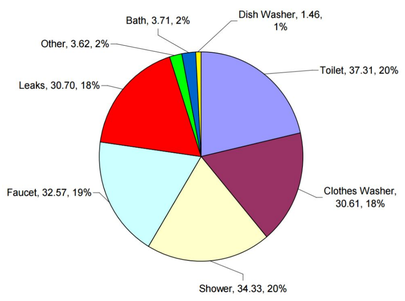
Eco-Engineering: Greywater Recycling

UCI Samueli School of Engineering

Background

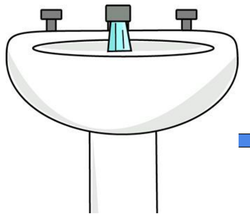
Water shortage has been a long running issue in the state of California. We are simply wasting too much water. Most of our water consumption come from toilets, showers, and sink faucets.

Water Usage per California Household (gphd, % total indoor use)

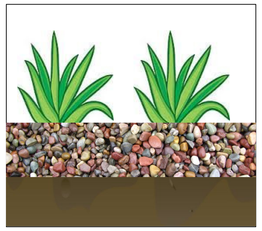


According to Water Research Foundation's Residential Uses of Water Executive report, Americans use 30 gallons of water in toilets, 28 gallons of water in showers, and 25 gallons of water in faucets per household every day. Currently in the market, there are no commercial systems that reclaim, filter, and reuse greywater.

1. Greywater Flows from Source

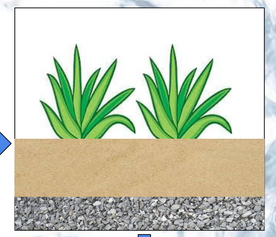


2. Rocky Soil Filtration



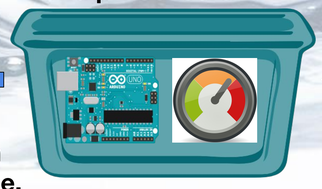
3. Grass and Plant Treatment

4. Sand and Gravel Filtration



5. Charcoal and Sand Treatment

6. Cistern 1 with Arduino and pH Sensors



7a. If water is "clean", pumped and stored in Cistern 2 for future use.

7b. If water is "dirty", pumped and relooped through system.

8. Cistern 2

Goal:

Research and design a residential scaled filtration and treatment system to re-use residential greywater and rain water for the purpose of irrigation

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.

Timeline

October 2016
Form group, establish goals and objectives, and start initial research

November 2016
Develop iterations of schematic to satisify specifications as well as prepare for first design review

December 2016
Fall Design Review
Finalize specifications and schematic drawing to prepare for next quarter

January 2017
Begin developing filtration, treatment and sensor system and conduct further research to improve the system

February 2017
Conduct tests of system in lab before implementing into house. Make adjustments and improvements accordingly.

March 2017
Winter Design Review
Display current system and assess observations, analysis, and difficulties

April 2017
Implement system into house and analyze performance

Future
If design yields successful results, possibly introduce to the market. If not, continue research and design

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