EE/CprE/SE 491 - sdmay19-31:
Multi-Purpose Automated Robotic Mixer (mpARM)
Week 14 Report
March 10– March 22
Client: Alexander Stoytchev/Brett Altena
Faculty Advisor: Alexander Stoytchev

Team Members

Drew Caneff — *3D Printer Specialist/CAD Designer/Accountant*
Amos Hunter — *Electromechanical Specialist/Meeting Scribe*
Brett Altena — *Meeting Facilitator/ Computer Vision Developer*
Kristian Wadolowski — *Report manager/Front-end programmer/Computer vision Developer*
Jase Grant — *Embedded Systems/ Assignment Manager*

Summary of Progress this Report

- **FPGA-** Searching the internet for tutorials on how to do this in python.
  looking in to see if I can still make a pipeline and use the python code for the FPGA instead of having to use the PYNQ framework.
  PYNQ framework is all in python and I know some python, but not enough to do this.
  Was able to find a way that might be possible to use the pipeline and the python code.
  Since I was able to find some library's for the python the chances of actually doing this is a lot better, but is still very slow going.
- **Arm-** Before the arm could finally be tested and programmed, it had to be wired and secured to the base. This task consumed a much larger amount of time than had initially been anticipated. Two trips to the hardware store were taken to acquire the properly sized screws for anchoring the arm to the plywood base, the second trip was the fault of inadequate measuring on my part, which led to the first set of screws being too large. Next the wiring of the arm had to be completed. Wiring the Arduino to the PCB was simple, but time consuming. Wiring the PCB to the arm required more work, as several motor wires were bare and could not be connected in that state. Several hours were spent soldering wire extensions and connectors to the motor wires. This was successful, and the arm was finally ready for testing.
  Contemplated various ways to more securely attach articulation 5/6 to rest of robot arm. Found two potential solutions with both positive and negatives. Presented these two solutions to group during Fridays meeting where I explained the pros and cons of each. In the end the group decided to pursue a design similar to the original THOR arm design with some modifications. This solution will provide more degrees of articulation than the other solution which is why it was considered to be the better of the two solutions. The other solution would have secured the articulation better, but it was determined that both will be sufficient solutions for fixing the articulation to the rest of the arm
- **Computer vision-** I worked on the code by increasing and decreasing the size of the bubbles/ contours the algorithms looked for. This gave a better impression on which technique is more reliable and how to rule out more false positives and false negatives. Overall, on a scale of very small (a few pixels), small, medium, large, extra large, extreme (pancake size), the size range that looked the most promising was medium to large. Since the minimum is medium it did rule out some of the smaller bubbles but disregarded a substantial number of false positives. The maximum value being large disregards batter movement and light changes.
- **Frame-** Built frame for robot out of the aluminum strut, wooden pieces, and screws

This building was done in accordance with previous designs. The camera and robot base mounting was omitted for now because we weren't sure of where to place those.
An electric drill and a Phillips-head screwdriver were used to assemble the frame.
Brought this frame to the Senior Design room and showed it to Prof. Stoytchev at a meeting
Went to Lowe's and bought a new base piece of plywood, which is more square inches, and also thicker. This was based on Stoytchev's suggestions. The receipt was saved as well.
This piece of plywood was pretty heavy and large, so carrying it to the Senior Design room was challenging. I had to be careful to avoid hitting doorways or people with it.

Pending Issues

- Complete Computer vision code
- Program the arm
- Integrate all components

Individual Contributions

Team Member	Contribution	Weekly Hours	Total Hours
Drew Caneff	➢ Started work on poster ➢ Collected images of team progress for 3D printing company	7	251
Amos Hunter	➢ Built frame	10.5	192
Brett Altena	➢ Worked on computer vision project proposal ➢ Worked on computer vision programs	7	199
Kristian Wadolowski	➢ Soldered extensions to motor wires ➢ Wired PCB and Arduino to arm ➢ Secured arm to plywood base	25	140
Jase Grant	➢ Worked on FPGA python code ➢ Worked on accelerating FPGA pipeline	19	121

Plans for Upcoming Reporting Period

Team Member	Plans
Drew Caneff	➢ Fix articulation 5/6
Amos Hunter	➢ Continue work on frame
Brett Altena	➢ Continue computer vision work
Kristian Wadolowski	➢ Begin testing arm ➢ Program motions for arm
Jase Grant	➢ Python research ➢ Integrate camera

Gitlab Activity Summary

Action: joined, Tue Sep 04 2018
Author: dvcaneff
