Project Background

Satellite dishes are a large assembly of multiple panels. The panels must be installed and adjusted to achieve an ideal shape to allow the dish to work correctly. High precision measurement methods are required to determine panel height. One of the methods is the use of a Spherically Mounted Retroreflector (SMR). This method employs a laser tracker and sensor to establish a precise location of the SMR. General Dynamics has entrusted us with developing a vehicle to transport two SMRs to target locations on the dish surface reliably and accurately.

Objectives

Our vehicle must meet many requirements including:

- Maintain traction on 45 degree surface.
- Deliver SMRs to target locations within an inch variance.
- Transport two SMRs on dish surface.
- Perform on metal surface with gaps and steps.
- Fit within an 18 inch cube and weigh less than 25 lbs.

Design Overview

- Lower Assembly: Addition of this assembly increases vehicle normal force 800 percent which allows the vehicle to operate at angles up to 60 degrees.
- Sensor mounting arms are spring loaded to remain in contact with surface throughout operation.
- 24V gear motor delivers high torque power to tracks.
- Optical incremental encoder provides closed loop feedback control of position and direction of motion.
- Spring loaded pins allow for easy disassembly of vehicle.
- Smooth track tread allows a high traction, low pressure contact on the dish surface.

Conclusion

With the target transporter, General Dynamics will experience...

- Reduction in test time and man hours
- Consistent test results
- Increased efficiency
- Higher repeatability
- Increased ergonomics
- Creating a safer work environment for technicians

Acknowledgements

The team would like to acknowledge:

- Ryan Neahr
- Dr. Wooram Park
- Dr. Todd Griffith
- Dr. Robert Hart
- Dr. Neal Skinner
- UTDesign staff

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