REMedy Sleep System

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Prepared for ENGG*4390 - Bioinstrumentatipn Design

Overview & Background

- Sleep is a physiologic process
  - Cycles through REM and nREM sleep stages
- Sleep inertia caused by waking in REM or deep nREM
  - Groginess
  - Impaired neuromuscular function
- User wears sleep mask with embedded sensors and processor
- System distinguishes between REM and nREM sleep stages
- Wake you at an optimal stage using integrated app
  - Alleviate effects of sleep inertia
- Apply engineering and technology to research principles

Market Objectives

Improve Wakefulness and Productivity

Designed For

Athletes

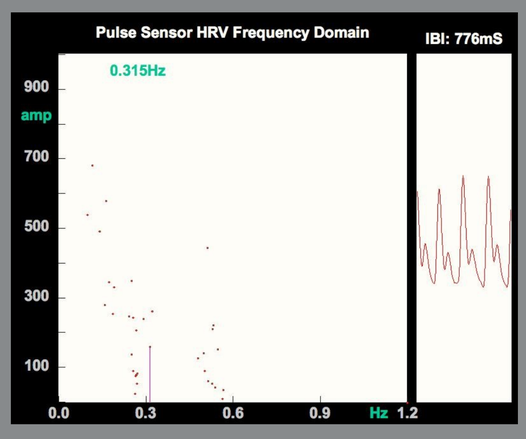
Professionals

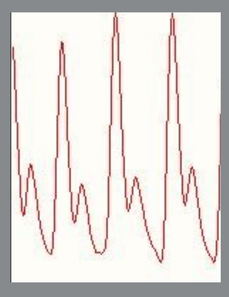
Students

Use the Best Available Data

Pulse Sensor Amped - Heart Rate Variability

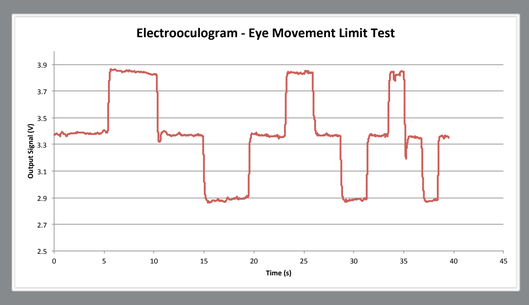
- HRV is a based on how the heartbeat changes
  - Measure of inter-beat interval
  - Sleep stage based on IBI frequency
- PuslseSensor uses photodiode to detect blood flow and determine heart beat

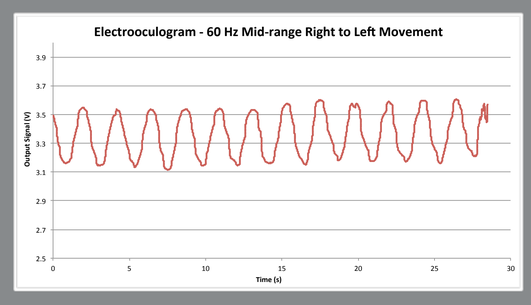


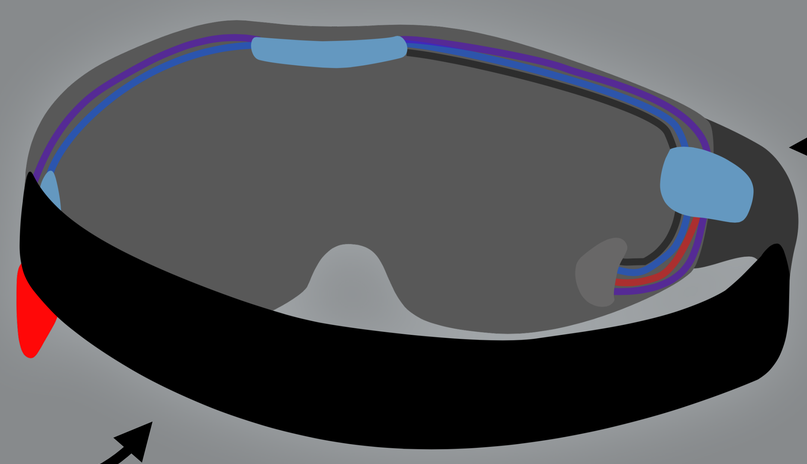


Electrooculogram

- Tracks the movement of your eyes during sleep to determine your sleep stage.
  - Electrodes measure voltage changes with eye movement
  - Frequency of movement related to individual stages of sleep

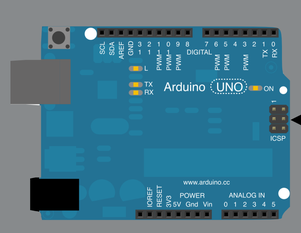




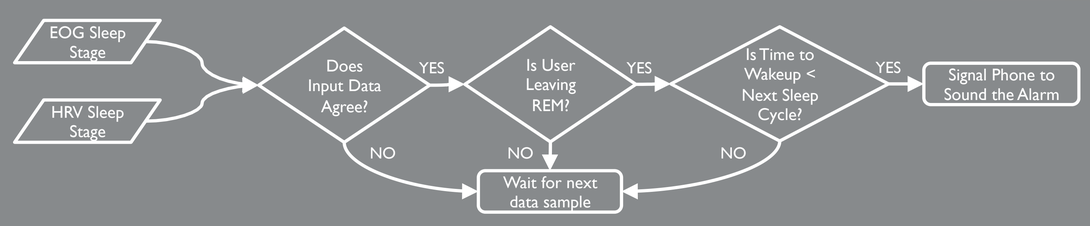


Arduino Microcontroller

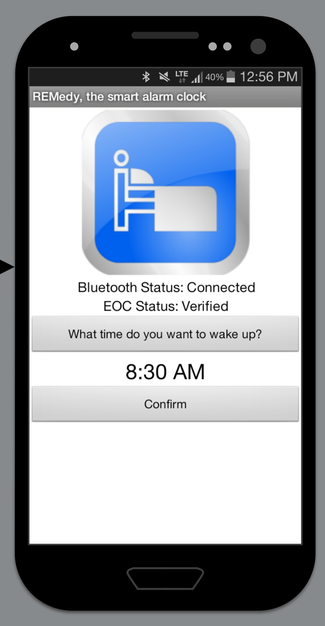
- Reads in analog sensor data
- Runs FFT and determines sleep stage based on specral analysis and literature data
- Algorithm to determine if alarm should sound



Arduino Logic Path



REMedy Android App



- Pairs and connects phone with Arduino via Bluetooth
- Set absolute latest wake up time
- Sounds alarm upon receiving appropriate signal from Arduino

School of Engineering

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Image credits: Sunrise designed by Wayne Middleton from the thenounproject.com, Briefcase designed by Alex Auda Samora from the thenounproject.com, Brain designed by Blake Ferguson from the thenounproject.com, and Dart Board designed by Ana Lourenço from the thenounproject.com.

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