



# Eco-Engineering: Greywater Recycling



## Background

Water shortage has been a long running issue in the state of California. Fortunately, most of our indoor water usage, such as that from faucets, showers, and washing machines, can be reused.

## Goal

Design a residential-scaled filtration system to store and re-use residential greywater and rainwater for irrigation purposes

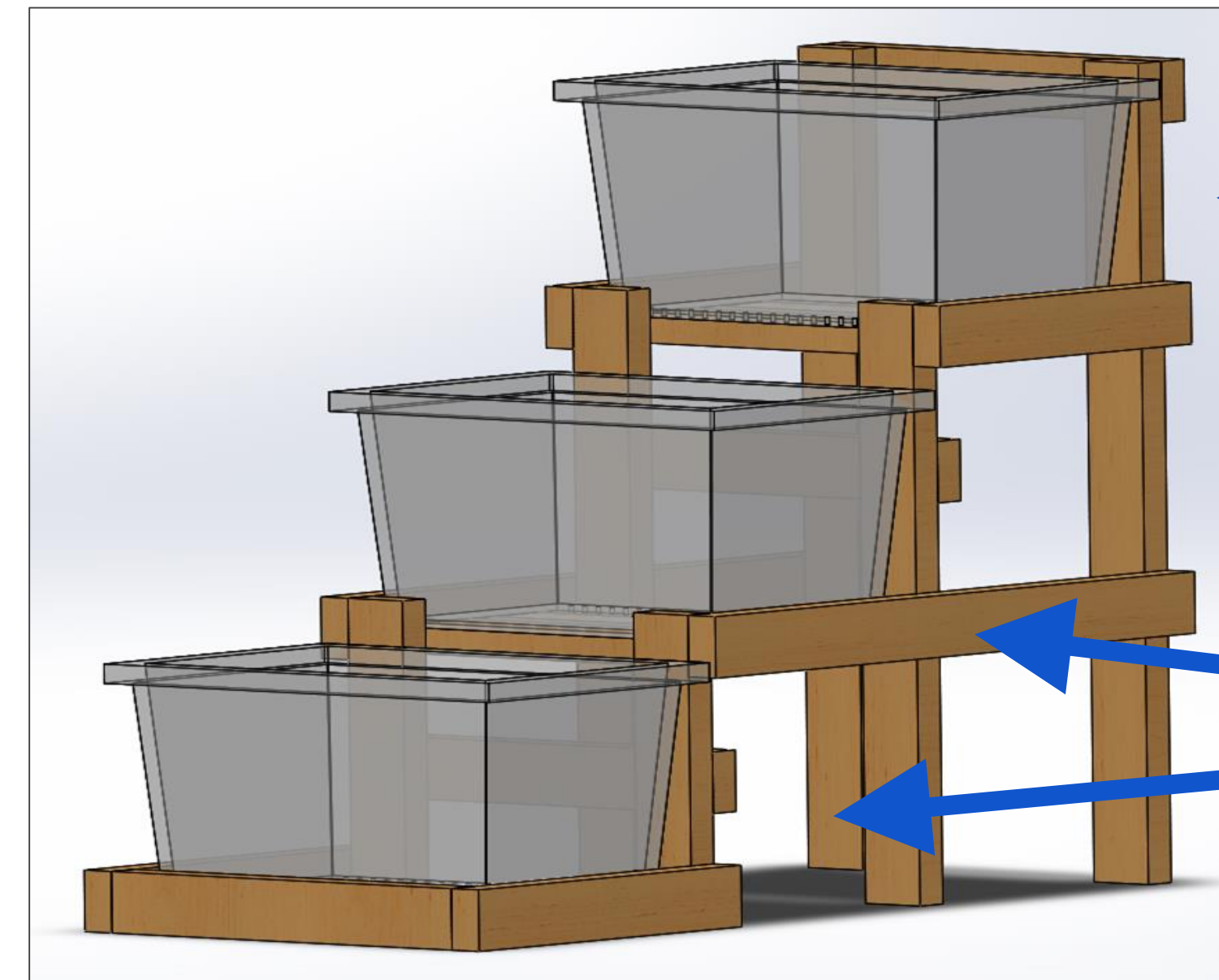
## Objectives

- Research, design and fabricate a working plant-based, outdoor filtration system that is self-sustainable, aesthetically pleasing, and easy to maintain.
- Ensure that the final product of the system is safe to use according to state water quality standards.
- Develop Arduino controlled system to monitor pH levels in the final product and redistribute water to appropriate locations.
- Implement the system into a house to conduct tests and analyze the effectiveness of the system.
- Treat water well enough so that it can be stored for long periods of time

## Water Usage Information

- CA household shower usage: 36 gal/day
- CA household faucet usage: 38 gal/day
- CA household indoor water usage: 150-300 gal/day
- 50-80% of indoor water usage comes from potential greywater sources

## Small-Scale Model

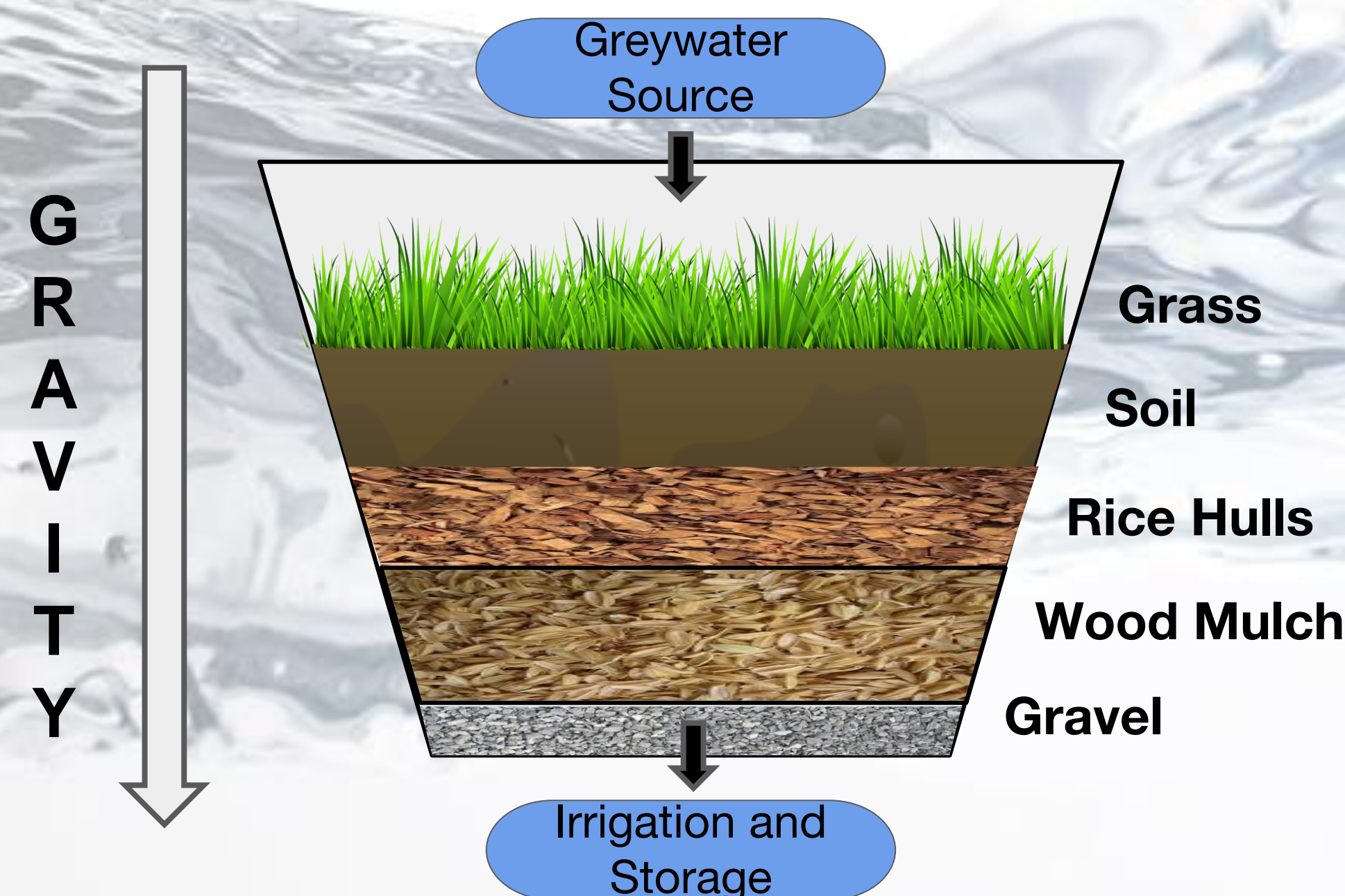


### Top Bin

- Plant (grass)
- Soil
- Wood Mulch
- Rice Hulls
- Gravel

### Middle/Bottom Bins

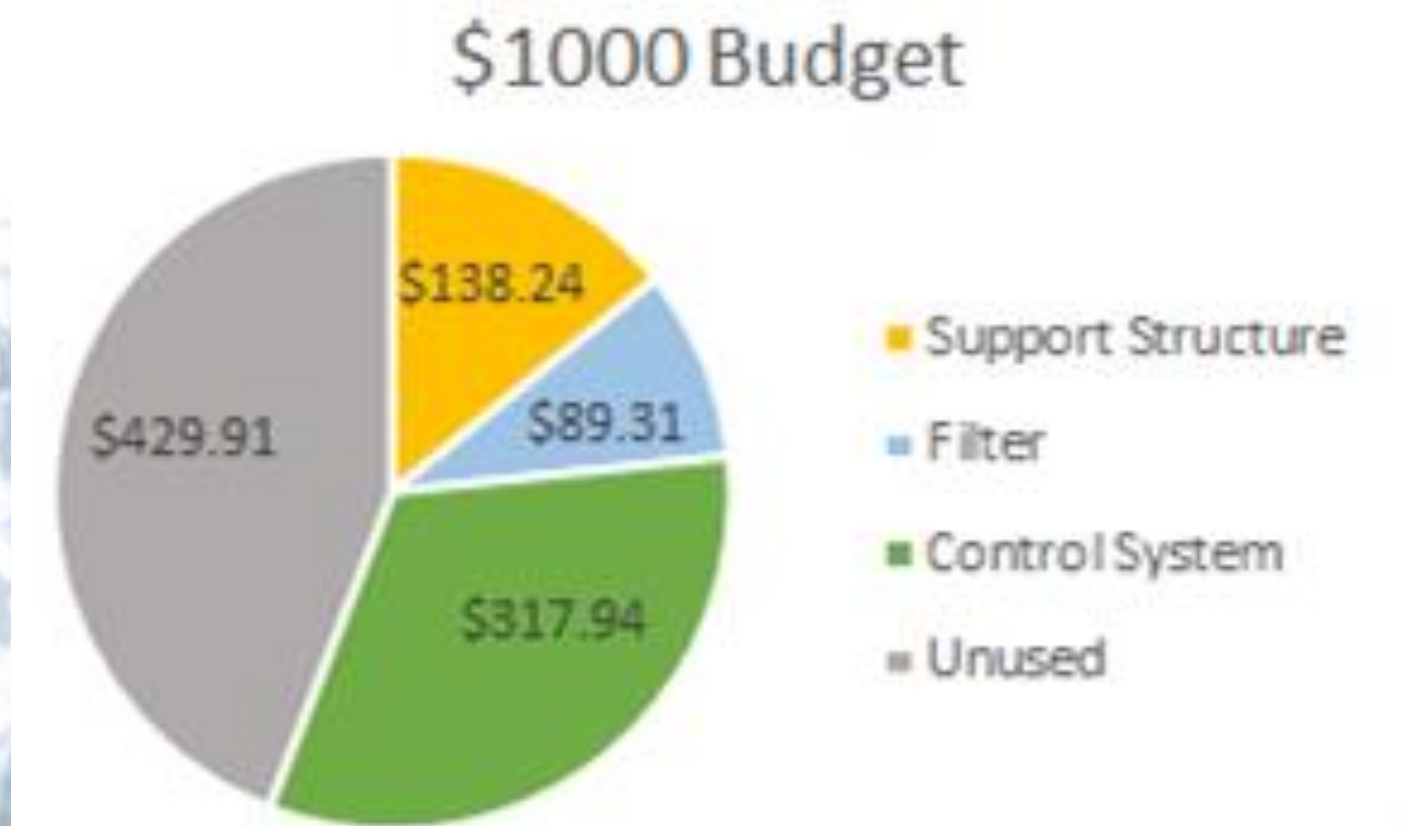
- Plant (grass, lavender)
- Soil and mulch



## Logistics

- How will it handle soap?
  - Some plants and dense filter media like sand can take care of soap
- How will it handle oil?
  - Wood mulch and earthworms living within soil have been known to eliminate oils
- How much water can it handle?
  - The small-scale model can filter 1-2 dozen gallons of water at a time. The full-scale model will take as much water as desired

## Budget



Currently under-budget. Future purchases include pumps, plants and piping.

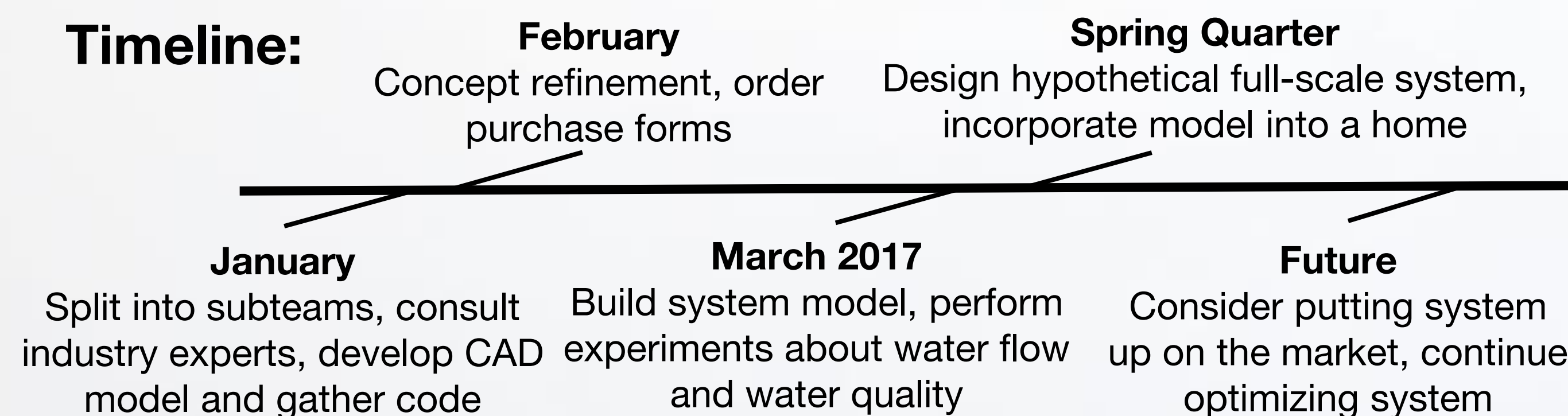
## Full-Scale Model

- Will incorporate pumps to get water from a home to the system
- Will include storage tank to store water until user wishes to use it
- Will exist primarily underground to take advantage of plants and large space
- Will be able to filter as much water as user desires
- Will use stored greywater for irrigation purposes

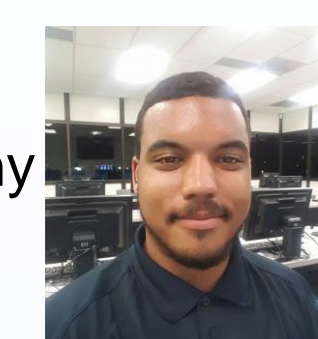
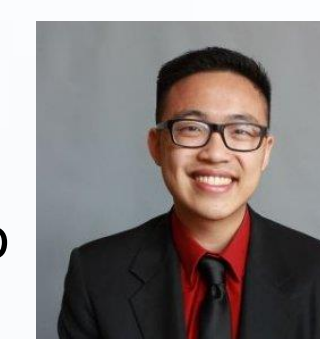
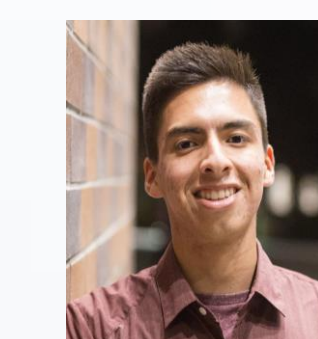
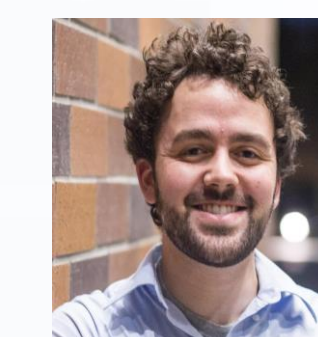
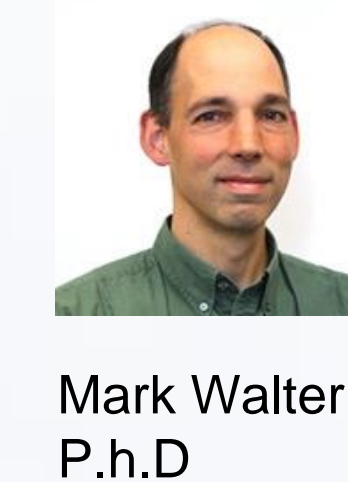
## What's next?

- Experiment with different filter media to optimize water quality
- Complete design of full-scale system
- Incorporate small-scale system into a home

## Timeline:



## Advisor



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