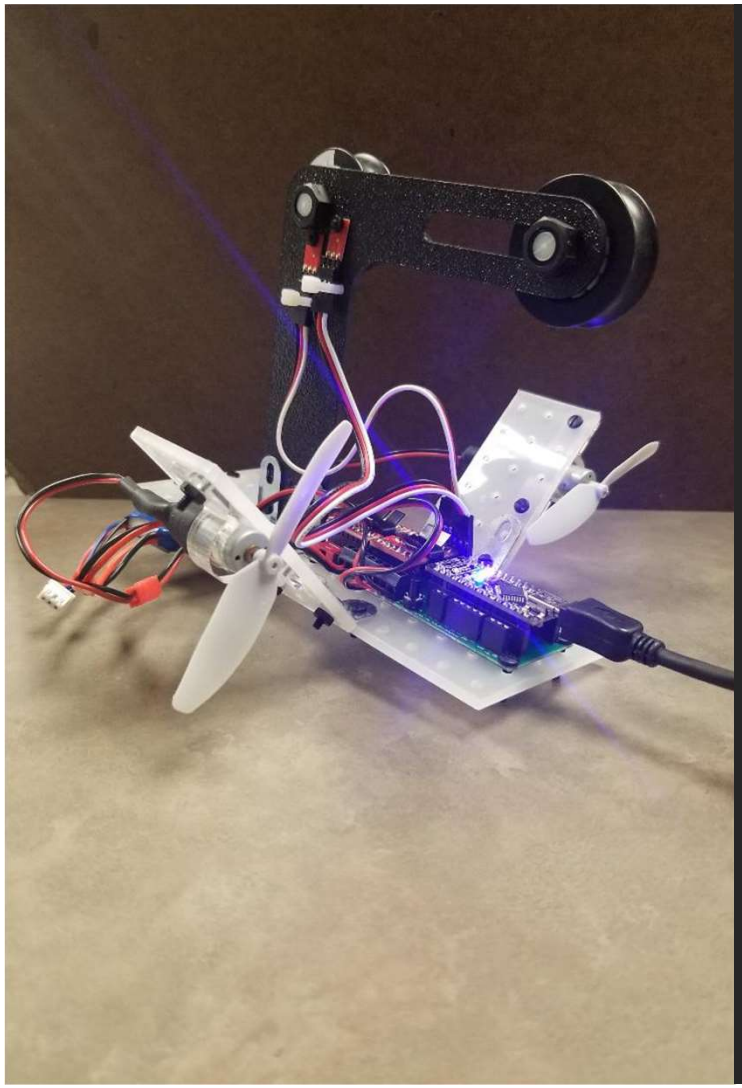

Team N

Sensor Accuracy and Voltage-Distance Tests

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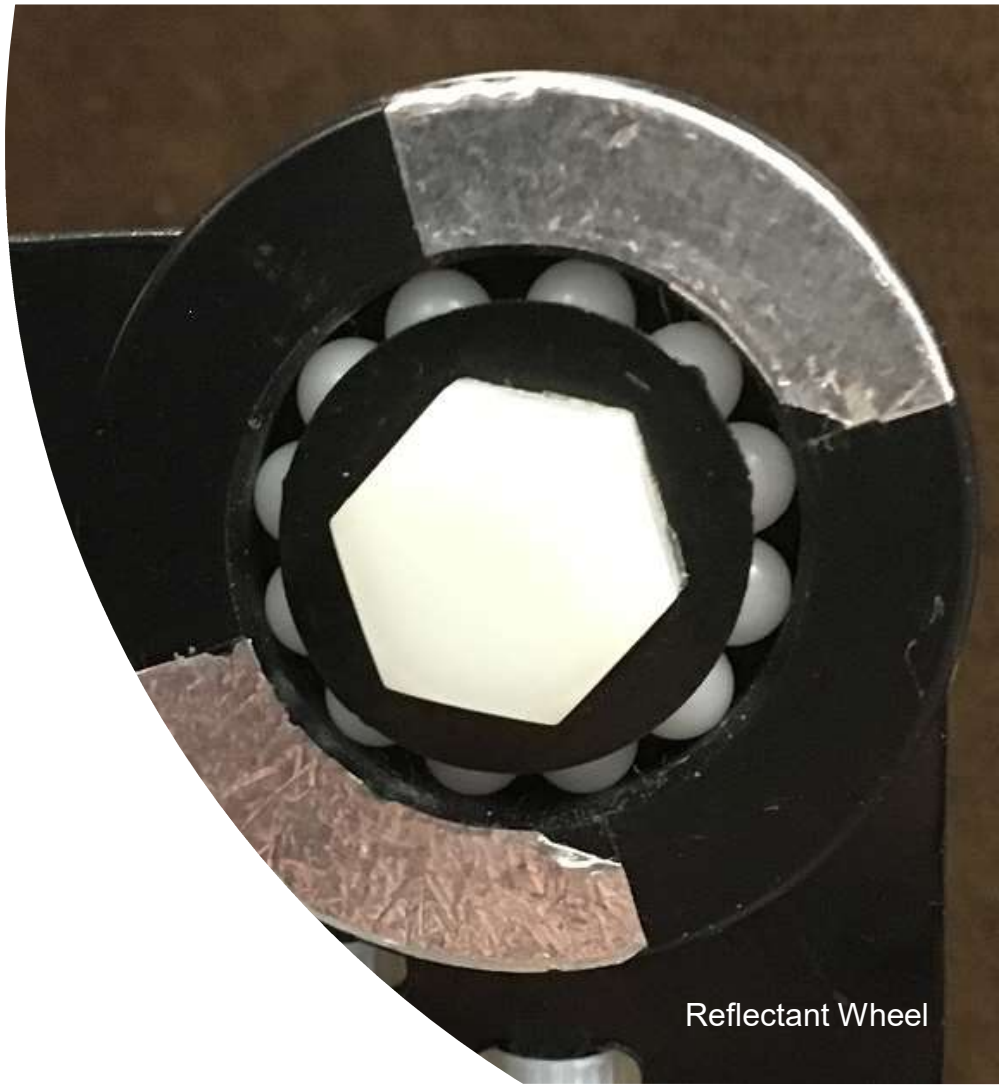
Sensor Accuracy Test Overview

This test focuses on determining the accuracy of the Reflectance Sensors

The Reflectance Sensors were tested under various conditions to determine what conditions created the most accurate and precise results

The purpose of the test is to determine the accuracy of the sensors, and thusly, whether the use of position codes (i.e. goToRelativePostion(n);, goToAbsolutePosition(n);) for the AEV is reliable.



Reflectant Wheel

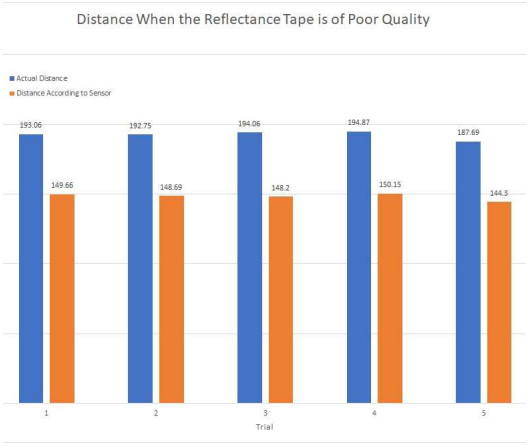
Sensor Accuracy Test Methodology

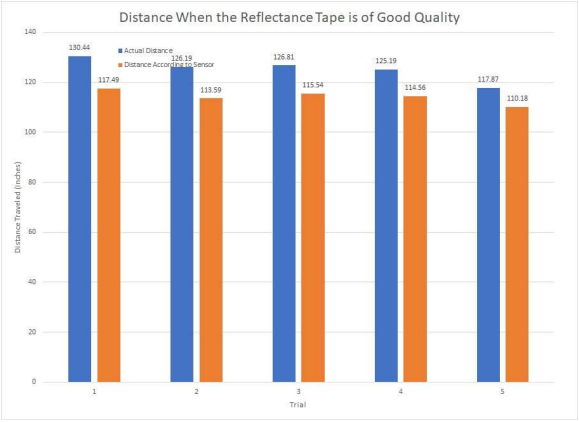
Two separate condition types were tested in order to understand the conditions that allow the sensors to be the most accurate and precise that they can be

The first test involved the code used and the quality of tape held constant, while the looseness of the reflectant wheel (the wheel with the reflectance tape) is the independent variable.

The second test type involved holding the wheel looseness and the code constant, while the quality of tape is the independent variable.

Error in methodology includes bumping the reflectance wheel after taking it off the track and before it finished finalizing data, which skews said data





Sensor Accuracy Test Results

Over all tests and trials, sensor reading was always lower than the actual distance traveled, with the difference between actual distance and sensor distance varying between conditions

Found that the conditions that allow the sensors to be most precise and accurate are when the reflectance wheel is tight against the sensor, and the reflectance tape used is of high quality (seen little to no wear and tear)

In the ideal conditions, the sensor consistently read 18-20 marks too short, thus positions codes can be used confidently as long as this shortness is accounted for and compensated

Voltage-Distance Test Overview

This test was designed to be able to see how the voltage changes the distance that the AEV coasted.

Determine the voltage during the performance test

Estimate the duration that the voltage should be at

Less troubleshooting

Voltage-Distance Test Methodology

Started the motor power at 20% for 3 seconds

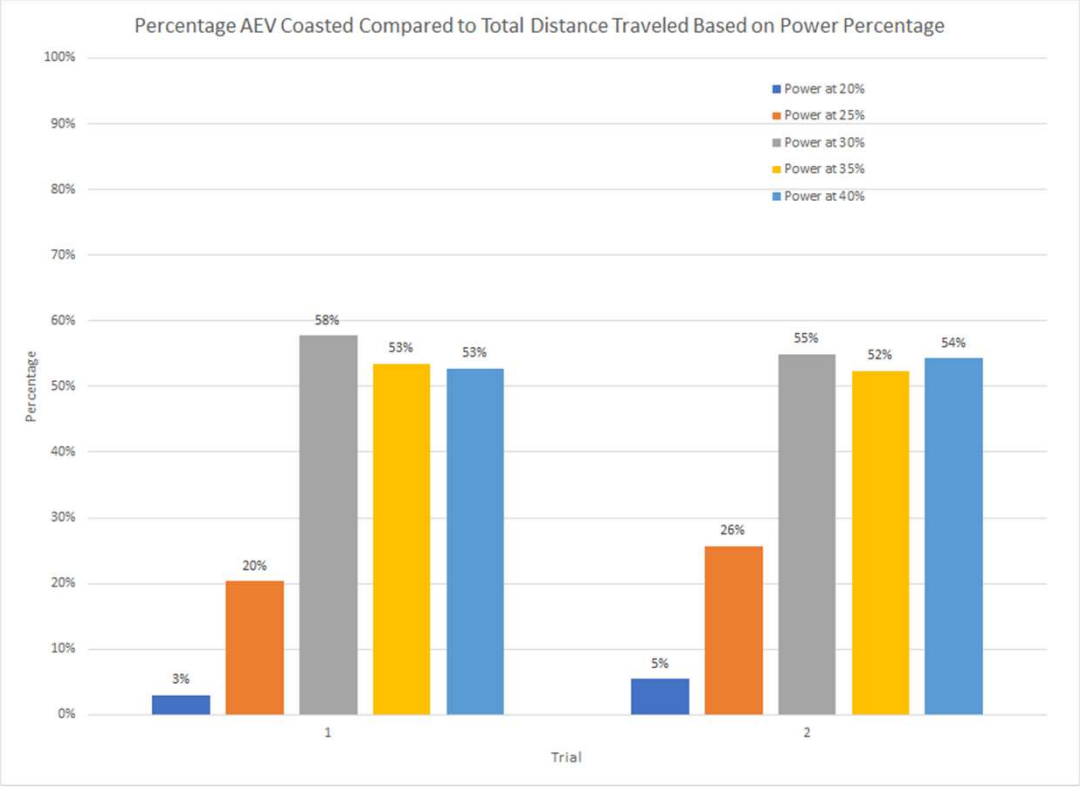
Increased the voltage in increments of 5%

Two trials per each voltage increment

Obtained the distance coasted

Distance is not accurate based on the Sensor Test

Voltage-Distance Test Results



Performance Test Plan Overview

2 Variable Plan - The track is notably different between Rooms 224 and 308. The same version of the code can be used, but before the code is executed, the variable named “Room” is set to either 224 or 308 to dictate which code to follow.

Flip and Burn - In order to have the power to climb the hill and to stop before the gate, the propellers flip directions and slow the AEV down so that it comes to a complete stop before the gate.

Time Data Collection - Using the data gathered by the Arduino board, the amount of time coasted plus 8 seconds (to allow for the gate to completely open) is allocated as “wait” time before the cart passes through the gate

Future Plans

SmartCode - a code that will be able to determine where on the track the AEV is and be able to compensate track variance to always reach the desired destination

Performance Test 2 - developing and testing code that will complete the AEV's course along the entire track

Final Performance Test - ensuring that the AEV can successfully carry passengers safely from Linden to Polaris

Future Strategy

SmartCode - Several kinematics equations and if/else statements will be added to the code in order to calculate how fast the AEV is traveling and when it needs to slow down and completely stop.

Performance Test 2 - A trial and error system based off of attempts taken during Performance Test 1 will be used to complete Performance Test 2

Final Performance Test - The SmartCode will be implemented into the code and the AEV will be able to determine itself what it needs to do to complete the course

References

- User Manual-Reflectance Sensors. The Ohio State University
- Lab Manual Advanced Research Design. The Ohio State University
- Mission Concept Review and Deliverables. The Ohio State University