

Land-Sailing Yacht for Individual with Loss of Lower Extremity Motor Control

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Figure 14. Prototype of the Land-Sailing Yacht

INTRODUCTION

A land-sailing yacht was engineered and fabricated to provide recreational activity for people with loss of lower extremity motor control. Many existing models boast a three-wheeled triangular shaped vehicle that is operated by using hands for the boom and feet for the steering system. These models create a problem for people with such disabilities, because the chair for the vehicle is usually obstructed by the triangular structure and the operation of the vehicle requires the use of feet and legs. The use of three wheels also increases the friction and reduces the efficiency to which the vehicle utilizes the wind. These problems motivated the design of our land-sailing yacht, as it is designed to ride on at most two wheels and eliminates the need for feet to steer the vehicle.

SUMMARY OF IMPACT

Recreational activity can be challenging for individuals who have no lower extremity motor control. This product succeeds in allowing such persons to ride the land-sailing yacht by using only their hands. The boom, used to control the intake of the air, and in turn the speed of the vehicle, can be controlled with one hand via a rope and pulley system, while the other hand can be used to control the steering via a push-pull mechanism. The design allows for easy access to the riding position as it eliminates all barriers to reaching the seat via a wheel chair and contains a swivel and sliding mechanism for the seat to accommodate people of all sizes. The design also allows for reduced friction as it needs to only ride on at most two wheels. This makes the vehicle much more efficient with the wind the sail captures.

TECHNICAL DESCRIPTION

The overall system consists of essentially four components attached to the main central chassis, also known as the nugget. The nugget is made of steel square tubing and boasts an arrow shape to which the side arms, the front extension arm, the rear extension arm, and the mast are attached. This section is the heaviest but also the strongest, as it takes on the highest stresses within the vehicle and is also the location to which the individual sits. The front and rear extension arms are steel square tubing but of much less weight and smaller cross sectional area. These arms are adjustable depending on the size of the person riding the vehicle and are connected by two bolts. Attached to these extension arms are the front and rear fork and wheels. The front wheel is a bicycle tire obtained from a children's bicycle while the rear wheel is a BMX bicycle tire. The side arms are made of PVC and attach the side wheels to the main nugget. The pneumatic wheels are attached to the PVC side arms via an aluminum adaptor, an aluminum spindle and a steel hub. The mast is connected to the nugget by steel square tubing. The mast which consists of two steel tubes, one fitted inside of the other, is placed inside the steel square tubing until it rests on the nugget and then bolted. Connected to the mast is the boom which operates the sail of the vehicle.

Many of the components were machined from stock materials. Other components, such as the bicycle tires and breaks were bought standard and then usually modified in some way to fit our need for the vehicle. Milling, turning, drilling, cutting and welding are the methods used to modify materials and create the tolerances necessary for this prototype.

Future work on this product will include reducing the weight of the mast along with the rest of the vehicle. It will also include finding a way to strengthen the side arms while maintaining the light weight that PVC offers.

The cost of the parts and supplies for this project was about \$700.

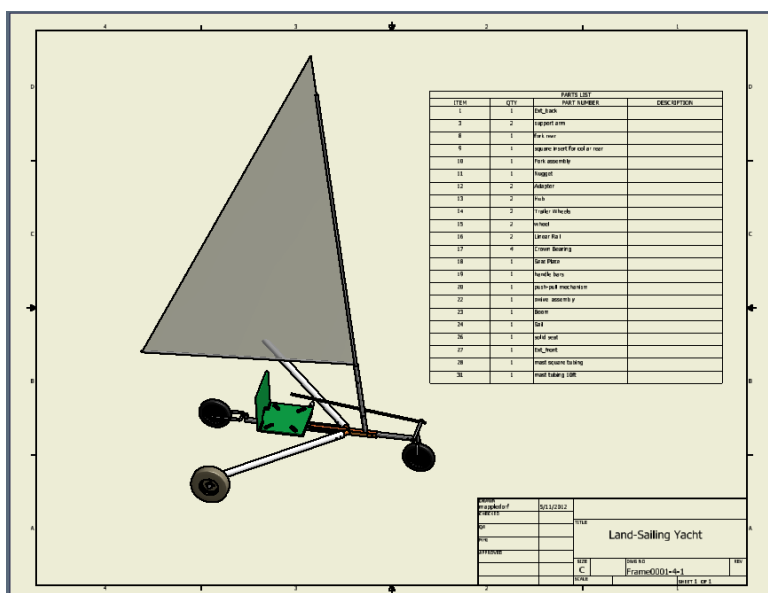


Figure 15. CAD Drawing of the Assembly of the Land-Sailing Yacht