



**CALIFORNIA STATE SCIENCE FAIR  
2015 PROJECT SUMMARY**

<b>Name(s)</b> Alex C. Tacescu	<b>Project Number</b>  35567
<b>Project Title</b> Project Maverick: An Omni-Directional Robotic Mobility System	
<b>Abstract</b> <b>Objectives/Goals</b> 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. <b>Methods/Materials</b> 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 <b>Results</b> 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. <b>Conclusions/Discussion</b> 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.	
<b>Summary Statement</b> 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.	
<b>Help Received</b> Exelsior and Sunrise Medical machined the parts I designed. I provided 3D models and engineering drawings.	