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Hands-free Control System and User Interface for Mobility Device

Researchers at the University of South Florida have developed a powered mobility device with integrated control systems and a user interface which allow the user to control the device hands-free. The torso-control system requires minimal movement of the upper body to cause the chair to move in the direction desired – front, back, or turning and has a mobile app interface.

In power wheelchairs with conventional hand-driven joysticks, it is difficult, if not impossible, for people with disabilities and limited hand/arm motion to control the wheelchair easily. Alternatives that are operated with head movement, tongue movement and other bio-signals exist in the marketplace. Also, chin-operated joysticks and switch arrays have been incorporated in control systems for power wheelchairs. However, they can be difficult or counterintuitive to operate and aesthetically unattractive.

To address the need of individuals who require greater freedom from mobility devices, our inventors have developed a hands-free, user-controlled power wheelchair with a mobile interface. A control system that can be retrofitted on most powered wheelchairs was also created to make powered wheelchairs hands-free. The body acts as the joystick and the leaning action of the user controls the movement of the chair in both axes: forward-reverse and left-right. The system consists of a series of plates with multiple sensors and corresponding electronics to allow the sensing of body movements to operate the device multi-directionally while also controlling speed. A switch is used to toggle between using the chair controlled mechanism and the original joystick. The sensors send a variable voltage signal to the control board for motion in the desired direction. The hands-free control system, interface, and powered wheelchair allow for applications in many areas including rehabilitation, mixed-ability dance, sports and more, all which lead to improved overall quality of life.

ADVANTAGES:

- **Provides a hands-free user interface to allow for a multitude of activities**
- **Engineered for greater stability**
- **Offers easy maneuverability**
- **Increases capacity for chair user to interact with upper body in sports, recreation, dance or daily life activity**

Functional, hands-free control of a mobility device with user interface for greater freedom and independence

The mobile control device being used with power wheelchairs allowing fluid dance movements.

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