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Theresa Chu's Individual Contributions Page

Fall 2016 Contributions

As part of the StaRS Filter Theory team, I am developing a mathematical model to explain filtration and write a paper on our results. In describing granular media filtration, a capillary model was developed, where sand pores were aggregated as many capillary tubes running down the length of the filter. I am creating the washer model, the next iteration of the model, where particle capture is pictured as "washers" of flocs at pore constrictions.

Spring 2016 Contributions

I continued my work on the StaRS Filter Theory team to reach our goal of creating a mathematical model. I designed a tube flocculator to facilitate creating small flocs similar to the influent water in AguaClara plants. Additionally, I advised the High Rate Sedimentation - Plate Settler and Rapid Mix Contact Chamber team. As team lead, I created and organized training sessions for the team to advance AguaClara's research.

Fall 2015 Contributions

As team lead, I worked with the StaRS Filter Theory team and advised the Spectrophotometer and Floc Hopper Probe teams. As part of the StaRS Filter Theory team, I designed a filter system that implemented the new injection system. I measured the filtration performance based on head loss and effluent turbidity. I also worked with PID control to create a constant influent turbidity.

Spring 2015 Contributions

I was a member of the StaRS Filter Theory team. I designed and built an apparatus to test whether slotted pipes clog at certain turbidities and coagulant dosages, as well as wrote a new Process Controller method file to run experiments. I ran several experiments that caused the slotted pipes to clog, analyzed head loss data, and defined failure points for slotted pipes. My data analysis was used to determine what conditions caused slots in the pipes to clog.

Fall 2014 Contributions

I continued my work on the StaRS Filter Theory team. I analyzed the data from Spring 2014 and designed experiments to test hypotheses concerning the head loss and geometry of the stacked rapid sand filter. I also rebuilt the experimental apparatus and ran experiments testing whether there was significant head loss across the mesh of the inlet and exit pipes to the filter. I analyzed the head loss data from these experiments.

Spring 2014 Contributions

I volunteered for the StaRS Filter Theory team by explaining the theory and lab setup to the other team members. We continued the work from Fall 2014 in running experiments and collecting data to create a mathematical model of the stacked rapid sand filter and discovering what inputs will change effluent turbidity and head loss.

Fall 2013 Contributions

I was a member of the StaRS Filter Theory team. We redesigned and built the filter apparatus so that it better represents the stacked rapid sand filter. Several issues in designing the experimental apparatus included keeping influent turbidity constant and reducing coagulant loss. We implemented and tested PID control so that influent turbidity stayed at a constant value and I monitored influent turbidity and clay pump control to test whether PID control was effective. I created part of the Process Controller method file to run experiments efficiently. I also compiled and analyzed data on effluent turbidity and head loss to evaluate filter performance.

In addition, I helped put together parts of the small scale plant model, which has been used for publicity and demonstrations.

Summer 2013 Contributions

I was a member of the Surface vs. Subsurface Filtration team. I ran experiments testing the different variables that cause clogging of the subsurface injection filter as well as measured the effect on effluent turbidity and head loss. The stacked rapid sand filter was compared to the conventional downflow rapid sand filter and the performance data was analyzed. I also modified the experimental apparatus and Process Controller method file as necessary.

Spring 2013 Contributions

I was a member of the Small Scale Plant Model team. We planned to build a model of a water filtration plant that will be built to scale within the dimensions of a carry-on suitcase and will be used for educating others and encouraging donations to the AguaClara team. This semester, I used the software Rhinoceros to lay out individual plant pieces in order to have templates ready for laser cutting the pieces, saved these pieces in usable AutoCAD drawing files, and researched laser cutting, Plexiglas, and other materials for building the final model. I also worked on the beginning of the construction of the mock-up model.