3D Clinostat

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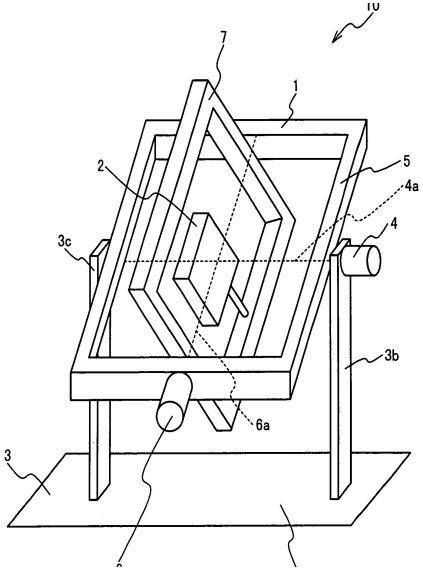
Client's Specifications

Goals

- Improve on past 3D Clinostat designs
  - Light supply
  - Camera shots during rotation
- Determine best method for giving light to plant
- Adequately cancel the gravity pull on plant growth
- Smooth rotation
- Low cost



Background on 3D-Clinostat

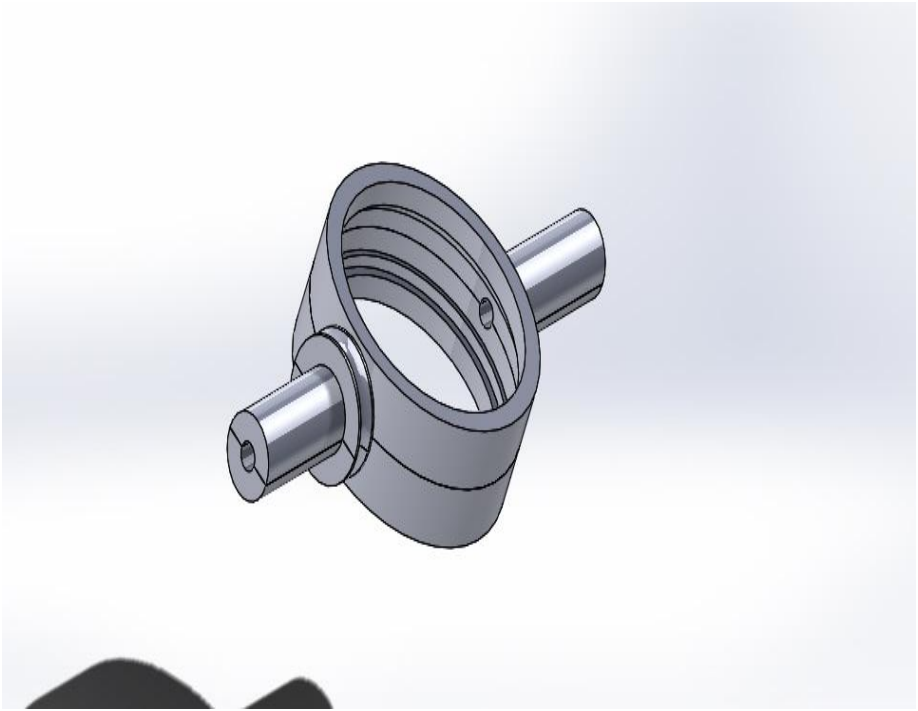
- 3D-Clinostat is a device that use rotation to cancel gravity pull on plant growth and development
    - microgravity
- Essential - SpaceX plan
- Low speed requirement -- 0.3 - 3 rpm for most plants
    - No centrifugal force effect (cannot be too fast)
    - No physiological response to gravity (cannot be too slow)
- 2 Axes needed but NOT 3 Axes!

Design Complications

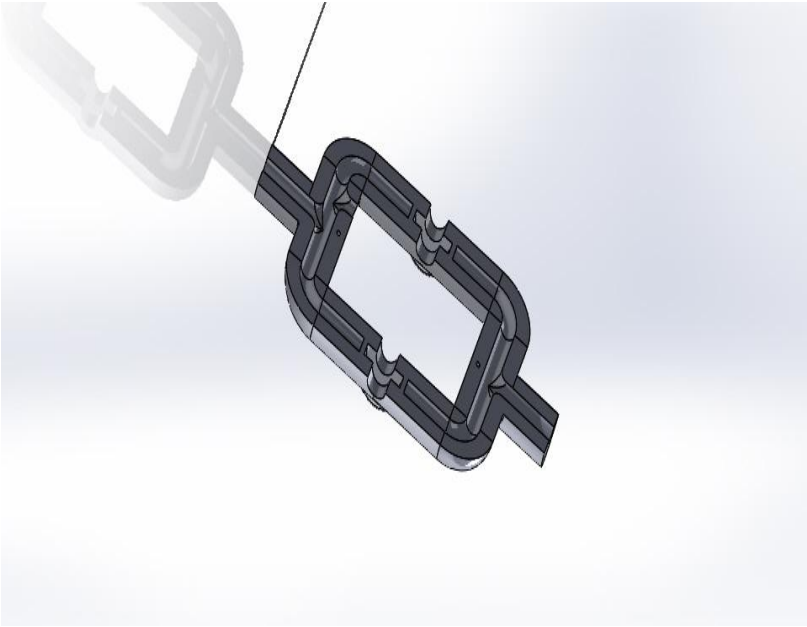
- LED Implementation
- Motor Integrations and Coding
- Weight and Balance Concerns
- Smooth and Programmable Rotation
- Wiring
- Drive System

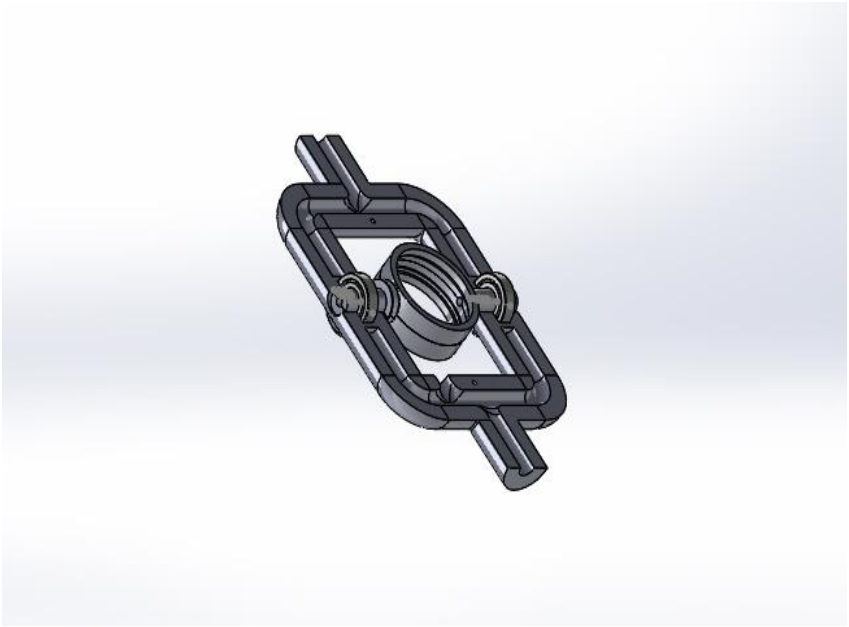
Drive System of Inner ring

Use of belt for driving of inner ring



Inner Ring CAD model





Outer Ring Cad Model

Final Design and Future Work

- Potential Gear Design - higher stability
- Adjustment of current frame design in order to account for Print Resolution
- Writing code for the motors and camera, and wiring diagram.
- Calculating the time it takes for the plant to line up with the camera
- Gain use of higher quality 3D Printers