

Term UROP is offered: Fall/IAP/Spring  
UROP Department, Lab or Center: D-Lab  
MIT Faculty Supervisor Name: Eric Verploegen

**Project Title:** Modeling of Heat and Mass Transfer of Evaporative Cooling Devices for Improved Vegetable Storage in Low-Income Rural Communities

**Project Description:** We are looking for a student to help develop a heat and mass transfer model of low-cost evaporative cooling devices for improving vegetable storage in Africa and India. When affordable and effective post-harvest storage solutions are not available or affordable, people living in off-grid rural communities will often experience vegetable spoilage, loss of income, lack of access to nutritious foods, and large amounts of time spent purchasing vegetables. Evaporative cooling devices have the potential to provide a low-cost, local available, and effective solution for improving vegetable shelf life

The goal of the model is to identify how specific design variations impact the performance of the evaporative cooling devices and enable organizations that produce and promote these technologies to optimize designs for maximum performance and minimum cost. The combined heat and mass transfer model will be refined and validated with both experimental data that has been previously collected in Mali and experiments that will be conducted on campus during the semester.

The project will have potential follow-on travel opportunities in (Uganda, Kenya, or India) to test viable prototypes in the field, as well as to continue on the project for multiple semesters.

Interested candidates should email [ericv@mit.edu](mailto:ericv@mit.edu) with a brief explanation of why they are interested in this project and describe any relevant previous experience.

**Prerequisites:** Applicants should have an interest in practical solutions to global poverty challenges. A background in thermodynamics and heat transfer, and experience using Matlab is required. Experience with heat transfer modeling is preferred.

**Relevant URL:** <https://d-lab.mit.edu/research/food/evaporative-cooling-vegetable-preservation/performance-and-design-research>

**Contact:** Eric Verploegen ([ericv@mit.edu](mailto:ericv@mit.edu))

