



CALIFORNIA STATE SCIENCE FAIR 2015 PROJECT SUMMARY

Name(s) Alex C. Tacescu	Project Number S0315
Project Title Project Maverick: An Omni-Directional Robotic Mobility System	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Nearly 40 percent of people age 65 and older had at least one disability. Of those 15.7 million people, two-thirds have difficulty walking. People who cannot walk unassisted, including those with Parkinson's disease or muscular dystrophy, may use a walker as an assist and eventually a wheelchair. Both of these have their deficiencies. A walker requires its user to balance and push along. Wheelchairs provide physical respite but often, muscular atrophy sets in. A wheelchair is also difficult to operate in tight spaces while a rigid walker does not offer a suitable solution either because its user must carry it around. This is where Project Maverick comes in: an omni-directional robotic system that provides mobility for users in a standing or sitting configuration by moving in any direction with an intuitive control system.</p> <p>Methods/Materials Linux based microcontroller: BeagleBone Black, Electronic Speed Controller, Absolute positioning sensors, Analog distance sensors, Slip rings, Slew Bearings, Steering and Driving Gearmotor, Gears, belts, pulleys, bearings, Aluminum and 3D prototyped manufactured parts, Power Supply, Oscilloscope and Multimeter</p> <p>Results My robotic system is designed to have extreme maneuverability combined with ease-of-use. It accomplishes this by using a new and innovative drive system containing 4 wheels and 8 motors. Each wheel has two independently-controlled motors for steering and driving, providing maximum flexibility. This system is simple and modular, built out of 4 identical wheel assemblies, and is economically feasible to be mass produced. It utilizes a flexible Linux-based controller programmed in Java that allows the implementation of advanced features, such as collision detection and autopilot through tight doorways. The main user input device is a 6-axis 3D controller, providing a simple and intuitive driving system.</p> <p>Conclusions/Discussion I believe that my project has a lot of potential on the market, being intended to help people with disabilities regain their mobility. The feedback received from people in the field was positive. I plan on building the first complete prototype and testing it, first on myself, and then on a volunteer. I realize that this might take a few iterations until my project will turn into a product, but I am looking forward to improve the lifestyle of many people around the world.</p>	
Summary Statement My project is a robotic system that provides mobility for people with disabilities, using an innovative drive system with 8 motors that allows the user to move in any direction and a 6-axis 3D controller as an input device.	
Help Received Exelsior and Sunrise Medical machined the parts I designed. I provided 3D models and engineering drawings.	