# Motorized Newtonian Telescope

# Engineering Notebook

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# Conceptual Overview

The basic idea of this project is to create a Newtonian telescope that will adjust what it points at with an embedded device. It is likely that stepper motors with a gearing that is TBD, would control these motions. The motorization would be calibrated to coordinate system, and commands could be sent to the device over a network that would allow the telescope to point to, and track, a given coordinate.

# Schedule



Figure , Project Timeline

Due to the extensive nature of the project, I will have to do some prep work over the summer. This project has a longer timeline because of that, and some phases in the design may move earlier to accommodate. From July to September, I will be working on the frame and mount for the telescope. I will have to do some design decisions during this time, so I will be documenting and researching during this time as well. From October to December, I will design the hardware assembly for the device and hopefully start programming. January to March will be the software development portion, and the rest will be testing. If at any time, the project is ahead of schedule, I plan on considering some of the stretch goals for implementation. Some of them will be easier to develop than others, so I will do a decision matrix and consult others for their opinion.

# 6/29/2022

Today I met with Yuehai Yang, my physics professor, and I showed him my idea for the senior project. We got to talking about the 12-inch mirror I had, and he said he was working on Schlieren photography system which used a 10-inch telescope mirror (I had originally used my mirror for this same thing). I ended up trading my mirror and mounting hardware for his mirror, mounting hardware, telescope tube, and eyepiece. It was a great deal for both of us because he got a better mirror, and I got a lighter one that already has the parts to make the Newtonian telescope, which will save be a TON of time. Now all I will have to do is create a way to attach the tube to the motors and base that I’ll make.

A person standing in front of a sink

Description automatically generated with medium confidenceUsing the eyepiece that is attached to the tube would prevent the eyepiece switching stretch goal, but I think it is worth it for time it would save. Since it is screwed in and not permanent, I can always remove it and make my own if I want to in the future.

Figure , Me with the mirror and tube I got from Prof. Yang

# 6/30/2022

Looking around on the internet, it seems like a lot of people are suggesting replacing the focuser for the eyepiece on the telescope, so that is something I will consider once I get it set up for practice viewing (before it’s motorized).

Diagram

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Figure , Basic design sketch

The simplest design for the mounting would be to place a vertical axis on the center of mass of the telescope connected to a horizontal rotating base. I would need to find the center of mass and mark it on the tube. I could make the axis permanent, but I think it would be a good idea to make it adjustable if needed, because adding hardware like cameras and different lenses would change the center of mass, thus changing the location of the axis. If the center of mass is not lined up with the center of the vertical or horizontal axis, it will put stress on the motors and gears which could misalign the image or break something.

# References