



## **Post Mortem for the BikeSmart System**

A smart and safe bicycle system

### **PROJECT TEAM**

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### **SUBMITTED TO**

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### **ISSUED DATE**

April 5, 2014



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The initial plan was to finish hardware and software design before April 9 <sup>th</sup> . Fortunately, I did manage to have everything done by the end of the semester. As shown in the Gantt chart in the appendix, our scheduled date for demo and presentation is April 15 <sup>th</sup> . .....	7
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## Introduction

The DreamRide Cooperation believes that “Visibility is the key”. Being as visible as possible to other road user is critical. While attaching fluorescent flag onto the bicycle could increase cyclists’ visibility, this is not exactly ideal for solving the lack of communication between cyclists’ and other road users.

The BikeSmart system is a signaling light device developed to allow better communication between cyclists and other road users, meanwhile removing the risk of the cyclists losing their balance when hand signaling. While there are similar products existing in the market, the BikeSmart system has a reliable voice recognition system, allowing users to control the signal lights simply by speaking to the microphone integrated in the helmet. The BikeSmart system does not only provide the benefit of better communication, but also provide a safe environment for the cyclists.

This document presents the post mortem of the project BikeSmart, providing an overview of the product, outlining the current state, individual learning, group dynamics, business aspects, and the challenges encountered. Alternative solutions and existing forms of the BikeSmart system are discussed and critiqued in the market and competition section. The BikeSmart system is the collection of existing features with the enhancements of a voice control system.

## Current State of the System:

Our BikeSmart system consists of LED light in the back of bicycle, feedback display on the handlebar in the front of bicycle, and voice recognition with microphone on the helmet. All the parts are enclosed within the case made of ABS (Arylonitrile-butadiene-styrene copolymer) material by using 3D printer, MakerBot. We have successfully developed our system; in addition, we also have Xbee antenna in our feedback display to show a speed of the bicycle. All of the components meet the requirements for a proof of concept model. The diagram below shows the system overview of BikeSmart system.

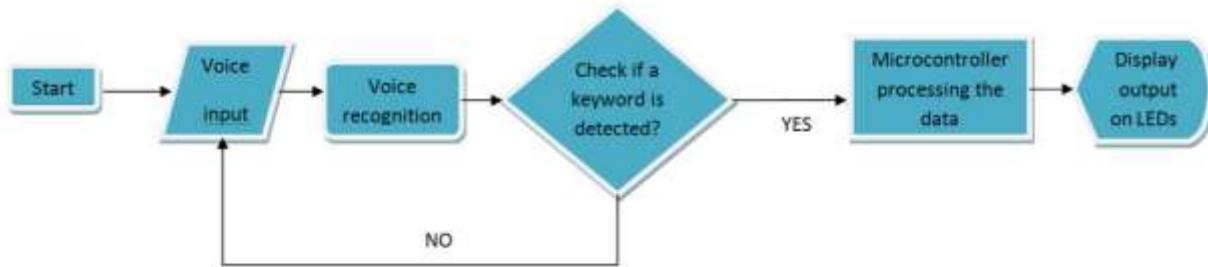


Figure 1: the block diagram of the latest BikeSmart System

As accelerometer has some problems working with the back LED matrix that it will occupy the voltage of the analog input on Arduino board which means accelerometer cannot sensing the deceleration as the reading is steady on our analog input. Thus we construct new braking lights with Super Red LED with accelerometer and another Arduino Board. Moreover, we also add the Front feedback LED matrix; it will show the direction as same as the back LED matrix simultaneously. In this way, bike users can clearly know what is happening at the back.

## Deviation of the Device and Challenges

Team DreamRide have decided to abandon the slide-switch control. Because of the outstanding performance of the voice recognition system, it is unnecessary to add another feature that is similar in terms of the system performance. Originally, the manually control slide-switch system was designed as a backup system for voice recognition feature. However, after a series of testing on voice recognition system, the team DreamRide are confident on performing the voice recognition system independently without any backup.

The following diagram shows the system with the slide-switch control.

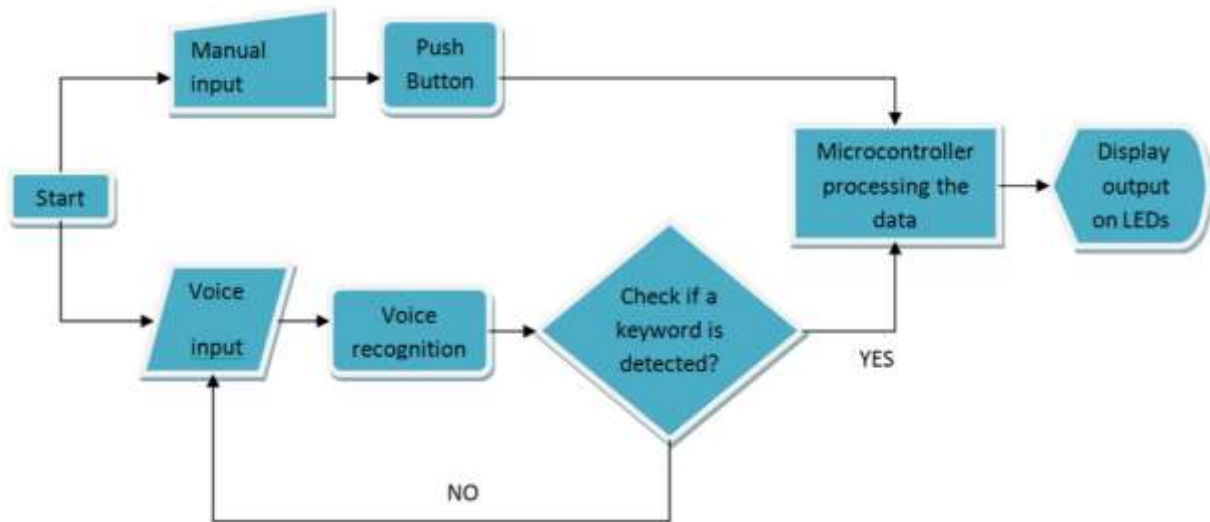


Figure 2: advanced development of the BikeSmart System with slide switch control

## Future Work:

In the future, DreamRide team would like to expand the market by adding a slide-switch control system to the device, by doing so user could also use the traditional way of controlling their signal lights in case if the voice recognition system fails and vice versa. Figure 2 shows the block diagram of the BikeSmart with slide-switch control system. In addition to the slide-switch control, a monitoring system that displays information such as calories burned, current speed, and heart could also be added to trigger more competitiveness of the product.

## Finance and Timeline:

### Budget

DreamRide has received a funding from the Engineering Student Society Endowment Fund (ESSEF) at 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, bicycle, Lithium Polymer Battery, Battery charger and booster, and various hardware parts. The following is a list of all parts that have currently been purchased:



Post Mortem for the BikeSmart System

Equipment List	Estimated Cost (CAD)
RGE LED Matrix 60mm *2	\$60
Red LED Matrix with MUX	\$20
Hall effect sensor	\$2
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 accelerometer 335	\$20
Voice shield	\$70
AA battery *16	\$8
AA battery holder *3	\$10
Super red LED *5	\$10
Power adaptor*3	\$6
Velcro (120cm*5cm)	\$12
9V battery *2	\$3
9V battery holder	\$1
<b>Total</b>	<b>\$418</b>
<b>ESSEF funding</b>	<b>\$300</b>
<b>Exceeded cost</b>	<b>\$118</b>

Table 1: Expenses Breakdown

As shown in table 1, the ESSEF funding is insufficient, so further sources of funding will be needed. By the end of semester, the team of DreamRide will file the application for Wighton Fund to cover the \$118 exceeded cost.

### Time Constraint

The initial plan was to finish hardware and software design before April 9<sup>th</sup>. Fortunately, I did manage to have everything done by the end of the semester. As shown in the Gantt chart in the appendix, our scheduled date for demo and presentation is April 15<sup>th</sup>.



## Personal Reflections

### Jason Coo – Chief Executive Officer

For the past few months, I had the privilege to work with not only my friends and also two other skillful engineering students with different background. I have learned many from each team member of the DreamRide. The group dynamic was great in general and members were willing to communicate, even when the project does not point at their desired directions. Though the outcome might not be as well as we expected, I am grateful to have this unique learning experience and opportunity.

As I was appointed to be the CEO of the group, my role was to direct the group and to make difficult decisions. Aside from the CEO's responsibilities, my primary task was to create the speedometer and its display, as well as creating the battery charger circuit. I was also the minute taker for each meeting.

The amount of knowledge I gained from working with this team is tremendous. The most important lesson is how to better manage my time. We had the illusion of being ahead of schedule until difficult problems happened. I believe we had underestimated many parts of the project as we only assigned a few manpower and few days for them. The ability of working under pressure is also a valuable skill that I have gained during the project. My biggest challenge was to program the 7-segment LED display to show the speed of the bicycle, while minimizing the pin used on the Arduino Uno board. The task was necessary as Stan's user-feedback display and my speedometer uses the same Arduino board. To reduce the amount of pin used on the board, I ended up using a MUX to simplify the circuit, but increased the programming complexity.

As I am the person to make the final decisions, most of the time, especially when it comes to ordering parts and shaping the project, I have learned that some sacrifices are inevitable, such as the time when I made the decision of abandoning the slide switch controller, due to its complexity to combine with the rest of the parts when there were not much time remaining. There are still many for me to learn to be the better decision maker.

Although the outcome of the project was not as I expected, I am very proud of what we had accomplished in only a few months. The experience and skills we have gain in this course are very valuable to our future careers.





## **Nadia Tehranchi – Chief Communication Officer**

I have enjoyed being a part of this project for the past 12 weeks. Being able to work with four other engineering students coming from a different background really helped me gain more experience made me more successful as a CCO in our group. My own background and experiences from volunteering and social involvements in various clubs allowed me to make better network connections both between our group members and with TAs and professors at SFU. For instance, I was able to persuade Dr. Gray to allow us to use her equipment in the Micro Instrumentation Lab for our project. I believe, as a whole, my achievements in the group as a CCO member were excellent.

Of the experiences and skills I have gained as part of this team, communication and time management have been the most notable. Working in a team usually has its challenges, but respecting and hearing individual team members' points of view, and considering their ideas is essential in accomplishing goals. Our team was able to clearly communicate ideas, needs, and problems, and team members listened and took into consideration different things that were brought up in our frequent weekly meetings. At these meetings, we set specific deadlines taking into consideration our schedules, and ensured our goals were attainable during this time. Doing so, allowed us to continuously meet our goals in the time frame we had set, and at the end we were able to achieve our big goal: creating a bicycle signaling system that responds to human voice, in effect eliminating the need for hand signals.

After several meetings, as a group we came to the decision of having half of the team work on the LED part and the other half work on the voice recognition aspect of the project. I was part of the latter group, working on the voice recognition segment of the project. My previous experiences of C++ and Matlab programming allowed me to work with microcontrollers such as various types of Arduino boards. While I did not have any experiences with voice recognition controls, this experience allowed me to learn how to be a motivated self-starter. Additionally, I was able to improve my programming and coding as I gained more experience with Arduino boards. Our team selected me to work independently on hardware packaging as we inched closer to the end of the term, showing me that my team appreciated and valued my ideas and work ethics.

Being a Research Assistant at Micro Instrumentation Laboratory for my last coop has been a privilege. Gaining experience in 3D software such as OpenSCAD, Blender, Wings 3D and SketchUp for designing micro-components from my past coop semester allowed me to become proficient in our group as a hardware designer. For the last month of working on the project, my main task became working on the hardware packaging for all of our designs, including user feedback, voice recognition, and LED parts by using 3D software and 3D printer. This task



allowed me to work with a MakerBot (3D printer) at the Dr. Gray's lab for the hardware packaging.

The DreamRide group worked exceptionally well as a team. All members contributed to tasks equally and were able to communicate with each other and finish the project on time. My experience with DreamRide Corporation has been extremely constructive and I look forward to continuing further work with Stan, Jason, Paul and Conrad in the future for other projects. This opportunity was a great experience for me, and I think that our collective experience as a team was very much in line with the goals of the course. I would like to express my special thanks and gratitude to our wonderful professors at SFU who have helped me through my studies to become a successful engineer. Our completion of this project could not have been attained without the support of Dr. Andrew Rawicz, and Steve Whitmore. I would also like to extend a special thanks to all of the TAs of ENSC305/440 who have helped us throughout this semester.

### **Stan Yang – Chief Operating Officer**

This semester has become the most unforgettable and important time frame of the four years I am in school in SFU. This course taught us not just how to work as a team but operate as a company. When I first met Dr. Andrew, he told me: "this course is the only course you can make mistake in Engineering at SFU or even before you step into your career." I could not understand at the first time, but now I completely understand what his meant. I am glad I have this opportunity to learn it the hard way.

From this experience with other four teammates, I learned the most important lesson is to communicate to each other. Taking personal possibility and self-learning are required, but without a good communication to other members in the group will just cause myself into many struggles and difficulties. As we did not make our roles clearly enough at the beginning of the course and we all know each other even before the course started, it makes us hard to assign tasks strictly to each other. In the conclusion, I sometimes need to stay up late to try to keep our process on schedule. However, as I still have other courses need to take care about, this make us need sacrifice some features or leave some details unclear.

I do have some experience with Arduino micro controller as I designed a Bluetooth auto lock device for doors from ENSC 100 last semester. However, the project we decided to do is entirely different than what I learned before. So I need to learn all the Arduino language again from Youtube, website and blogs. For approaching to our goal, I did some researches on the internet and decided what components we need to buy. Jason, the CEO from our team, spend plenty of time with me to many electronic shops in Vancouver again and again. My mainly job is to make each components can work as a product. I need to make sure the voice recognition can



#### Post Mortem for the BikeSmart System

perfectly communicate to our back LED matrix and front LED feedback. Despite the combinations, I need to improve the accuracy of detecting voice of our voice recognition by calibrate the code with its library. Moreover, I also need to design driving our LED matrix for back signal, using XBee modules and make sure all components can well communicate to each other and how to use triple-axis accelerometer to sense the braking for our braking light. In order to reduce size of our product, I decided to use MUX (MAX7219) to drive our LED feedback. When I finished some features, I will perform and demonstrate to our group to discuss the developments of our product. I failed many times and waste a lot of time doing the troubleshooting in the wrong direction. However, when the product successfully functions, I was happy and enjoy the result.

In conclusion, I have to admit that I tasted some depressions and failures during this semester, but those negative feelings only make me more positive and also reminder me where I can improve of my personality. As a result, I have to thank all the members to provide this environment before I step into my career in my real life.

#### **Conrad Wang – Chief Technology Officer**

I came into ENSC440 with the expectation to apply all the knowledge I have learned in the previous fourth years in engineering. I was wrong. What I had to apply was so much more than just the technical skills. After four months of working on this project, I have come to the conclusion that the most valuable assets of an engineer are the ability to learn, to manage time, and most importantly, to communicate. Fortunately, I had four exceptional teammates with all of these traits that allow us to always move forward without major roadblocks.

In this era where Internet is easily accessible, information is not hard to obtain. My main responsibility was to design a voice recognition control to turn the signal lights on and off. Although I came into this project with no experience in Arduino programming language and no background knowledge of voice recognition control, I was able to learn a lot from the internet and quickly contribute to the team. Even when I ran into problems, I was able to figure them out with more research online. This is why I think the ability to learn is more important than the knowledge I already have. In the industry, not everything will be familiar to me. I will need to be able to self-obtain the required knowledge in a timely matter to make myself useful.

Throughout the project, I have also noticed that having a schedule with set deliverable dates can greatly improve the progress of the project. When we started the project, we assigned roles to each member but we didn't really enforce any deadlines. This led to delays on a few occasions. In late March when we realized that we were falling behind, we started setting



deadlines for each task. This proved to be great for us as all tasks got completed in the time frame we desired.

The DreamRide team worked really well as a unit. We complement each other well and we had great communication. Whenever one person ran into issues, another would step in to help. Whenever reports were due, we divided the work equally and everyone contributed. When we had differences in opinions, we held meetings to resolve them. Because of our great communication, we were able to conquer difficulties and progress.

I want to thank all my teammates for being wonderful people. Although not everything went according to the original plan, we were still able to come up with alternative solutions. This project had been a great experience. If I have a chance to work with this group again, I will totally do so.

### **Paul Chen – Chief Financial Officer**

Over a year ago in order to fill the spare time we had as the engineering students, me and two of my friends each purchased an Arduino board along with basic electronic components just trying to entertain ourselves. Back then, we would do some little projects such as thermometer or simple voice-control display. We would also throw ideas for capstone course back and forth and that was how this ENSC 305/440 project started. This semester I am finally teamed up with two amazing engineering students and also the two friends that I mentioned previously. I have learned so much from my four excellent teammates that I would never have learned in other courses.

As the CFO of DreamRide, my primary responsibility was to keep the BikeSmart project within the budget as possible. Aside from that, I would also need to make sure all the purchased electronics components would arrive on time to meet the deadlines. In addition, I had to research and compare all the hardware components between online electronic shops and make the best decision for the team. Consequently, I was managed to reduce our project cost from \$733.00 to \$446.00 and economically spent the funding from ESSEF.

Other than the financial tasks in the team, I am also responsible in designing voice control system. With the rich experience in Arduino platform, I was able to contribute an adequate effort to the team. However, even with the experience obtained in the past, I still encountered many problems in this project that I did not really expect, mainly the time management issue. Before taking this course, I did not have to worry about the timing pressure when doing Arduino projects in my own spare time. At the beginning of the semester, the same attitude



was carried on and I soon realized the problem. Fortunately, I was able to put myself back on the right track and follow the schedule in an efficient way.

Overall I am quite satisfied with the whole progress of making this project from the ground up with four other teammates. If I could go back in time and do things differently, I would have started my research on the hardware components way earlier before the semester and manage my time effectively. It was nearly impossible to finish the project and expect it to be exactly the same with the proposal that we handed in on second week of the semester. However, if the teammates would gather together few months before the semester starts, we would have been better prepared for the project.

As the project BikeSmart finally coming to an end, I was actually pleased with the commitment that my teammates showed in attempt to complete this project. Even though I wish DreamRide members would have been able to accomplish more aspects of BkieSmart that we set out in the beginning, I am still happy with our final product. I would like to thank all the members in the group for giving me a chance to gain the technical and personal skills that will help me in the future career.

## Work Breakdown

High Level Task	Nadia	Stan	Paul	Conrad	Jason
LED Design (hardware & firmware)		*			
Voice Recognition (firmware)	*		*	*	
Voice Recognition (hardware)			*	*	
Feedback Display (hardware & firmware)		*			
Speedometer					*
Xbee Wireless Module		*			
Components Combination		*			*
Braking Lights (Accelerometer)		*			
Power Switch					*
Module and System Testing	*	*	*	*	*
Packaging	* *	*			*
Assembly Parts	*	*	*	*	*
Parts Sourcing	*	* *	*	*	* *
Documentation	*	*	*	*	* *
Administrative Tasks	*	*	*	*	*

Table 2: Work Breakdown of the Team DreamRide



## **Conclusion**

The engineers from DreamRide have made a great effort and progress on this project for the past few months, even though the product has changed some of its major designs that we initially planned. However, with a tremendous demand out there, we believe that the idea of BikeSmart system has a high market potential not only target for the cyclists, but also for the general public. This project has enlightened all the members of DreamRide and made this capstone course enjoyable.

## **Acknowledge**

We would like to express our deepest appreciation to Dr. Bonnie Gray, who gives us permission to work in Micro-instrumentation Laboratory at SFU and use the MakerBot 3D printer.

## Appendix 1

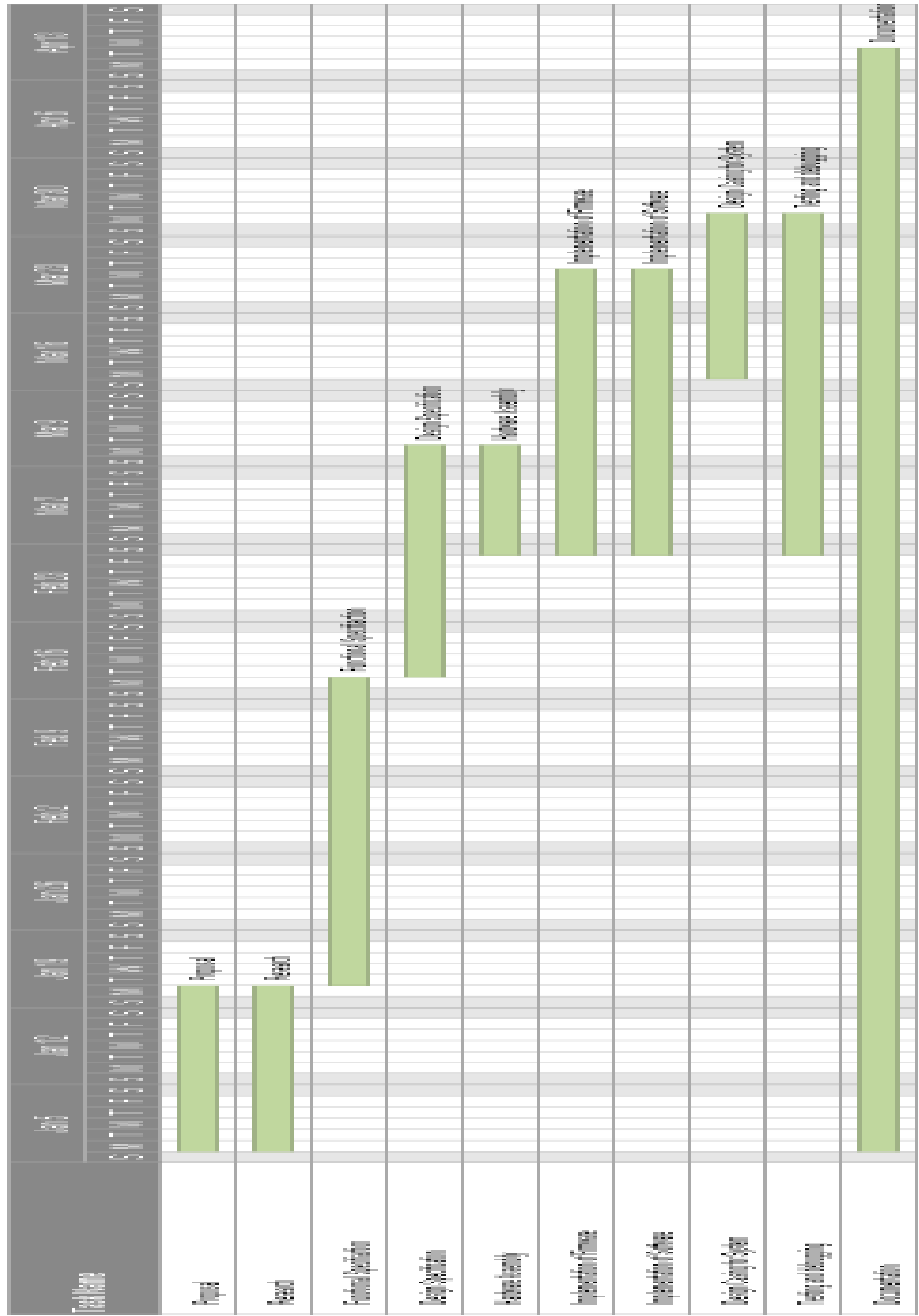


Figure 3: Gantt chart of Project Schedule



## Appendix 2

### DreamRide Inc.

#### AGENDA

January 10, 2014

10:30-12:30

### ENSC Lab 1

**Purpose of Meeting:** To discuss the price of components for the project, in order to apply for funding

**Items for Discussion:**

- Parts needed and their prices for each options of the project
- Ways to obtain a bicycle
- ESSEF project fund deadline

### DreamRide Inc.

#### MINUTES

January 10, 2014

10:30-12:30

### ENSC Lab 1

**Present:** Jason Coo, Nadia Tehranchi, Stan Yang, Paul Chen, Conrad Wang

**Absent:** None

**Purpose of Meeting:** To discuss the price of components for the project, in order to apply for funding

**Minutes:**

Jason called the meeting to order at 10:30 after ENSC 305W class.

**A. Approval of the agenda and minutes of the last meeting**

- First recorded meeting minutes; Not Available

**B. Business Arising**

What parts and how much will the project cost with the two designs?

**Discussion:** Paul and Stan gave quick estimation of about \$800 (which doesn't include the jacket, if the company is going for the jacket design) if all parts are bought locally





**Action:** Stan and Paul will find cheaper options online.

**C. Possible ways to obtain a bicycle**

**Discussion:** Jason felt he could get a new bicycle using his own money, since he is planning to buy a new bicycle anyway. Stan agreed. Nadia suggested to check if the professors are able to provide one.

**Action:** The group is going to talk to either Professor Rawicz or Whitmore after the meeting.

**D. ESSEF project fund deadline**

**Discussion:** The group realized the ESSEF project fund deadline might be soon. Jason felt he could talk to the ESSS people and find out. The rest of the group agreed on checking with the professor to obtain alternative way to contact ESSEF people.

**Action:** The group is going to talk to Professor Whitmore after the meeting.

**E. Next Meeting Date**

The next meeting was arranged for January 17, 2014 at 22:30 on Skype.

**F. Other Business**

None.



## **DreamRide Inc.**

### **AGENDA**

**January 17, 2014**

**22:30-23:30**

### **Skype Meeting**

**Purpose of Meeting:** To discuss problems related to the proposal

#### **Items for Discussion:**

- Finalizing company name and product name
- Deciding position for each member
- Partition of the proposal
- General progress report from each member

### **MINUTES**

**January 17, 2014**

**22:30-23:30**

### **Skype Meeting**

**Present:** Jason Coo, Paul Chen, Stan Yang, Conrad Wang, Nadia Tehranchi

**Absent:** None

**Purpose of Meeting:** To discuss problems related to the proposal

#### **Minutes:**

Jason called the meeting to order at 22:30

#### **A. Approval of the agenda and minutes of the January 10, 2014 meeting**

Minutes were approved as amended:

- ESSEF funding form is still in the process of completing.

#### **B. Business Arising**

A company name and a project name is needed.



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**Discussion:** Jason suggested “Bikesmart” as the company name and “Smartifier” for the product name. Nadia suggested “dream bike” as the company name and “Smart Safety System” for the product name. Conrad suggested “DreamRide Inc.” to be the company name which all members liked and agreed.

**Action:** Member voted on the name they preferred. Result: “DreamRide Inc.” as the company name, and “BikeSmart” as the product name.

### C. Deciding position for each member

**Discussion:** As for the proposal, a “Company Details” section is needed. The group decided to divide jobs/position according to different skills/specialty of each member.

**Action:** Each member has to pick one to two jobs from “CEO”, “CFO”, “COO”, “CTO”, and “CCO”, and give a short speech about why would they fit such position. Then other members vote on it. Voting will be done during next meeting.

### D. Partition of the proposal

**Discussion:** As for the proposal, there will be 8 sections/topics. Each member has to take part of at least 2 of them. The proposal will be saved on a google document, such that members can work on it asynchronously.

**Action:** Jason is in charge of Introduction/Background and Project Planning; Paul is in charge of Scope/Risks/Benefits and Cost Consideration; Stan is in charge of Company Detail and Markets/Competition/Research/Rationale; Nadia is in charge of Executive Summary and Conclusion/References; Conrad is in charge of Company detail and Conclusion References

### E. General progress report from each member

Paul, Conrad, and Nadia are working on voice control system; Nadia got access of a 3D printer; Jason and Stan are working on the LED matrices and the control buttons, wired test prototype will be finished soon.

### D. Next Meeting Date

The next meeting was arranged for Sunday, January 19, 2014 at 15:00-19:00 at Vancouver Campus.

### E. Other Business

None.



## **DreamRide Inc.**

### **AGENDA**

**January 19, 2014**

**14:00-19:00**

### **Vancouver Campus**

**Purpose of Meeting:** Finalization of proposal

**Items for Discussion:**

- Each member's position in the company
- Redoing the Development/Millstones Section using MatchWare MindView

### **MINUTES**

**January 19, 2014**

**14:00-19:00**

### **Vancouver Campus**

**Present:** Jason Coo, Paul Chen, Stan Yang, Conrad Wang, Nadia Tehranchi

**Absent:** None

**Purpose of Meeting:** To discuss problems related to the proposal

**Minutes:**

Jason called the meeting to order at 14:00 on Vancouver campus

**A. Approval of the agenda and minutes of the January 17, 2014 meeting**

Minutes were approved as amended:

- ESSEF funding form is still in the process of completing. Still need to complete the material parts and price part.
- DreamRide Inc. is the final decision for the company name

**B. Business Arising**

Each member's position in the company



**Discussion:** For the proposal, each member need to take different position in the company.

**Action:** A voting session was done over who each member thinks fits each position the best.

**Results:** Jason – CEO; CFO – Paul; COO – Stan; CTO – Conrad; CCO – Nadia.

**C. Redoing the Development/Millstones Section using MatchWare MindView**

**Discussion:** Nadia suggested that MindView should be used in the proposal for the Development and Millstones part of the proposal

**Action:** Jason who was assigned for the part is going to redo the part using MindView at home, due to none of the presenting member has it installed on their computer.

**D. Next Meeting Date**

The next meeting was arranged for Tuesday, January 21, 2014 at 16:30 – 17:30 on Burnaby campus.

**E. Other Business**

Stan and Paul will have the parts and price part of the ESSEF funding form done by Friday, January 24, 2014.



**DreamRide Inc.**

**AGENDA**

**January 21, 2014**

**16:30-17:30**

**Lab 1**

**Purpose of Meeting:** Problem about the ESSEF form and the presentation

**Items for Discussion:**

- Finalization of the ESSEF application
- Preparation for the ESSEF presentation

**MINUTES**

**January 21, 2014**

**16:30-17:30**

**Lab 1**

**Present:** Jason Coo, Paul Chen, Stan Yang, Conrad Wang, Nadia Tehranchi

**Absent:** None

**Purpose of Meeting:** To discuss problems related to the proposal

**Minutes:**

Jason called the meeting to order at 16:30 in Lab 1 Burnaby Campus

**A. Approval of the agenda and minutes of the January 19, 2014 meeting**

Minutes were approved as amended:

- Proposal was successfully done; Millstone section was finished using MindView
- ESSEF application was still in progress of finishing

**B. Business Arising**

Finalization of the ESSEF application



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**Discussion:** Jason finished the Proposal Description part; Nadia finished the Social and Education Benefits; Conrad finished the Implementaion Schedule part; The Cost Breakdown are to be finished by Stan and Paul

**Action:** A proof reading session was done over all the finished parts. Stan and Paul's part was to be finished by Friday.

#### C. Preparation for the ESSEF presentation

**Discussion:** As part of the ESSEF application required each group to give a brief presentation about the product and the cost breakdowns. There will also be a 5 minute Q&A session after the presentation. Each member has to take some part of the presentation preparation.

**Action:** A power point presentation is to be created before the presentation day (January 28<sup>th</sup>, 2014). Each member will make a point form slide about their part in the proposal.

#### D. Next Meeting Date

The next meeting was arranged for Monday, January 27, 2014 at 16:30 – 17:30 on Burnaby campus.

#### E. Other Business

None



**DreamRide Inc.**

**AGENDA**

**January 27, 2014**

**16:30 – 17:30**

**Lab 1**

**Purpose of Meeting:** To discuss problems related to the ESSEF presentation and rehearsal

**Items for Discussion:**

- ESSEF presentation and rehearsal

**MINUTES**

**January 27, 2014**

**16:30 – 17:30**

**Lab 1**

**Present:** Jason Coo, Paul Chen, Stan Yang, Conrad Wang, Nadia Tehranchi

**Absent:** None

**Purpose of Meeting:** To discuss problems related to the ESSEF presentation and rehearsal

**Minutes:**

Jason called the meeting to order at 16:30

**A. Approval of the agenda and minutes of the January 21, 2014 meeting**

Minutes were approved as amended:

- ESSEF funding form is finished and submitted

**B. Business Arising**

ESSEF presentation and rehearsal

**Discussion:** As agreed from last meeting, members are to focus on their own part in the proposal and create a brief, point form slide about their part.





#### Post Mortem for the BikeSmart System

**Action:** Slides are put together. Paul suggests to memorize the script when Conrad suggests not to. Jason suggests to bring the script and others disagreed. A vote happens where members agree not to memorize the whole script, but the important points of it and present as naturally as possible.

#### **D. Next Meeting Date**

The next meeting was arranged for Tuesday, January 28, 2014 at 17:30 – 18:30 at Lab 1, Burnaby Campus.

#### **E. Other Business**

None.



Post Mortem for the BikeSmart System

## **DreamRide Inc.**

### **AGENDA**

**January 28, 2014**

**17:30-18:30**

### **Lab 1**

**Purpose of Meeting:** ESSEF presentation final rehearsal and project updates

**Items for Discussion:**

- Project updates – Stan propose a new design for the LED panel



Post Mortem for the BikeSmart System

**DreamRide Inc.**

**MINUTES**

**January 28, 2014**

**17:30-18:30**

**Lab 1**

**Present:** Jason Coo, Paul Chen, Stan Yang, Conrad Wang, Nadia Tehranchi

**Absent:** None

**Purpose of Meeting:** ESSEF presentation final rehearsal and project updates

**Minutes:**

Jason called the meeting to order at 17:30 in Lab 1 Burnaby Campus

**A. Approval of the agenda and minutes of the January 27, 2014 meeting**

Minutes were approved as amended:

- Memorizing script is not necessary for the ESSEF presentation

**B. Business Arising**

Project updates – Stan propose a new design for the LED panel

**Discussion:** Instead of using 2 LED matrices, Stan suggests to use only 1 LED matrix. By putting the LED matrix in a diamond fashion, the middle 16 LEDs can be used for the brake signal and the 2 sides of the matrix can be used to show direction as they form in the shape of arrows.

**Action:** In order to decide which one is better, both model will be implemented to determine.

**D. Next Meeting Date**

The next meeting was arranged for Tuesday, February 4, 2014 at 14:30 – 16:30 on Burnaby campus.

**E. Other Business**

Final rehearsal was done over at the last 10 minutes of the meeting



Post Mortem for the BikeSmart System

## **DreamRide Inc.**

### **AGENDA**

**February 4, 2014**

**14:30-16:30**

### **Burnaby Campus**

**Purpose of Meeting:** Progress report and drafting Functional Spec.

**Items for Discussion:**

- Updates from the two groups
- Decision on who to focus on which part of the Functional Spec. document **DreamRide Inc.**

### **MINUTES**

**February 4, 2014**

**14:30 - 16:30**

### **Burnaby Campus**

**Present:** Jason Coo, Paul Chen, Stan Yang, Conrad Wang, Nadia Tehranchi

**Absent:** None

**Purpose of Meeting:** Progress report and drafting Functional Spec.

**Minutes:**

Jason called the meeting to order at 14:30 on Burnaby campus

**A. Approval of the agenda and minutes of the January 28, 2014 meeting**

Minutes were approved as amended:

- Two models of the LED panel are being implemented by Jason and Stan.

**B. Business Arising**

Update from each group

**Manuel Switch Team:** The two models are currently being programmed, expected to be finished by next Monday.



Post Mortem for the BikeSmart System

**Voice Control Team:** Only “f” and “th” sound can be detected from “left” and “right” respectively. Deciding whether or not to switch to a new Library.

C. Decision on who to focus on which part of the Functional Spec. document

**Discussion:** While there are two teams working on different parts, each team will have to focus on their according parts. An overall revision will be done as a group later to ensure all requirements are covered

D. **Next Meeting Date**

The next meeting was arranged for Friday, February 7, 2014 at 16:30 – 17:30 on Burnaby campus.

E. **Other Business**

None



Post Mortem for the BikeSmart System  
**DreamRide Inc.**

## **AGENDA**

**February 7, 2014**

**16:30-17:30**

### **Burnaby Campus**

**Purpose of Meeting:** To updates the members about the Project and Functional Spec. Document

**Items for Discussion:**

- Project Update
- Functional Spec. Document Updates



Post Mortem for the BikeSmart System

## **DreamRide Inc.**

### **MINUTES**

**February 7, 2014**

**16:30-17:30**

## **Burnaby Campus**

**Present:** Jason Coo, Paul Chen, Stan Yang, Conrad Wang, Nadia Tehranchi

**Absent:** None

**Purpose of Meeting:** To updates the members about the Project and Functional Spec. Document

### **Minutes:**

Jason called the meeting to order at 16:30 in ASB hallway in Burnaby Campus

#### **A. Approval of the agenda and minutes of the February 4, 2014 meeting**

Minutes were approved as amended:

- Both team agree to work on their part in the functional specification and review as a group later

#### **B. Business Arising**

Project Updates:

##### **Discussion:**

Switch Control Team: Both design of LED panels are implemented and will be evaluated and tested later.

Voice Control Team: Changed to a new library, programming is still in progress. Expected to be finished over the reading break.

Action: Jason and Stan will bring in the 2 designs and let the group decide which will be the final model. Meanwhile, Stan will help the Voice Control Team with the programming; Jason will be working on the speedometer and the switch.

#### **C. Functional Spec. Document Updates**

##### **Discussion:**

Conrad: Working on System Requirement.

Paul: Done Introduction, working on the Scope



Post Mortem for the BikeSmart System

Nadia: Just finished the letter. Currently working on the executive summary.

Stan & Jason: Working on slide switch, sensors, and LED panel requirements

#### **D. Next Meeting Date**

The next meeting was arranged for Thursday, Feb 13, 2014 at 11:00 on Vancouver campus.

#### **E. Other Business**

None

### **DreamRide Inc.**

#### **AGENDA**

**February 13, 2014**

**14:30-17:30**

### **Vancouver Campus**

**Purpose of Meeting:** To updates the members about the Project and Functional Spec. Document

#### **Items for Discussion:**

- Project Update
- Functional Spec. Document Updated

#### **MINUTES**

**February 13, 2014**

**14:30-17:30**

### **Vancouver Campus**

**Present:** Jason Coo, Paul Chen, Stan Yang, Conrad Wang, Nadia Tehranchi

**Absent:** None

**Purpose of Meeting:** To updates the members about the Project and Functional Spec. Document

#### **Minutes:**

Jason called the meeting to order at 14:30 in ASB hallway in Vancouver Campus





**A. Approval of the agenda and minutes of the February 7, 2014 meeting**

Minutes were approved as amended:

- Everyone had finished their part in the functional specification.

**B. Business Arising**

Project Updates:

**Discussion:**

Switch Control Team: Both design of LED panels are implemented, Jason is working on the coding part of the LED and the switch.

Voice Control Team: Still working on editing part of specification

Action: Since Jason and Stan parts are almost finished, Stan is going to the Voice Control Team to help out.

**C. Functional Spec. Document Updates**

**Discussion:**

All parts are done, proof reading + editing is done over the meeting.

**D. Next Meeting Date**

The next meeting was arranged for Thursday, Feb 17, 2014 at 14:30 on ASB hallway in Burnaby campus.

**E. Other Business**

None



Post Mortem for the BikeSmart System

## **DreamRide Inc.**

### **AGENDA**

**February 17, 2014**

**14:30-15:30**

### **Burnaby Campus**

**Purpose of Meeting:** To updates the members about the Project

**Items for Discussion:**

- Project Update

## **DreamRide Inc.**

### **MINUTES**

**February 17, 2014**

**14:30-15:30**

### **Burnaby Campus**

**Present:** Jason Coo, Paul Chen, Stan Yang, Conrad Wang, Nadia Tehranchi

**Absent:** None

**Purpose of Meeting:** To updates the members about the Project

**Minutes:**

Jason called the meeting to order at 14:30 in ASB hallway in Burnaby Campus

**A. Approval of the agenda and minutes of the February 13, 2014 meeting**

Minutes were approved as amended:

- Stan is now helping out in the Voice control team.

**B. Business Arising**

Project Updates:



**Discussion:**

Switch Control Team: Jason is still working on the programming of the switch and the LED display

Voice Control Team: Still working on editing part of specification

Action: N/A

**C. Next Meeting Date**

The next meeting was arranged for Thursday, Feb 26, 2014 at 14:30 on ASB hallway in Burnaby campus.

**E. Other Business**

None



Post Mortem for the BikeSmart System

## **DreamRide Inc.**

### **AGENDA**

**February 26, 2014**

**14:30-15:30**

### **Burnaby Campus**

**Purpose of Meeting:** To updates the members about the Project

**Items for Discussion:**

- Discuss about which LED display model is to be used.
- Oral progress preparation

## **DreamRide Inc.**

### **MINUTES**

**February 26, 2014**

**14:30-15:30**

### **Burnaby Campus**

**Present:** Jason Coo, Paul Chen, Stan Yang, Conrad Wang, Nadia Tehranchi

**Absent:** None

**Purpose of Meeting:** To updates the members about the Project

**Minutes:**

Jason called the meeting to order at 14:30 in ASB hallway in Burnaby Campus

**A. Approval of the agenda and minutes of the February 17, 2014 meeting**

Minutes were approved as amended:

- N/A

**B. Business Arising**

Project Updates:

**Discussion:**

The 2 model of LED display panels are finished, a vote of with one is better is held.



## Post Mortem for the BikeSmart System

- Nadia thinks the one LED panel is too small and might not be clear enough from a distance.
- Everyone else thinks the one LED panel is better because for the less power consumption and lower programming complexity.

Action: The one LED panel model is the final decision.

### **C. Oral presentation**

Presentation date: Feb 27 @ 14:30.

Intro – Nadia – Background, overview

Schedule – Jason – using timeline

Financial – Paul – Overall price, how much did we already spend

Program Remediation – Stan + Conrad

### **D. Next Meeting Date**

The next meeting was arranged for Thursday, Feb 27, 2014 at 13:30 on ASB hallway in Burnaby campus.

### **E. Other Business**

None



Post Mortem for the BikeSmart System  
**DreamRide Inc.**

## **AGENDA**

**February 27, 2014**

**14:30-15:30**

### **Burnaby Campus**

**Purpose of Meeting:** Final rehearsal for the oral progress report

**Items for Discussion:**

- Oral Progress report preparation.



Post Mortem for the BikeSmart System

**DreamRide Inc.**

**MINUTES**

**February 27, 2014**

**14:30-15:30**

**Burnaby Campus**

**Present:** Jason Coo, Paul Chen, Stan Yang, Conrad Wang, Nadia Tehranchi

**Absent:** None

**Purpose of Meeting:** Final rehearsal for the oral progress report

**Minutes:**

Jason called the meeting to order at 13:30 in ASB hallway in Burnaby Campus

**A. Approval of the agenda and minutes of the February 26, 2014 meeting**

Minutes were approved as amended:

- Everyone agreed on their part and have prepared scripts for it.

**B. Oral presentation**

Rehearsal & Timing

Intro	Nadia	1:15
Schedule	Jason	1:19
Financial	Paul	1:19
Programming	Conrad	2:28
Programming	Stan	1:21
	Total	8:00

Feedback/comment from the presentation:

- LED might not be bright enough, have to look into light intensity
- Number of pin in Arduino might not be enough.



**C. Next Meeting Date**

The next meeting was arranged for Sunday, March 2, 2014 at 13:30 on Vancouver campus.

**D. Other Business**

None





Post Mortem for the BikeSmart System

**DreamRide Inc.**

**AGENDA**

**March 2, 2014**

**14:30-17:30**

**Vancouver Campus**

**Purpose of Meeting:** Design Spec. Documentation

**Items for Discussion:**

- Design Spec. documents job dividing
- Project update

**DreamRide Inc.**

**MINUTES**

**March 2, 2014**

**14:30-17:30**

**Vancouver Campus**

**Present:** Jason Coo, Paul Chen, Stan Yang, Conrad Wang, Nadia Tehranchi

**Absent:** None

**Purpose of Meeting:** Design Spec. Documentation

**Minutes:**

Jason called the meeting to order at 14:30in Vancouver Campus

**A. Approval of the agenda and minutes of the February 27, 2014 meeting**

Minutes were approved as amended:

- Everyone agreed on their part and have prepared scripts for it.

**B. Design Spec. Documentation**

- Conrad + Paul – Voice recognition (software and testing)
- Stan – XBee stuff + LED Matrix + 3-axis accelerometer
- Jason – Slide Switch + Arduino Uno R3, Lithium Polymer Battery and the charger circuit.
- Nadia – 3D printer stuff, project component and their dimensions.

**C. Next Meeting Date**



Post Mortem for the BikeSmart System

The next meeting was arranged for Saturday, March 8, 2014 at 13:30 on Vancouver campus.

**D. Other Business**

None



Post Mortem for the BikeSmart System

## **DreamRide Inc.**

### **AGENDA**

**March 8, 2014**

**14:30-18:30**

## **Vancouver Campus**

**Purpose of Meeting:** Design Spec. Documentation

### **Items for Discussion:**

- Design Spec. documents job dividing
- Project update

## **DreamRide Inc.**

### **MINUTES**

**March 8, 2014**

**14:30-18:30**

## **Vancouver Campus**

**Present:** Jason Coo, Paul Chen, Stan Yang, Conrad Wang, Nadia Tehranchi

**Absent:** None

**Purpose of Meeting:** Design Spec. Documentation

### **Minutes:**

Jason called the meeting to order at 13:30 in ASB hallway in Burnaby Campus

#### **A. Approval of the agenda and minutes of the March 2, 2014 meeting**

Minutes were approved as amended:

- Everyone agreed on their part to work on and have prepared to combine together a document.

#### **B. Design Spec. Documentation**

##### **Discussion:**

All parts are done, proof reading + editing is done over the meeting and ready to hand in by March 10.

#### **C. Next Meeting Date**



Post Mortem for the BikeSmart System

The next meeting was arranged for Wednesday, March 12, 2014 at 14:30 on Burnaby campus.

**D. Other Business**

None



Post Mortem for the BikeSmart System

## **DreamRide Inc.**

### **AGENDA**

**March 12, 2014**

**14:30-16:30**

## **Burnaby Campus**

**Purpose of Meeting:** Project update

### **Items for Discussion:**

- Speedometer
- Battery charger

## **DreamRide Inc.**

### **MINUTES**

**March 12, 2014**

**14:30-16:30**

## **Burnaby Campus**

**Present:** Jason Coo, Paul Chen, Stan Yang, Conrad Wang, Nadia Tehranchi

**Absent:** None

**Purpose of Meeting:** Design Spec. Documentation

### **Minutes:**

Jason called the meeting to order at 14:30 in ASB hallway in Burnaby Campus

#### **A. Approval of the agenda and minutes of the March 8, 2014 meeting**

Minutes were approved as amended:

- Design spec document handed in on time.

#### **B. Item to Discuss**

##### **Discussion:**

- Since all part are almost done, should we start the Speedometer?
- Jason thinks we might not be able to finish it on time, and wasted the time invested on it.



## Post Mortem for the BikeSmart System

Other than Jason, everyone thinks we should start the speedometer.

Jason will be in charge of the speedometer and the battery and its charger circuit while Stan continue combining the switch, the LED matrix and the accelerometer (braking light).

### **C. Next Meeting Date**

The next meeting was arranged for Monday, March 17, 2014 at 14:30 Burnaby campus.

### **D. Other Business**

None



Post Mortem for the BikeSmart System

## **DreamRide Inc.**

### **AGENDA**

**March 17, 2014**

**14:30-16:30**

## **Burnaby Campus**

**Purpose of Meeting:** Project update

### **Items for Discussion:**

- Discarding slide switch controller
- 3D printed box
- Project update

## **DreamRide Inc.**

### **MINUTES**

**March 17, 2014**

**14:30-16:30**

## **Burnaby Campus**

**Present:** Jason Coo, Paul Chen, Stan Yang, Conrad Wang, Nadia Tehranchi

**Absent:** None

**Purpose of Meeting:** Project update

### **Minutes:**

Jason called the meeting to order at 14:30 in ASB hallway in Burnaby Campus

#### **A. Approval of the agenda and minutes of the March 12, 2014 meeting**

Minutes were approved as amended:

- Everyone is working on their task



**B. Item to Discuss**

**Discussion:**

- Even though the slide switch controller is finished, Stan who works on the LED matrix notice a confliction between the slide switch controller and the voice controller. The slide switch is to be discarded.
- Stan finished the voice control box (wireless signal sender and the microphone). The system is handed over to Nadia to design the container for it and 3D printed it.
- Budget saving wise, Jason announced that he is using a 4 digit 7 segment LED display for the speedometer.
- Stan will work on the feedback display and its wireless circuit next.

**C. Next Meeting Date**

The next meeting was arranged for Monday, March 21, 2014 at 14:30 Burnaby campus.

**D. Other Business**

None





Post Mortem for the BikeSmart System

## **DreamRide Inc.**

### **AGENDA**

**March 21, 2014**

**14:30-16:30**

## **Burnaby Campus**

**Purpose of Meeting:** Project update

### **Items for Discussion:**

- Progress Report writing

## **DreamRide Inc.**

### **MINUTES**

**March 21, 2014**

**14:30-16:30**

## **Burnaby Campus**

**Present:** Jason Coo, Paul Chen, Stan Yang, Conrad Wang, Nadia Tehranchi

**Absent:** None

**Purpose of Meeting:** Project update

### **Minutes:**

Jason called the meeting to order at 14:30 in ASB hallway in Burnaby Campus

#### **A. Approval of the agenda and minutes of the March 17, 2014 meeting**

Minutes were approved as amended:

- N/A

#### **B. Progress Report writing**

##### **Discussion:**

- Jason – Schedule + Feedback Display update
- Stan – Xbee Wireless Configuration + LED Panel + Voice Control
- Paul + Conrad – Intro + Financial + Conclusion
- Nadia – Hardware Packaging + Voice Control



**C. Next Meeting Date**

The next meeting was arranged for Friday, March 28, 2014 at 14:30 Burnaby campus.

**D. Other Business**

None



Post Mortem for the BikeSmart System

## **DreamRide Inc.**

### **AGENDA**

**March 28, 2014**

**14:30-16:30**

## **Burnaby Campus**

**Purpose of Meeting:** Project update

**Items for Discussion:**

- Project update

## **DreamRide Inc.**

### **MINUTES**

**March 28, 2014**

**14:30-16:30**

## **Burnaby Campus**

**Present:** Jason Coo, Paul Chen, Stan Yang, Conrad Wang, Nadia Tehranchi

**Absent:** None

**Purpose of Meeting:** Project update

**Minutes:**

Jason called the meeting to order at 14:30 in ASB hallway in Burnaby Campus

**A. Approval of the agenda and minutes of the March 21, 2014 meeting**

Minutes were approved as amended:

- Progress report handed in on time.

**B. Discussion**

**Individual task update**

- Nadia: LED matrix box and voice controller box finished.
  - Jason and Stan gave her the dimensions for the feedback display box
- Jason: Finished battery charging circuit (minimized the size of voice controller); Still working on the speedometer (80%) finished, some noise problem to be solved.



#### Post Mortem for the BikeSmart System

- Stan: Finished the LED matrix, and helped finish the voice recognition firmware. XBee configuration finished; still programming the feedback display LED.
- Conrad + Paul: Started stretching post-modem.

#### **C. Next Meeting Date**

The next meeting was arranged for Friday, April 4, 2014 at 14:30 Burnaby campus.

#### **D. Other Business**

Stan, Jason, and Nadia had to have everything ready by next meeting, so that testing can be carried out.



Post Mortem for the BikeSmart System

## **DreamRide Inc.**

### **AGENDA**

**April 4, 2014**

**14:30-16:30**

## **Burnaby Campus**

**Purpose of Meeting:** Project update

### **Items for Discussion:**

- Testing

## **DreamRide Inc.**

### **MINUTES**

**April 4, 2014**

**14:30-16:30**

## **Burnaby Campus**

**Present:** Jason Coo, Paul Chen, Stan Yang, Conrad Wang, Nadia Tehranchi

**Absent:** None

**Purpose of Meeting:** Testing of the whole system

### **Minutes:**

Jason called the meeting to order at 14:30 in ASB hallway in Burnaby Campus

#### **A. Approval of the agenda and minutes of the March 28, 2014 meeting**

Minutes were approved as amended:

- N/A

#### **B. Testing**

- Boxes are perfectly made, everything can easily loaded in to the box.
- Voice recognition need to have an “okay” accuracy. (could be improved)
  - o Conrad has perfect control over the turn signals; the system sometimes gives wrong signal when others try to use it.

Problem need to be solved (quickly):



#### Post Mortem for the BikeSmart System

- When seated on the bicycle, the LED matrix box will block user from cycling.
- Speedometer have bad signal sensing (noise?)
- Improve voice recognition accuracy

#### **C. Next Meeting Date**

The next meeting was arranged for Friday, April 13, 2014 at 16:30 at Jason's home.

#### **D. Other Business: none**



Post Mortem for the BikeSmart System

## **DreamRide Inc.**

### **AGENDA**

**April 13, 2014**

**16:30-21:30**

### **Jason's Home**

**Purpose of Meeting:** Project update

**Items for Discussion:**

- More Testing

## **DreamRide Inc.**

### **MINUTES**

**April 13, 2014**

**16:30-21:30**

### **Jason's Home**

**Present:** Jason Coo, Paul Chen, Stan Yang, Conrad Wang, Nadia Tehranchi

**Absent:** None

**Purpose of Meeting:** Testing of the whole system

**Minutes:**

Jason called the meeting to order at 16:30 in his home

**A. Approval of the agenda and minutes of the April 4, 2014 meeting**

Minutes were approved as amended:

- Some problems are solved

**B. Testing**

- Speedometer still need improvement.
- Some wires are really loose, might need to apply hot glue.

**C. Presentation Document**



## Post Mortem for the BikeSmart System

- Conrad – Introduction
- Stan – LED Display Panel + Wireless Communication + Feedback Display
- Jason – Speedometer + Battery and the charger circuit
- Paul – Voice Recognition + Budget + Scheduling
- Nadia – Packaging

### **D. Next Meeting Date**

The next meeting was arranged for Friday, April 14, 2014 at 12:30 @ Jason's house.

### **E. Other Business: none**





Post Mortem for the BikeSmart System

## **DreamRide Inc.**

### **AGENDA**

**April 14, 2014**

**12:30-22:30**

## **Jason's Home**

**Purpose of Meeting:** Project update

### **Items for Discussion:**

- More and More Testing

## **DreamRide Inc.**

### **MINUTES**

**April 14, 2014**

**12:30-22:30**

## **Jason's Home**

**Present:** Jason Coo, Paul Chen, Stan Yang, Conrad Wang, Nadia Tehranchi

**Absent:** None

**Purpose of Meeting:** Testing of the whole system

### **Minutes:**

Jason called the meeting to order at 12:30 in his home

#### **A. Approval of the agenda and minutes of the April 13, 2014 meeting**

Minutes were approved as amended:

- Some problems are solved

#### **B. Testing**

- Speedometer has a coding bug when the wheel stopped spinning, the speed display does not go to 0.
- More wires are really loose need to apply more hot glue.

#### **C. Presentation Document**



- Finalizing the presentation document

**D. Next Meeting Date**

The next meeting was arranged for Friday, April 15, 2014 at 10:00 Burnaby campus to finalize everything before the presentation at 12:30.

**D. Other Business**

N/A