



Computer-Controlled Power Wheelchair Navigation System

(VA Reference No. 01-021)

Novel system to provide the physically disabled with autonomous navigation over frequently used paths

Technology

Computer-controlled power wheelchair navigation system

Inventor

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Key Features

- Autonomous navigation suitable for a wide spectrum of users
- Can be used with a variety of wheelchair devices
- Dual operation, either autonomous navigation or manual steering

Stage of Development

Reduced to practice with successful demonstration and evaluation in prototype systems

Keywords

- Rehab/Assistive Device
- Wheelchair navigation
 - Autonomous operation
 - Computer-controlled

Patent Status

[US Pat. No. 7,383,107](#)

[US Pat. No. 6,842,692](#)

Contact

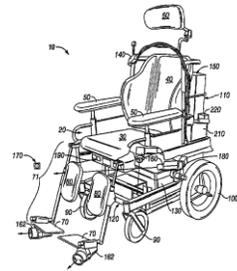
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Technology

The Department of Veterans Affairs has developed a computer-controlled power wheelchair navigation system to provide the physically disabled with a means of "on command" navigation over frequently used paths. The system is designed to operate with minimal rider input consisting only of supervisory commands (purely autonomous operation).

Description

The computer-controlled power wheelchair navigation system was designed for a segment of that population that is unable to manually guide the movements of powered wheelchairs. The technology provides autonomous navigation capabilities in repetitively used environments such as homes, offices, hospitals, and conceivably in public buildings. The system consists of encoding and video capture devices to provide accurate ongoing estimates of the wheelchair's position and orientation, ultrasonic sensors to detect obstacles, and a computer programmed to the drive-systems of commercially available powered wheelchairs. The computer's software has the function of path and destination learning, recognition of obstacles, and navigation to a selected destination and is intended to enable independent mobility for severely handicapped persons.



System navigation is accomplished by the use of an extended Kalman-filter-based estimator with interface software running on an onboard laptop computer. Dual cameras, proximity sensors, microphones, and rotation sensors for the wheels are mounted to the wheelchair. By the use of these electronic components, the specialized software and small visual markers placed on the walls of the rider's home or office, the computer-controlled wheelchair is able to travel autonomously to locations that it has been taught to follow.

Competitive Advantage

Current navigational systems for semi-autonomous vehicles have difficulty handling multiple and intersecting paths, if they can handle them at all.

This Invention:

- Is adaptable to a number of platforms and can be used with any number of wheelchair devices.
- Can be readily engaged for autonomous navigation or disengaged for manual steering.
- Is adaptable to multiple user communication devices or switches to accommodate different users abilities.

Status

The Department of Veterans Affairs is looking for a partner for further development and commercialization of this technology through a license, and the VA inventors are available to collaborate with interested companies through a Cooperative Research and Development Agreement (CRADA).