ATHLETIC**INNOVATIONS**

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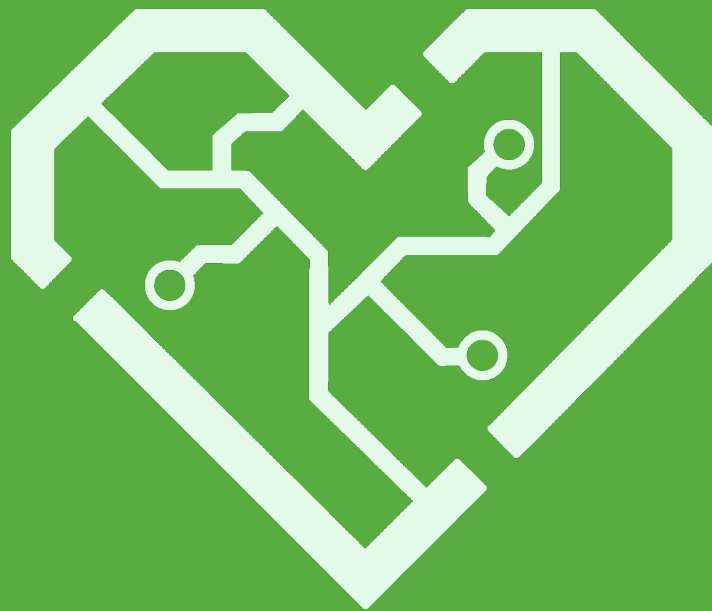
RunWare

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PROGRESS

REPORT

March 30th, 2015

1. Introduction

Athletic Innovation`s *RunWare* will provide runners with an elevated running experience that promotes a healthy, active lifestyle. Our team has spent the last three months ensuring that a working proof-of-concept is ready to present by our presentation date of April 10th. With the progress made so far, and the time remaining until our deadline, we are certain that we will meet our goal. The following document will outline the progress and remediation strategies used to complete *RunWare*.

2. Schedule

Our initial schedule from our Proposal is shown in **Appendix A-1.** This schedule was not very realistic and did not account for documentation time. We also faced some setbacks due to ordered parts not meeting our requirements, and as a result new parts needed to be ordered. We then adjusted the schedule accordingly to make up for this lost time. An updated Gantt Chart showing our new schedule is shown in **Appendix A-2**.

In the beginning there were two meetings every week to work collaboratively and discuss upcoming milestones as well as completed goals. However since the Design Specifications, meetings have been less frequent and more independent and collaborative work sessions took place instead. We work together in the lab, so any issues that arise are quickly discussed and decisions are made.

3. Financial

Athletic Innovations have received $550 from the Engineering Science Student Endowment Fund and a jacket from LOTUSACTIVA. To cut down costs and increase sustainability, an additional jacket and the parts for the speakers were reused. After all of the parts were ordered initially only $180.85 was spent, but it was soon realized that $90.76 was spent in ordering the wrong Arduino Lilypad and Bluetooth module. As the wrong Lilypad remains sealed, we intend to return it for a full refund. There were also a couple of oversights and additional parts were ordered, such as parts needed for the heart rate sensor, a phototransistor for the EL Wire, an FTDI Breakout, and NPN Transistors. More details can be seen in **Appendix B**. So far Athletic Innovations has spent $562.91. If the additional total difference in cost remains under $100, it will be covered out of pocket. Otherwise, an application will be made to the Wighton Engineering Development Fund for the remaining costs.

4. Progress & Remediation

Hardware

Heart Rate System Progress

After receiving the required components for assembling the heart rate circuit, we began to construct the circuit on a breadboard. Due to our inexperience with surface mounted components, we had significant trouble with soldering them onto proto-boards. When we tested the output waveforms with the oscilloscope, they were not what we expected. After a few days of debugging, we made the decision to order off-the-shelf heart rate sensors.

Heart Rate System Remediation

We encountered problems with prototyping a heart rate sensor to output the correct waveforms. Therefore with time dwindling, we made the decision to order off-the-shelf heart rate sensors that will just plug into the Arduino. This will save us time in implementing our heart rate sensor circuit and allow us to focus on the completing the Arduino code and integrating the sensor into the jacket.

Variable Lighting System Progress

All parts and materials have been acquired and all research has been completed. Research, experimentation and design of the hardware are complete. The majority of the circuit has been surface mounted and the additional wiring is being left until the integration with the jacket. The only remaining tasks regarding the variable lighting subsystem is sewing the EL wire into the jacket and embedding the phototransistors upon the shoulders of the jacket. The remainder of the hardware will be placed within the enclosure located in the lower back of the jacket.

Software

Android Application Progress

In the first half of the semester, the driver and passenger method was used to create code for the RunWare application, where one person on the team would be programming while the other watches over their partner's shoulder to catch mistakes and to aid in research. This method was found to be effective in creating good code, but ineffective in terms of time restraints. Because of complications from trying to use Git, both members needed to be present for code creation and it became a very slow process.

Android Application Remediation

Initially, the RunWare app was expected to be completed by March 1st. The user interface of the app was decided upon in early January and steps were taken to complete the ideal interface. Unfortunately, incorporating the functionality of every feature was found to be more difficult than anticipated. Therefore a new interface was designed to not include buttons for phone calls and music playing, as these features are able to stream to the Bluetooth module through the mobile phone itself. The only features left to complete are GPS route plotting, as well as receiving and displaying data received from Bluetooth.

5. Conclusion

Within the last three months, we have made significant progress towards a workable proof of concept and plan on having all work completed by April 10th. Integration of the completed processes into one package has begun while the remaining hardware and software processes have made progress towards stand-alone completion. Due to our contingency plans in the initial planning stage we have been able to remain within our budget estimate. Although we are behind schedule and still need to resolve a few issues, we are optimistic that with the implementation of our remediation plans all problems will be resolved in time.

Appendix A – Gantt Charts
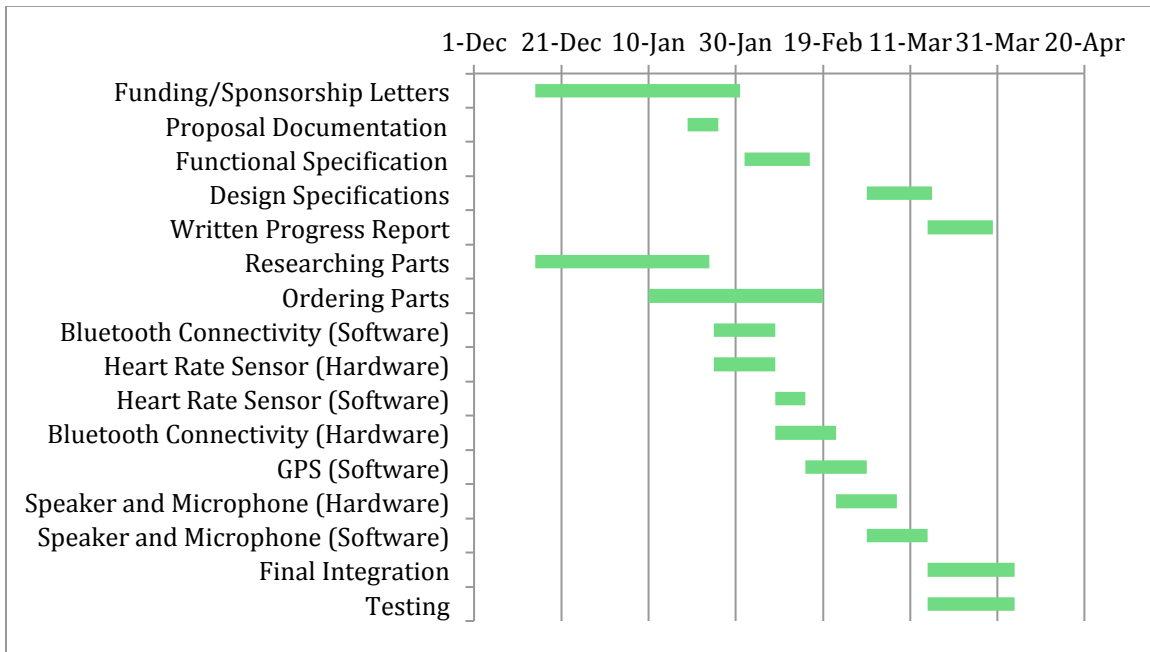
1 - Original Gantt Chart
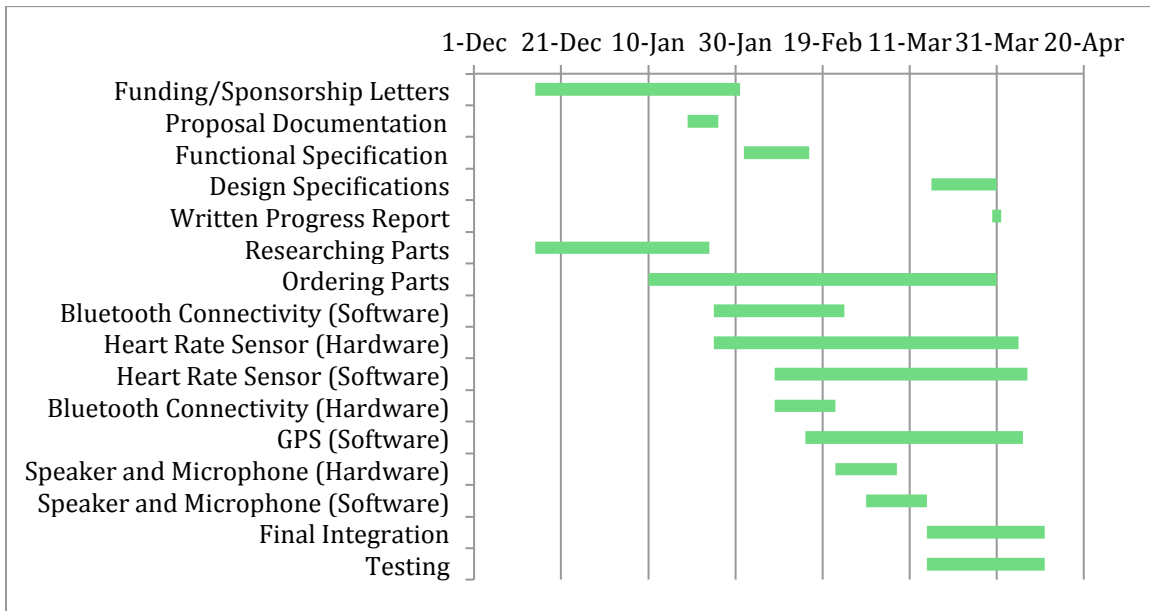
2 – Updated Gantt Chart

Appendix B – Budget Spreadsheet

Item	Quantity	Unit Cost	Projected Costs	Actual Costs
Circuitry				
Arduino Lilypad Simple	2	$23.95	$67.24	$67.24
Arduino Lilypad	2	$22.90		$51.30
JY-MCU Bluetooth Wireless Serial Port Module for Arduino	3	$6.43	$23.52	$23.52
Electroluminescent Wire	2	$9.95	$22.28	$35.84
Heart Rate Sensor related parts + Phototrans for ELWire				$41.06
FTDI Breakout + NPN Transistors				$25.31
Piner Portable Wireless Bluetooth Stereo Speaker	2	$25.90	$68.02	
Microphone (POW-1644L-B-R)	2	$6.33	$24.18	
Waterproof wiring tools (Heatshrink, ports, etc.)	--	$50.00	$66.00	
Rechargeable Lithium Ion Battery (VL-3032/GUFN)	2	$9.00	$30.16	67.93
Accelerometer (KXCJ9-1008-FR)	2	$2.68	$6.00	
Phototransistor (ALS-PT19-315C/L177/TR8)	2	$0.79	$11.77	
Photocell/diode (SFH 2430-Z)	2	$2.37	$15.31	
Green LED (MLEGRN-A1-0000-000001)	2	$1.58	$13.54	
128 Mbit Memory (557-1562-ND)	2	$2.43	$5.44	$44.25
EL Inverter - 3v	1	$9.95		$12.11
EL Wire - White Retail	1	$10.95		$13.11
Pulse Sensor	2	$24.95		$53.82
SparkFun Audio Bluetooth Breakout - RN-52	2	$39.95		$84.22
Grove - 3 Axis Analog Accelerometer ADXL335	1	$15.80		$17.70
Textiles				
Running Jackets	2	$99.99	$223.98	
Texsport 15615 - Waterproofer/Seam Sealer	1	$19.56	$21.91	
Sewing Materials (Thread, Zippers, Buttons, etc.)	--	$25.00	$28.00	$15.50
Miscellaneous				
Logo Design	2	$8.50	$17.00	$10.00

Security	1	$7.84	$8.91	
Wet Look (High Gloss Polymer for Speakers)	1	$17.50	$29.60	
Epoxy	1	$9.33	$10.45	
Chest Heart Rate Monitor	1	--	--	
Contingency (10%)			$69.33	
Total			**$762.63**	$562.91