jfg98

Juan Guzman's Individual Contribution Page

Fall 2015

This was my first semester on AguaClara and I was placed on the ram pump subteam. My two teammates and I spent a good portion of the semester understanding the complexities of the pump. Once we had a greater understanding of the mechanism by which it functioned and the physics that governed it, we began to test the effect of springs of different lengths and constants on the efficiency of the pump. We were able to confirm the findings from the previous semester's team, chiefly that the pump would only function for a specific range of governing spring forces (the spring stiffness constant, k, multiplied by the distance that the spring was compressed.

Winter 2015-16

In January of 2016, before beginning this semester, I traveled to Honduras with 20 or so other AguaClara team members to tour AguaClara plants in Honduras and gain a more thorough understanding and appreciation for AguaClara's mission and method of operation. While there, I worked with team member Priya Aggarwal to fix existing broken ram pumps within plants, and occasionally fabricate entirely new pumps from whatever we could scavenge from local hardware stores.

Spring 2016

Continuing with the ram pump team, this semester I worked to redesign and refabricate the ram pump to make the system self-contained. Previously, the water that was required to drive the pump but that was not actually pumped (called 'unpumped water') would simply be ejected into the air. The previous design required a concrete box to be placed around the ram pump to capture the ejected water, since it was clean and treated, and therefore very valuable. After many iterations and designs, My team member and I constructed and begun to test a new, enclosed ram pump which can be placed in line with vertical pipe, in which the unpumped water simply continues its route through the pipe.

Summer 2016

I stayed on with the team this summer, working on a new, exciting project to downscale an AguaClara plant to make the technology affordable for small towns. The goal was to fabricate a 1 liter per second (LPS) plant in its entirety from raw materials: primarily PVC. Working full time with between 4-6 other students over the course of the summer, we were able to complete the entrance tank, chemical dosing unit, flocculator, and sedimentation tank. While we did not have time to construct a filter, coagulation followed by flocculation, sedimentation, and disinfection is capable of producing potable water from low turbidity sources, so the plant was shipped to Honduras at the end of the summer for testing in the field. The plant consistently produces low turbidity, chlorinated effluent and has is considered a success to the point that Agua Para el Pueblo, AguaClara's partner organization in Honduras, is setting up a shop to begin local production of these 1 LPS plants (to begin in the Summer of 2017).

Fall 2016

This was my first semester being a research advisor. I advised two subteams: Ram Pump and 1 LPS fabrication. Being a research advisor is very different from being a team member, and both my knowledge of the teams I was advising and my leadership skills increased by leaps and bounds through this new perspective. I was the resident expert on the ram pump and fabricating the 1 LPS plant due to my prior experience, and my task was to communicate and pass on my knowledge and experience. It took time and practice for me to figure out the best way to disseminate knowledge and explain why and how things worked to new team members, though by the end of the semester I felt I had improved vastly in that respect, and the teams were functioning far more smoothly.

Spring 2017

Currently I remain the advisor to the Ram Pump subteam, and I am also on the Enclosed Stacked Rapid Sand Filter (EStaRS) subteam. The current challenge with the EStaRS is making it short enough to be used in series with the 1 LPS plant. The Fall 2016 EStaRS team created a design that would lower the depth of the sand beds in the filter to accommodate this new height constraint, and also switched the piping connecting the entrance and exit tanks to the filter from flexible to rigid tubing. This semester we are working to fabricate the EStaRS filter. We have also made edits to the design, including increasing the diameter of the piping to reduce headloss and ensure an equal flow distribution to each of the sand beds.