



# 3-D Clinostat

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## ABSTRACT

To study the effect of a zero-gravity environment on plant matter, Dr. Richard Barker requires a machine to manipulate the petri dishes in a way that cancels out the effects of gravity on growth. A machine that can accomplish this task is a 3D Clinostat.

## PROBLEM STATEMENT

**Problem:** To create an affordable and accessible 3-D Clinostat, for use by educators and researchers, that can be created with rapid prototyping technology.

**3-D Clinostat Definition:** The usual type of clinostat turns slowly to avoid centrifugal effects. By rotating about both axes, the plant is not permitted to respond to gravity. If the device is too slow, the plant has time to generate physiological responses to gravity; if it is too fast, centrifugal forces and mechanical strains introduce artifacts. The optimal rotational speed has been determined to be between 0.3 and 3 rpm for most plant systems.

## DESIGN SPECIFICATIONS

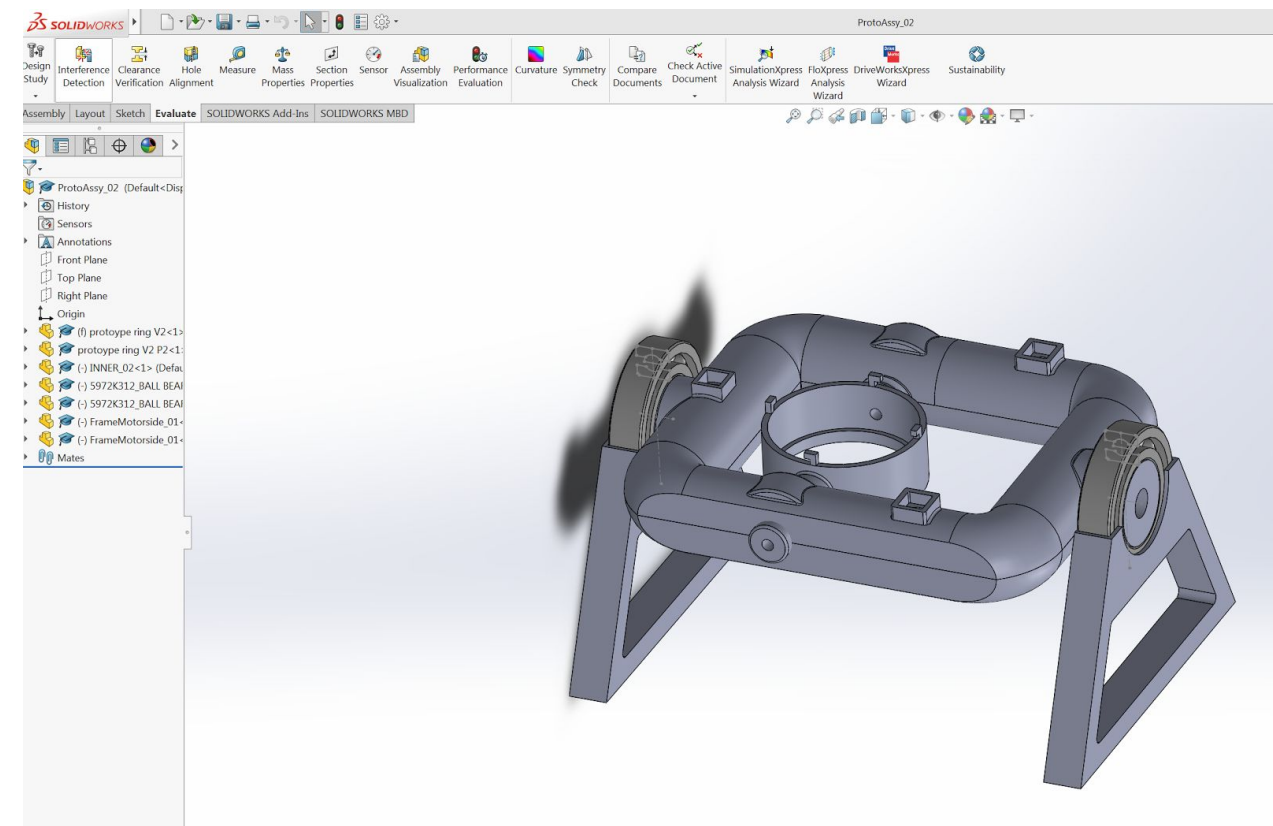
- Determine best method for giving light to plant
- Adequately cancel the gravitational pull on plant growth
- Smooth consistent rotation
- Low cost

## MATERIALS

- (2) Arduino's
- (1) Nema 14 Stepper motor and a4988 Stepper Driver
- (1) 28BYJ motor and Driver
- ABS, PLA and Resin prints
- (4) Various Sized Bearings
- (1) 12 Wire Slip Ring

## METHODOLOGY

- Design frame that simulates antigravity with dual-ring system



- Devise a system to drive the rings of the Clinostat

