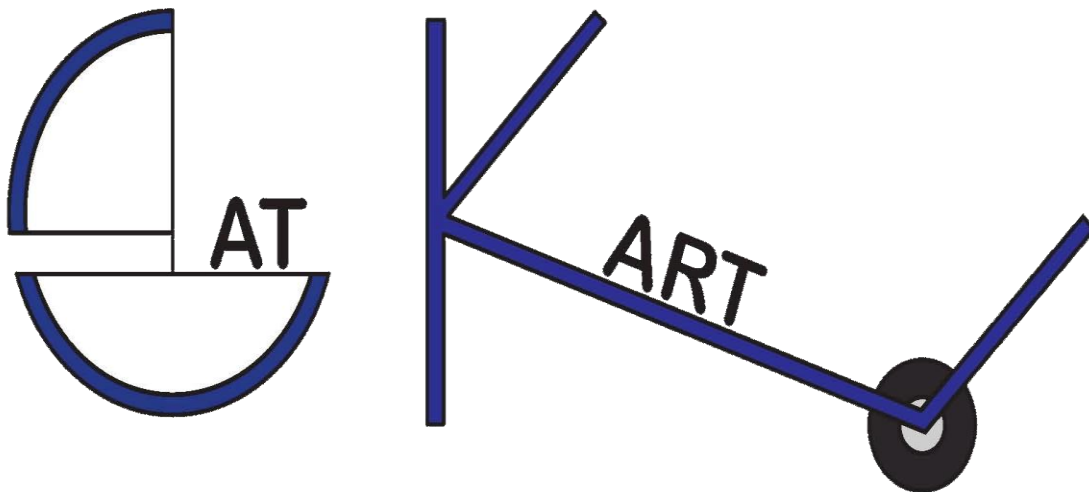


# Designing the CatKart and Catslippers for Catamarans on Wilmette Park District



**Advisor: Jim Braband**

## **1.0 Executive Summary**

This IPRO project was designed in order to create a better way for catamaran sailors to transport their boats from the sand into the lake for sailing. Currently this process is very demanding and cumbersome for one person, and often needs to be performed by several people. The process involved balancing the heavy catamaran on top of a set of wheels attached by a metal bar in order to bring it out to the water for sailing, but was very challenging for one person to perform.

This semester, our group designed a product that allows a single person to bring their catamaran sailboat out into the water by themselves with less work than the older process. Our group also created a complementary product called a Catslipper, which aids in the catamaran transportation process as well. Furthermore our team has developed a business model to generate revenue from the creations of the CatKart and Catslipper.

## **2.0 Background and Objective**

Currently there are no easy, inexpensive ways to transport small sailboats from the sand to the water at public beaches. The existing solution involves several sailors lifting the catamaran onto a bar attached to two wheels called a Cattrax, push it into the aisle, and then proceed to push it all the way to the way to the water, which could sometimes be up to 100 yards. On the other hand, some sailors that use private beaches choose to use an ATV in order to transport their sailboats, but new ATVs usually cost somewhere between \$5,000- \$10,000 and are tough to transport. Other competitors seem to be do-it-yourselfers who decide to design their own device in order to transport their catamaran.

The target market for our two new products are the sailors that use the Wilmette and Evanston beaches, which are in the north shore suburbs, just north of the city of Chicago, on the shores of Lake Michigan. These beaches are open for sailing from May 2<sup>nd</sup> to September 13<sup>th</sup>. The park districts there currently own a pair of Cattrax, which they rent out to the beach users, but sailors often have to wait in order to use them, and also need to ask their friends to help them haul it to the water, even with the Cattrax. The Wilmette Park District

currently has 489 boats at their beach site at Gillson Park, and 181 of those boats are catamarans. Some of these catamaran owners own their own pair of Cattrax for hauling their boat out to the water, but the vast majority of them have no transportation device. The Evanston beach is located just south of the Wilmette Park District beach, and is slightly smaller. It currently has 24 catamarans, and 90 small sailboats that are stored on their beach location, as well as 180 kayaks. One problem with the Evanston beach location is that they currently only have one set of Cat-Trax, which could create long wait times for its users.

With the creation of the Cat-Kart and Cat-Slipper, sailboat owners are allowed to easily slide their boats out of their parking space with our Cat-Slippers, and haul their boat into the water with the Cat-Kart. (Need to add the engineering behind our designs)

### 3.0 Organization and Approach

In order to achieve the goals that we set for our group at the beginning of the semester, our group decided to break into three different teams that would work on different components of the project. The three specific teams were the engineering, business, and model/media teams.

Our engineering team was composed of mechanical engineers, whose main task was to design and create a working device to haul catamarans from the beach to the water, with minimal effort needed from one user. The engineering team first made some measurements on some catamarans at the boat show located at Navy Pier, so that they knew how large this device needed to be. Next they drew up several different preliminary designs but decided to use the current Cat-Kart design. They calculated the Forces and Power needed to lift and pull a boat, and found an opportunity to build a separate product to reduce the friction force on the bottom of the boat when pulling it out of its parking spot at the beach. They then continued to order the materials and construct both devices.

Our business team was composed of students with different fields of study, with the goal of producing a business model for our new products, and monitoring the finances. The business team decided to approach this

by first conducting some secondary research on catamarans, and the catamaran hauling market. Next they chose to create a survey for catamaran sailors in order to get more information from the users themselves.

Our model/media team was composed of students studying architecture and computer science, and they were given the tasks of developing a website, creating models, and making logos for our products.

#### **4.0 Analysis and Findings**

The entire analysis and finding had two parts to it, one being the 'Engineering' part and the other being the 'Business' part.

From the business side of our project we did the market research towards the beginning of the semester. We found that there were over 100,000 Hobie Cats sailing around the world currently, according to hobicat.com. Our group also did some research about how many multihull sailboats were manufactured each year. In 2006, there were 2,674 multihull sailboats less than 20 feet long produced in the United States, which was an increase of 331 units, from 2005 production totals. This represents a 12% increase in production, according to the North American Sailing Industry Study conducted in 2006. According to the study, the largest increase in production in multihull sailboats is coming in the smaller catamaran market.

From the Engineering standpoint, our calculations show that the force required to pull the boat on sand on wheels is roughly 150lbf. Therefore, the power required to move the boat at a walking pace is .8HP. In the design, an electric motor is used with a chain drive system to allow adequate power transfer and speed reduction. A custom hub was fabricated to allow a beach wheel to be connected to the drive-train. Another design issue that needed to be considered was lifting. Proposed designs included: a winch which pulls the boat onto a frame, a hydraulic lift, and a mechanical lever. Ultimately, the mechanical lever was chosen because unlike the winch and hydraulic lift, the lever does not require an extra motor, expensive components, and more batteries. In the lever design, the drive wheel acts as a fulcrum for a lever that will lift the boat. Another advantage to the lever is that the drive system and lifting mechanism are integrated in one piece.

Overall our I PRO group accomplished many of our objectives over the course of the semester, among them were:

- Creating and testing a working prototype
- Developing a business model for the Cat Kart
- Creating a complimentary product for our Cat Kart called the Cat Slippers, when our group found another pain point in the catamaran hauling process
- Created a logo for our products
- Conducted a survey on 10% of sailors at Wilmette beach
- Conducted market research in order to develop overview of catamaran industry
- Estimated the budget and the projected revenues for our Cat Kart beach valet service
- Made designs in order to build a metal device in the future
- Built a working website in order to support our Cat Kart and Cat Slipper products
- Have created twitter and facebook accounts for promotion of our products in the future
- Created videos of test run of Cat Kart and Cat Slippers

## **5.0 Conclusions and Recommendations**

Since testing our Cat Kart and Cat Slippers at the beach, we recognized that there were some minor flaws in the designs. First, the Cat Slippers had shown signs of wear after the first day of use in the form of scratches on the piping. We decided that a possible adjustment that can be made to the Cat Slippers is to have a PVC pipe with a larger radius than the older PVC pipe had, so that it can roll, and not scratch the surface of the PVC pipe. More adjustments were also needed for the Cat Kart though. The Cat Kart's chain was too loose since it was stretched out after a couple of uses, and needed to be tightened. Another problem with the trial run was

that the Cat Kart's base was too long and could be shortened a foot or more. This was actually a beneficial finding, because it will lower the production costs in the future for this product.

Another aspect of our project that we completed, but may also need some slight adjustments is the website for our products. A lot of work was done on the website over the course of the semester, but if we decide to start our beach concierge service at the beach, it would be beneficial to have a place on the website where you can order a Cat Slipper kit, or reserve a time for the concierge service to bring your catamaran to the beach. Since we only have one Cat Kart at the moment, this would be crucial to our success since we would need to avoid long wait times at the beach. If we did have wait times over 15 minutes we would lose customers, as well as have lower customer satisfaction.

In order for this project to succeed, another year of development and market research would be necessary. This could be done at the Gillsen Park beach in Wilmette, since this is where our initial research was conducted. We only surveyed 10% of the catamaran sailors at the beach, and would want to receive information from a much larger percentile so that we would be able to project our survey results. Getting video testimonials of our product from actual users at the beach would also benefit the marketing of our products.

Another reason why we would need to spend a summer at the beach testing our product and conducting market research would be that we would be able to get advice on the actual design of our products. It also would benefit us to see how our products hold up after a long summer at the beach, since it they will go through a lot of wear and tear throughout the whole catamaran hauling process.

A third reason why spending a summer at Gilsen Park beach would be a good idea, is that we would spread word of our product. Marketing through word of mouth is obviously the cheapest, and often the most effective way to market a product since information usually comes from a trusted source.

6.0 Appendix

This appendix provides aims at providing a summary of the project using the pictures and other documentation.

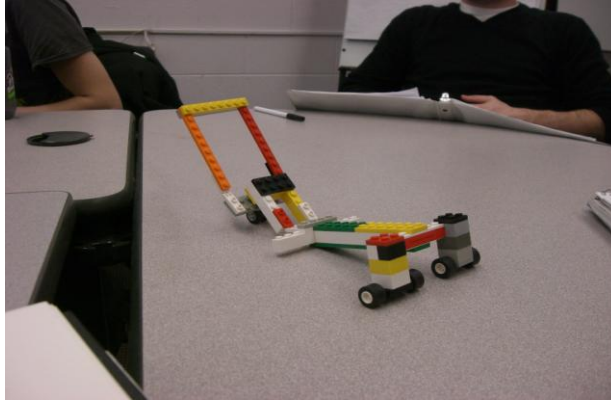
1. A glimpse of many Catamarans being parked on the sands of beaches. They need to be transported to the waters of the beaches if you want to sail! This picture also describes the problem we are trying to solve.



2. "Cat-Trax", commonly known as 'Beach Wheels' currently being used at the beaches to haul the Catamarans

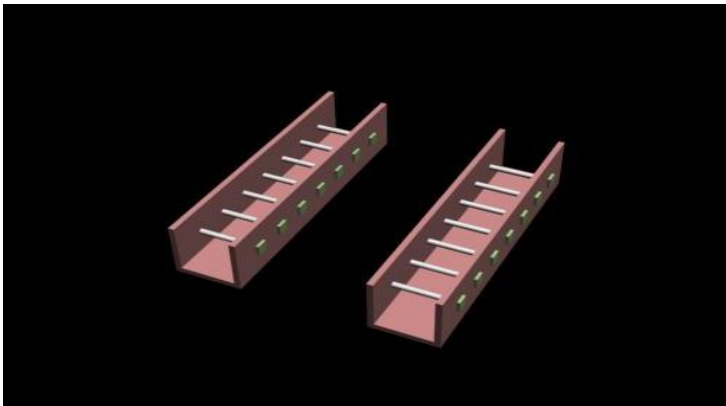


3. A Prototype of the Cat-Kart designed using LEGO. This device is the solution we have come up with to solve the problem of transporting the catamarans to the waters of the beaches, which is a “meticulous” task to many users. Also, model is happens to be first product that we on the IPRO352 have designed.



4. The image below shows the second product that was designed by our Engineering team. It is called the ‘Cat-Slippers’, which is simply an elevated platform for the Catamarans to rest

An AUTOCAD illustration of the Cat-Slippers





The final product, represented by one part of a pair of Cat-Slippers is shown below



5. Primary market research was conducted by our Business team in the form of an online survey. The survey results obtained were then interpreted as 'graphs' to better represent the results. This graph below depicts the user interest in the "Beach Valet" service, which happens to be the business model for 'CatKart'.



6. The end result: Two fully functional products at work on the beach. This was also a part of our in-field testing.



The Cat-Kart in action above (Item #1)



The Cat-Slippers have done their duty here! (Item #2)

## **Acknowledgements**

We would like to express our thanks to the following parties:

1. Jennifer Keplinger for helping us out with all of our questions and concerns
2. The IPRO Office at IIT for providing us support and access to resources vital to the project
3. All the participants who took part in the survey as this move itself was a substantial help for us in conducting the market research.
3. John Braband, for providing thoughtful inputs to the team during the project
4. Wilmette Park District for providing us access to the beach
5. Bob Anderson for giving us valuable feedback on our presentation work during the mock final presentation session.
5. Finally, our instructor, James Braband for helping us out on various tasks on the project and more importantly for providing guidance to the team throughout the semester

## **References**

1. Sample Final Report: "Developing Web Applications for the Northern Illinois Hockey League"; IPRO 398, Fall 2009. Illinois Institute of Technology, Chicago.
2. "IPRO Final Project Report Guidelines", Spring 2010. Illinois Institute of Technology, Chicago.