

The following are tasks that need to be completed this term:

1. Finish non-motorized telescope assembly.
 - a) Drill holes into turntable and assemble uprights.



- b) Drill holes and screw in horizontal struct piece.

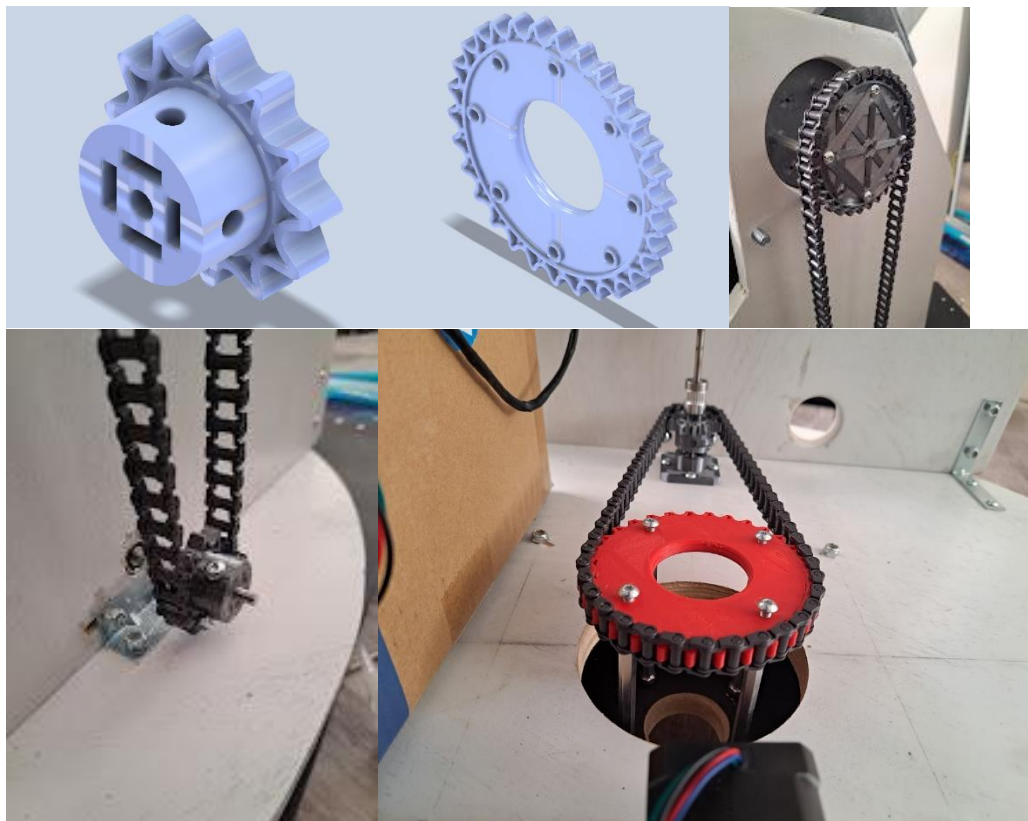


- c) Paint unfinished pieces



2. Create gearing system.

- a) Design and print large pulley gear.



- b) Order smaller gear and timing belts.

(you saw the timing belt in demo, now using chain I already had)

3. Connect power adapter to power supply.

(Saw in demo)

4. Connect power supply to stepper drivers.

(Saw in demo)

5. Connect level shifter for the 3.3V I/O of Raspberry Pi to 5V of the stepper motor driver.

(Completed, but later used 2222NPN transistors instead)

6. Develop software to drive motors.

- a) Develop software to drive 2 motors at once.

(see video)

https://photos.google.com/photo/AF1QipPvImcMB4_67zJRhahv9zSW7swaBpVDf2k44Kmo

7. Develop software to aim telescope.

- a) Find the math behind aiming 2 axis control in 3D geometric space.

“A rigorous algorithm for telescope pointing” – Patrick Wallace (2002)

- b) Apply the math to the code for driving the motors.

The screenshot displays two windows side-by-side. The left window is a 'Linux Console Window' showing a series of astronomical calculations. The right window is 'Stellarium 1.0' showing a 3D model of the Andromeda Galaxy (M31) with associated data.

Linux Console Window Output:

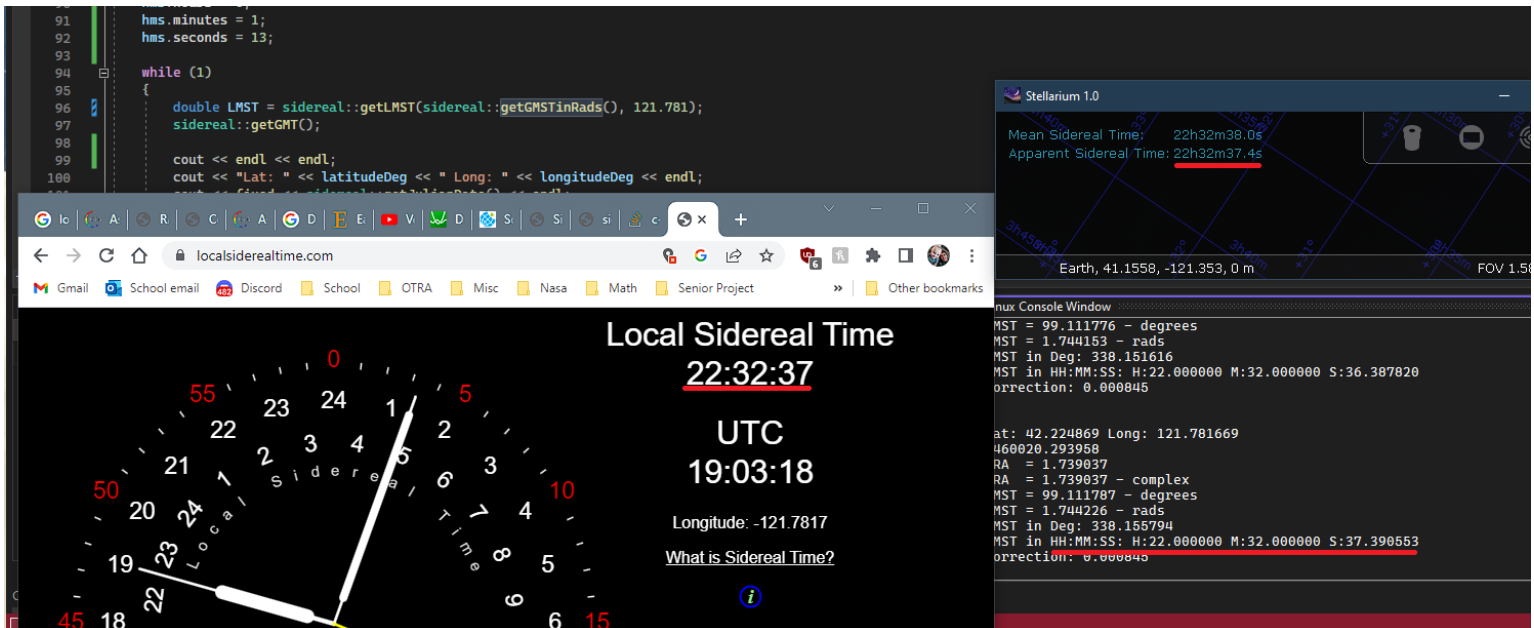
```
LMST: H:5 M:11 S:46.6221
RA Deg input: 10.9922 Dec Deg input: 41.3942
Andromeda RA: H:0 M:43 S:58.12
Andromeda Dec: 41Deg 23m 39.3s
Calculation:
Hour Angle = 66.9521 HMS: H:4 M:27 S:48.5021
Alt deg: 41Deg 26m 31.8025s
Az deg: 292Deg 56m 53.9245s
LMST: H:5 M:11 S:47.6248
RA Deg input: 10.9922 Dec Deg input: 41.3942
Andromeda RA: H:0 M:43 S:58.12
Andromeda Dec: 41Deg 23m 39.3s
Calculation:
Hour Angle = 66.9563 HMS: H:4 M:27 S:49.5048
Alt deg: 41Deg 26m 21.546s
Az deg: 292Deg 57m 0.198386s
```

Stellarium 1.0 Data for Andromeda Galaxy (M31):

- Type: galaxy (SA(s)b)
- Magnitude: 3.40
- Color Index (B-V): 0.96
- Surface brightness: 13.31 mag/arc-min²
- Contrast index: -0.00
- RA/Dec (J2000.0): 0h42m42.72s/+41°16'04.8"
- RA/Dec (on date): 0h43m58.12s/+41°23'39.3"
- HA/Dec: 4h27m49.45s/+41°23'39.3"
- Az./Alt.: +292°56'59.9"/+41°26'22.1"
- Gal. long./lat.: +121°10'07.9"/-21°34'25.9"
- Superqal. long./lat.: +336°11'28.8"/+12°33'25.0"

8. Develop software to track a coordinate as the earth rotates.


a) Develop software for calculating sidereal time.



9. Create or purchase board and electronic housing.

ORDER PLACED	TOTAL	SHIP TO	ORDER # 112-9786317-6610614
March 16, 2023	\$58.99	Nathan Wiley	View order details View invoice

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Troy Scevers