Team 10 - Vision

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Introduction

The goal of team Vision is to bridge the autonomous gap between industry and the public by creating a central autonomous nervous system fashioned onto a chassis. Public access to autonomous devices enables the modern user to accomplish more. The goal of this project is to create a vehicle that uses distance and camera sensors to follow a designated object.

Things weigh a lot, and they can be difficult to move for some people. Anyone with a disability that hinders their ability to push a cart/ stroller/wheelchair and anyone inside a wheelchair. Or anyone with a physical job that would benefit from the assistance of a dolly/wagon. This includes the elderly, parents of kids who are handicapped, farmers, factory workers, etc.

The Build

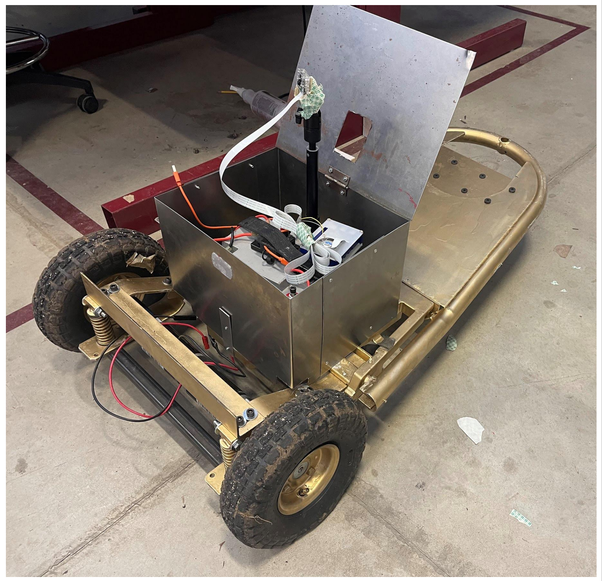

Figure 1: *Photo of robot*

Methods

Parameters

- Can carry 200 lbs. of a person or load
- Motors can go 4 mph
- Ultrasonic keeps robot at lest 2 feet away from all objects
- Can follow a person

Block Diagram

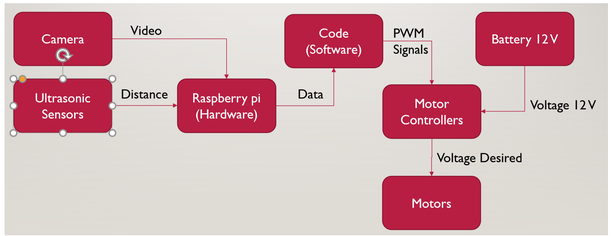

Figure 2: *Block diagram of robot. Displays overview of design*

Mechanical

The goal of the mechanical side was to create an elegant and easily maneuverable robot that carry a significant amount of weight. The main chassis was fashioned from an old mobility scooter that was found in the engineering building. The build was modified to support a tricycle wheel configuration (two drive wheel and one wheel that can pivot)

What was accomplished on the mechanical side include replacing motors, replacing wheels with assorted fixtures, designing, prototyping and building wheel couplers, camera Mount, creating a box for electric components, using electrolysis to clean the chassis, sand blasting, and painting the robot gold

OpenCV

OpenCV - a library of programming functions mainly aimed at real-time computer vision - is run on our main processor - a Raspberry Pi. Originally, the team intended for the camera to track a tennis ball but it was soon found that the camera latches onto an orange safety vest more intensely. Through developing the code and color specifications the team managed to get the camera to track the object in several different environments, including outdoors and in buildings. The system works by outputting an X coordinate which sends an efferent signal to the motor controllers to decern which way the robot goes.

Ultrasonic Sensors

In order to determine the distance between the robot and various objects, the team decided to use ultrasonic sensors. The sensors have the following specs:

- Accurate to +/- 3 cm
- Works up to 4 m
- Outputs at a 30° cone

Motor Controllers

- Frequency Driven
- Inputs frequencies from 400 Hz to 1000 Hz
- Outputs voltage from -12 V to 12 V
- Inaccurate below |3| V

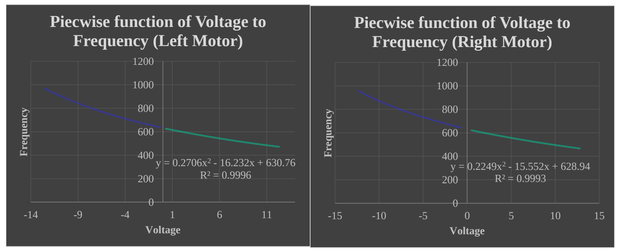

Figure 3: *graphical depiction of voltage to Frequency (VTF( )) Equations*

Team Photo : David, Sam, Fenton, Lane, Einstein

Future Improvement

Mechanical

- Use four wheels, all driven
- Design a specific chassis instead of repurposing
- Pillow block on wheels for protecting the motor system

Electrical

- Use Encoder and PID to know exact locations of motors as well as to track accurate movement of the wheels
- Implement FOB/remote to help camera decern between distracting colors and desired object
- Stereo Cameras to more accurately pick up on things occurring in the environment

Acknowledgements

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