Reinventing the Wheel: Development of a Novel Magnetic Motion Device for Omnidirectional Movement

Shaughnessy, Alice (School: Calasanctius College)

The project aim was to reinvent the wheel. The intention was to develop a system to allow increased move-ability of mobility devices in confined spaces. It was desired that the system took a novel approach and be propelled by permanent magnets. The purpose of this project was to develop a device that manipulates the directional element of magnetic forces from permanent magnets, to generate kinetic energy in a spherical wheel. The kinetic energy was created by two attracting magnets that were controlled by the insertion of a third opposing magnet between them. This invention was developed through prototyping, electronic design development and experimentation with magnets. The mechanical design is as follows: A sphere is embedded with magnets at certain intervals. Surrounding this are several magnet-motor units, consisting of a servo motor with a fixed neodymium magnet adhered to its side. On the pin of this servo motor is an additional, opposing neodymium magnet intended to intercept the fixed and embedded magnets. When one fixed magnet becomes exposed to the sphere, it attracts to the embedded magnets, rotating the sphere towards that fixed magnet. The servo motor, controlled by Arduino boards, returns the intercepting magnet to its stationary position, covering the fixed magnet. This continues for each sequential magnet-motor unit, for a given direction. The entire scope of potential applications is unknown but some notable suggestions include automotive vehicles, forklifts, electric wheelchairs and robotics.