Solar Powered Water Pasteurizer

Sponsor's Name: USDA CSREES – Higher Education Challenge Program
Sponsor's General Mission or Business Statement: The United States Department of Agriculture Cooperative States Research Education and Extension Service (USDA CSREES) provides agricultural information and assistance. The higher education challenge grant program provides innovative inquiry based undergraduate opportunities.
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Senior Design Clinic I-II (ENGR 480-1) Project Description: To provide safe drinking water to an average village family in Mali, Africa.

Major Design Requirements:

1. Provide clean water for average family.
2. Affordable.
3. Manufacturable in Mali.
4. Minimal user intervention.
5. Use renewable power.
6. Non-toxic.
7. Small and stationary.
8. Must function in a dusty environment.
9. Reliable and robust.
10. Culturally acceptable.

Senior Design Project Summary: Today, over one billion of the world's population does not have access to clean drinking water. A solar powered water pasteurizer has been designed to provide clean drinking water for an average Malian family. A study of solar heat transfer in conjunction with experimental optimization was applied to determine a prototype design, which was tested in Mali, West Africa. Our on-site experience and the completion of all post-Mali testing and analysis resulted in a successful final design, which meets the design requirements. Design highlights include a modified, commercial radiator valve for control and a pasteurizer structure that can be made of readily available materials. Technical work included design of experiments, CAD, heat transfer and thermodynamic analysis, extensive cost analysis, and significant material and manufacturability considerations. The design will be handed off to an entrepreneurial agri-business center in Mali, who will continue with the next stage of product development.

Left: Working prototype in Mali, West Africa.
Above: A CAD drawing of final design recommendation for water pasteurizer.