Interview with Sarah Brownell

P21652

08/26

**Previously planned Questions**

* Sarah Brownell
  + Is there a specific type of concrete that is desired (fine aggregate or no aggregate)?
    - Fine aggregate, sand for this to work. Mostly for prototyping instead of production.
    - Molds aren’t cheap so the concrete could be a better option to make molds.
    - Silicon is not good for objects are are larger that a foot
  + What kind of bag of concrete? 80lbs? 10lbs? What concrete capacity is desired? One full bag is very vague and leaves a lot of leeway.
    - Sarah can provide the volume
    - We don’t use a full bag to print to arborlieu or toilet.
    - 80lbs bag is plenty
  + Elaborate on the strength requirement of the concrete prints. How would this be substantiated? Keep in mind that there will be different strengths based on the axis that is considered. (With FDM printing the X and Y axis have the greatest strength while the Z will have the least strength due to layer adhesion limitations)
    - Standard concrete - no rebar or anything, using the orange compression cylinders (?), test our recipe vs standard concrete
    - For tension testing, they’ve done it in mechanical engineering labs
  + Have any requirements or expectations changed upon seeing the work that the previous MSD team did? What has changed and why?
    - In their final documentation page, most of that is solid advice/notes
  + Who do we approach for more funding if that becomes necessary?
    - Can always reach out to try and get donations, can also put a request in with MSD office for an increased budget (usually at the end of MSD I, can see clearly if budget needs to be increased or not)
  + Ideally when would this project be completed? Certainly we have a lot of work ahead of us and it remains to be seen if this project will need to be completed by another subsequent team.
    - Probably can finish, previous team would’ve completed z-axis but covid
  + When it says “0.5” accuracy” does that mean ±0.25” or ±0.5” tolerancing?
    - Originally thinking that its ± 0.5 inches, if can do better great
  + Where would this printer end up being installed upon completion?
    - Guess we need to keep thinking about, talk to Concrete lab (they’re interested in it), can be stored in the Construct and moved around (storage volume)
    - Maker space may be used as storage space as well

* MSD students that need concrete prototyping
  + What nozzle geometries would be beneficial to MSD students? (Desired State/What Question)
    - Possibly have smoothing feature, generally desired
    - Another group was 3D printing nozzles to see which works best
  + What kind of geometries will the students be expecting to print with the printer? Will there be any overhangs or complex internal geometries? (Key Goals/What Question)
    - Using it with molds/sand to assist with overhangs and support material
    - Might be able to use sand as a mold for geometries. In Haiti used sand and plastic wrap to prototype(all by hand).
  + How often will this be used, will it be fully assembled most of the time or will it be used only in spring semester? (Desired State/How Question)
    - Disassembled most of the time and used for a month or two before going back into storage
  + Accessible Toilet Team: What features would you desire in a Concrete 3D printer? (Desired State/What Question)
    - Overhangs (unsure if able to do), dimensions (how thin do/can we go)
* The Past Team (P20652)
  + The final report mentions the .5” nozzles did not work with the current concrete. What was happening when these nozzles failed? (Current State/What Question)
  + What concrete solution was used when testing and developing the auger versions? (Current State/What Question)
  + Why did the previous team select to use Sakrete S-type Concrete mortar mixture? (Current State/Why Question)

**Other information**

* Chemical Engineer might join us!!!!
* Being able to print house in 3rd world countries would make a huge impact
* Concrete can generate a ton of heat which can lead to greenhouse gasses
* “Bio char” can be added to cement to make it weigh less
  + More carbon neutral
* Deliverable:
  + dry faster-mixture
* Noozles
  + A group was 3d printing nozzles elsewhere
  + Other msd teams can 3d print nozzles and use them with our already made printer
* Testing process
  + Compression like normal
  + Tension in the Chem lab(?)
* Typical use is 24hr (i believe mentioned somewhere in PRP), by MSD students
* Assembly/Disassembly
  + It might be out for a few days
  + Then stored for a few weeks
* Budget
  + We can apply to get more money from MSD
  + Always welcome to ask for donations for companies
* Recipe
  + Did not add gravel
  + What about string from plastic
  + Only tested basic recipes provided on the concrete bags
  + Arborloo did have some concrete testing with materials commonly found in Haiti including coconut fibers
  + Pumice was used in Nicaragua bc they have a lot of volcanoes and they were for roof tiles.
* Another stakeholder might be the art students
  + clay / pottery
  + Plaster
* Goal make cement more green
* A foot on the nozzle to reduce bubbles and smooth surfaces