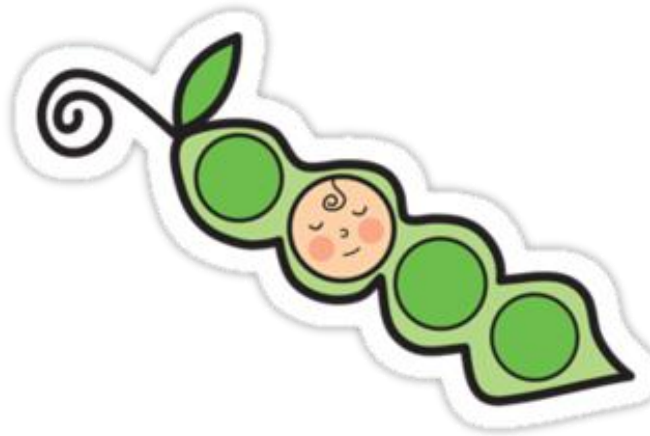


Initial Project and Group Identification Document

September 17, 2013

BABY PEAS (Pulse Early Alarm Sensor)

A non-evasive infant monitoring system which provides vital signs while sleeping



Department of Electrical Engineering and Computer Science

University of Central Florida

Dr. Samuel Richie

Senior Design

GROUP 4

Christopher Ramirez

407-310-0830

cramirez36@cfl.rr.com

Xin Tong

407-4378604

x.tong@knights.ucf.edu

Yowwu Lin

407-435-7804

wasiasd@knights.ucf.edu

Benjamin Goolsby

904-347-7935

goolsby@knights.ucf.edu

Motivation

Markets sell a variety of baby monitoring equipment that includes an abundance of features; some common features include infrared cameras and ambient temperature sensor. While many traditional monitors focus on the video as a safety feature, a baby's wellbeing is sometimes hard to decipher on a grainy screen. Our product, instead, focuses on quantifiable bio-markers, such as pulse oximeter, accelerometer, and direct contact temperature sensor, to indicate the baby's health. This project strives to improve upon the current models and involves several factors for specific medical and social considerations.

Geared toward infants and young toddlers, Baby PEAS is designed to provide an empirical picture of the newborn's physical condition. If the pulse-ox detects sudden drops in pulse or oxygen levels, a triggered alarm alerts the caretaker. Whereas, if relying on video observation, the caretaker could find his attention distracted or misread a picture on the screen and lose critical minutes in a potential serious medical emergency. In addition to basic pulse functions, the accelerometer and the temperature sensors can help monitor against risk factors for sudden infant death syndrome (SIDS). Although no definitive cause is known, the medical community agrees on several factors that can magnify risk of SIDS. The accelerometer and temperature sensor should mitigate the risk factors.

Objective

Due to the nature of usage, form and packaging comprises a large portion of design. Because the unit is planned to operate under direct contact with the baby, safety considerations include minimal invasion and heat dissipation. In addition, ergonomic concerns include ease of use, bulk, and portability. Power factors in as well due to the targeted length of function time.

Specifications:

| | |
|------------------------------|---|
| Device Battery Life: | ➤ 8HRS |
| Weight of Device | ➤ 100 Grams |
| Dimensions | < 20mm (W) < 10mm (H) 100-150mm (L) (Adjustable) |
| Pulse Oximeter Accuracy: | + - 20% |
| Heart Rate Accuracy: | + - 20% |
| Temp Accuracy on board | + - 5 Degrees C |
| Position Accuracy | Must let the user know whether the infant is on their back, front, stomach or side. |
| Wireless Transmission Range: | 100 feet |
| Operating Temperature: | 5 degrees ~ 50 degree |
| Operating Humidity: | 10%~90> |

Project Budget Estimates

| | |
|--|-----------------|
| WIFI / Bluetooth | \$250.00 |
| Pulse Oximeter | \$50.00 |
| Accelerometer | \$30.00 |
| Temperature Sensor | \$30.00 |
| Microcontroller | \$200.00 |
| Power Supply | \$50.00 |
| PCB | \$100.00 |
| Solder Tools | \$25.00 |
| Prototype Tools | \$50.00 |
| Mechanical Assembly parts | \$30.00 |
| Google Play Developer Account | \$25.00 |
| Overhead (Pizza, Caffeine Pills, etc) | \$100.00 |
| Totals | \$990.00 |

Cost Responsibilities

Cost responsibilities will be an even 25% splitting among the group of whatever the total amount comes too. While the total estimate is \$990.00 we are trying to set a goal to come in under budget at around \$500.00

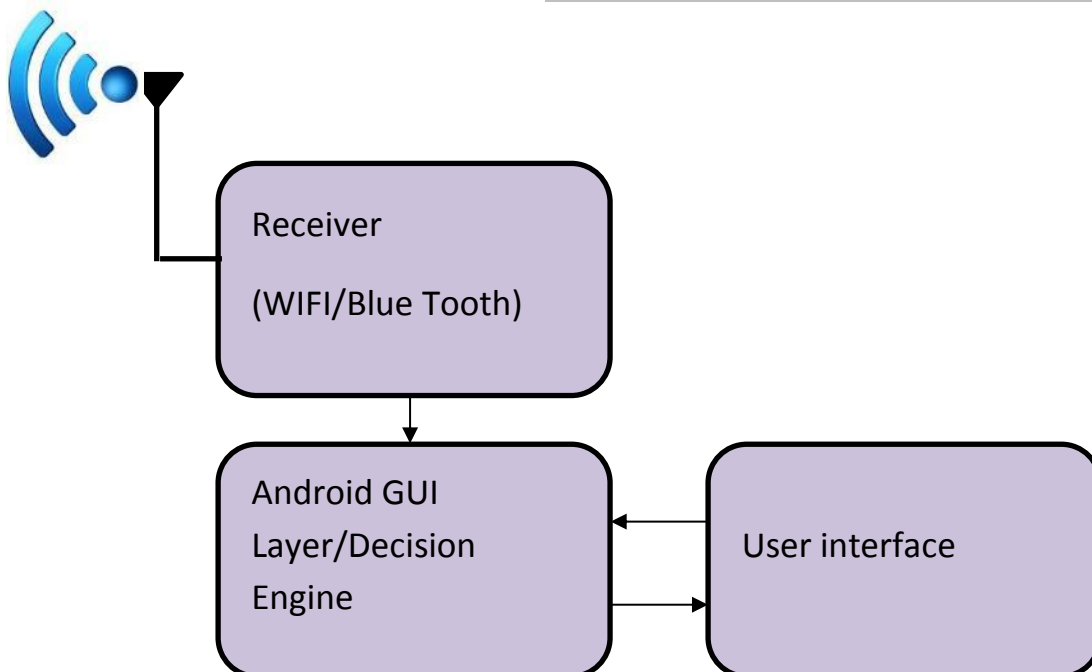
Sponsors

Currently no sponsorships have been awarded. Possible sponsorships being approached are

- Philips Medical
- Quality Manufacturing Solutions (QMS)
- L-3 Communications / Cyterra division
- Texas Instruments

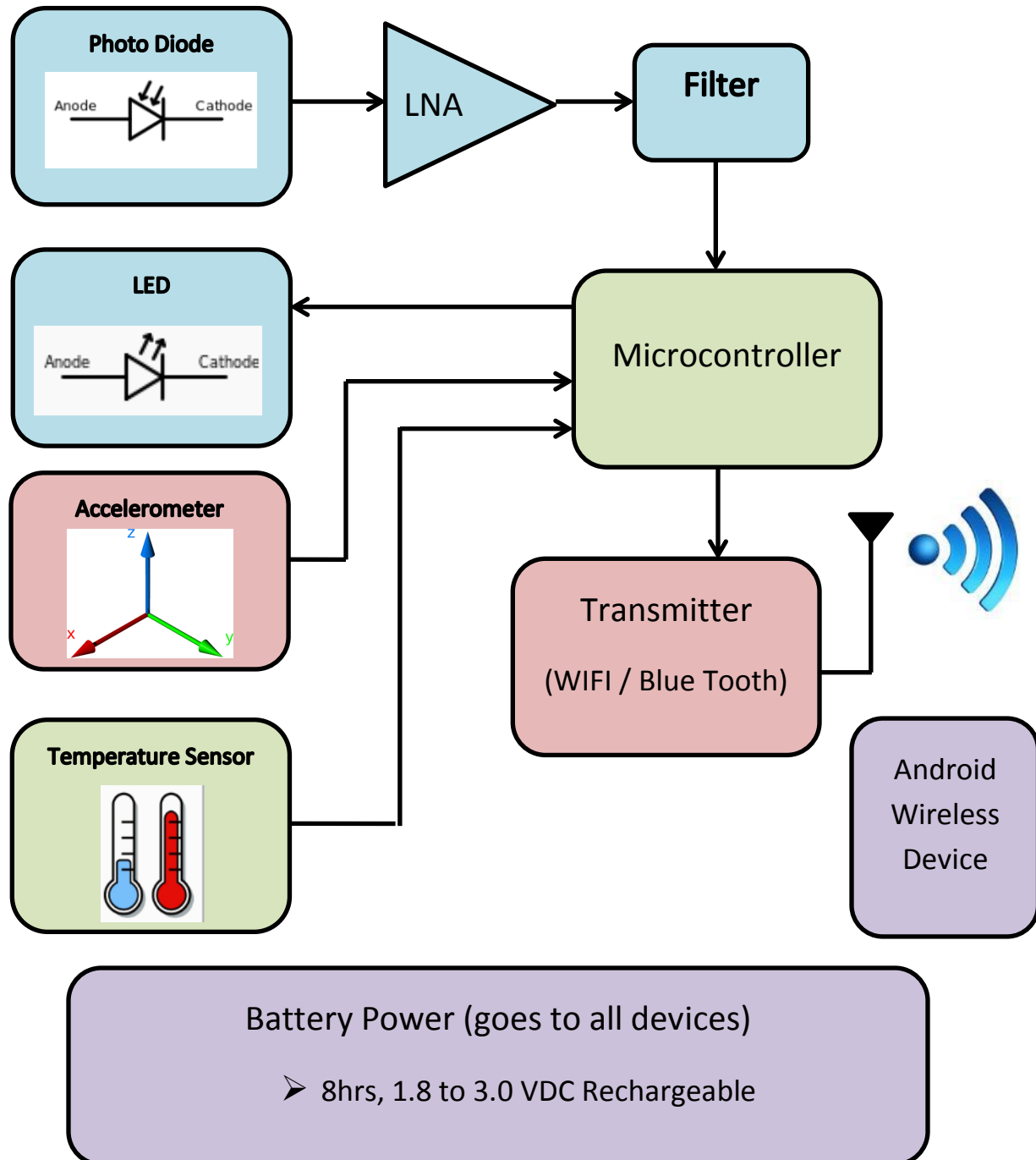
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| Christopher Ramirez |
| Xin Tong |
| Yowwu Lin |
| Benjamin Goolsbe |

Software Design Block Diagram



















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|---------------------|
| Christopher Ramirez |
| Xin Tong |
| Yowwu Lin |
| Benjamin Goolsby |

Hardware Design Block Diagram



Schedule / Milestones

| ID |  | Task Mode | Task Name | Duration | Start | Finish | Predecessors |
|----|---|---|--|-----------------|--------------------|--------------------|--------------|
| 0 | |  | seniordesign | 118 days | Tue 9/10/13 | Thu 2/20/14 | |
| 1 | |  | 1 Initial documentation | 6 days | Tue 9/10/13 | Tue 9/17/13 | |
| 2 | |  | 2 Wireless protocol decision | 10 days | Wed 9/18/13 | Tue 10/1/13 | 1 |
| 3 | |  | 3 Fundraising | 45 days | Wed 10/2/13 | Tue 12/3/13 | 1 |
| 4 | |  | 4 Microprocessor and Power supply | 10 days | Fri 9/27/13 | Thu 10/10/13 | 2 |
| 5 | |  | 5 Peripherals decision | 4 days | Fri 9/27/13 | Wed 10/2/13 | 2 |
| 6 | |  | 6 Circuit | 20 days | Tue 10/8/13 | Mon 11/4/13 | 4,5 |
| 7 | |  | 7 Paper milestone 60 pages | 32 days | Wed 9/18/13 | Thu 10/31/13 | |
| 8 | |  | 8 Paper milestone rough draft complete | 14 days | Fri 11/1/13 | Wed 11/20/13 | 7 |
| 9 | |  | 9 Paper milestone Complete | 7 days | Thu 11/21/13 | Fri 11/29/13 | 8 |
| 10 | |  | 10 Breadboarding and testing | 30 days | Wed 1/1/14 | Tue 2/11/14 | |
| 11 | |  | 11 Accelerometer | 4 days | Wed 1/1/14 | Mon 1/6/14 | 10SS |
| 12 | |  | 12 Pulse oximeter | 10 days | Wed 1/1/14 | Tue 1/14/14 | 10SS |
| 13 | |  | 13 temperature sensor | 4 days | Wed 1/1/14 | Mon 1/6/14 | 10SS |
| 14 | |  | 14 PCB layout | 7 days | Wed 2/12/14 | Thu 2/20/14 | 10 |