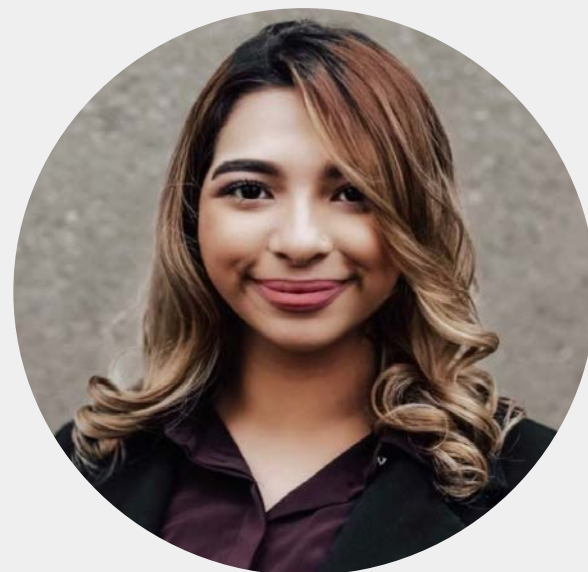




Spencer Bravo
Team Lead



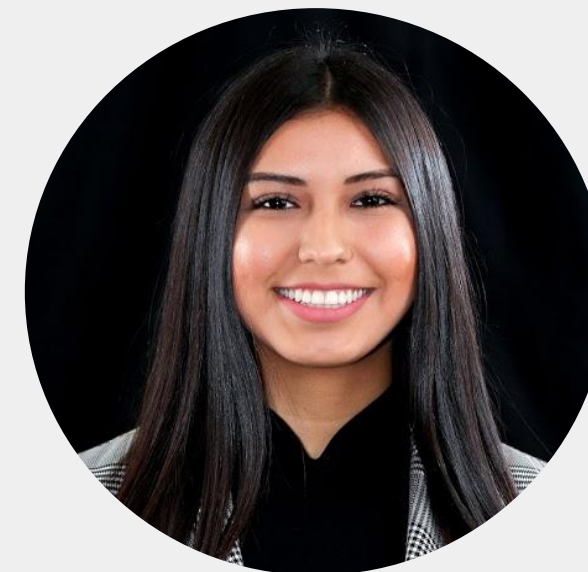
Cynthia Frausto
Boiler Lead



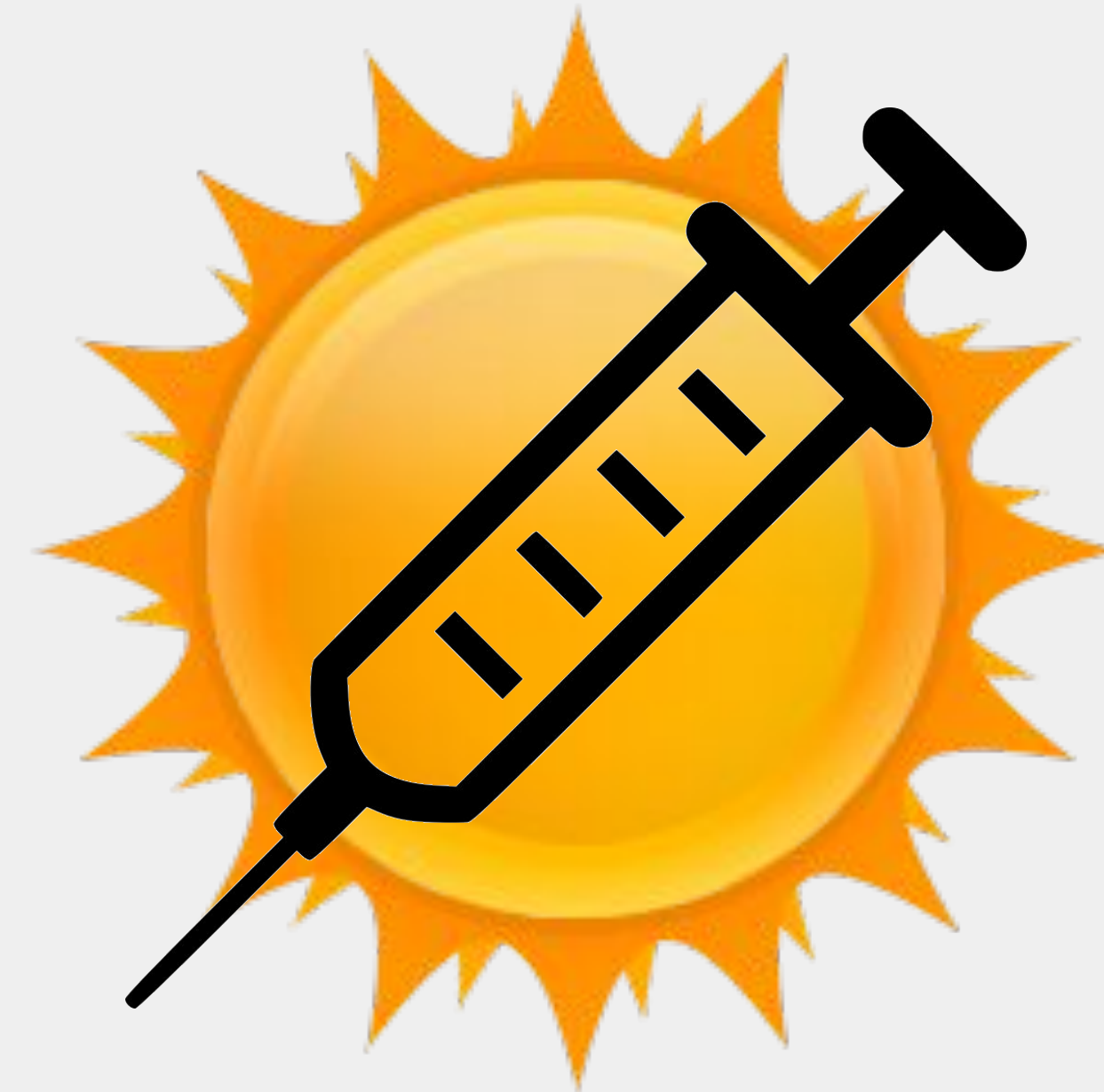
James Reece
Distiller Lead



Alexander Smith
Autoclave Lead



Gardenia Valenzuela
Solar Concentrator Lead



Team Sterilight



Sponsor: Dr. Kevin Wood
Faculty Advisor: Dr. Scott Shaffar
Department Support:
Dr. Miller, Professor Ayala,
Michael Lester, Julie Smitherman
Graduate Researchers:
Tyler Lestak, Jack Lucas



SAN DIEGO STATE UNIVERSITY

Problem Statement

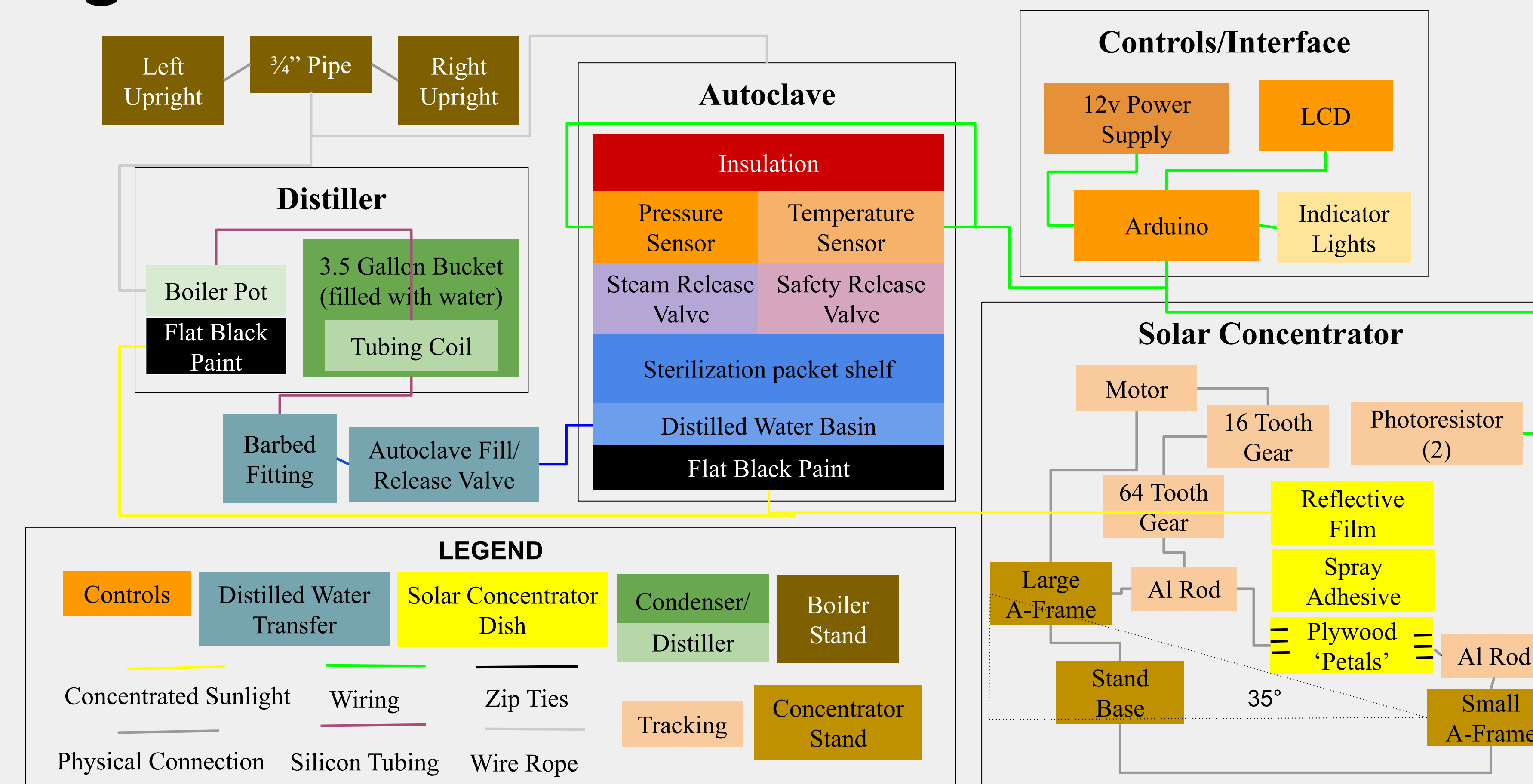
Health Care Associated Infections (HCAI) are a major problem in first world countries, but are far more common and often more severe in non-standard medical environments, such as those in developing nations and remote military deployments. It is difficult to mitigate these increased risk factors without access to cheap, effective, and easily manufacturable tools to sterilize medical equipment.

Project Overview

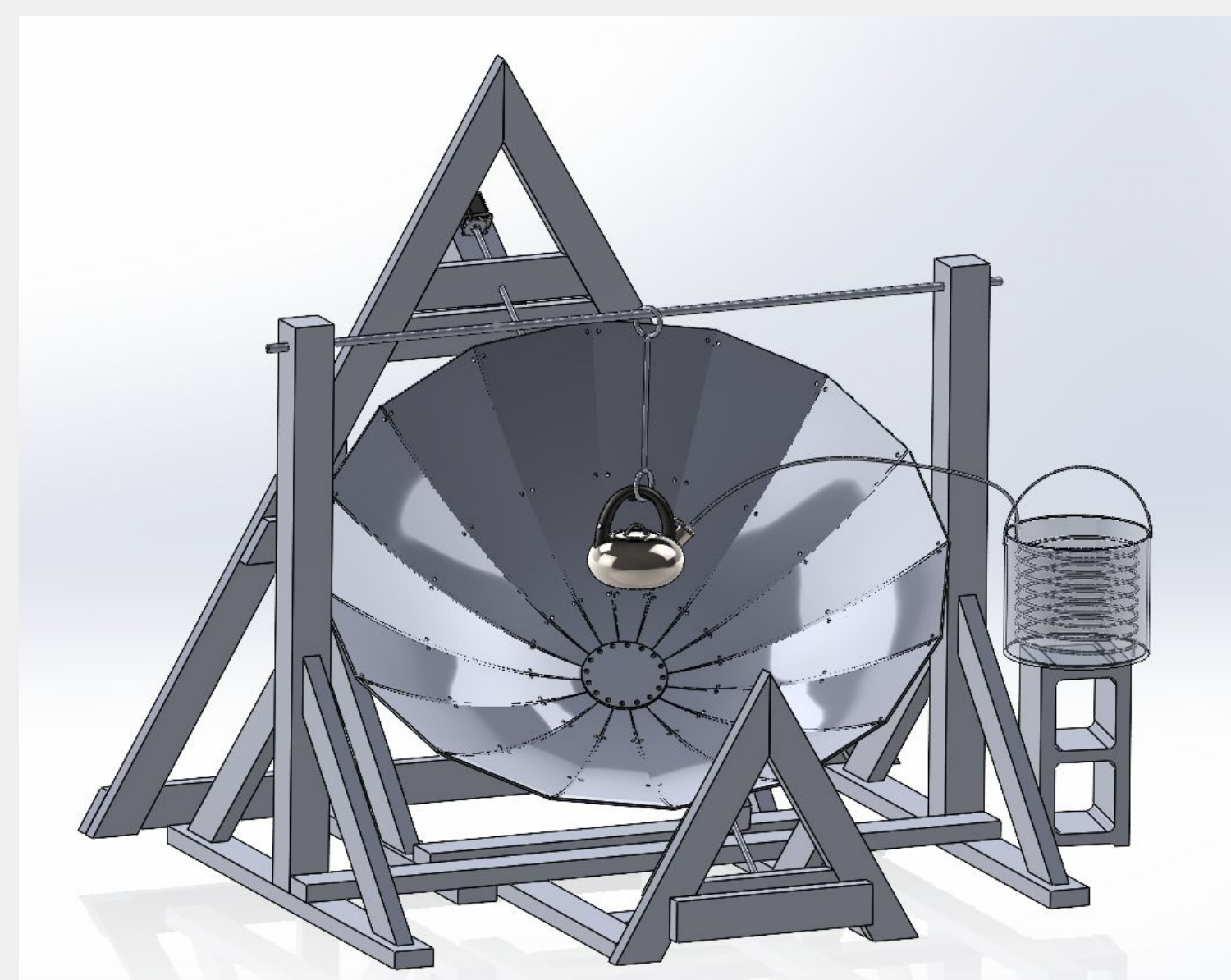
Traditional sterilization equipment is not only expensive but also requires significant electrical energy input and medical consumables such as distilled or deionized water to operate. In order to help reduce the inequitable occurrence and severity of HCAI, a system composed primarily of components that are widely available and/or easy to manufacture, does not require electrical energy from the grid, or medical consumables to operate was designed.



System Level Diagram

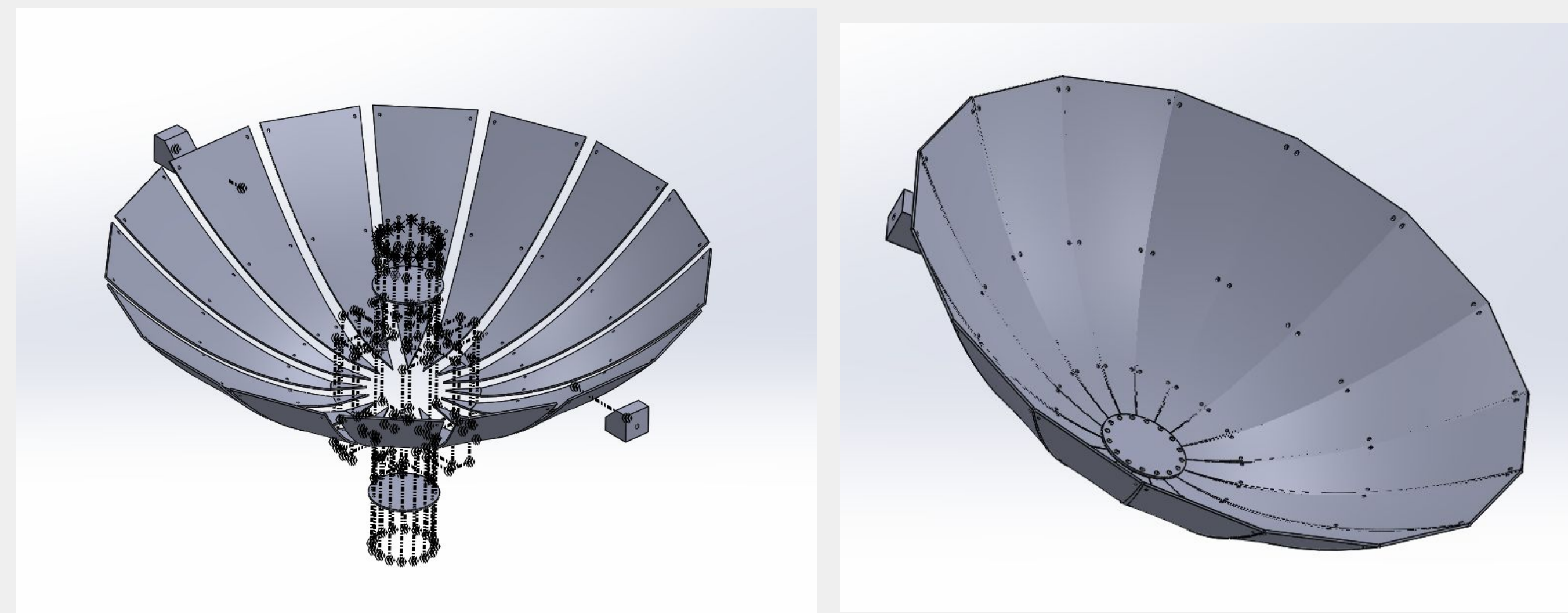


CAD Assembly

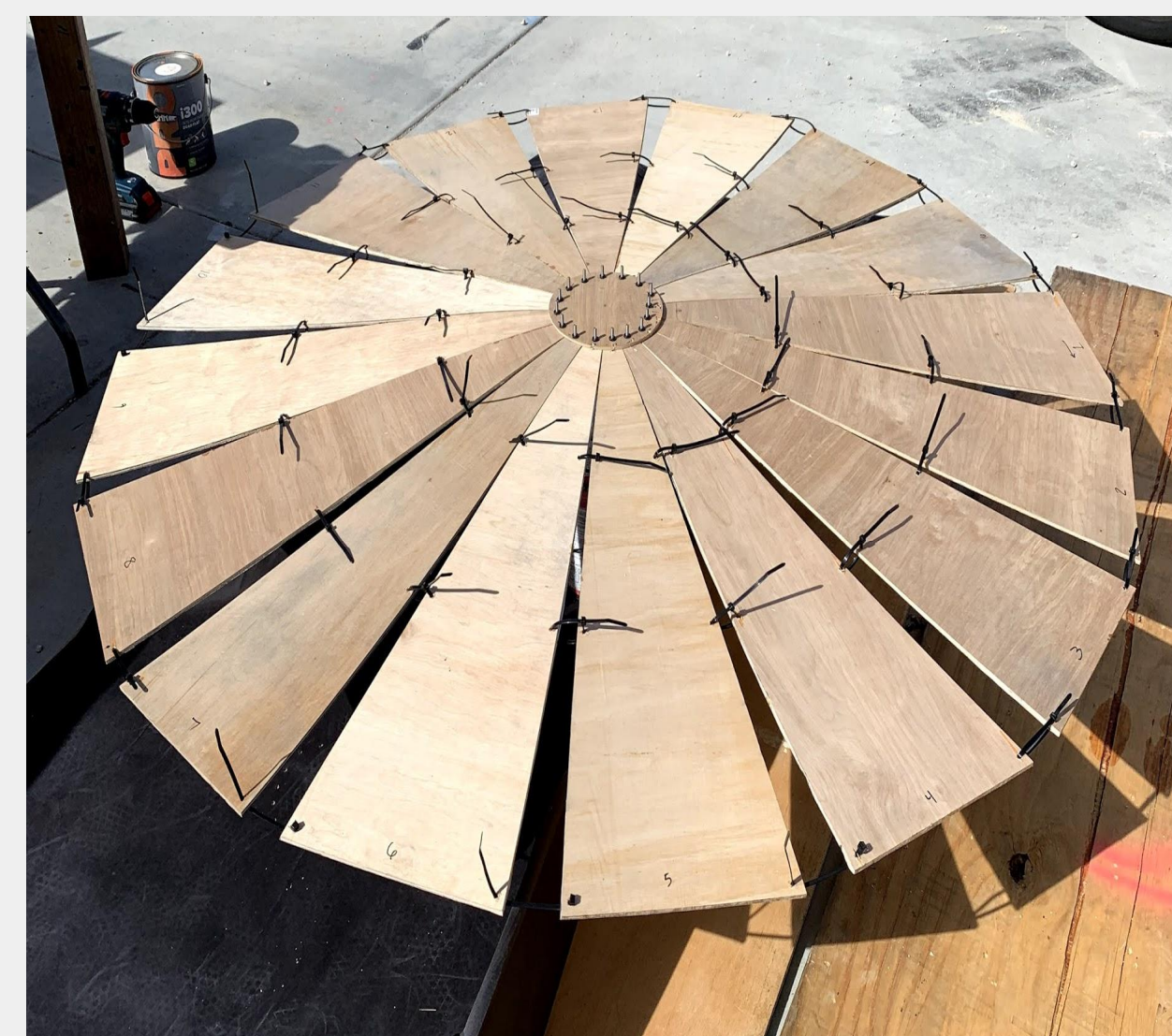


Valve/Sensor Interface

Concentrator Dish CAD Model



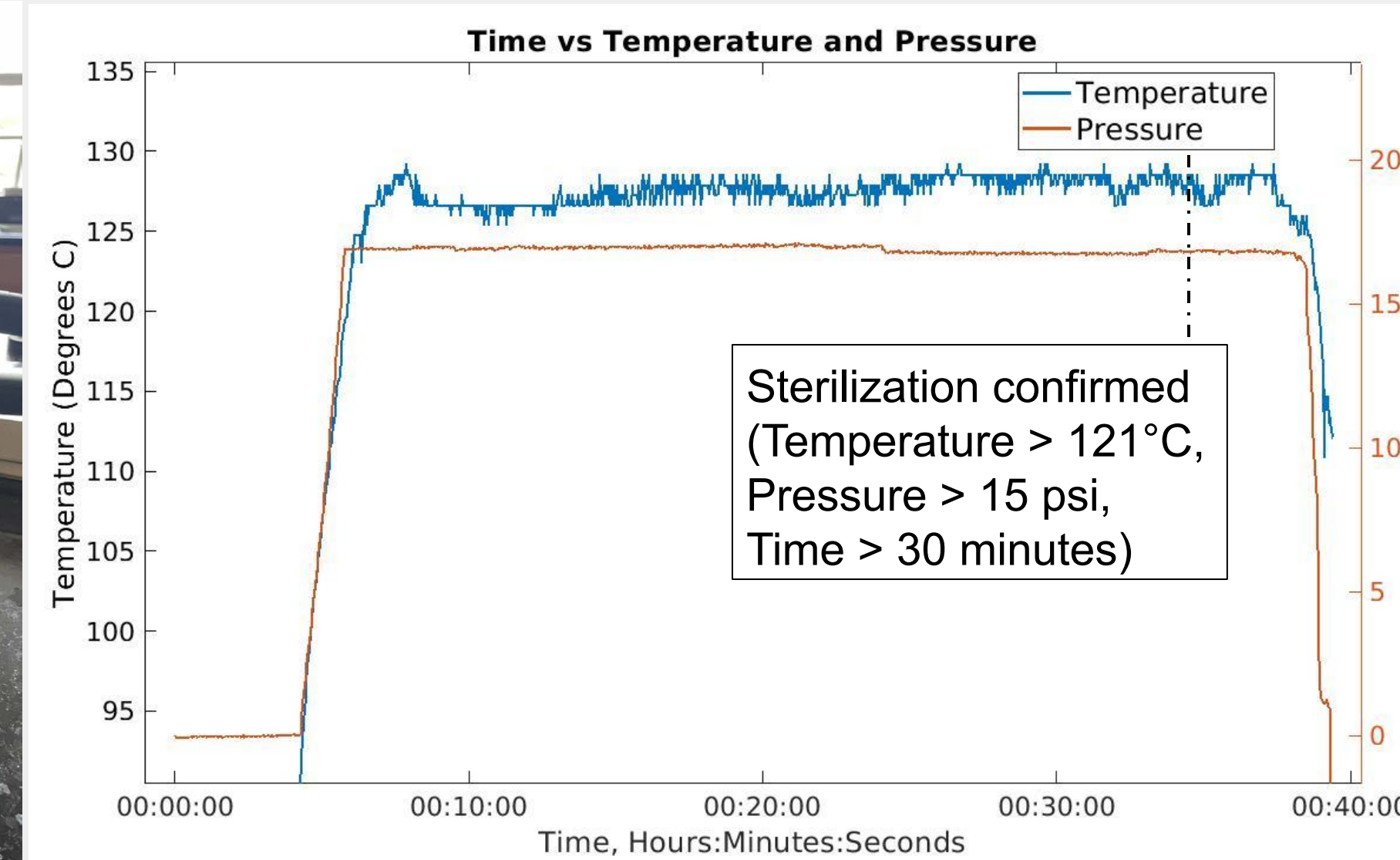
Concentrator Dish Manufacturing



Design Solution Overview

By employing concentrated solar thermal energy, the electricity input necessary is vastly reduced. The only controls required are temperature and pressure sensors for sterilization parameter verification and a motor for solar tracking. A built in distillation system eliminates the necessity of purified water to run this system. Creating the autoclave by modifying a pressure cooker, a common cooking appliance, allows this design to be widely implemented. All manufacturing operations can be performed with basic hand tools and minimal machining knowledge. In total, the Beta prototype does not require medical consumables or electrical energy from the grid and cost less than \$750, a mere fraction of what industry standard autoclaves cost.

Autoclave Stovetop Test / Sterilization Verification



unprocessed strip processed strip

Spring 2021