Non Contact Vital Signs Monitoring System

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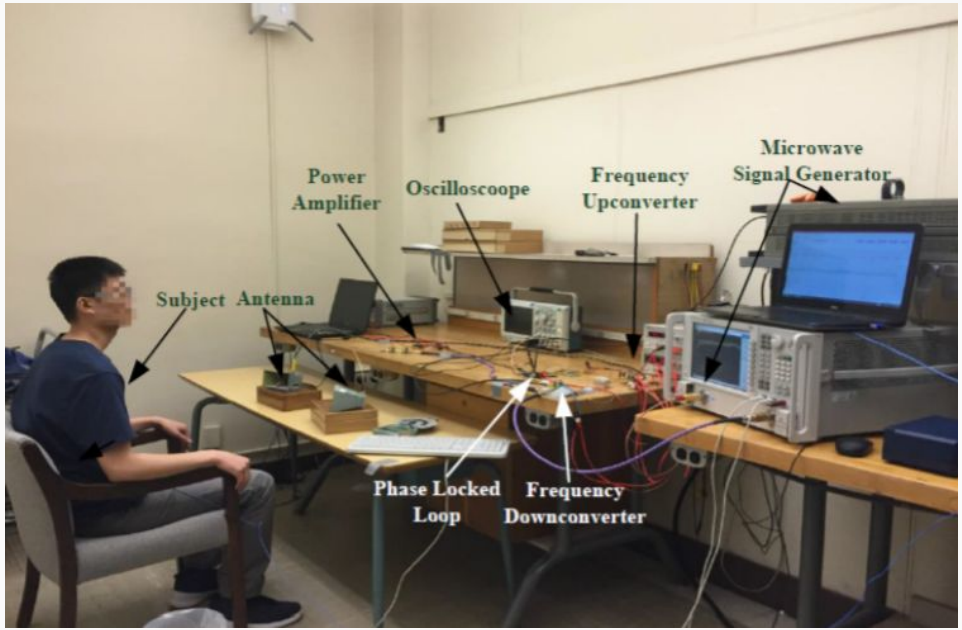
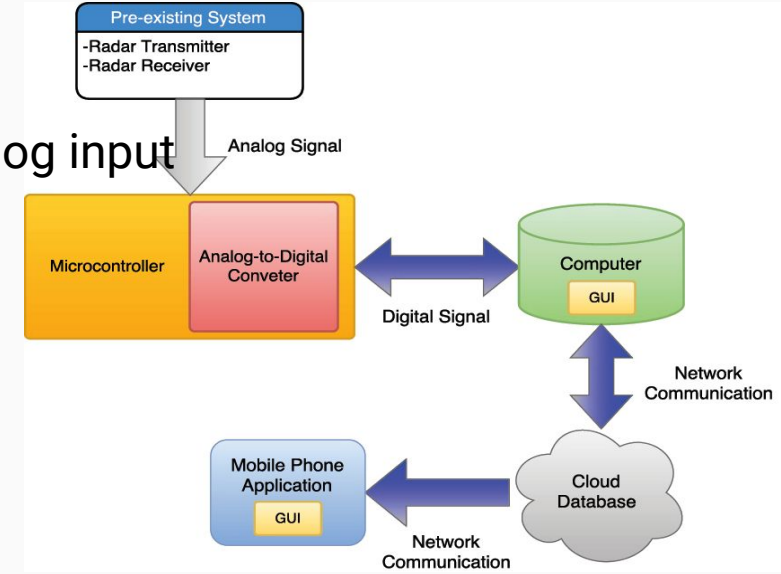
Project Description

- Requesting $174.34 to build prototype
- Samples and analyze analog signal containing respiration and heart rate
- Display important data on computer UI and mobile app



Planned Workflow

- Pre-existing Doppler radar
- Signal transmission via microcontroller
  - User controls sampling rate of analog input
  - Trigger contact system
- Signal Deconstruction
- Display information on computer UI
  - Data is stored in a database
- Mobile app display



Required Technical Specifications

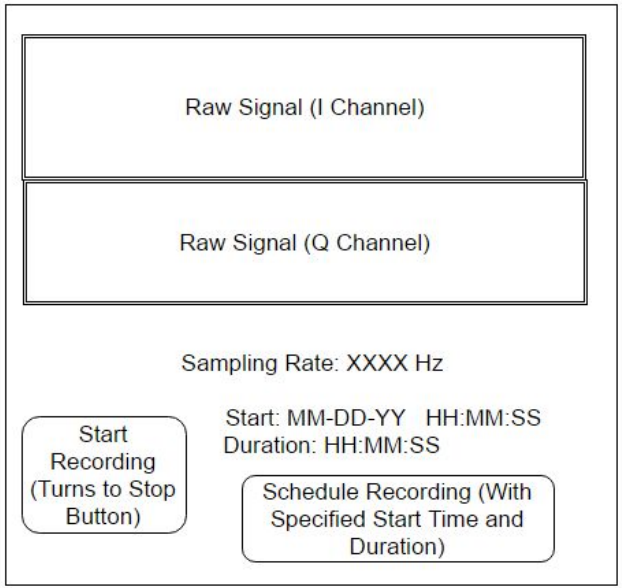
- 16 Bit resolution for ADC
  - External ADC evaluation board
- 2 Sampling Channels
- 1000 samples/second
- UART MCU-computer connection
- SMA female connector on ADC

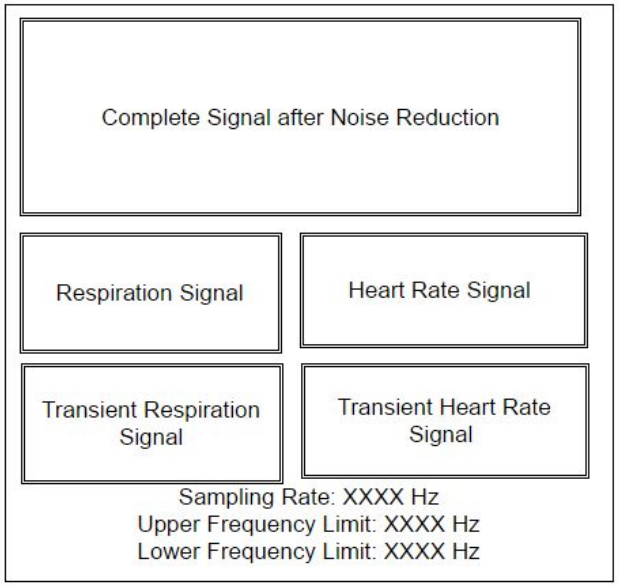
Signal Processing

- Variable Sampling Rate
- Blind Signal Separation of the Input Signal
  - Independent Component Analysis
  - RELAX Algorithm
- Signal Separation
  - Band Pass Filters
  - Track the individual signals

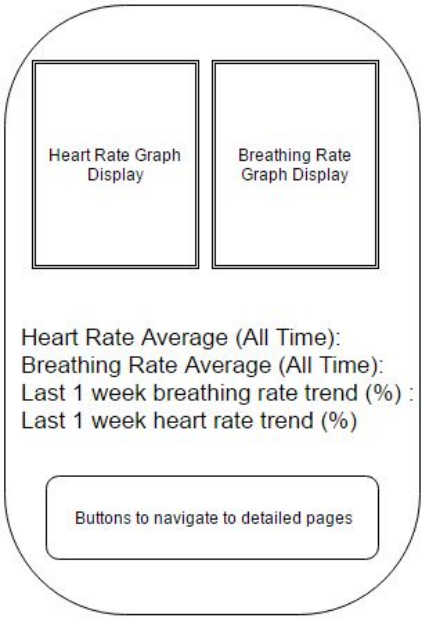
Database/Mobile App

Computer:

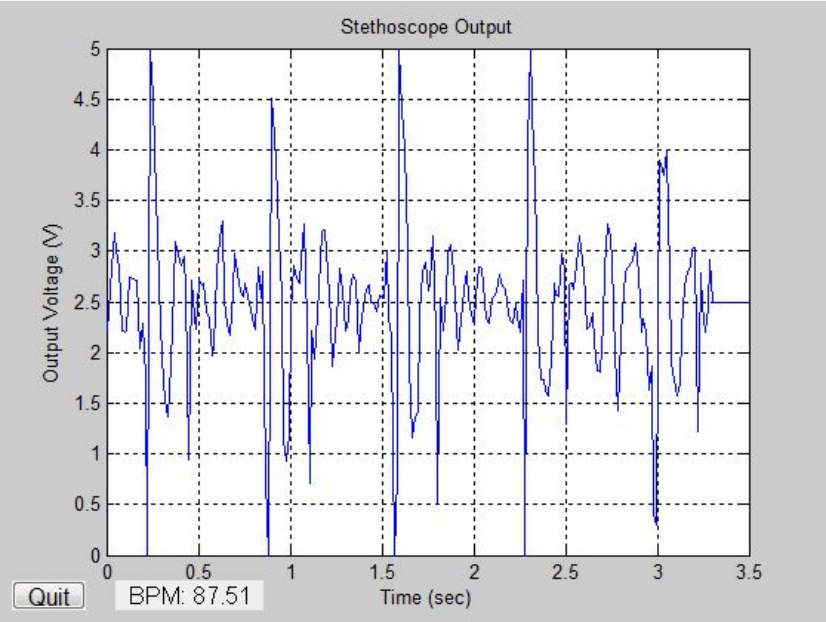




Mobile:



Constraints



- Real time display
- Delay will be introduced in order to sample and transmit data
- Finite amount of data can be stored in the database for free
- Wired transmission used to save time and avoid design expenditures into wireless protocol

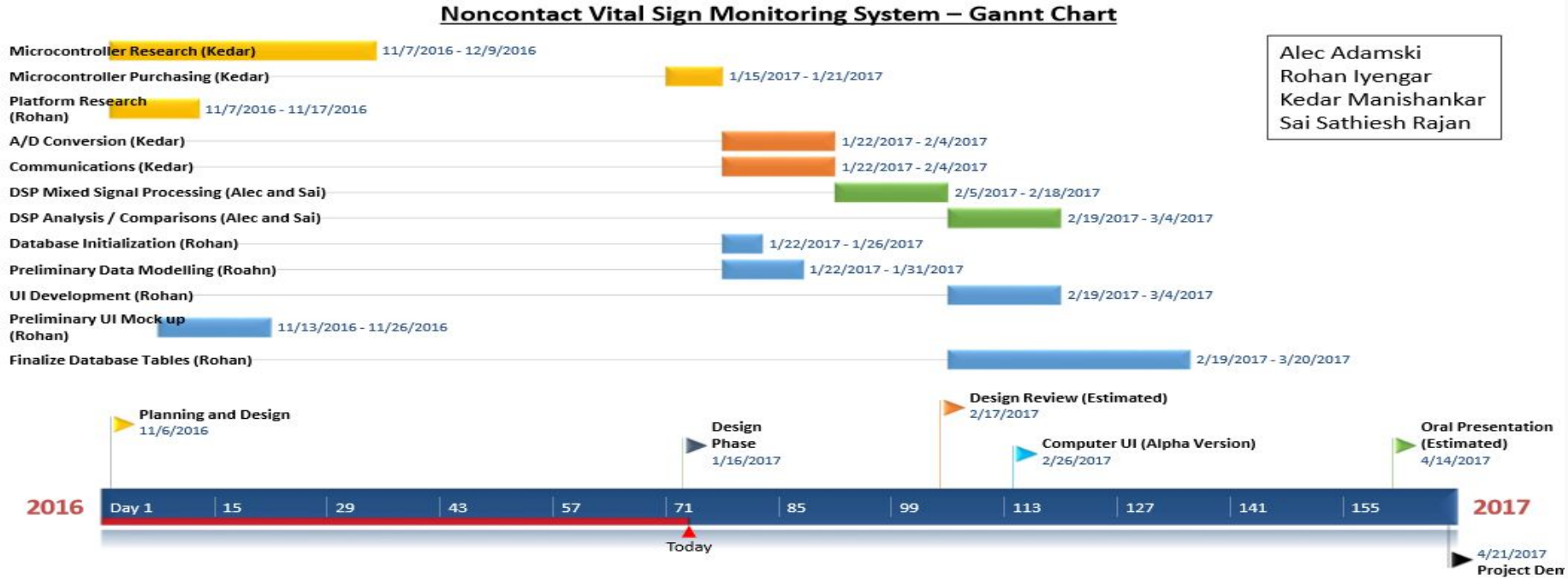
Marketing Analysis

- Vital sign monitoring systems range from $1350 to $3895 depending on features and robustness
- Our prototype will not be as expensive but will not have the same features

Demonstration

1. A user will be able to create a new account or add their health data to a precreated existing account.
2. Once the user is logged in, the raw signal data will be displayed on the screen. The user can set sampling rate and frequency range to analyze and then click a button to go to start recording.
3. The user views processed signal data like heartbeat and breathing rate on the computer interface to track the current sensor measurement. The transients will also be displayed on this screen.
4. After a brief delay of 1-2 seconds, can use the phone to access processed data with historical trends on the mobile application.

Schedule


Noncontact Vital Sign Monitoring System – Gannt Chart
Microcontroller Research (Kedar) 11/7/2016 - 12/9/2016
Microcontroller Purchasing (Kedar) 1/15/2017 - 1/21/2017
Platform Research (Rohan) 11/7/2016 - 11/17/2016
A/D Conversion (Kedar) 1/22/2017 - 2/4/2017
Communications (Kedar) 1/22/2017 - 2/4/2017
DSP Mixed Signal Processing (Alec and Sai) 2/5/2017 - 2/18/2017
DSP Analysis / Comparisons (Alec and Sai) 2/19/2017 - 3/4/2017
Database Initialization (Rohan) 1/22/2017 - 1/26/2017
Preliminary Data Modelling (Roahn) 1/22/2017 - 1/31/2017
UI Development (Rohan) 2/19/2017 - 3/4/2017
Preliminary UI Mock up (Rohan) 11/13/2016 - 11/26/2016
Finalize Database Tables (Rohan) 2/19/2017 - 3/20/2017
Alec Adamski
Rohan Iyengar
Kedar Manishankar
Sai Sathiesh Rajan
Planning and Design 11/6/2016
Design Phase 1/16/2017
Design Review (Estimated) 2/17/2017
Computer UI (Alpha Version) 2/26/2017
Oral Presentation (Estimated) 4/14/2017
2016
Day 1
15
29
43
57
71
85
99
113
127
141
155
2017
Today
4/21/2017
Project Den

Questions?