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## Development of an Autonomous Wheelchair System

Antione Clanton

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## **Development of an Autonomous Wheelchair System**

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This paper introduces the development of an electric wheelchair that provides an autonomous driving, obstacle avoiding, wall following, and line following. The objective of this project is for the wheelchair to be able to travel autonomously through an area safely and detect objects within 50 inches of collision. Based on a manual electric wheelchair, 3D printed structures are created as a kit, and the electric system consists of a Raspberry Pi 4B microprocessor, 2 ultrasonic sensors, and a Raspberry Pi cam. A Raspberry pi cam is connected to a Raspberry pi 4 to detect follow lines and obstacles in its path. A touchscreen is implemented for a Graphic User Interface while an Arduino is used for motion controls based on ultrasonic sensor data. The ultrasonic sensors detect objects as well as measure a distance from the wall to keep the wheelchair within 10 inches of that distance. The developed wheelchair successfully navigated autonomously for 50 feet at an average moving rate of 3 mph without running into objects or people. The weight balance of the wheelchair needs to be studied as a future improvement. The wheelchair has much greater weight on the back due to the added sensors and battery. As a testbed, the wheelchair supports more advanced implementations. Future implementation includes using the Robot Operating System (ROS) environment, implementing mapping with autonomous path planning, and driving.