

Our team at Goddard Robotics has come together to develop a self-driving distribution solution that will save users from the tiresome task of pushing around heavy loads. We have purposely designed our autonomous solution to be highly functional and easy to use while maintaining a robust and weatherproof exterior at a feasible cost.

ROVER, our autonomous distribution vehicle (ADV) will have a level 2 autonomy for self-guidance and obstacle aversion, which will be achieved with the use of Global Positioning Systems (GPS), Bluetooth, and Inertial Measurement Unit (IMU) sensors. The GPS will be used to position both the user and the robot on a physical plane, with the IMU orienting the robot via a magnetometer and magnetic north. The bluetooth modules will serve to feed the GPS data from the user to the robot for calculation.

From this, distance and tracking algorithms will be used to calculate the optimal path between the user and the robot, to minimize travel time and power consumption. The system will also use obstacle avoidance sensing to detect any obstacles in the system's path, and find the next suitable shortest path to the users.

We will run the GPS, the Bluetooth, and IMU data through a data reduction system to improve initial data results, then cross-reference all data and run a data reduction on the aggregate data in order to provide accurate geolocation and navigation. Our software will provide the robot with on-axis rotation and a direct drive wheel control allowing the user to have an easy-to-use tracking band for the robot to follow.

ROVER ADV is powered via a 12-volt lead acid battery - this was chosen over Lithium-Polymer and Lithium-ion batteries due to their high reliability, accessibility and feasibility. The 12-volt battery also allows for any ADV to be easily charged inside our designed charging station.

The drivetrain of the car has been designed with a four-wheeled direct drive wheel system that will be able to switch - manually - from tracks to wheels. These tracks will provide improved traction in rural terrains while the rugged wheels will provide a solution for the ADV to traverse typical rural and urban landscapes. The body will be made out of medium density foam (MDF) with sheet metal for the exterior body. It will have all proper waterproofing materials for waterproofing and robustness.