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Intelligent Assistive Technology and Systems Lab (IATSL) Design “Smart Wheelchair”

Age-related cognitive, physical, and visual impairments can mean that traditional devices used to support people with disabilities are used with difficulty by an older population. This is especially true with powered wheelchairs in long term care settings, as any driver impairments could jeopardise the safety of the driver themselves, fellow residents, and staff. A team of researchers consisting of computer scientists, robotics and biomedical engineers, and occupational therapists from the University of Toronto, University of British Columbia, University of Dundee, and Toronto Rehabilitation Institute are working with the Intelligent Assistive Technology and Systems Lab (IATSL) to develop a solution. OLTCA member homes are now engaging with IATSL in order to help with research and development projects that may assist long term care residents in their day to day lives.

Geared towards use in populations with dementia, such as those commonly found in long term care homes, a compact computer and a depth-perceiving sensor are attached to a slow moving wheelchair. When an object is detected in the path of the wheelchair, such as a person, the system will automatically stop the wheelchair to avoid collision. The system will then provide the driver with audio feedback (e.g. “Try moving right”) to prompt the driver of the wheelchair to move safely around the obstacle in the direction of the most free space. Pilot testing with this system has shown that the wheelchair can detect and avoid hitting objects as thin as a cane. In addition to anti-collision abilities, mapping and tracking capabilities are under development to enable the wheelchair to automatically detect its location within the long term care home. This mapping system, combined with the wheelchair driver’s schedule, could be used to provide reminders and prompts to the wheelchair driver about appropriate time-sensitive goals (e.g. driving to the dining area just before lunchtime). This will have the effect of stimulating the driver, encouraging him/her to become more interactive and explorative within his/her environment. The system could also be integrated with existing nursing station technologies to provide caregiving staff with the position of wheelchair driving residents and notify the staff if a potentially hazardous situation were detected.

It is hoped that through the development of technologies such as the anti-collision powered wheelchair, people with cognitive or other disabilities will be able to regain safe access to mobility and thus independence and quality of life, while simultaneously reducing caregiving need and caregiver burden.

For more information about this and other intelligent assistive technology projects that IATSL is working on, please visit www.iatsl.org