

## GO BaBy Go – MROC

### Abstract

Studies have shown that power-assisted mobility has had positive effects on the development of mobility and socialization skills in children with motor disabilities. Independent mobility in a young developing child is often underestimated. Being able to move independently supports the development of their motor skills and their language, cognitive, psychosocial, and play skills. Children with disabilities can experience delays in these areas when they are not able to move independently. However, commercially available motorized wheelchairs are not regularly approved by insurance for children under three years of age. The out-of-pocket cost for a motorized wheelchair would be outside the budget of many families already paying for specialized health care costs. The Cerebral Palsy Foundation has created collaborative networks to bring together medical institutions and innovative thinkers in diverse areas such as engineering to address this issue. This work is a joint project between University A with ABET Engineering Programs and University B with Physical Therapy and Occupational Therapy Departments. The Cerebral Palsy Foundation recommends the Go Baby Go (GBG) program, a community-based program that focuses on affording children with limited mobility a means to engage in everyday activities like their peers without physical limitations.

The Go Baby Go project provides children with physical disabilities with an economical solution to issues relating to limited mobility by modifying small ride-on electric cars. The Modified Ride-On Car (MROC) is a ride-on electric car customized to make it safe and usable for a young child with disabilities. The MROC provides activities that support the development of motor and play skills. The primary goals of the work are to ensure the safety and welfare of the children. The following modifications were implemented:

- Reduce the acceleration rates for forward and reverse
- Reduce the maximum speed of the car for forward and reverse
- Add postural support
- Add an emergency cutoff switch
- Add fuses to prevent overheating of motors, if the motors are stalled
- Add or remove the accelerator pedal using a joystick or push button
- Add a data logger to measure and record the direction the MROC is driven (i.e., forward, backward, stop) and the exact time and duration of each event
- Place the programming code under a free software license
- Create a blog for communicating between students, faculty, and professionals
- Implement modifications for \$250 to \$300 for parts, including the car

The work provided students a significant design experience in demonstrating knowledge and skills acquired, technical and non-technical, during their academic careers. No plans or specifications were furnished with the cars. Students had to reverse engineer the mechanical and electrical systems to design and implement modifications that meet the children's needs. Students implemented an upgrade to a commercially available ride-on vehicle for children with limited motor skills. Mentors comprised of Electrical, Mechanical, and Computer Engineers supported the students throughout the project's development. Industry collaboration included the local chapter of TSPE and the local section of IEEE, with 16 professionals participating that consisted of 8 PEs, 2 EIs, an attorney, and 5 health and physical therapy-related specialists. Another 8 individuals from industry and university staff mentored student teams or served as consultants and evaluators for the project, along with the 16 professionals.