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Nottingham Robotic Mobility Assistant (NoRMA): An Affordable DIY Robotic Wheelchair Platform

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The Problem

- 1% of the world's population needed a wheelchair in 2008. [1]

- Not all users are able to use a regular manual wheelchair.

- Powered wheelchairs can help some of these users, but they still present difficulties such as navigating through crowds and maneuvering backwards and through confined spaces. [2]

Research mainly focuses on Alternative inputs Control methodology Processing capability

Little or no public information on how to reproduce published wheelchairs

Commercially available smart wheelchairs are very expensive

Most published control systems are not/only briefly described

Inaccessible Accessibility

Our Solution

NoRMA is an affordable ROS compatible research platform that can be easily retrofitted to an off-the-shelf wheelchair.

We have written a first-of-its-kind DIY guide to build your own smart mobility devices.

NoRMA is easy to build using common, cheap components.

Reduced barrier for entry with no advanced knowledge or complex techniques required.

Discussion and implications

- The assumption was there would be maintenance documentation for an off-the shelf wheelchair. This assumption did not hold.

- Documentation available to end users was limited and components had to be reverse engineered.

- This unfortunately supports the gap between academic research and end-users, especially regarding assistive technologies, which are generally too expensive to gain widespread use.

The DIY guide allows researchers and end-users to build customised systems in an easy and affordable way.

It creates a standard for exploring custom control systems, interface methods, and AI algorithms for mobility support.

The affordability of the platform means you can have multiple research systems for the price of a single commercial one.

The standard system means that researchers can easily and cheaply verify, challenge, and build-upon work that uses the same system.

[1] World Health Organization, "Guidelines on the provision pf manual wheelchairs in less-resources settings," World Health Organization, Geneva, 2008.
[2] C. Torkia, D. Reid, N. Korner-Bitensky, D. Kairy, P. W. Rushton, L. Demers and P. S. Archambault, "Power wheelchair driving challenges in the community: a users' perspective," Disability and Rehabilitation: Assistive Technology, vol. 10, no. 3, pp. 211-215, 2014.

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COBOT MAKER SPACE

Cyber-physical Health and Assistive Robotics Technologies

mixed reality lab

github.com/HCRLabRepo/NoRMA