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Sustainable Agriculture

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Sustainable Agriculture

Jacob Dean & Madalyn Heckman

Clients

The team serves both Sheltering Wings, an orphanage in Yako, Burkina Faso and Trans World Radio, a Christian radio ministry in Benin, Africa.



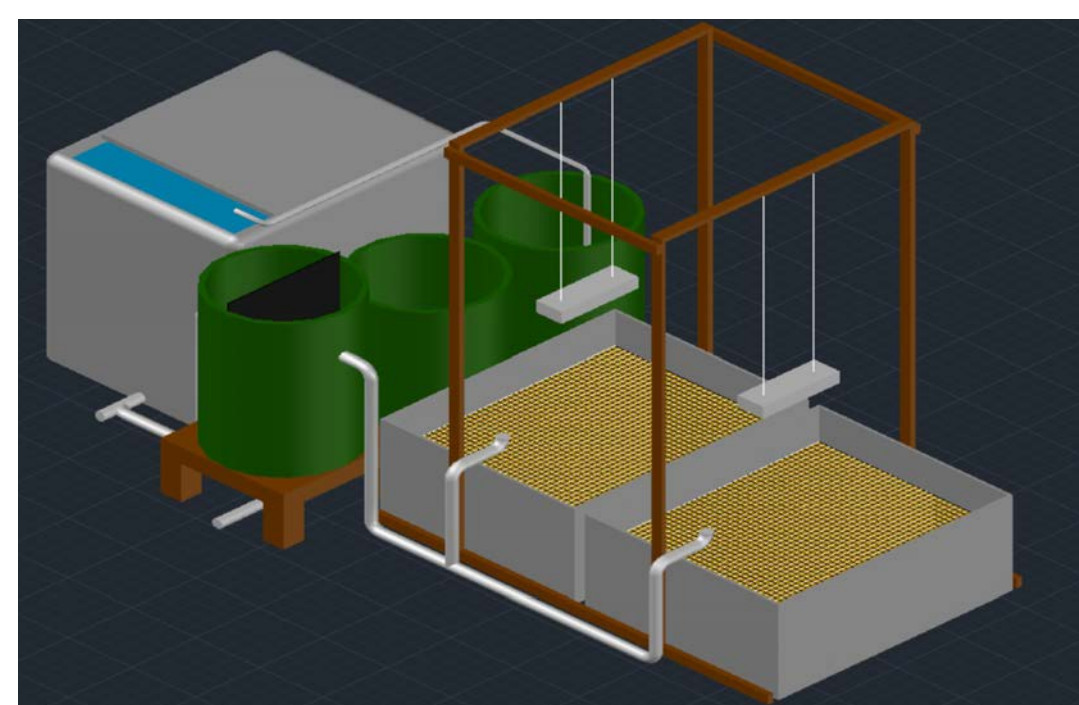
Amy Riddering from Sheltering Wings



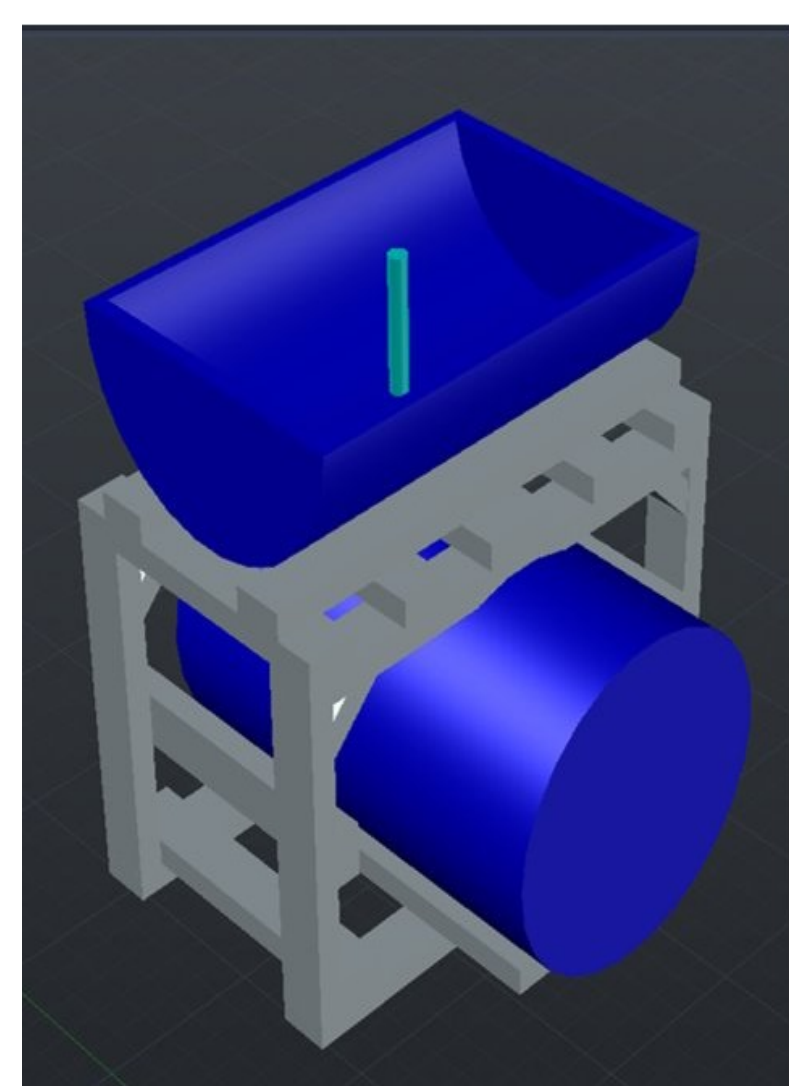
Garth Kennedy from TWR

Prototypes

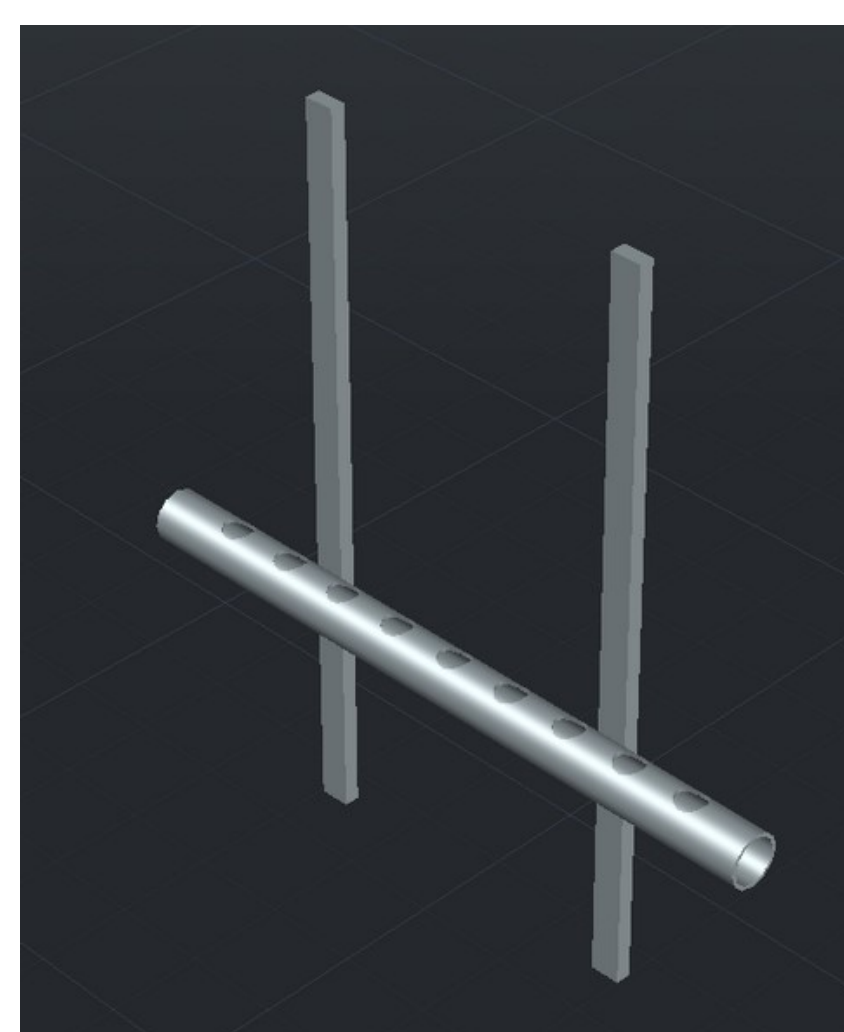
The team currently has three working prototypes at Messiah.



Constant Flow Prototype



Flood and Drain Prototype



Nutrient Film Technique Prototype

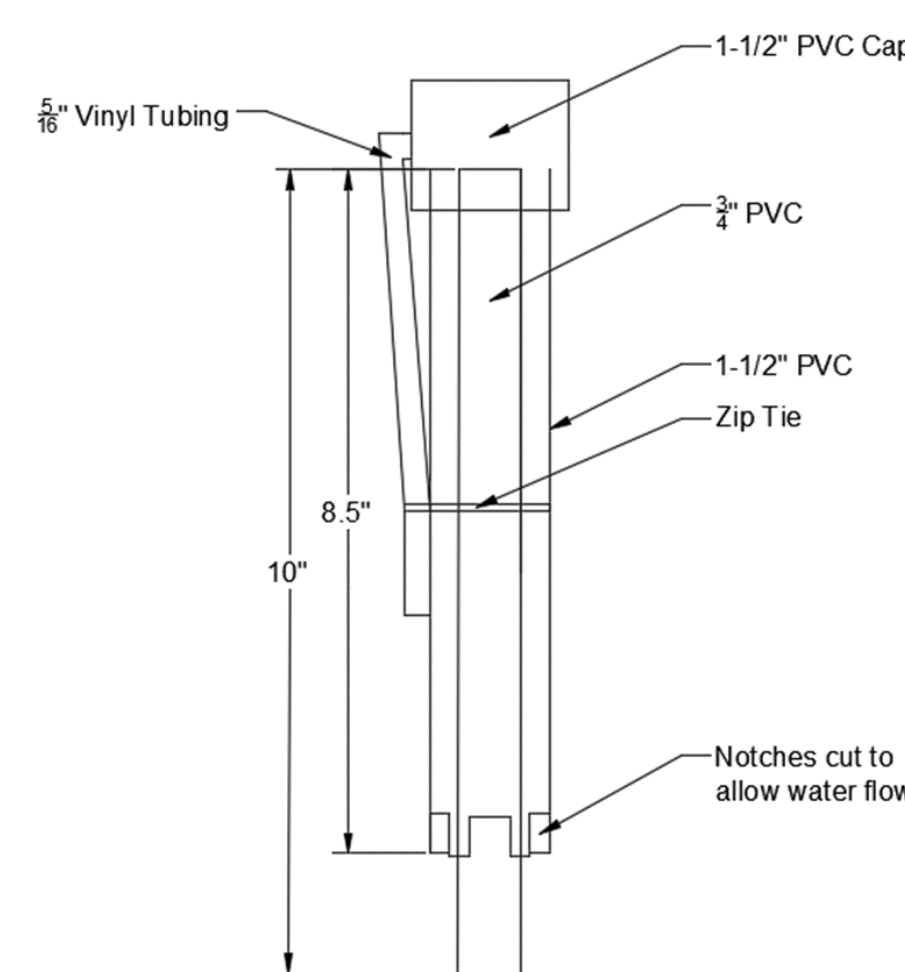
Problem Statement

The Sustainable Agriculture team works to design aquaponics systems which help communities struggling with malnutrition and infertile soil. This method of farming results in fresh produce and fish for the communities to enjoy.

Progress

This year, the team had the overarching goal of increasing the efficiency of aquaponics systems. This was done by implementing a flood and drain prototype which utilized a bell siphon in place of a second pump, thus decreasing the power consumption.

The team's client Garth Kennedy (TWR) installed this prototype in Benin, Africa to help the team collect real world data.



Bell Siphon Drawing



Bell Siphon Implementation

An additional way which the team increased the efficiency of the system was through eliminating the need for water quality testing. This was done by implementing a Nutrient Film Technique (NFT) prototype. The NFT grows small leafy plants quickly. The team has chosen to grow basil in this system, which is used as an indicator plant.



Nutrient Film Technique Implementation

Conclusion

This year, the goal of sustainability was achieved through reducing the power consumption of the system by eliminating a pump as well as increasing the efficiency of the system by installing an NFT with indicator plants which determine water quality.



The Sustainable Agriculture Team: (Left to right) Miggy Matanguian, Jacob Dean, Brandon Bickom, Micah Hess, Madalyn Heckman, Aleesa Wu

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- Engineering Department



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