**Problem Definition:**
The goal of this project is to complete a proof of concept for a solar powered refrigeration compressor. This includes determining a system for the compressor to operate in and evaluating system feasibility. With this system, an adequate cooling effect is produced with minimal electrical energy input, allowing small standalone units to operate almost entirely off solar thermal energy. This new cycle could serve many markets, reducing the use of non-renewable energy sources and moving towards a sustainable future.

**Needs**
- Cooling Effect
- Minimal Energy Input
- Mechanically Driven Compressor
- Computer Modeling
- Prototype Data Acquisition
- Range of Operation

**Specifications**
- ½ ton cooling capacity
- Electric input to pump acceptable
- Driven by pressure differences
- Predict thermo system behavior
- Measure outlet pressures
- Boiler temperature 75º to 140º F
- Condenser temperature 50º to 75º F

**Project Motivation:**
According to the U.S. Department of Energy, about 20% of commercial and residential electricity use is for cooling and refrigeration. There is a clear need to move towards more sustainable practices and this system has boundless potential for applications:
- 3rd world refrigeration
- Produce transportation
- Residential AC and refrigeration
- Commercial AC and refrigeration
- Industrial machine cooling with waste heat

**Conclusions:**
- Thermodynamic proof of concept complete
- Prototype proof of concept complete
- System as a whole is feasible
- 80% theoretical reduction in electricity consumption (3/4 ton cooling capacity)
- System has potential for use in thousands of applications

**Recommendations:**
- Explore valve actuation
- Alter piston chamber sizes
- Complete heat exchanger analysis
- Build complete thermal system
- Understand system feasibility
- Determine experimental efficiency of system
- Continue project in Senior Capstone 2012

In picture above from the left:
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