Project Recap & Planning
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Recap

The project is to create a decent-sized mashup of the Bellagio Hotel from Las Vegas and a generic water pump speaker. It will serve as a music visualizer, using water pumps and LEDs synced to the beat of a song. The song is analyzed in real-time.

What was done?

During the latter half of the previous semester:

- Acquired water pumps designed for aquariums to be the fountains. The pump outlet was fitted with a length of tubing that it came with—this is so the water can be directed towards the center of the tank.
- Designed the pump control PCB. Each pump is controlled by a simple circuit and is replicated on a board 12 times for a total of 12 pumps.
- Acquired the trays that are to be the encapsulation of the water show.
- Acquired parts to complete the pump PCB once it is received—SMDs, soldering materials, wires, etc.

Over the summer, the following items were achieved:

- Soldered and tested (using LEDs) the pump PCB.
- Acquired the LED strip to accentuate the fountains. Also began programming the LED strip to fade-in/fade-out. Every time it fades in, it will fade into a new color. The color pattern is supposed to be random, but it instead repeats the same color pattern every time it's restarted.
- Laser cut 2 of the 3 trays: the tray for the pool area, where the pump wires are filtering out from, and the stage area. The pool area only has a small hole about an inch wide in the center while the stage area has the entire bottom cut out. A third tray was also scheduled to be cut, but when the stage area came out, it was slightly off center and had a larger lip than anticipated. The decision was made to hold off on it until exact measurements could be taken to avoid messing up and having to order more trays down the road.
- Attached 12 pumps to the pool area using industrial-grade, waterproof adhesive and fed the wires through the center hole. Sealed the hole with a lot of silicone.
- Decided to use the Arduino UNO as the main microcontroller for everything instead of the STM Discovery board.

Plans for the Semester

The first thing to do is finish as much of the physical assembly as possible by the end of September. Once the majority of the encapsulation is finished, it will likely reduce the stress of having to figure how everything will tie together at the last minute. In October, focus completely on programming and debugging. In November, testing.

Timeline (Hopefully)

Week of 08/21 - 08/25

- (**DONE**) Cut the LED strip to fit the inside diameter of the trays and seal the end with electrical-grade silicone sealant to prevent water from getting in and damaging the circuit. Highly unlikely with how the water is supposed to fall away from the strip, but better safe than sorry.
- (**DONE**) Use the Dremel to sand off the leftover lip on the stage.

Week of 08/28 - 09/01

- (**DONE**) Drill holes into the tray mentioned above with the Dremel for the tubes. Laser-cut is easier, but Dremel allows for the holes to be at an angle and makes it easier to direct the water inward.
- (**DONE**) Laser-cut the third tray for the tube holes and hole where the water falls back into. To do so means to get the outside diameter of the tubes, the total distance from the tray wall to the edge of the tube + a few millimeters (give room for some error). When doing the actual cutting, run several test passes of the cut to make sure it's as exact as possible. Add a piece of paper on the tray so the laser point can be seen better. If necessary, use Dremel to refine anything that might not look right.

Week of 09/04 - 09/08

- Presentations…
- (**DONE**) Obtain 3D-printing material.
- (**In progress**) Build CAD model of encapsulation of the trays + service box + speakers—trays first.
  - Initial thoughts include taking several pieces of square acrylic and cutting them to form a box that the encapsulation would sit on. 3D-printing allows for something more custom-made and probably a much better finish.
  - Likely will need 4 prints due to size: trays, ½ of the service box + 1 speaker, other ½ of the service box + other speaker, and lid for the service box.

Week of 09/11 - 09/15

- Finish CAD model of the tray stand—model will include the stand area underneath the trays to give room for wires to be fished through. Will also need to add a finger-joint connection for the service box

(thus eliminating the need for screws).

- Start CAD model of the service box.
  - Concurrently 3D-print the tray stand and test. Make modifications as necessary.
  - Will need to figure out how to finger-join the floor of the three pieces.

Week of 09/18 - 09/22

- Print service box and test. Make modifications as necessary.
- Assemble the stand and insert the trays.
- After assembly, start connecting components together. Should probably test components individually to make sure everything works still before moving forward.

Week of 09/25 - 09/30

- Programming, start!
  - PWM for the pumps
  - FFT on audio input—also figure out if Arduino UNO has the power to do real-time FFT (does not have floating-point arithmetic support.
  - Receiving audio input