The Heart Buddy

Andrew Pagan, Andrew Villagomez, Jose Reyes, Jairo Hernandez

What is the Heart Buddy?

The Heart Buddy is a low-profile, portable armband specialized in getting help to individuals before or as soon as an accident occurs via sensors such as heart beat, body orientation, and acceleration. The Heart Buddy keeps track of many human vitals, allows doctors to check up on the health of their patience, track sleep cycle, and overall secure the well-being of the user.

Who Will Use It?

The primary users of the Heart Buddy will be among the elderly population

May apply to other individuals in need of constant monitoring/check-ups or health enthusiasts

The Team and Area of Focus

Andrew Pagan	- Leader, Heart Rate Sensor, BIG FALL
Jairo Hernandez	-Bluetooth, Gyroscope, and Accelerometer
Jose Reyes	-Thermometer, Pedometer
Andrew Villagomez	- GPS, WiFi

The Schedule and Game Plan

Meeting Days

Tuesday(Optional): 7 / 8 PM to variable time

Wednesday: 8 PM to variable time

Thursdays: 4 PM to 7 PM

Friday: 12 PM - 2:45 PM

Sundays: Variable

Game Plan

Each meeting, our goal is to achieve as much as possible, while also having adequate time to ask questions before a major Milestone due date

Initial Specifications

GPS

- Gives global location for use in alerting proper authorities in case of emergency
- Can track routes taken for fitness applications

WiFi

- Give Heart Buddy the ability to connect to internet directly for contacting proper physician easily.
- Allows WEP, WPA, and WPA2-PSK security

LCD Display

- Displays various information on health and heart beats.
- Allows user to input WiFi information for connecting via HeartBuddy

Initial Specifications II

Sensors

- Heart Beat monitor for gathering data on user's heart
- Thermometer for monitoring user's temperature
- Accelerometer, Pedometer, and Gyroscope will work together for information of user's movements and the detection of the Big Fall

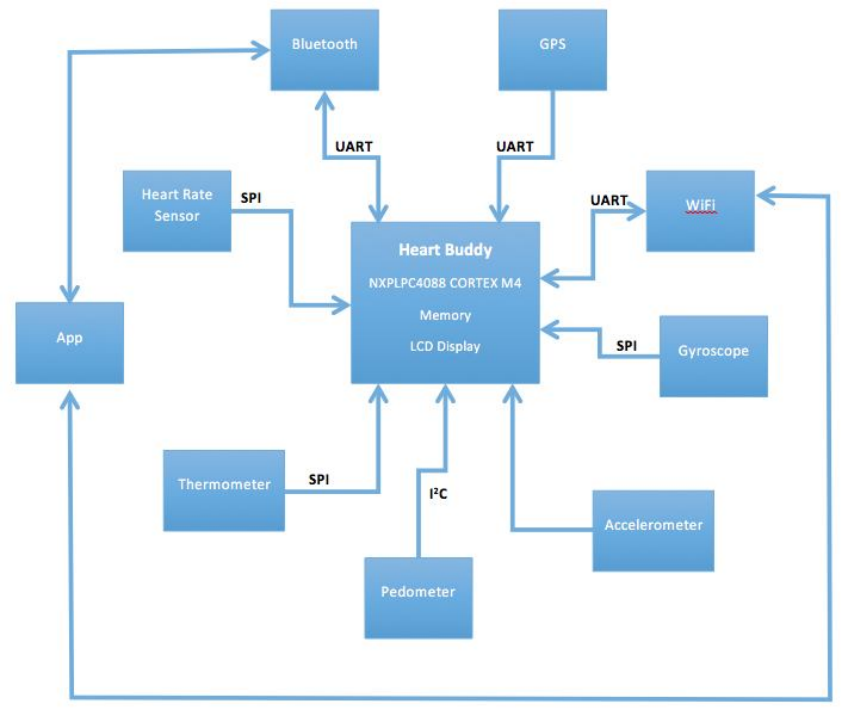
Android Application

- Application to display user health information possibly in more detail than the LCD display
- Allow the user to contact physician and set appointments via App

Bluetooth

- Allows the Heart Buddy to connect to cellular device to send data to the Android Application

High Level Block Diagram



Parts - Processor

NXP Semiconductors LPC4088FBD208,551

- Max clock speed: 120 MHz
- Operates between 2.4V and 3.6V

Serial Interfaces

- 5 UART, 3 I2C, 3 SPI, 1 I2S

512 kB of flash memory and 96kB of RAM

Price: $12.92

Parts - WiFi Module

RN171XVW-I/RM Ultra-low power

- 4 uA sleep, 35 mA Rx, 185 mA Tx at 12 dBm
- Tx power configurable from -2 to 12 dBm 2.4GHz IEEE 802.11 b/g transceiver

Configuration over UART interface using ASCII commands

Secure WiFi authentication via WEP, WPA, and WPA2

Embedded Networking Applications

Cost: Free due to extras

Parts - GPS Module

Maestro Wireless GPS Receiver With Integrated Antenna : A2035-H

Fast, responsive location experience

- High-sensitive navigation engine with tracking down to -163dBm
- 48 track verification channels

Micro power technology

- Requires only 50 – 500µA to maintain hot start capability

Active jammer remover

- Removes in-band jammers up to 80dB/Hz

Operable at 3.3V / 24mA

Parts - Bluetooth

Microchip Technology RN41-XVC

Backwards-compatible with Bluetooth version 2.0,1.2, and 1.1

UART interface

3.3 V voltage supply

Low power (30 mA) when connected

Cost : Free due to extras

Parts - LCD Touch Screen

4D Display's µLCD-32PTU-GFX

Interface: I2C

3.2" Touchscreen Display

Operates between 4 V to 5.5V DC

Price: $84.95

Parts - Thermometer

Microchip TC72-5.0MUA
- Temperature to Digital Converter

SPI Compatible Interface

Features High Temperature Accuracy
- Can measure the temperature approximately every 150ms

2.65V to 5.5V Operating Range

Cost: $0.92

Parts - Heart Rate Monitor

Texas Instruments' AFE4403

Interface: SPI

Acts as both a Heart Rate Monitor and Pulse Oximeter

- measures the proportion of oxygenated hemoglobin in the blood in pulsating vessels
- Hypoxemia (low blood oxygen)

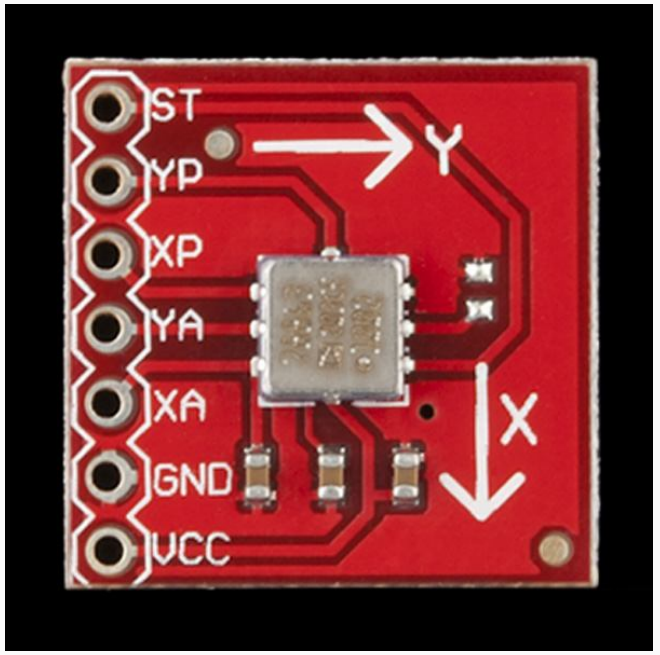
Operating between 2V and 3.6V

Price: $8.41

Parts - Accelerometer

Dual Axis Accelerometer

- Dynamic measurements (e.g. vibrations)
- Static measurements (e.g. gravity)
- 3500 g shock survival
- Doesn't require data to be sent to
- Only need to read the voltage outputs
- 700 µA at VS = 5 V (typical)



Parts - Pedometer

Freescale Semiconductor MMA9555LR1

I^2C Interface

Operating at up to 2 Mbps for communication with the host processor

Intelligent Motion-Sensing Sensor

Not just pedometer functionality, but also includes activity level and six directional orientation monitoring.

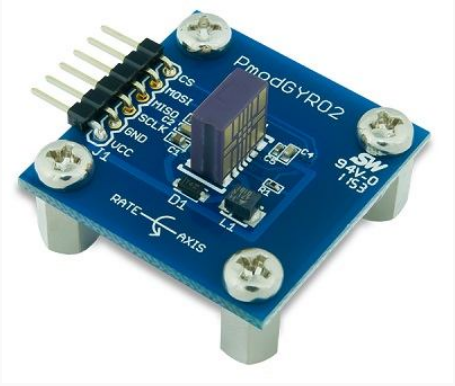
Operates at 1.8V

Cost: $3.18

Parts - Gyroscope

High Performance, Digital Output Gyroscope

- ±300°/sec angular rate sensing
- 2000 g powered shock survivability
- Low noise and low power
- 3.3 V to 5 V operation
- Comes with downloadable driver for easier programming
- SPI interface



Critical Elements

Gathering of accurate information from all sensors

Accelerometer, Gyroscope, Pedometer, Heart Rate Sensor, and Thermometer working together for monitoring of user's health and triggers for emergency contact

Working user interface

LCD Touch Screen and / or Android Application

Bluetooth and WiFi connection

Ability to connect to internet and / or application for emergency contact and contact ith user physicians

FINs

Questions?

Comments?