1. RTx Controller
   1. RTx Controller Hardware
      1. Schematic
         1. Verify processor selection (Robert – 8 hours)
         2. Review and document ADC filter design (Rob – 4 hours)
         3. Implement Ethernet port in HW (Robert – 20 hours)
         4. Implement USB port in HW (Robert – 3 hours)
         5. Determine PCB power requirements and design power supplies (Robert – 8 hours)
         6. Select connectors and cabling (Robert – 5 hours)
         7. Determine processor pin-out (Robert and Rob – 6 hours)
      2. PCB
         1. Layout PCB
            1. General Layout (Robin and Rob – 12 hours)
            2. High-speed Signal Routing (including research) (Robert – 5 hours)
         2. Assemble PCB (All members – 6 hours)
   2. RTx Controller Firmware
      1. Develop Axis Position Control Loop
         1. Research Control Theory (Rob – 10 hours)
         2. Model control transfer function and derive PID coefficients (Rob – 6 hours)
         3. Develop code for PID loop (Rob – 6 hours)
      2. Develop Ethernet API
         1. Research ChibiOS/RT UDP implementation (Rob – 5 hours)
         2. Determine required functionalities (Rob – 18 hours)
         3. Write code (Rob – 10 hours)
      3. Develop tracking algorithm
         1. Research capabilities of Sightline SLA1500 (Rob – 8 hours)
         2. Research capabilities of available imaging devices (Rob – 3 hours)
         3. Develop the algorithm (Rob – 16 hours)
         4. Write code (Rob – 16 hours)
2. Battery Unit
   1. Determine system power requirements (Robert – 3 hours)
   2. Select batteries and battery “enclosure” (Rob – 1 hour)
3. Manual Control Unit
   1. Hardware
      1. Design ADC filters for the manual inputs (Rob – 3 hours)
      2. Complete enclosure of manual controller (Robin – 4 hours)
   2. Software
      1. Develop manual control algorithm (Rob – 8 hours)
      2. Write code (Rob – 8 hours)
4. FMEA
   1. Determine all single points of failure and determine which ones could result in injury or permanent damage (Robin – 12 hours)
   2. Determine methods of prevention (Robin – 24 hours)
5. Design the power filter for the axis motors
   1. Schematic (Robin – 4 hours)
   2. PCB layout (Robin – 4 hours)
6. Select Ethernet switch (Robert – 2 hours)
7. Testing
   1. RTx controller
      1. Hardware
         1. Test development (Robert/Robin – 2 hours)
         2. Test execution and debugging (Robert/Robin – 3 hours)
         3. Revision (Robert /Robin– 3 hours)
      2. Firmware
         1. Test development (Rob – 32 hours)
         2. Test execution and debugging (Rob – 32 hours)
         3. Revision (Rob – 16 hours)
      3. Integration
         1. Test development (All members – 8 hours)
         2. Test execution and debugging (All members – 6 hours)
         3. Revision (All members - 6 hours)
   2. Manual controller
      1. Hardware
         1. Test development (Robert/Robin – 1 hour)
         2. Test execution and debugging (Robert/Robin – 1 hour)
         3. Revision (Robert/Robin – 1 hour)
      2. Firmware
         1. Test development (Rob – 8 hours)
         2. Test execution and debugging (Rob – 8 hours)
         3. Revision (Rob – 4 hours)
      3. Integration
         1. Test development (All members – 1 hour)
         2. Test execution and debugging (All members – 1 hour)
         3. Revision (All members – 1 hour)
   3. System integration
      1. Test development (All members – 4 hours)
      2. Test execution and debugging (All members – 4 hours)
      3. Revision (All members – 16 hours)
8. Enclosure
   1. Select enclosure and determine PCB size and shape (Robin – 8 hours)

*Expect a minimum of 10 hours a week to be put into this project – times are based accordingly*