MTE 481 - Design Project

Object Avoidance and Navigation for Powered Wheelchairs

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Introduction

Need Statement

Powered wheelchairs can improve the mobility of the physically handicapped, but alertness and control are required for safe operation. Additional assistive technology is needed in order to afford the same benefits to the more severely disabled.

Objectives & Constraints

- Improve the safety of powered wheelchairs, for the occupants and pedestrians both.
- Assist wheelchair users with difficult tasks, such as precise positioning and movement in constrained spaces.
- Make powered wheelchairs accessible to people who would otherwise be denied due to safety concerns.
- It must be possible to integrate with existing wheelchairs.

Criteria

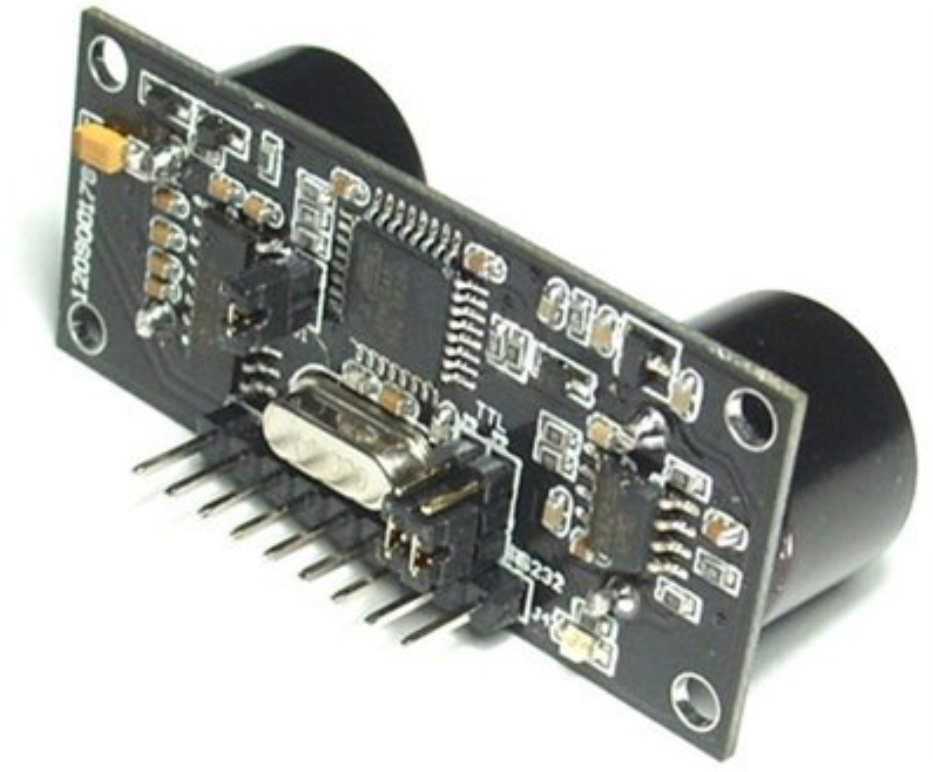
- Risk of human harm.
- Robustness against human error.
- Robustness against physical damage.
- Must be operable in diverse environmentsbe minimized.
- Should be physically robust.
- Price.
- Electrical power consumption.

Design Concept

- Use sensor(s) as inputs to a computer-controlled system.
- Take user input into this system.
- Combine the user input and sensor readings to determine output to motor controllers.
- Produce collision-free movement of chair (whether by warnings, automated avoidance, etc.)

Stereo Vision

Ultrasonic



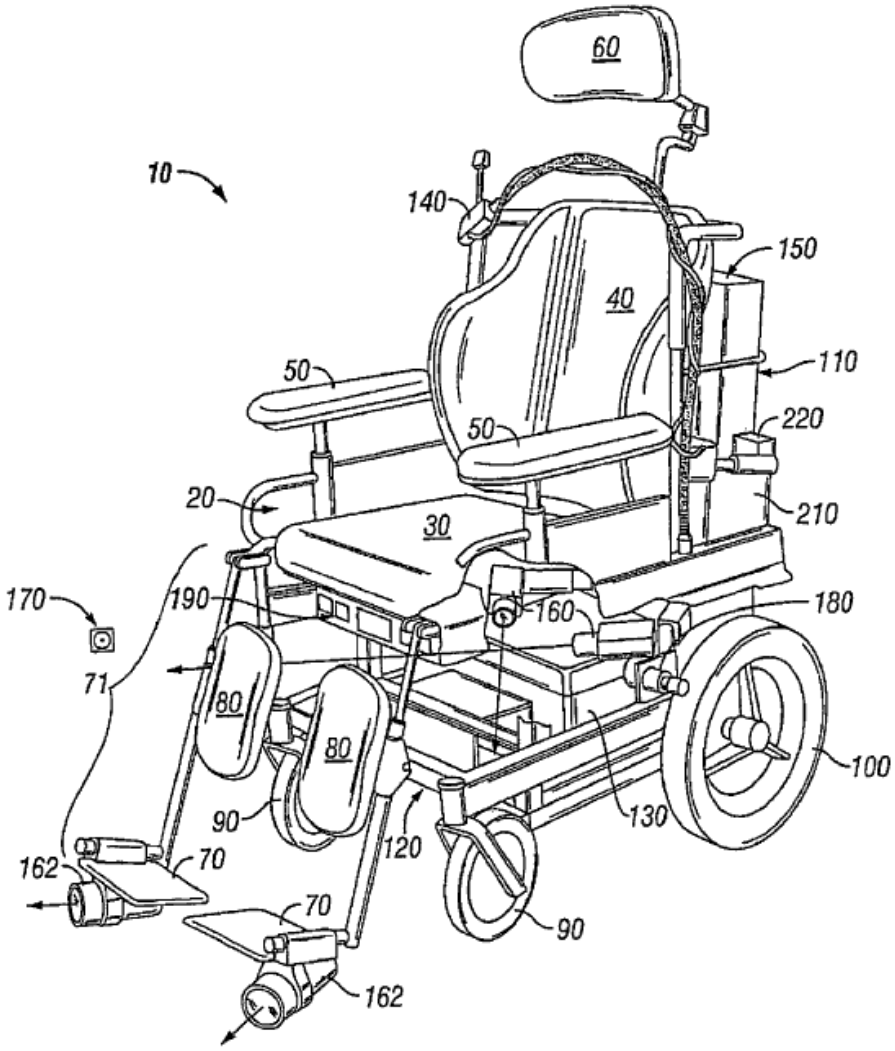
Infra-Red

RADAR

LIDAR

Patent Search

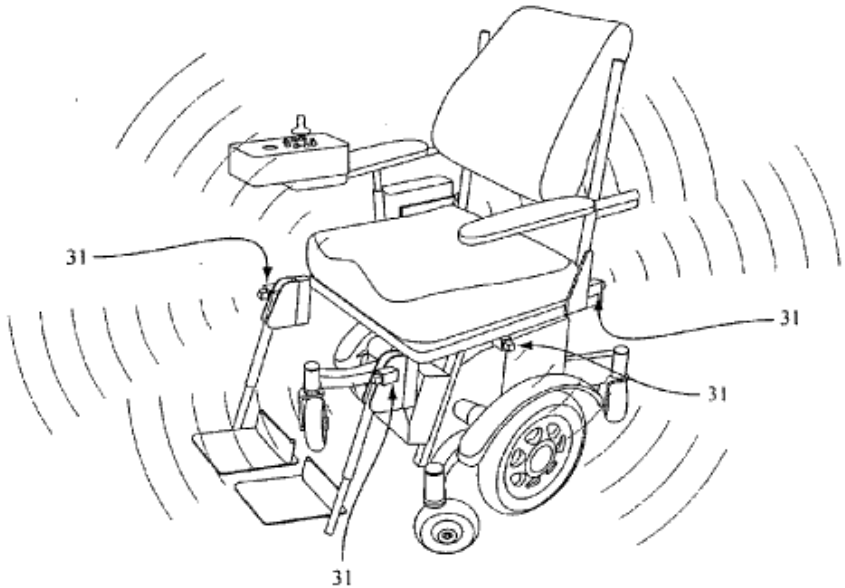
"Computer controlled power wheelchair navigation system"



- Patent No. US 7,383,107 B2 (June 3, 2008)

Patent Search

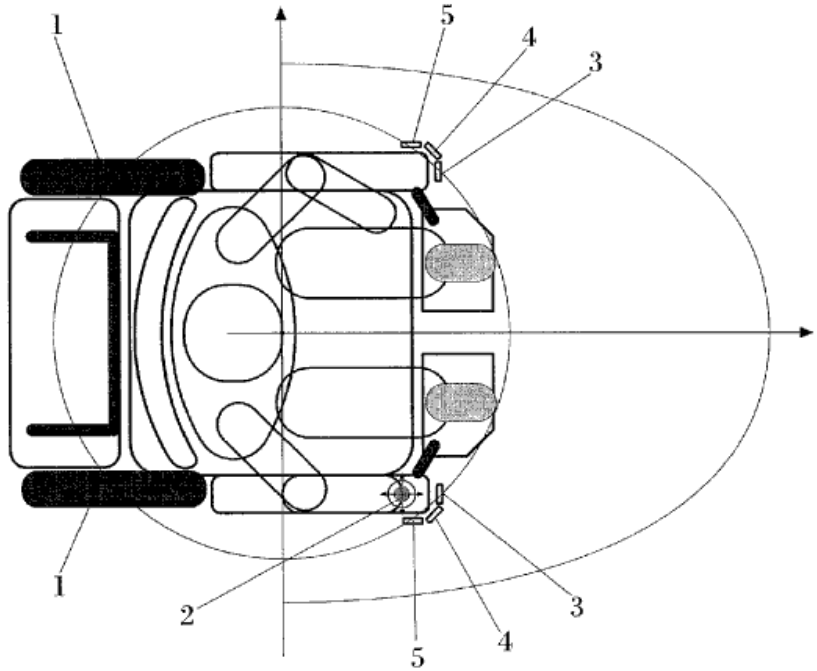
"Powered Wheelchair"



- Patent No. US 2010/0082182 A1 (April 1, 2010)

Patent Search

"Wheelchair and method for correcting the guidance of a wheelchair"



- Patent No. US 2011/0130940 A1 (June 2, 2011)