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No Electricity, No Problem

University of Dayton

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NEWS

Tuesday May 3, 2016

No Electricity, No Problem

University of Dayton engineering students won three awards at the USA Science and Engineering Festival in Washington, D.C., for a device they hope will one day operate without electricity and provide eco-friendly refrigeration in areas lacking reliable electricity or affordable solar power.

The team, supported by a U.S. Environmental Protection Agency People, Prosperity and the Planet (P3) grant, won the American Society of Civil Engineering's Sustainability Development Award, the Mid-Atlantic Solar Energy Society's Sustainability Energy Award and architecture and consulting firm organicARCHITECT's Vituvius for the team's Solar Thermal Adsorption Refrigerator.

The project started in 2012 with a University of Dayton Engineers in Technical Humanitarian Opportunities of Service-Learning (ETHOS) trip to Patna, India, searching for a way to refrigerate medications and vaccines because of the high rate of vaccine spoilage.

"The group's prototype model showed one successful replacement of a conventional fridge with this technology can achieve up to 22 tons of lifetime carbon dioxide emission reduction. That's equal to emissions from three typical U.S. households in a year," said Jun-Ki Choi, an assistant professor of mechanical engineering and an advisor to the group. "Even a small percentage of the proposed technology being adopted can significantly reduce environmental impacts worldwide."

To run the refrigerator without electricity, the group will need to perfect the adsorption process for ethanol vapor on charcoal and the cycle of evaporation where liquefied ethanol will continually remove heat from the fridge, thus keeping it cool. Adsorption is when chemicals adhere to the surface of a material, as opposed to absorption when chemicals soak into a material.

"This has been a huge collaboration among many students in ETHOS, the renewable and clean energy program and chemical engineering," said Amy Ciric, a senior lecturer in the chemical engineering department and an advisor with Choi. "Every one of them had a hand in earning these awards. We have been very fortunate to have many talented students take an interest in this project."

The current team — Amnah Altaher, Claudia Labrador Rached, Jack Schlueter, Katie Willard, Bjoern Winter and Matthew Worsham — is competing for a U.S. Environmental Protection Agency People, Prosperity and the Planet Phase II grant for up to \$75,000 for design and/or implementation of the project in the field.

Williard and Rached will be among a group traveling to India this summer to continue work with the Rev. Paul Mariadass, S.J., and Solar Alternatives and Associated Programmes.

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