Progress Report for the BikeSmart System

A smart and safe bicycle system

PROJECT TEAM

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SUBMITTED TO

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ISSUED DATE

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Introduction

This report documents schedule, expenditures, and planning for the rest of the semester. The product BikeSmart system has been successfully put to test under various circumstances and extreme conditions and it is now in its final stage of development. In the final stage, the BikeSmart system will be integrated onto the bicycle and run through several testing plans. For the past few weeks, engineers of DreamRide have completed the voice recognition system and slide-button control system which are the main features of the product BikeSmart. This achievement includes a series of hardware and software testing modules. The progress of this project is currently a week behind the previously designed schedule. Details are shown in the following sections.

Schedule:

The initial plan was to finish hardware and software design before March 26th. However, due to technical problems when combining all hardware and software together, we are currently a week behind schedule. The original plan set the finish date on April 1st, when demo and presentation time were yet to be scheduled. As shown in the Gantt chart in the appendix, our scheduled date for demo and presentation is April 15th, which grants us two extra weeks to work on testing and debugging, as well as preparation for the presentation.

Financial:

DreamRide has received a funding from the Engineering Student Society Endowment Fund (ESSEF) in the amount of $300.00. Since it is our primary source of funding, this fund was used to purchase major hardware components which included the 7-segment LED panel, Hall Effect sensors, Lithium Polymer Battery, Battery charger and booster, and various hardware parts. The following is a list of all parts that have currently been purchased:

Equipment List	Estimated Cost (CAD)
RGB LED Matrix 60mm * 2	$60
Red LED Matrix with MUX	$20
Hall effect sensor	$30
3.7V 2000 mAh battery	$22
Heat string	$1.50
Bicycle	$100
7 segment	$5
Xbee	$30
USB charger with voltage booster	$22
Helmet	$15
Triple axis ADXL accelerometer335	$20
Voice shield	$70
Total	$396
ESSEF funding	$300
Exceeded cost	$96

Table 1: Expense Breakdown

As shown in table 1, the ESSEF funding is insufficient, so further sources of funding will be needed. By the end of March, the team of DreamRide will file the application for the Wighton Fund to cover the $96 exceeded cost. The team is expected to spend another maximum of $30 more to the unforeseen expense such as broken parts and additional hardware.

Progress Report

Voice Control – (Completion Status: 90%)

- Hardware successfully constructed and working perfectly
- Firmware with "µSpeech" library tested and completed

The voice control now can clearly recognize the "Left" and "Right" command from one of the members in the group through numerous testing. More testing will be examined to ensure the system capability of recognizing all ascents.

LED Panel – (Completion Status: 70%)

- Hardware successfully constructed and working perfectly
- Breaking light is still in the designing process; Coding for the Triple-axis accelerometer is still ongoing

- Firmware algorithm designed and testing awaits the coding to be done

We have completed the LED matrix and its firmware and it displays the directions. However, we have not installed it on the bicycle yet and do not know if it is bright enough for other road user to notice. Furthermore, the breaking light's firmware has not been completed yet.

Feedback Display – (Completion Status: 50%)

- Hardware successfully constructed but needs rework

The small LED matrix displays correct feedbacks (directions) to user. However, the matrix requires too many pins to operate. Considering we need to share one Arduino UNO R3 board with the Hall Effect sensor and 7-segment display, we have decided to use MUX to control the LED matrix instead of Uno board to solve this problem.

- Firmware algorithm designing and testing

The Firmware of MUX to control LED matrix needs rework

XBee Wireless Configuration – (Completion Status: 100%)

- Hardware successfully constructed and working perfectly
- Configurations set up in broadcast mode and working well

We set voice control as "Coordinator" and set the front and back components as Routers. As we use "broadcast" mode to set up our XBee modules, routers successfully receive the commands from the coordinator. As a result, this achievement makes our product wireless enabled.

Hardware packaging – (Completion Status: 70%)

At the moment, two of the three case designs have been completed for packaging.

- Case design of LED light:
    - All required measurements have been taken
    - The design size have been minimized
    - The design of case satisfies all the requirement

- Case design of voice recognition:
    - All required measurements have been taken
    - The design size have been minimized
    - The design of case satisfies all the requirement
    - The name of the group have been engraved on the package
- Case design of front feedback display:
    - Waiting for hardware team to finish the front feedback display to design its case

The MakerBot 3D printer was used to create all the casing in the project. The ABS filament was used to finish all the printing of the casings. We would like to express our deepest appreciation to Dr. Bonnie Gray, who gives us permission to access the MakerBot 3D printer in the Micro-instrumentation Laboratory at SFU.

Conclusion

The engineers from DreamRide have made a great effort and progress on this project for the past few months. Although we are a week behind schedule, the recently scheduled presentation and demo date allow us to have two extra week to complete the remaining parts. There are still several parts to be done, but we are comfortable to meet our final deadline for the completion of the device and plan on being able to perform the project presentation and demonstration of the device by April 15th, 2014.

Appendix

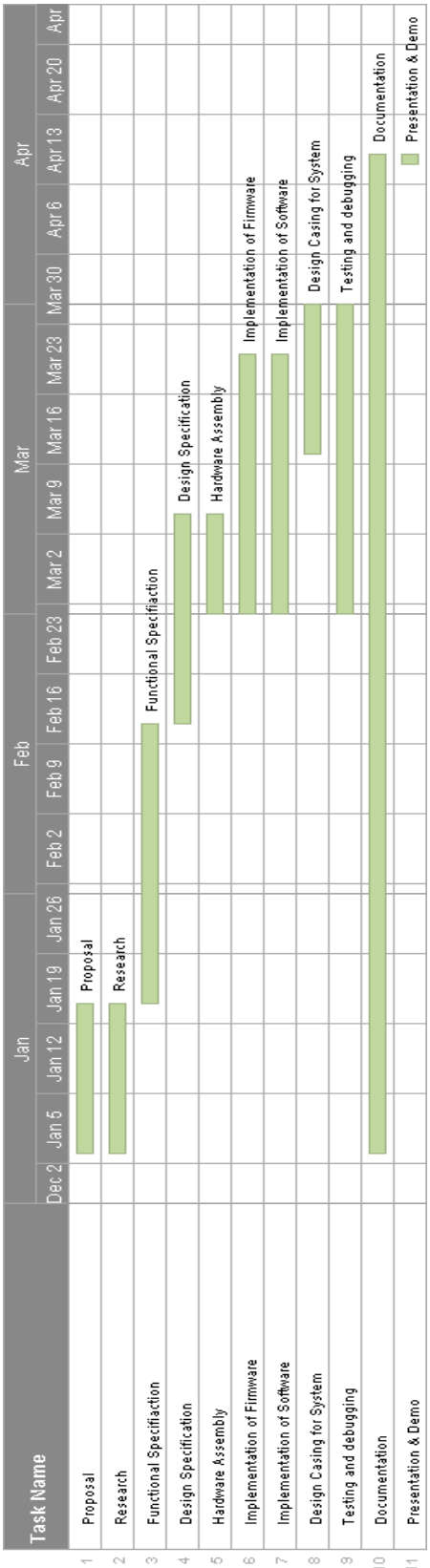

Figure 1: Gantt chart of the Project Schedule