

EE/CprE/SE 491 - sdmay19-31:**Multi-Purpose Automated Robotic Mixer (mpARM)**

Week 14 Report

March 3– March 9

Client: Alexander Stoytchev/Brett Altena

Faculty Advisor: Alexander Stoytchev

Team MembersDrew 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**

- **Arm-** Portions of the robotic arm assembly proved to be difficult. The last plate connecting articulation three to four proved to be very difficult. It was nearly impossible to determine if the pully system was being installed correctly as when the plat was installed one could no longer see the internal systems. Through trial and error the plate was taken on and off tell it felt right. Additionally, when installing the last plate the slight component misalignments were most noticeable. Everything was done to sure up the system in its completed form.
Based on time restrictions and the overall limitations of using Sketchup as opposed to programs like Blender, the custom 3D models are rather simplified. While ideally Blender would have been used, my proficiency in the program is dwarfed by the years of experience using a far simpler 3D modeling program(Sketchup). The results could be better, but for the turnaround time the models look good and more importantly will serve their purpose well.
- **Frame-** Measured and marked the locations to drill holes based on the dimensions of the joint blocks (wooden pieces) using a tape measure and sharpie.
Re-drilled the first holes a few times to properly size the holes for the screws
Carefully swept up the millings of aluminum from the floor, they were sharp and messy
Selected a proper bit for hole drilling
Lifted the arm to test its weight
Selected some pins from my parts bin that were long enough and strong enough to be used for the robot arm
Offered technical insight to issues surrounding the placement of the robot arm and how that affects the frame
- **Computer vision-** The biggest change I made this week was to making sure that both algorithms do not count the same bubble twice even though the circle/ contour may have changed their center pixel. I check this by calculating the difference in X and Y of the currently being looked at object and comparing the values to all previously found objects. If the center being looked at is less than 15 pixels away in both directions, the object is ruled to being too similar and is then skipped. This significantly helped the system's bookkeeping and ensuring that the bubblesCounted variable is not being incremented more than once for the same bubble.
The next update I made was that I increased the sensitivity of the Hough circle approach to allow the algorithm to sense more non-circular objects. Before the program was only sensing 2 - 4 bubbles but now it is sensing up to 13 bubbles of the test video I have been using. The algorithm does not sense

100% of the bubbles formed due to either lighting or angle of the camera but this issue should be fixed in the next version of the frame structure. It also detects more false bubbles such as circles made by the light/ batter moving but the following parts of the program rule out falsely detected "bubbles".

- **FPGA-** Searching the internet for tutorials on how to do this in python.

Started the new FPGA code with the python.

Having trouble with the camera because I can't test the input with the test bench yet.

Was able to find some of the library's that I need to be able to do this in python.

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.

Waiting for the J-Tag to come in.

Pending Issues

- Complete Computer vision code
- Assemble frame

Individual Contributions

Team Member	Contribution	Weekly Hours	Total Hours
Drew Caneff	<ul style="list-style-type: none"> ➤ Finished Thor Arm ➤ 3D modeled and printed arm attachments 	23	244
Amos Hunter	<ul style="list-style-type: none"> ➤ Worked on frame 	10	181.5
Brett Altena	<ul style="list-style-type: none"> ➤ Worked on Computer vision program ➤ Worked on Computer vision Project proposal 	10	192
Kristian Wadolowski	<ul style="list-style-type: none"> ➤ Reviewed arduino code 	2	115
Jase Grant	<ul style="list-style-type: none"> ➤ Continued Python research ➤ Worked on FPGA ➤ Worked on Pipeline acceleration 	9	102

Plans for Upcoming Reporting Period

Team Member	Plans
Drew Caneff	<ul style="list-style-type: none"> ➤ Work on Poster ➤ Assemble backup components ➤ Fix articulation 5/6
Amos Hunter	<ul style="list-style-type: none"> ➤ Continue work on frame
Brett Altena	<ul style="list-style-type: none"> ➤ Computer vision testing
Kristian Wadolowski	<ul style="list-style-type: none"> ➤ Test arm ➤ Program arm motions
Jase Grant	<ul style="list-style-type: none"> ➤ Python research

	➤ Camera integtation
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Gitlab Activity Summary

Action: joined, Tue Sep 04 2018
Author: dvcaneff
