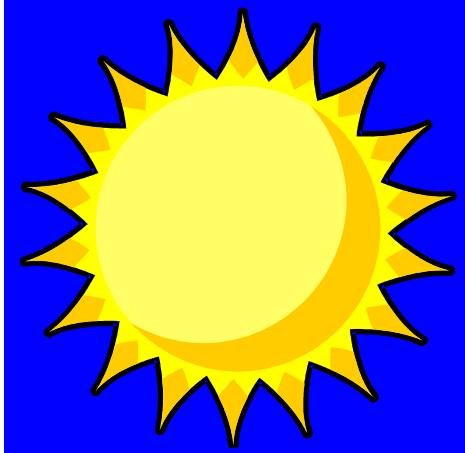


Solar Dish Collector

University of Washington

Mechanical Engineering Department

2003-2004

Background and Goals

Background Information

- In summer of 2003, the UW ME Department requested a solar powered Stirling engine.
- The chosen Stirling engine requires 100 W of thermal energy, thus an appropriately sized parabolic dish was designed.
- All design, fabrication and assembly would be completed by the design team.

Project Goals

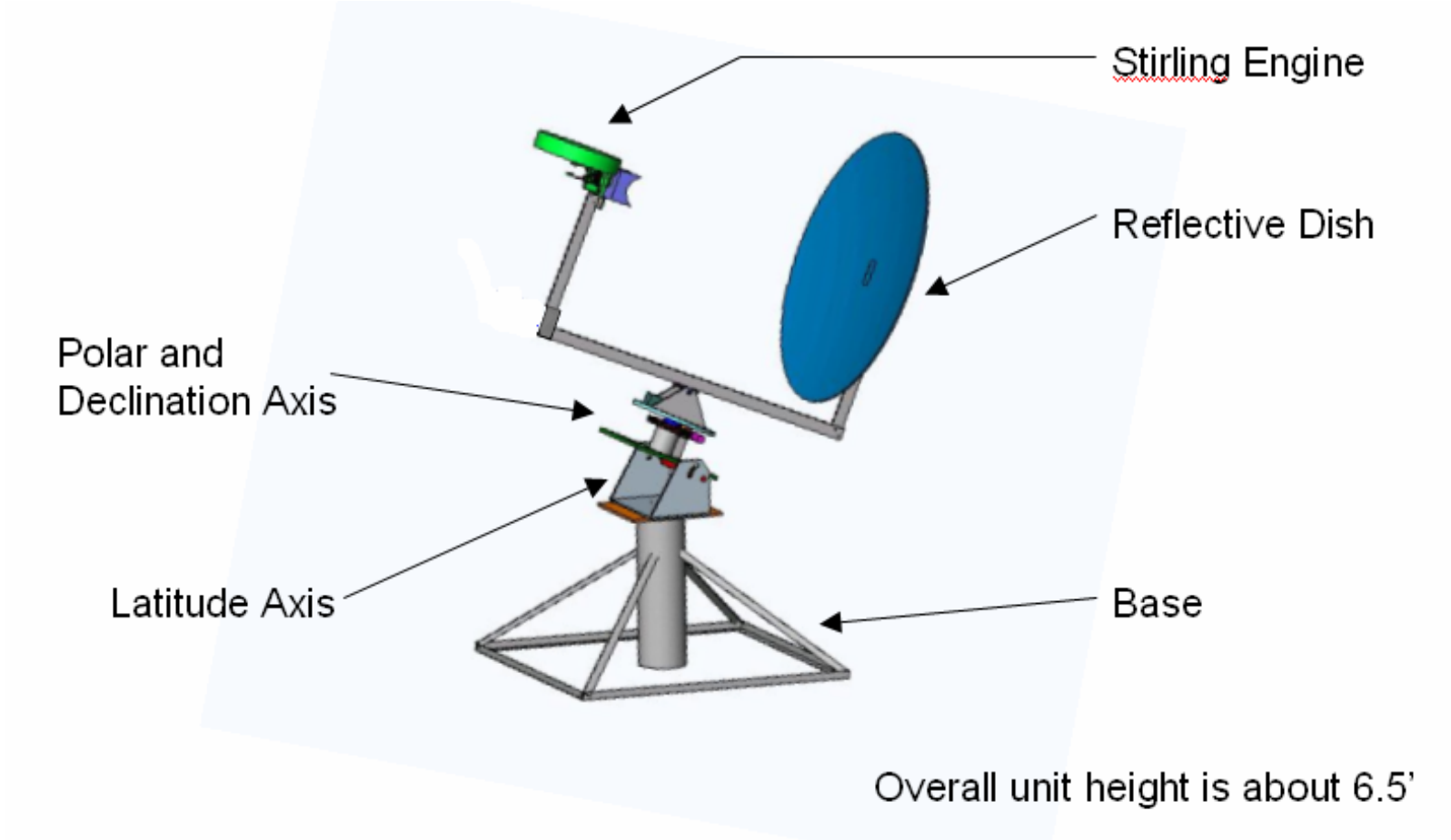
- Produce a reflective parabolic dish with tight dimensional tolerances.
- Design and fabricate a functioning prototype consisting of mounting supports for both the dish and engine and a reliable method to track the sun.
- The overall unit including the dish and engine must be inexpensive.

Motivation and Constraints

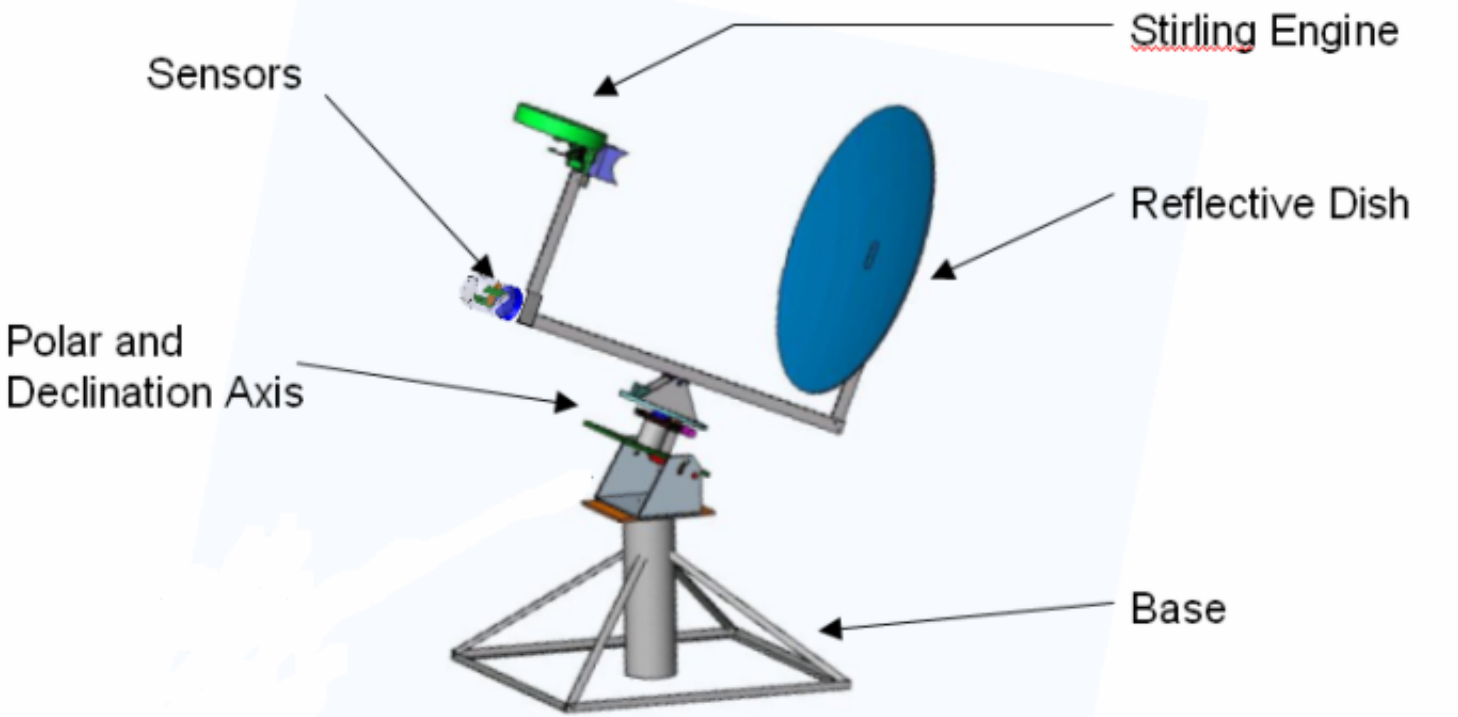
- **Motivation for using a solar powered Stirling engine**
  - Energy production from a clean renewable source.
  - Has the potential to be more cost effective than solar PV.
  - Can provide power in off grid locations.

- **System constraints**
  - The unit must be able to withstand the appropriate loading imposed on it by weather conditions.
  - In order to optimize the Stirling engine's performance, the dish must be orthogonal to the sun, therefore the tracking method must be precise.
  - The motors and controller units must not consume more energy than the system can produce.

Original Design



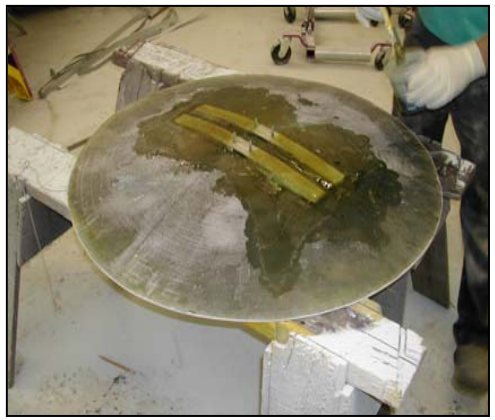
First Redesign



Parabolic Dish

Precision foam mold

Fiber glass dish (1/4” thick)



Completed dish (with mounting brackets)

Flexible mirror surface

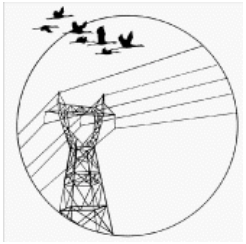
Completed reflective dish

Important Attributes

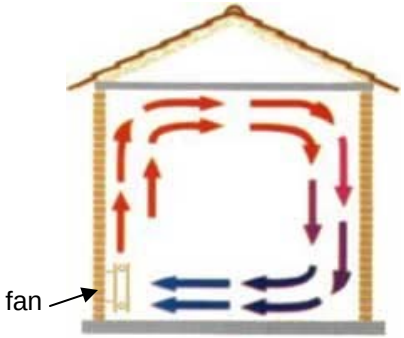
- Similar existing systems can produce various amounts of power (1 kW – 25 kW) depending on the size of the unit.
- The system is simple in design with easy set-up.
- Minimal pollution.
- There are no fuel costs, all costs are up front.
- Depicts some of the versatility in solar energy.
- Dish/engines can compete with diesel engines on the basis of performance, environmental impact and cost in underdeveloped regions.

Possible Uses

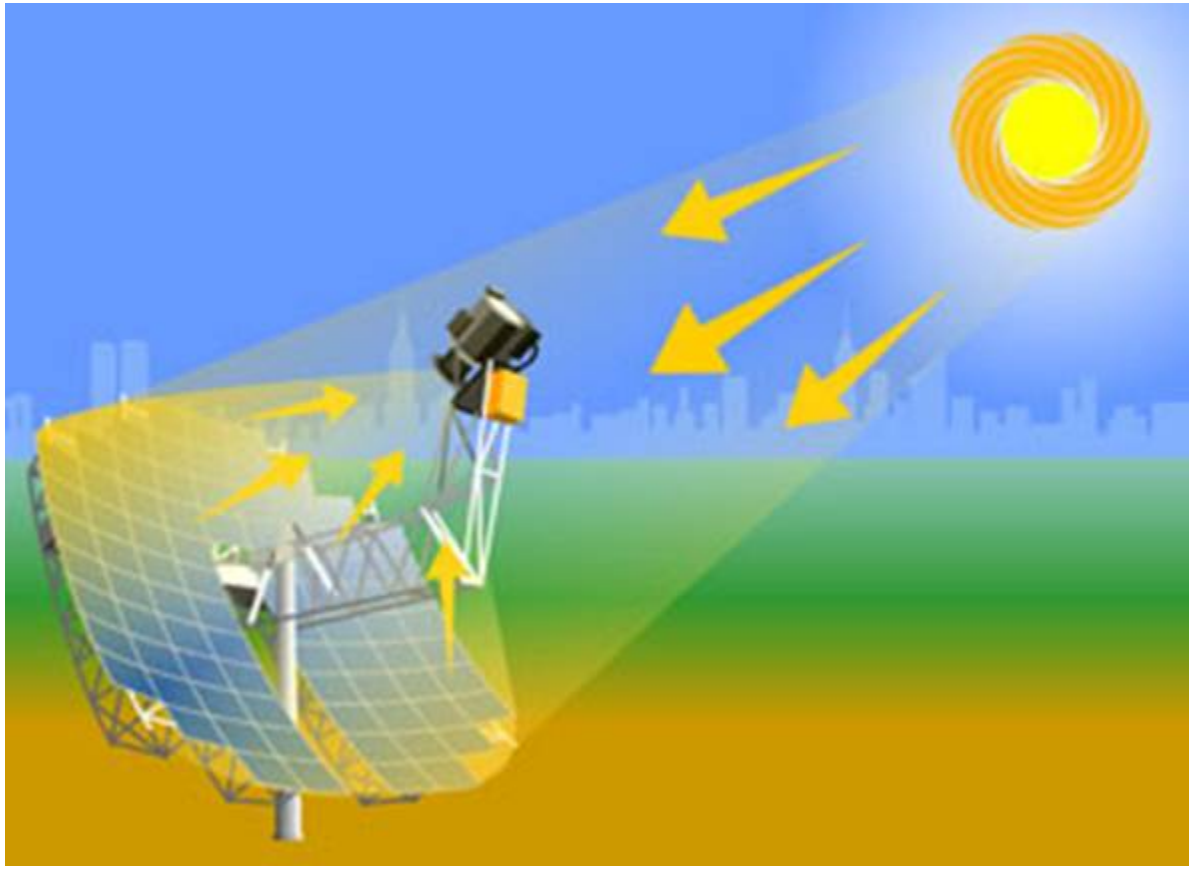
- **The system can be used in conjunction with a generator to produce electricity.**



- **In regions without power (such as remote areas or in underdeveloped nations), the system can operate mechanical devices.**
  - A fan can make a greenhouse into a convective greenhouse. This can be very important in farming regions that do not have electricity.
  - A solar powered pump can be used to pump drinking water.



Questions and Answers



-Design Team-

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-Faculty-

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