**Presentation of Preliminary Findings Handout**

**Team 5**

* 1. **Materials (Nick Kamarianakis)**

For housing electrical components of the bike, I have chosen glass filled polycarbonate (GFP) [1] used in Gopro cameras [2] because it is lightweight and very durable. GFP will be a good choice for housing electrical components because it is highly impact resistant, has good flammability rating and has great electrical insulation properties [3]. This material can vary in thickness which makes it good for housing the electrical components, however cannot be molded into large sheets or panels easily. For the outer panels of the bike I have researched Glass-Fiber Reinforced Polyester (FRP). Like GFP it is impact resistant so it will provide safety to the biker however can be molded into large panels easily and less expensively. FRP panels are used in many different types of vehicles on the road today, including existing models of enclosed recumbent bikes [4]. FRP panels can come in a wide range of colours and finishes to provide a more attractive appearance [5].

[1] Plastics International (2013) *Zelux (Glass Filled Polycarbonate)* [Online] Available: http://www.plasticsintl.com/datasheets/Polycarbonate\_40\_GF.pdf

[2] Gopro. (2013) *Hero3 Replacement Housing* [Online] Available: http://gopro.com/camera-accessories/replacement-housing

[3] UL IDES (2013) *UL 94 Flame Rating* [Online] Available: http://www.ides.com/property\_descriptions/UL94.asp

[4] Aerorider (2012) *Aerorider Concept (Specifications)* [Online] Available: http://www.aerorider.com/en/aerorider.html

[5] Gilham P. (07/01/2010) *Polyester vs. Polycarbonate Materials* [Online] Available: http://sensigraphics.blogspot.ca/2010/01/polyester-vs-polycarbonate-materials.html

* 1. **Shape and Size (Douglas Raymond)**

As per shape and size of the bike, a fully enclosed model shall be used. The dimensions of the bike (Roughly 278L x 85W x 120H cm) will be specifically tailored to the size of a Canadian bike lane, while also ensuring space to comfortably fit the user. The shape of the bike will be similar to that of the Aerorider [1]. Aerodynamics have been carefully considered; making sure the shape will be efficient for the seasons and tasks provided, by considering the winter season and minimizing the snow collection on the roof.

[1] Aerorider (2012) *Aerorider Concept (Specifications)* [Online] Available: <http://www.aerorider.com/en/aerorider.html>

* 1. **Frame (Jacob Hawley)**

In order for the recumbent tricycle to remain sturdy and strong the wheel base must be a certain length. The wheel base is measured from the center of the back wheel to the center of the front wheels. If a long wheel base is used the turning radius will be greater and the trike will be less sturdy. But with a long wheel base the ride will be smoother and more comfortable because you are not on top of the front tires. A shorter wheel base will provide better handling and stability along with a smaller turning radius. If the wheel base is to short however the back tire may not get enough weight on it, the tire could spin out causing problems or the trike could flip forward when stopping. The optimal wheel base is around 40 inches witch the seat situated around 70/30 from the distance from the rear tire [1].

[1] Horwitz Ricky (2012) *Recumbent Trike Design* [Online] Available: http://www.hellbentcycles.com/trike\_projects/Recumbent%20Trike%20Design%20Primer.pdf

* 1. **Locking Mechanism (Neal Traynor)**

For the security of the bicycle, I have chosen to take the existing car lock design, and install it on the door of the outer shell of the bicycle. The design is very common, and the basic mechanism that is used on the locks are virtually everywhere, so it would be easy to contact a car company for the purchase of the locking system. Also, it allows the user of the bike to go online and buy a power lock system to install themselves if they wish. The user can also buy something called 'the club' from Canadian Tire or another similar store. What this does is it locks the steering wheel in one place, so if the vehicle does happen to get broken into, the thief can't drive it away. This can be very easily be implemented into the recumbent bicycle.

* 1. **Interior Features (Will Rose)**

The comfort of the driver depends on the ergonomic study of how the driver will sit and operate the vehicle. My research has shown that a critical point on the human body is the H-Point. It is located at the hip where the pelvis and thigh bone connect. It is important because of how it can affect the lower back with lumbar support and the reach of the foot to access the accelerator and brake pedals. As lower back injuries are very common in situations where habitual sitting occurs, remaining comfortable in long commutes is key to the health of the operator. As the human body can be modeled as a system of linkages [1, 47] you can figure out where to provide the best support based upon statistical surveys. As such, being able to adjust the back, trunk/thigh, and knee angles will give the operator the best comfort [1, 48].

References

[1] M. P. Reed, “Survey of Auto Seat Design Recommendations for Improved Comfort,” Univ. Michigan, 2000.