Elecanisms Mini Project 1

Adit Dhanushkodi, Saarth Mehrotra and Ankeet Mutha

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1 Summary of Design Decisions

The mechanical haptic controller system is shown below. The system is composed of pieces of laser cut clear acrylic pieces, with a motor driving a 4.625 inch diameter wheel through a friction drive.

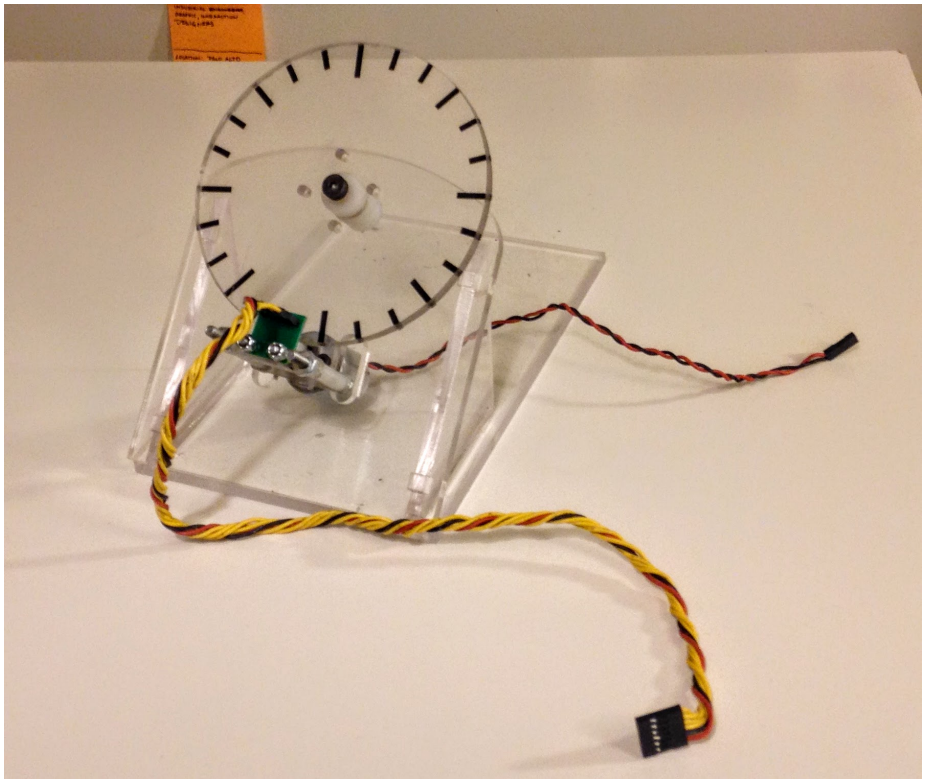

Figure 1: Full System Assembled

The transmission has a rubber tube pressfit onto the motor shaft. The rubber tube is one side of the friction drive, and it engages with the acrylic

wheel, which is the base of the haptic controller. At the end of the rubber tube is a 3D-Printed enclosure that houses a magnet for sensing the angular position of the motor shaft. Using plastic spacers, a small board with a hall effect sensor is mounted close to the magnet.

In order to ensure the transmission engages properly, the entire motor and associated assembly moves along slots. This may have been a poor decision considering that after assembly, it isn't easy to access the screws to shift the motor.

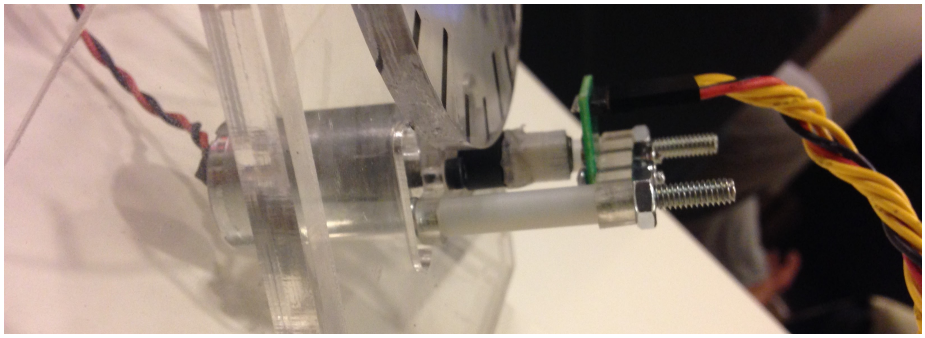

Figure 2: Transmission

The wheel itself is mounted above the motor using a shoulder bolt, a brass bushing, two plastic spacers, and a locknut. The wheel spins freely on the shaft, and is driven by the rubber tube press fit onto the motor. The wheel is also fixed in position, as the motor is mounted on a slot. In the next iteration, I might switch this, and make the wheel mounted on a slot, with the motor fixed in one position.

On the face of the wheel, there are ticks spaced 15 degrees apart to help with calibration. There are also four mounting holes in the center of the wheel to eventually mount steering wheels that will be 3D-Printed in the future.

Both the motor and the wheel are mounted on a slanted face of the acrylic frame, to give a better angle of use for the steering wheel.

2 Plots

2.1 Calibration Curve for Angle Sensor

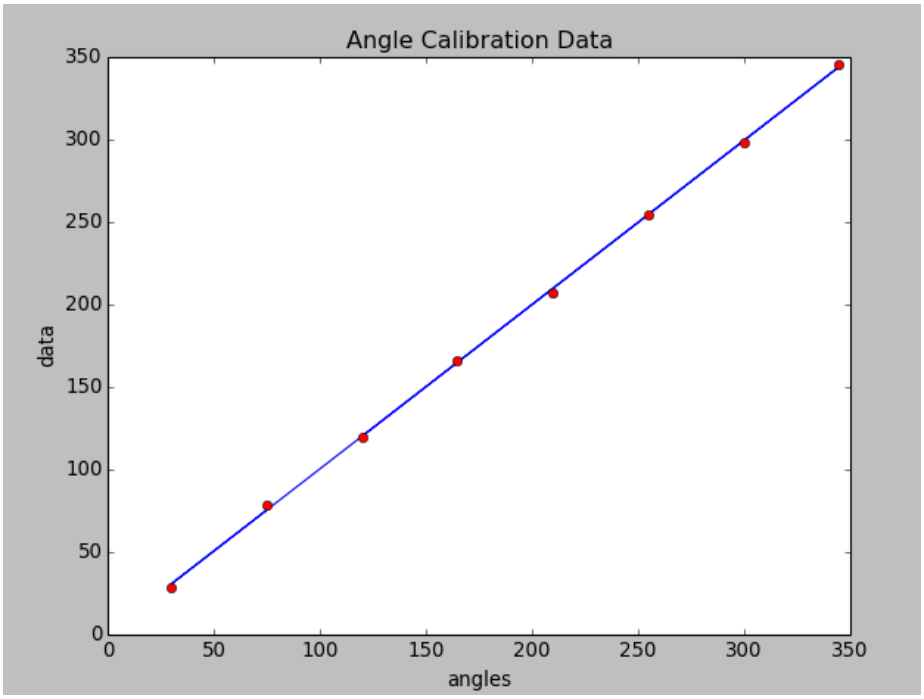

Figure 3: Calibration plot with best fit line ($y = 0.99 * x + 0.97$).

2.2 "Spin-Down" Data

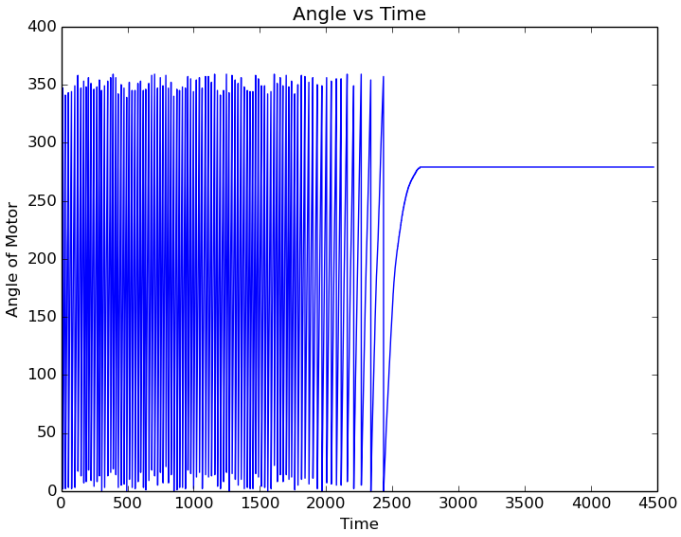

Figure 4: Plot demonstrating angle reading during "Spin-Down".

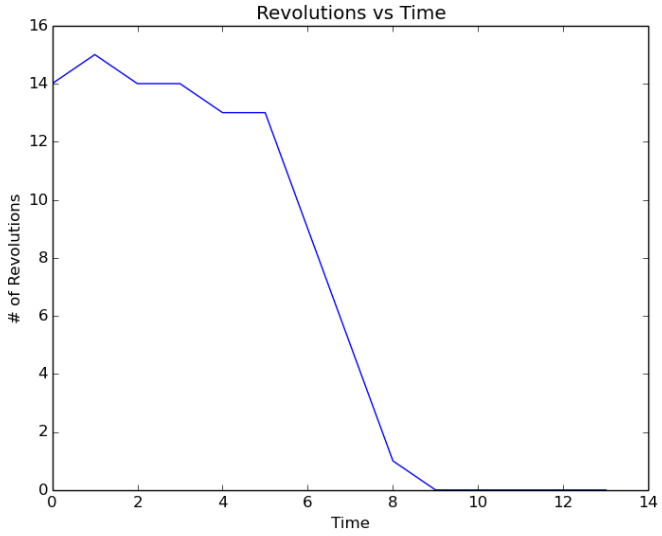

Figure 5: Plot showing the number of revolutions during "Spin-Down".

3 Repository with Source Code

https://github.com/amuthaOlin/elecanisms/tree/master/miniproject1