

Solar Refrigeration Bihar, India

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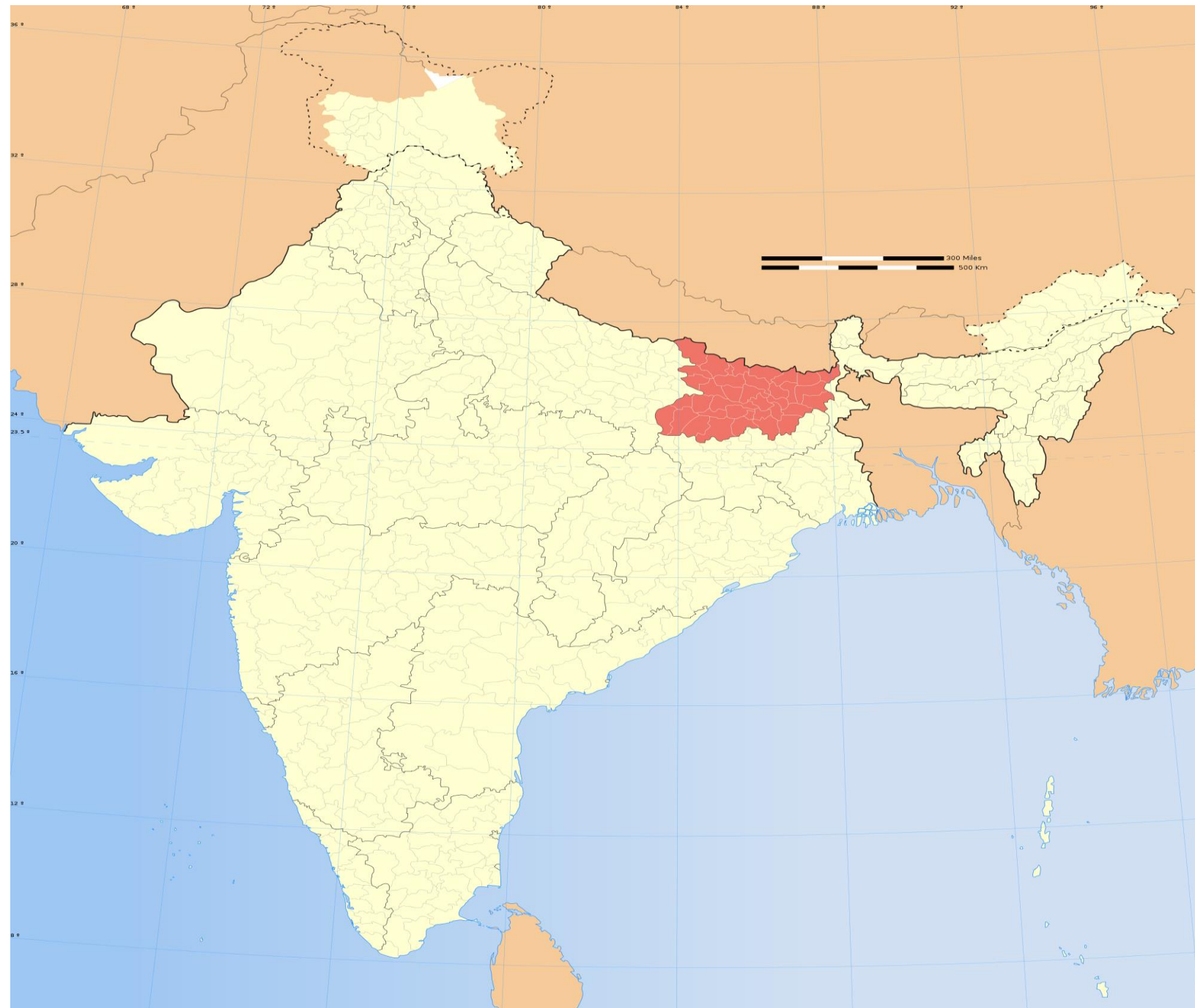
Engineering and Technical Opportunities of Service-Learning

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ETHOS

- Engineers in Technical Humanitarian Opportunities of Service-Learning
- Core values:
 - Appropriate Technology; Do more with less
 - Cultural Sensitivity; Respect the inherent values of the culture
 - Partnership; Spread hope
 - Cultural Immersion; Act in solidarity through service
 - Personal Transformation; Let the world change you

Where are we going?



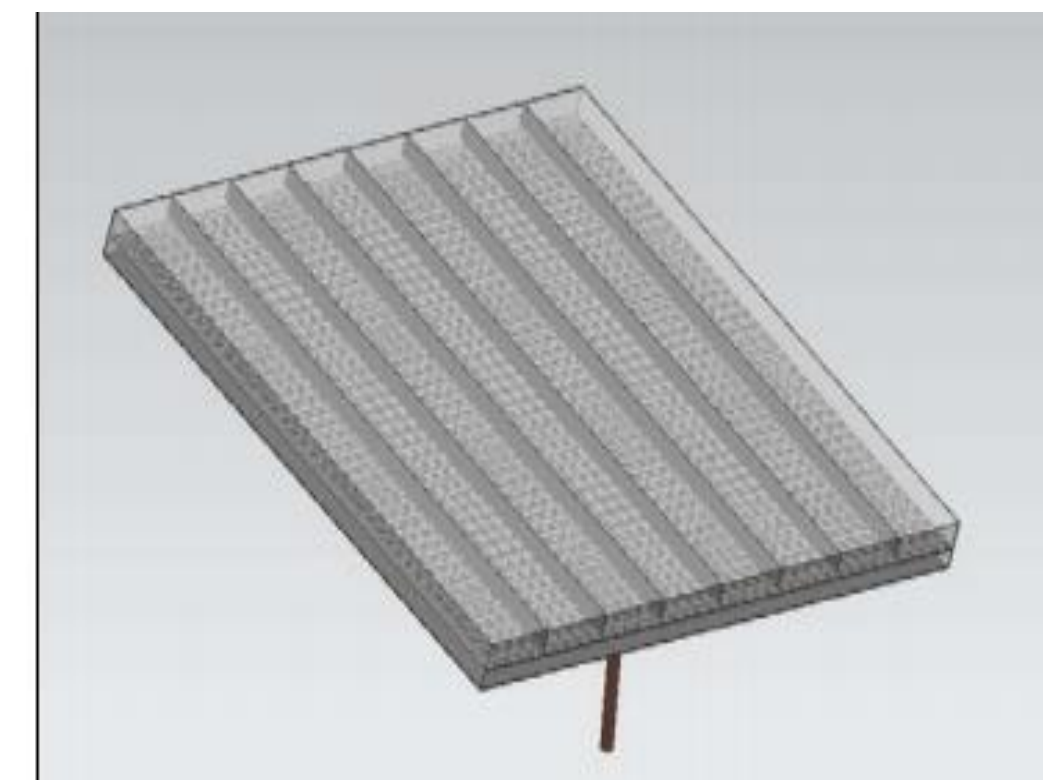
Place: Patna, Bihar, India
 Population: 1,683,200
 Time frame: May 19- July 28
 Hosting organization: Solar Alternatives and Associated Programs (SAAP)

Motivation

- Unreliable Energy distribution to different locations in India
- Need of constant refrigeration for medicine in hospitals and local pharmacies
- Sufficient Solar radiation in India
- Ethanol and charcoal (activate carbon) are non toxic and available resources
- Around 151 million vaccines (approx. \$750 million) go to waste each year due to improper refrigeration in developing countries

The system

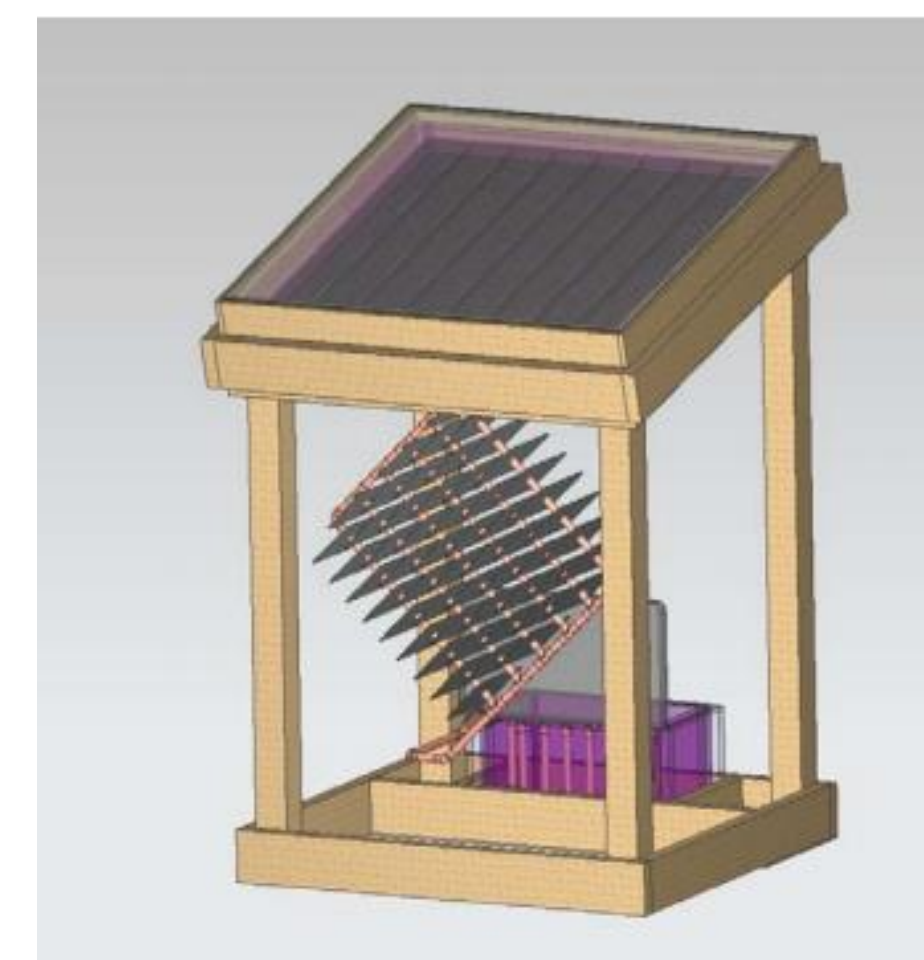
Solar collectors are placed in ideal locations to allow for activated carbon to heat up and adsorb the ethanol within the system.



The cooling/evaporation coils are placed inside a cooler, where it is able to achieve required medicinal temperatures



The final design is illustrated bellow, where the cooler is placed under the solar collector, and the cycle is able to continue under vacuum.



Past Work

- Research on vaccination storage
- Measure of loads
- Design of system
- Construction of system illustrated above
- Finding and sealing larger infiltration pathways
- Building relationships with the host organization

Current Problems

- System is not able to maintain pressure requirement for adsorption
- Fouling of the system prevents it from achieving higher efficiency

Goals

- To immerse within the culture
- To better understand the problems within the system and find ways to fix it
- To understand viability and requirements for a fully functioning system
- To compare existing system with a possible PV refrigeration system designed and sized this semester

Conclusion

With the availability of solar power already on-site a system to run a small refrigerator solely on solar power is planned to be tested.

Solar PV power has been becoming more accessible over the past years as it continues to develop and improve. With this in mind it seems that a project will be able to be completed in a timely manner without too many expenses due to the current solar PV power installed.

Below shows the a PV system designed to fit into a box next to a picture of the system being used to run a refrigerator.

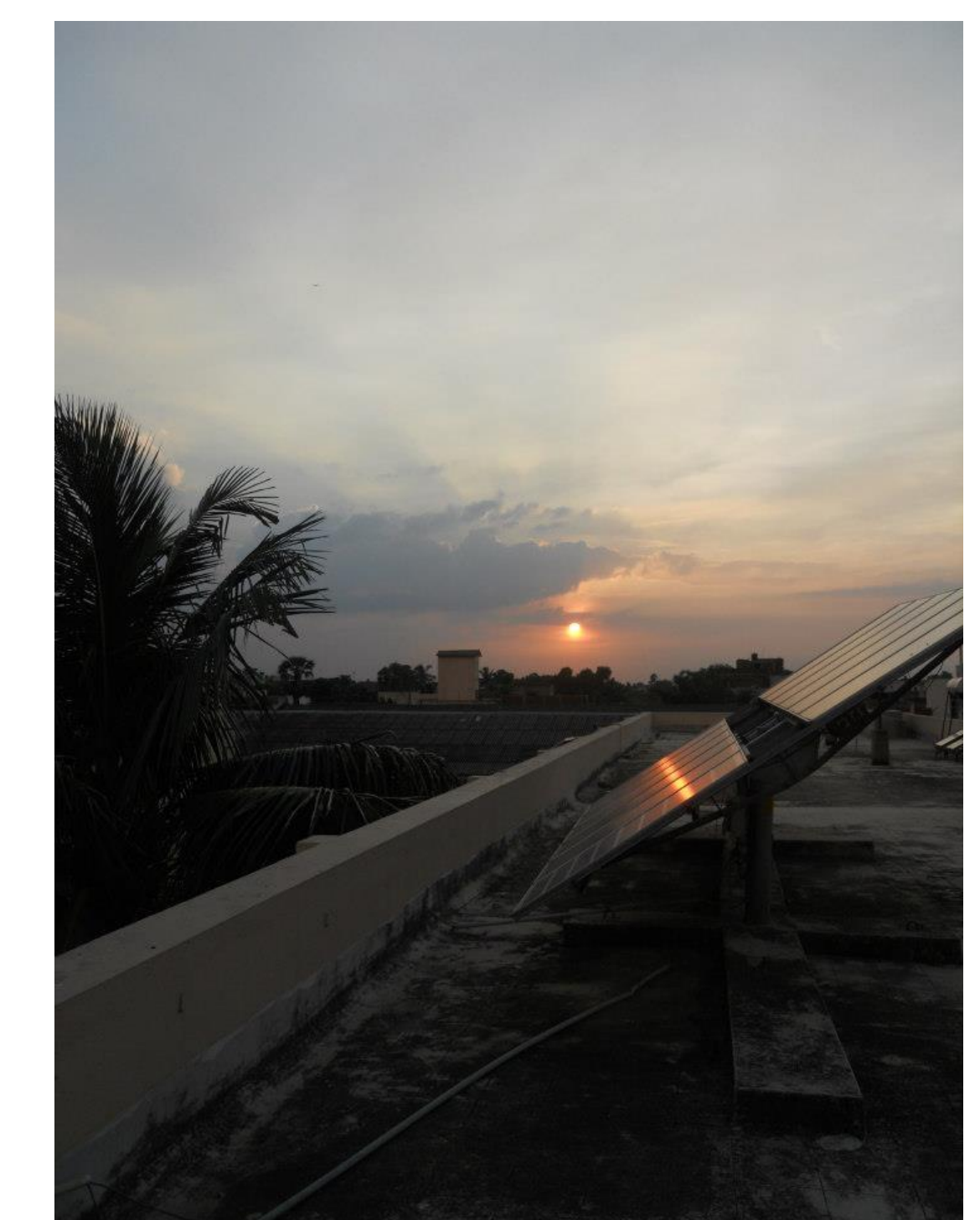


This Summer



We are planned to stay in Patna and Bangalore India for 10 weeks to experience a cultural immersion to be able to create more in-tune and applicable solutions for our host organizations.

The time will be spent first understanding the projects being worked on already and building relationships. Through that foundation, the theories formed in class will be able to be tested and implemented then onsite.



References

- http://orion.bme.columbia.edu/senior_design/13/koolinda/problem.html
- <http://en.wikipedia.org/wiki/Patna>
- Ethos immersion to Auroville, India in 2012