



Opportunities for Cooper Union Student Projects in Guatemala in Summer 2024

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Strong Connection with Guatemala

- The Sisters of Charity of New York have served in Guatemala since 1971
- The ministries in Guatemala have partnered with US universities on engineering and medical projects and welcome partnership with Cooper Union
- Seven students had wonderful experiences in the summers of 2021-2023 doing projects that combined their expertise with the local needs





THE COOPER UNION

The Barbara Ford Peace Building Center

- Founded in 2009 in memory of Sister Barbara Ford, murdered in Guatemala City May 5th, 2001.
- www.cenpaz.org and <https://vimeo.com/489887446>
- 50-acre campus
 - Administrative buildings
 - Hotel
 - Restaurant
 - Farm
 - Eco-trail
- Three categories of programs
 - Health
 - Entrepreneurship
 - Human rights
- “Home base” for Cooper Union projects



Barbara Ford Center - Facilities

- Conference Center
 - 100-pers on conference room
 - Two meeting rooms for 10-15 people
- Offices in administration bldg.
- Restaurant
 - 100-person capacity
- Hotel with 60 beds
- Model farm
 - originally instituted by Save the Children to develop techniques for affordable small-scale agriculture to improve the diet of indigenous people in the surrounding area
- Beekeeping equipment



Historical Research Projects

- Research projects are based on the needs of the Center, which runs economic development projects, primarily for indigenous women
- EE, CE, and MechE majors all have found relevant projects



Barbara Ford Center - 2021 & '22 EE projects



- Power improvements for campus: Joya Debi (EE '23)
 - Several buildings spread across 50 acres
 - Tied to local grid but electricity is expensive and has periodic outages
- Solar power for entrepreneurship projects: Azra Rangwala (EE '24)
 - Women were provided sewing machines and taught to use them
 - Electricity cost in Guatemala is a high barrier



Joya Debi (EE '23) and the solar meter



Azra measuring voltage in a Guatemalan home



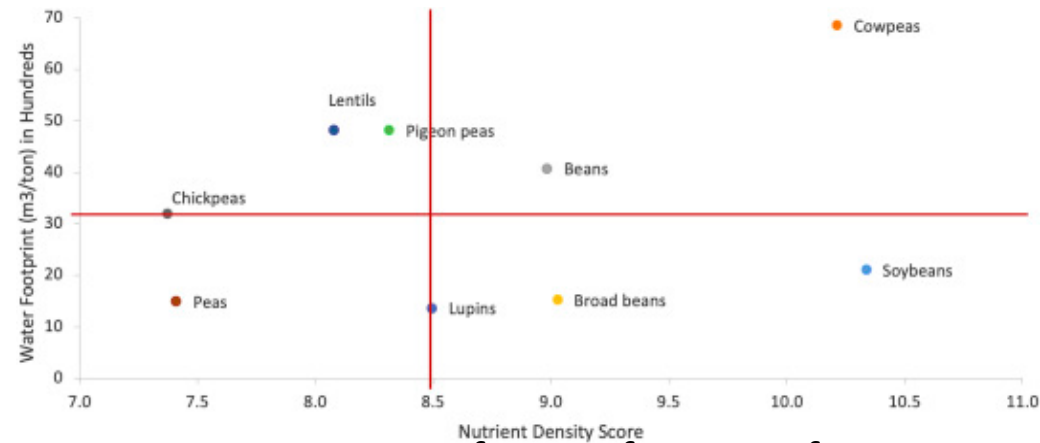
Joya measuring batteries at the Barbara Ford Center

Barbara Ford Center - 2023 EE project

- Off-grid irrigation system: Arav Sharma (EE '24)
 - Rural families suffer from malnutrition
 - Home gardens would improve nutrition, but water is scarce
 - Solution: gather rainwater and plant high-nutrition crops that require little water
 - Some fields are hard to access on steep mountainsides...they would benefit from an automated off-grid irrigation system

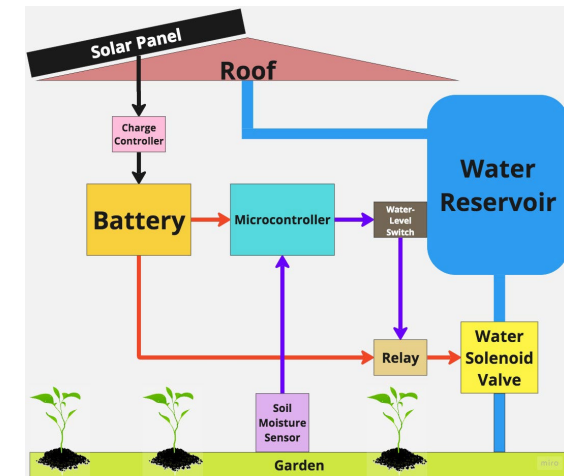


Rooftop rainwater collection system at the Barbara Ford Center



Nutrition as a function of water footprint for various vegetables

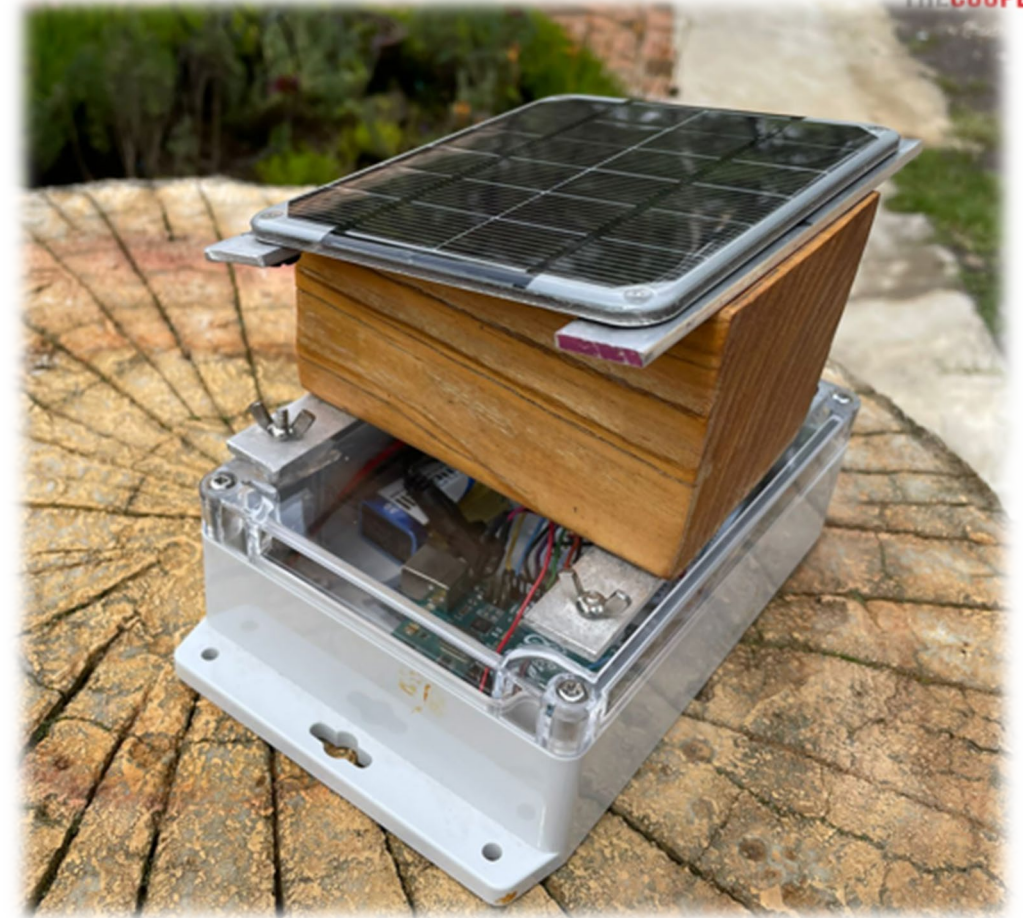
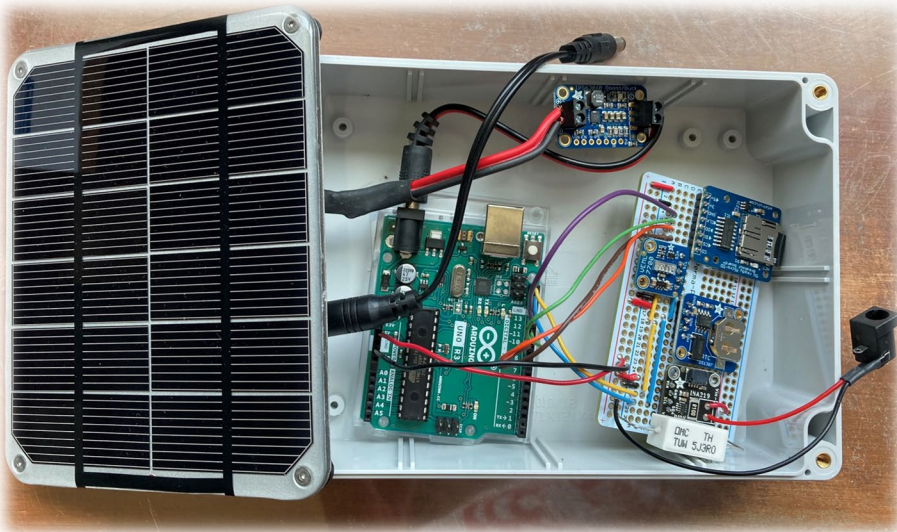
<https://www.sciencedirect.com/science/article/pii/S0959652619307450#:~:text=Of%20these%2C%20fruit%20and%20vegetables,density%20and%20low%20water%20footprint.>



Off-grid gravity-fed automated drip irrigation system design

Potential EE Project for Spring 2024

- Improved solar meter design
 - Used to determine local solar insolation levels
 - Two are in Guatemala, but had flaws
 - Features to add:
 - Water resistance
 - Wireless data downloads
 - Battery recharging



Barbara Ford Center- 2022 MechE project

- Chicken-raising entrepreneurship project: Ryan Chung (ME '24)
 - Local women were given materials to build coops and taught to raise chickens
 - Baby chicks need to be kept warm
 - High electricity cost for heat lamp: turning off heat lamp increases chick mortality
 - Ryan presented options:
 - Hot-water heating system
 - Better coop design



Barbara Ford Center-2022 CE project



- Water reduction and conservation: Jacob Krebs CE '24
 - Water pumps: largest source of electricity consumption
 - Jacob addressed this in two ways
 - Rainwater collection feasibility study
 - Improvement of irrigation plan



Possibility of Professional Conference Publication

- Azra, Ryan and Jacob all had their summer abroad papers accepted at the IEEE Global Humanitarian Technologies conference, <https://ieeeghtc.org/>

