



DESIGN OF A 2-AXIS, CONTINUOUS ROTATION, CAMERA CONTROL PLATFORM



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Introduction

Commercial platforms exist, but are limited to one rotation. A desire existed for a platform capable of continuous rotation for tracking and augmented reality applications



Objective

To build a 2-axis continuous rotation camera control platform, capable of speeds greater than 40°/s and an Accuracy of less than 1°.

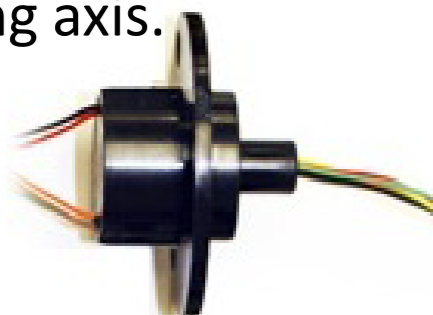
Design

• Drive

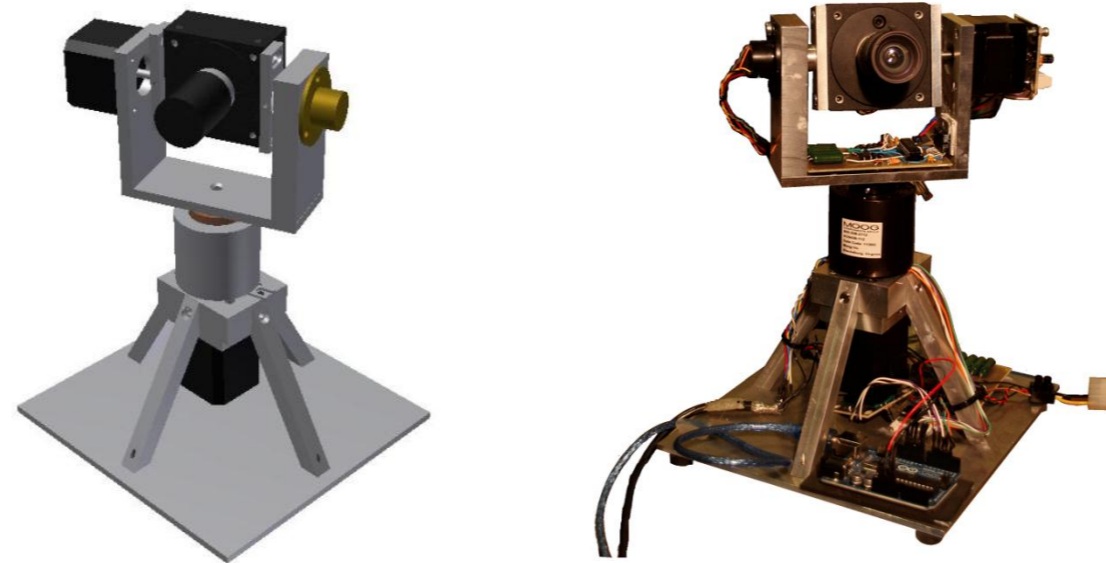
Stepper Motors were chosen for their simplicity of control and accuracy.

• Data & Power Transfer

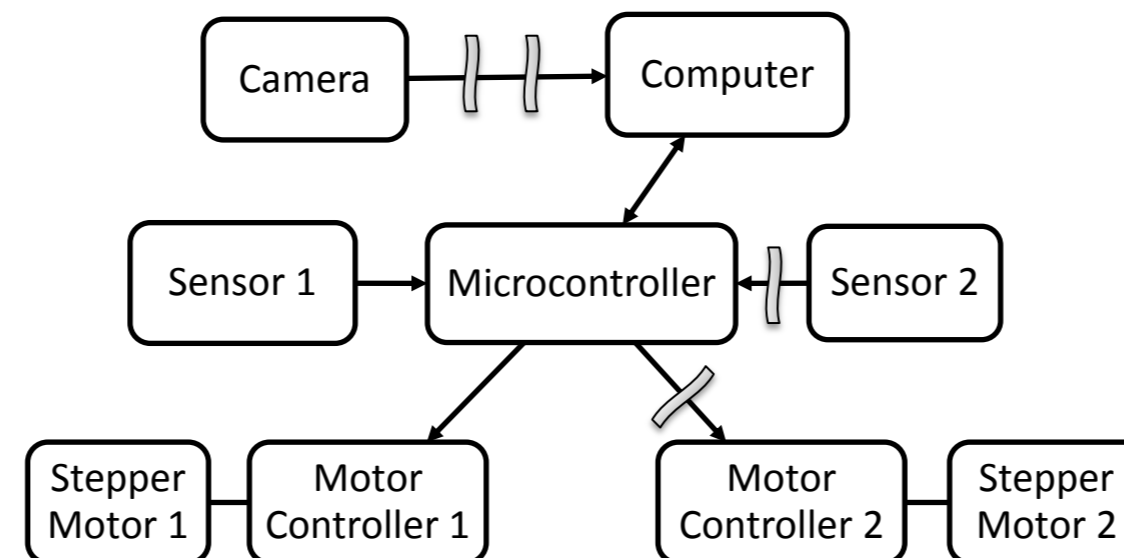
Slip Rings allow a continued electrical connection through a rotating axis.



• Platform

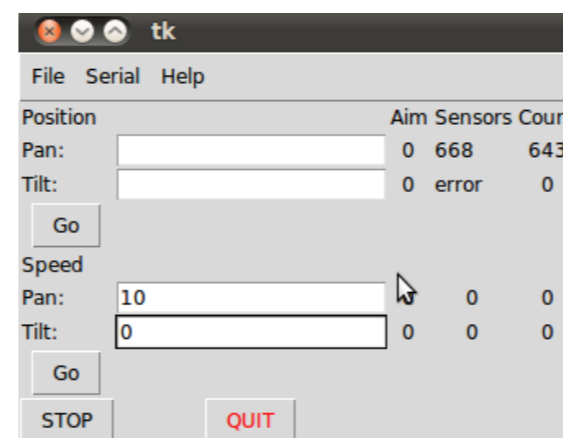


• Electronics



• Software

User interface allows control of motion and displays positional data.



Results

Data Transfer

- Wire modifications and slip rings had no negative effect on data transfer.
- Tested up to 1000°/s in both planes.

Speed

- Maximum speed: 100°/s.
- < 4% calculated measured error.
- Time to desired speed (ω): $t = \frac{1}{\omega/0.45}$ s
- 45ms to 10°/s

Position

- Position addressable in 0.45° increments.
- Accuracy: 0.23° ±10%
- Time to position: $t = \frac{\Delta angle}{40}$ s

Conclusion

A platform was successfully designed and manufactured that was capable of continuous rotation with a speed and accuracy as required, while still maintaining an electrical connection without degradation of the data link.