Project Statement

Hand Control Riding Lawn Mower

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Statement of Need

People who have cerebral palsy and other neurological disabilities will often encounter difficulties when looking for jobs, due to physical limitations. This creates a strong desire for adaptive machines and practices to enable people with disabilities to operate on a par with people who do not have disabilities. Developing a ride-on lawn mower for Shane will enable him to help his family mow their two acre plot, and could expand into a job for him to mow other lawns in his neighborhood. This will provide him with a potentially lucrative business, as well as helping him become a greater asset for his family.

Shane is a 20 year old male that suffers from cerebral palsy and spastic quadriplegia. These medical conditions have left him with limited control and movement of his extremities. Shane has tried a ride-on lawn mower with no modifications in the past, but only had limited success. His condition limits how efficiently he is able to operate the mower, and also creates great discomfort when he is driving unmodified vehicles. Ultimately, Shane would like to be able to comfortably and efficiently operate a ride-on lawn mower, with as much independence as possible.

Introduction and Overview

The purpose of this project is to create a lawn mower that Shane can operate easily, comfortably and with little to no assistance from others. Shane has expressed that unmodified mowers have caused him a great deal of pain and discomfort when operating. The lawn mower will have to consist of a hand control that will enable Shane to operate the lawn mower safely. The mower will also need additional security measures such as structural supports to ensure Shane’s safety when he is operating the mower. He experiences limited strength and motion of his hands and arms which will require modifications to the lawn mowers blade, gear box, and power switch to bring these controls into a reachable distance. Another condition to be considered is how accessible the mower’s gas tank is to Shane and with what ease can the gas tank be refilled. An emergency shutoff switch to terminate the mower’s engine is another desired safety featured. The mower must also be designed so that Shane can move easily from his wheelchair to the seat of the mower. The mower’s driver seat has to be assessable and within a realistic distance from Shane’s wheelchair. We will need to develop a process in which Shane can transfer safely to and from his mower. Increased back support from the driver’s seat will also be needed to make operating the mower more comfortable.

Realistic Constraints

The biggest constraint of this project is to ensure that the lawn mower is designed so that all of the machine’s controls can be accessed and operated by Shane alone. Shane’s disability can be progressive, so he may lose strength in his extremities over time, which must be taken into account for the mower’s design. The lever for the blade, the steering wheel and the lever that adjusts the speed all need to be within reach. Shane prefers to use his left hand since he has more control with it so this would be taken into consideration for the final design layout of the controls. The gas tank and emergency shutoff switch will need to be located well within his reach. Another factor to be considered is Shane’s ability to move from his wheelchair to his
lawnmower. When Shane moves from his wheelchair to another chair he prefers to transfer to his left side, so the mower seat should be accessible from the right.

Shane would like the ultimate design to have space for his legs to be together when he operates the machine. This may require severe modification to an already existing mower, which will need to be taken into the ultimate design.

Economic constraint will also play a role in the design project for Shane. The family currently does not own a lawn mower for Shane so the design would either need to be to build a lawn mower for him or to purchase one for him that could modify. It needs to be ensured that if a lawn mower is purchased that it can be easily modified in accordance with Shane’s needs and it remains within the budget. A lawn mower that would be purchased would likely be used and if it was bought over the internet a secure auction site should be used (eBay, craigslist). If building Shane his own custom modified lawn mower is best; then the needed parts must be purchased in a timely fashion and within budget.

Other Information

Shane is also being built a go cart by design team 3.

Questions

What is the budget for the project?
What are Shane’s physical capabilities?
What are the physical features of the lawn?
How will the clippings be taken care of?
Will an already existing mower be modified, or will a new model be constructed from component parts?
Will an iPod dock and speakers be incorporated into the design?
Will the lawnmower be powered by a joystick or a steering wheel?
Where will the mower be stored?
How big will the mower be?