Memo

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| To: | Troy Scevers |
| From: | Nathan Wiley |
| Date: | October 7, 2022 |
| Re: | Memo 1 |
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Over the summer I acquired a 10” telescope primary mirror, tube, finder scope, elliptical mirror, and eyepiece. I have decided to move forward with this set of parts instead of the 12” primary mirror since I would have to build or purchase the other listed parts that match with the geometry of a 12” tube. The 10” tube that I am moving forward with will also be easier to move because it weighs approximately 5 lbs. less than the 12” mirror.

The parts I received were used, and some damage had been done. This past week I have spent 4 hours on restoration which included, disassembly, removing rust, dusting, and reassembly (pictures on following pages). I discovered missing teeth in the rack of the eyepiece focuser. I do not think it will pose a problem for basic use of the telescope as it can still be adjusted.

I am going to approach my design based on the motors that I need, so I’ve done 2 hours of research on the different types of motors and the advantages of each. It appears that stepper motors perform well, but only when it is geared with a high ratio, so individual steps do not impact long exposures with jitter. Servos do not jitter, so a direct drive could work, but they do not have the encoders that stepper motors have. With that, I am leaning towards stepper motors because of their increased level of control with encoders, but I will still need to do more research.

I know that if I choose the stepper motor, I will need some type of gear ratio to provide smooth movement, so I have asked an officer of the 3D printing club and some other students if 3D printed gears are viable. The consensus seems to be that it might be possible with the right filament. I searched about this online and found that nylon filament has been demonstrated to perform better than other standard filament types. However, not all printers can use this filament, so I will keep that in mind if I end up needing 3D printed gears.

I also spent 2 hours revisiting the decision on the alt-azimuth mount vs the equatorial mount. I rented books “How to Make a Telescope”, Practical Astronomy”, and “Reference Frames” from the library and begun reading the first one. So far, I am still holding the position that the alt-azimuth mount will be best for this project. The equatorial mount would reduce the number of motors to 1, but it would require an expensive and complex base.

In all, this week I’ve worked 10 hours including the time spent revising the schedule and writing this memo.

Next week I plan to start the design of the bracket and base of the mount. I downloaded Autodesk Inventor, and I plan to create a “blueprint” for a structure to hold the telescope tube and provide an axel for the vertical axis. The tube is showing wear, so next week I will also purchase sanding materials and either an outdoor spray paint, or roof coating to weatherproof the tube. Once that is done, I will reassemble the parts and begin fitting the tube to the structure.

**Below is the detailed schedule for this term:**



**Below is the updated general schedule for the next two terms including this one:**



**Photos of dust on used telescope parts below:**

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| **A picture containing gear  Description automatically generated** | **A picture containing indoor  Description automatically generated** | **A picture containing indoor, weapon, sword  Description automatically generated** |
| **A picture containing indoor, counter  Description automatically generated** |  |  |

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|  | **A close-up of a door handle  Description automatically generated with medium confidence** |  |
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**Photos of restored parts below: (Note missing teeth in the rack on the last picture)**