

High-Tech Solution for People with Disabilities: Voice-Controlled Electric Wheelchair



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PROBLEM STATEMENT

The year is 2022 and access to mobility is a problem we all face. There are those with disabilities who have less access than others. Humans can develop mobility limitations when born or through an injury that leaves them unable to have a full range of motion. Mobility limitations are the leading cause of functional limitations among adults with an estimated prevalence of 40 per 1,000 persons aged 18 to 44 and 188 per 1,000 aged 85 years and older in the general population. People with disabilities are limited in their range of motion, and worst of all, the products they rely on are limited as well. The next generation of mobility for those with disabilities starts with the wheelchair. A device that has, for decades, not been improved upon much, the wheelchair is due for an upgrade so that those with limited or no ability to move can be in motion once again.

BACKGROUND

A wheelchair is a chair with wheels that is used when walking is difficult or impossible due to illness, injury, or disability. Wheelchairs come in a variety of formats to meet the specific needs of the user. These can include specialized seating adaptations, individual controls, and can be specific to specific activities, as seen with sport wheelchairs and beach wheelchairs. The most widely recognized distinction is between powered wheelchairs ('electric vehicles'), in which propulsion is provided by batteries and an electric motor, and manual wheelchairs, in which propulsion is provided by the user, the wheelchair user pushing the wheelchair manually ('self-propelled') or pushed from the back by an attendant ('steward push').

SUMMARY OF WORK

Voice-Controlled Wheelchair

- Electric-Powered and Rechargeable
- Can be controlled using voice commands
- Object detection and collision avoidance
- Used as alternative to manual/power wheelchair

Figure 1: (above and left) CSUS STUDENTS, TEAM 13.

Figure 2: (Right) Voice-Controlled Wheel Chair developed by CSUS students, Team 13.



IMPACT ON COMMUNITY

The intended, long-term impact of this work includes:

- Light-weight and cost-effective alternative to manual and powered wheelchairs.
- Access to mobility for those suffering from paraplegia or quadriplegia.
- Contributions possible in the area of medical device research and design as it pertains to User Interfaces for patients with disabilities.
- Control system is not limited to wheelchair design and can be adapted to allow voice control of numerous vehicles or wheeled devices.