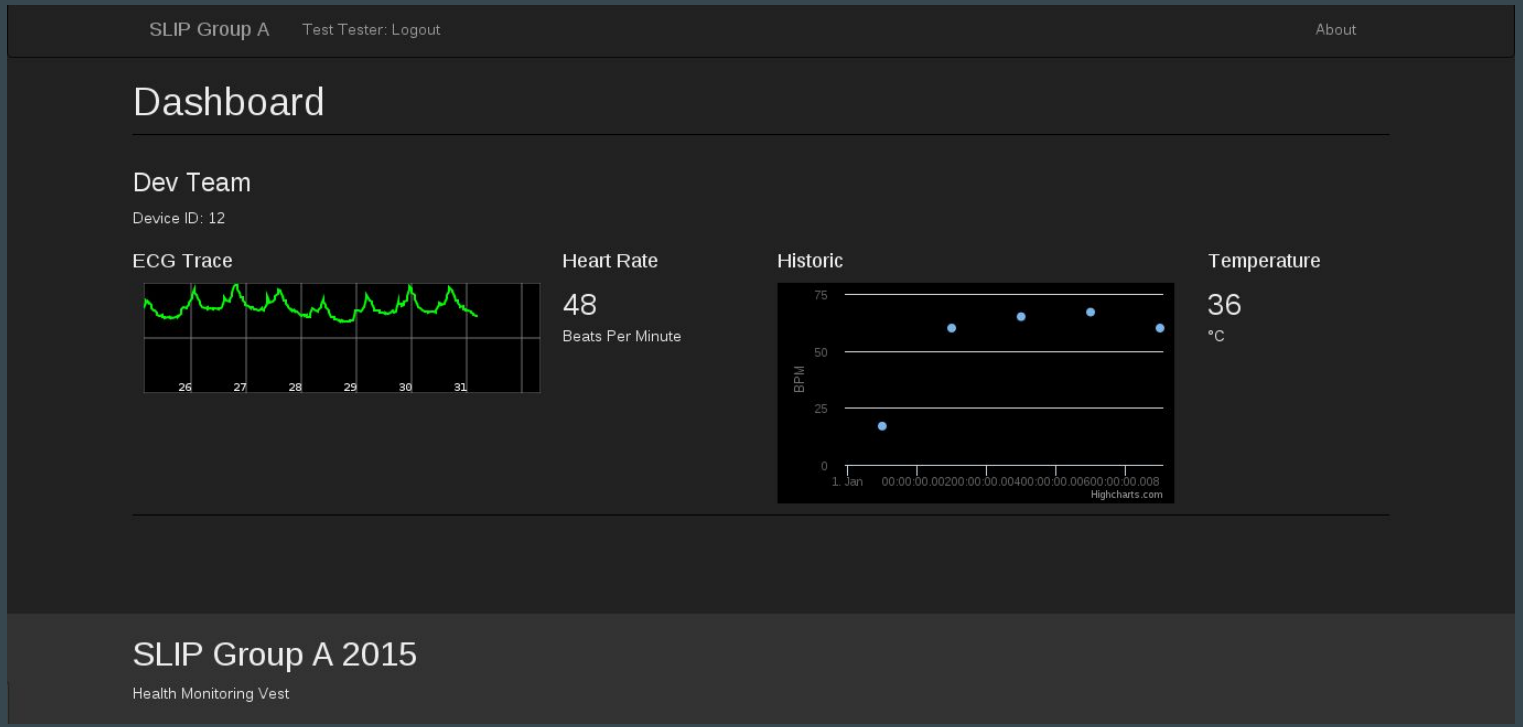


Web Interface



Improvements

- Improve dimensions with minimized SMD PCB
- Improve sensory readings and stability
- Additional sensors, Reflectance based pulse oximeter.

Health and Sport Applications

- Rugby world cup teams tracked GPS and heart rate
- heart attack / stroke detection
- Continuous temperature monitoring as an indicator of diseases
- Continuous monitoring of patients
  - COPD

Q & A

Dashboard