Project Plan

1. What are the broad purpose and goals of the project?

* To repair and refurbish a Small Radio Telescope (SRT) and get it operational
* To learn about radio astronomy, programming, mechanics, and physics to better prepare me for the field upon completion of my undergraduate degree.

1. What should success look like?

* Establishing a Graphical User Interface (GUI)
  + Research possible GUIs to use
    - Determine what inputs will be necessary for my GUI and what will be accessory.
    - Use an established GUI or rewrite an existing one
  + The graphical interface should take in a variety of information to track the ecliptic of an object
    - Latitude/longitude
    - Right ascension and declination
    - Azimuth/zenith
  + Determine how the information will be processed and how python will translate the input variables to x and y motor controls.
* Implement a Raspberry Pi for the GUI to run on and act as a master for the Arduino
  + Run the GUI on the Raspberry Pi on Python script
  + Implement a communication protocol between the Pi and the Arduino
    - Probably I2C, need to be confident this outline will work as planned prior to making a firm choice
    - Learn about communication protocol.
  + Write a program to interpret the information from the GUI to steps for the motor to be sent and interpreted by the Arduino
  + Error protocols should be established to process any unexpected anomalies in the feedback routines.

1. What broad steps/tasks need to be done to have success?

* I will need to research radio astronomy, so I am able to map an object as it passes through the sky.
* I will need to establish a GUI for the user to interface with that will likely run on a raspberry pi.
* I will need to implement or develop a communication protocol for use between a raspberry pi and an Arduino.
* I will need to continue calibrating the motor controls and the motor to gear turn ratio.
* I will need to further develop the pulse counting mechanisms.

1. Who needs to be involved with the different steps/tasks?

* I think I can mostly do this myself with oversight from Dr. Ferkinhoff.
* There is a lot I will need to learn how to do, I will try and use my fellow research students as information resources as well.

1. What don't I know? What questions do I need to ask? What information/skills do I need to learn?

* I’ll need to become more familiar with OSF, Arduino, Python, GUIs, SDRs.
  + Documentation is one of my biggest shortcoming, so learning OSF and Markdown will be an important part of the successful completion of my goals for this research.
  + Though I have had some experience with Python I have not implemented a program of this caliber before. Familiarizing myself with Python and learning how a GUI works from the software end will be essential.
* I need to learn about communication protocols between different ICBs.
  + I have not used an I2C protocol before and will need to learn how to run commands in this or a similar communication protocol routine.
* Above all, I need to learn radio astronomy!
  + I am still unfamiliar with the fundamentals of astronomy that will be necessary for the structure of this project. Tracking the ecliptic is the most important astronomy need right now.

1. Are there any limiting factors? Limited Timeframe? Limited Funds? A hard deadline?

* My paid position maxes out at 400 hours over the next 8-12 weeks
* Expenditures shouldn’t be excessive for this project, so I imagine I won’t be limited.
* The research position ends on August 16