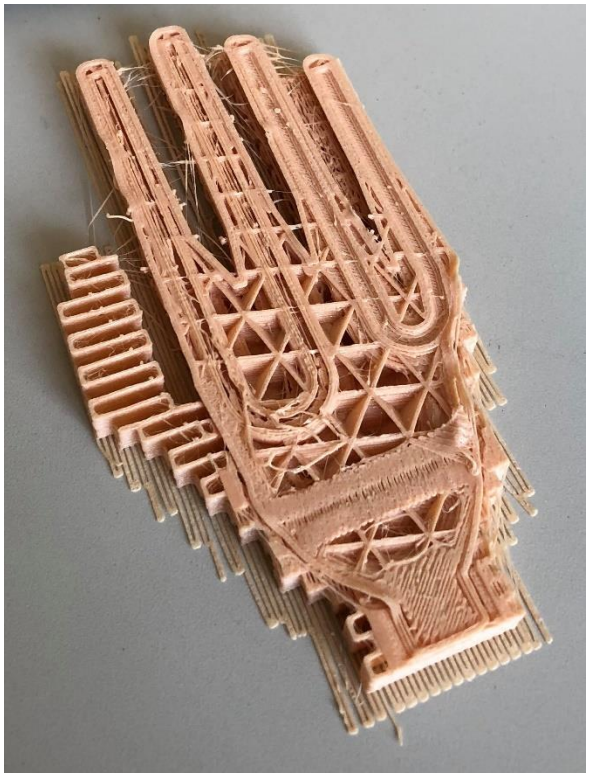
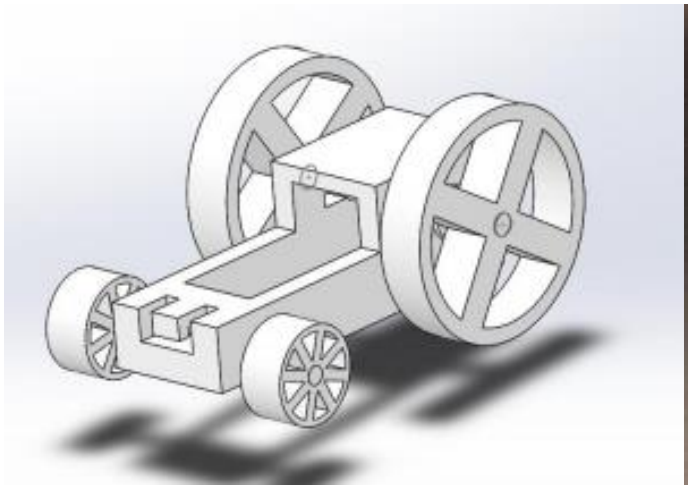
Brendan Lin Design Portfolio

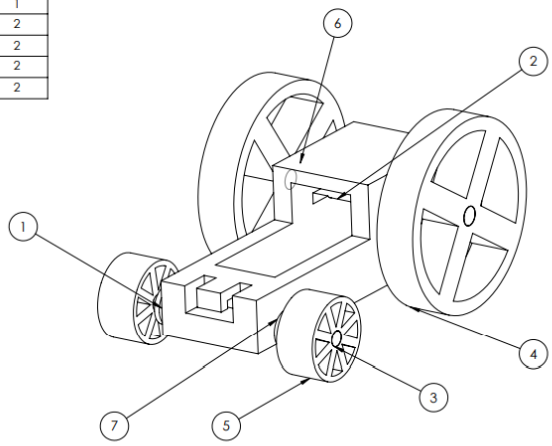
June – September 2018: Prosthetic Hand Research Project at San Jose State University:



December 2018: Final project for CAD Class:

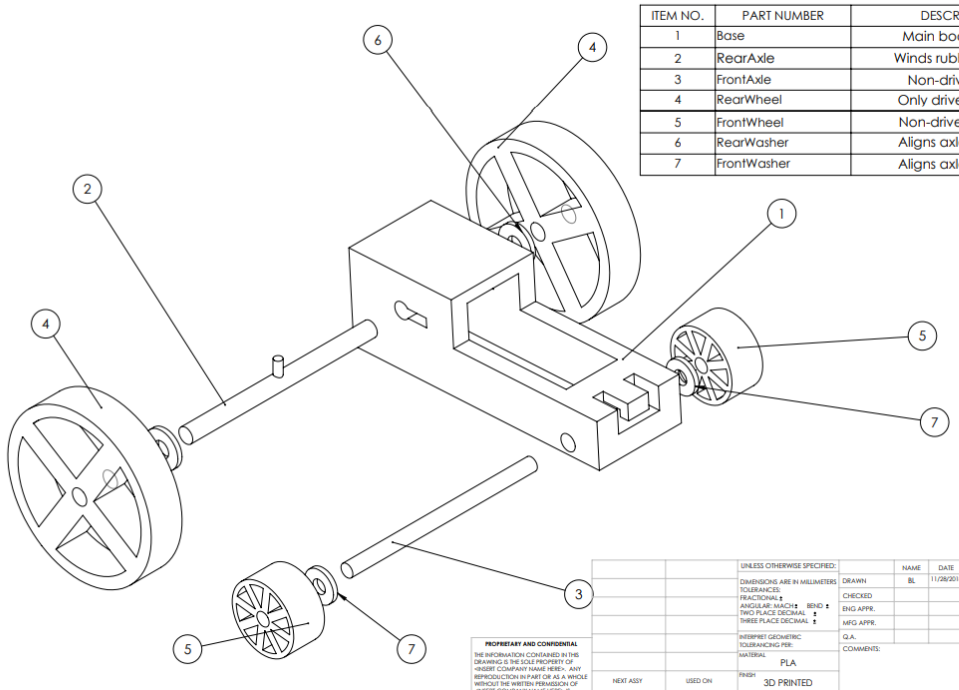


ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	Base	Main body of car	1
2	RearAxle	Winds rubber band	1
3	FrontAxle	Non-driven axle	1
4	RearWheel	Only driven wheels	2
5	FrontWheel	Non-driven wheels	2
6	RearWasher	Aligns axle to base	2
7	FrontWasher	Aligns axle to base	2



		UNLESS OTHERWISE SPECIFIED:		NAME	DATE	MAE 94 - UCLA
		DIMENSIONS ARE IN MILLIMETERS	DRAWN	BL	11/14/18	TITLE: Car Assembly Drawing
		TOLERANCES: FRACTIONAL ± ANGULAR: MACH ± BEND ± TWO PLACE DECIMAL ± THREE PLACE DECIMAL ±	CHECKED			
			ENG APPR.			
			MFG APPR.			
		INTERPRET GEOMETRIC TOLERANCING PER:	Q.A.			
		MATERIAL PLA	COMMENTS:			SIZE B | DWG. NO. 1 | REV 1
NEXT ASSY	USED ON	Finish 3D Printed				SCALE: 1:2 | WEIGHT: 159.81g | SHEET 1 OF 1
APPLICATION		DO NOT SCALE DRAWING				

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	Base	Main body of car	1
2	RearAxle	Winds rubber bands	1
3	FrontAxle	Non-driven axle	1
4	RearWheel	Only driven wheels	2
5	FrontWheel	Non-driven wheels	2
6	RearWasher	Aligns axle to base	2
7	FrontWasher	Aligns axle to base	2

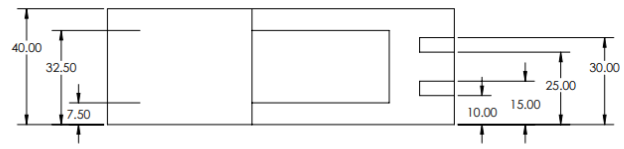


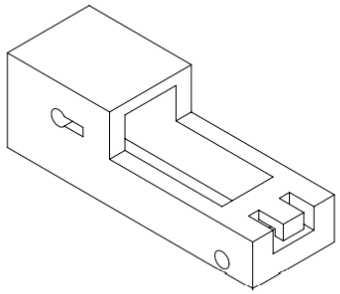
UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN MILLIMETERS
TOLERANCES:
FRACTIONAL ±
ANGULAR: MACH ± BEND ±
TWO PLACE DECIMAL ±
THREE PLACE DECIMAL ±
INTERPRET GEOMETRIC TOLERANCING PER:
MATERIAL: PLA
FINISH: 3D PRINTED
NEXT ASSY | USED ON
APPLICATION | DO NOT SCALE DRAWING

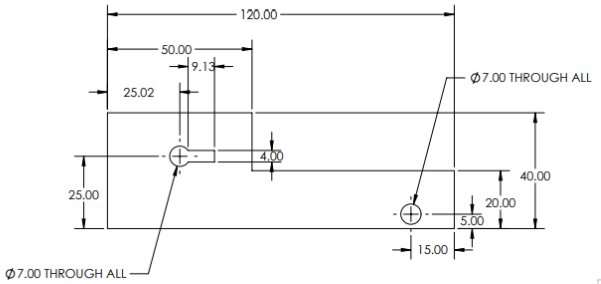
	NAME	DATE
DRAWN	BL	11/28/2018
CHECKED		
ENG APPR.		
MFG APPR.		
Q.A.		
COMMENTS:		

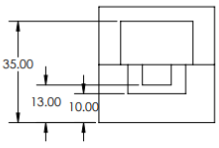
PROPRIETARY AND CONFIDENTIAL
THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF <INSERT COMPANY NAME HERE>. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF <INSERT COMPANY NAME HERE> IS PROHIBITED.

MAE 94-UCLA
TITLE: Exploded Assembly Drawing
SIZE B | DWG. NO. 1 | REV 1
SCALE: 1:2 | WEIGHT: 159.81g | SHEET 1 OF 1









UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN MILLIMETERS
TOLERANCES:
FRACTIONAL ±
ANGULAR: MACH ± BEND ±
TWO PLACE DECIMAL ±
THREE PLACE DECIMAL ±
INTERPRET GEOMETRIC TOLERANCING PER:
MATERIAL: PLA
FINISH: 3D PRINTED
NEXT ASSY | USED ON
APPLICATION | DO NOT SCALE DRAWING

	NAME	DATE
DRAWN	BL	11/28/18
CHECKED		
ENG APPR.		
MFG APPR.		
Q.A.		
COMMENTS:		

PROPRIETARY AND CONFIDENTIAL
THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF <INSERT COMPANY NAME HERE>. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF <INSERT COMPANY NAME HERE> IS PROHIBITED.

MAE 94 - UCLA
TITLE: Base
SIZE B | DWG. NO. 1 | REV 1
SCALE: 1:1 | WEIGHT: 76.02g | SHEET 1 OF 1

September 2018 – June 2019: Automated Cell Plate Washer Design Project:

UCLA Samueli Bioengineering

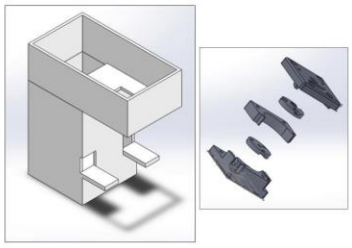
Automated Cell Washer

Philip Lue, Brendan Lin, Linnet Chang, Alison Tran, Sam Esperon

UCLA Biomedical Engineering Society

Background

- Any wet lab that works with cell culture requires washing and changing media in a cell dish
- This is a tedious and time consuming process
- Wanted to create a single machine that could be placed within a lab setting and used to simplify lab work
  - This would allow researchers to focus more time on other tasks
- Industrial 96-well plate washers exist, but can cost several thousand dollars
  - Also wanted to design a plate washer that could handle a larger dish of cells, since a "stock" of cells will often be grown in a larger area for convenience



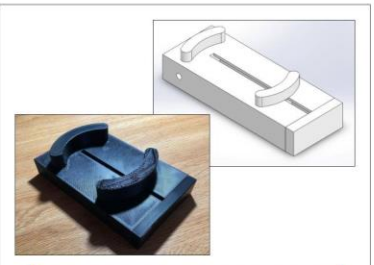
Prototypes for Base and Pump

Skills Developed

- **Circuitry**
  - Configured stepper motor components with motor driver and power supply for peristaltic pump
  - Connected simple circuits to control servo motors
- **Coding**
  - Created a single program with separate classes to control different parts of the pump
  - Coded using Arduino (C++) language
- **Computer-Aided Design**
  - Learned how to design many of the cell washer parts using Solidworks
  - 3D printed components at UCLA Boelter Makerspace

Concepts and Prototyping

- Dispensing mechanism
  - Several different ways to pump liquid
  - Decided on peristaltic pump for practicality and functionality
- Aspirating mechanism
  - Wanted to either utilize the vacuum in laboratory biosafety cabinets or use a reverse pump mechanism
- Cell plate shaking
  - Needed to find mechanism to spread solution across all cells in plate
- Aseptic technique
  - Wanted a way to allow researcher to switch out pipettes or pipette tips to keep them sterile



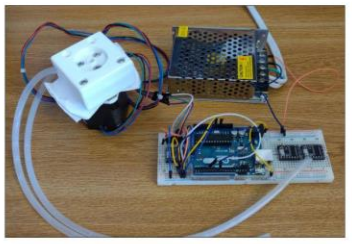
Cell Plate Platform and Clamp

Future Directions

- Several further additions can be made to improve current design
  - Automatic cell plate sorter that feeds cell plates into the washer
  - Add more pumps to allow for different solutions to be used to wash
  - Add another peristaltic pump for more continuous liquid flow
  - Develop a method to aspirate and dispense using one rotating pump only
  - Create better cell plate shaking and securing mechanism

Execution

- Peristaltic pump used for dispensing PBS and/or media
  - **Good for aliquoting accurate amounts (mL) and is rate is easily controlled**
- Servo motors used to rotate shaking platform and to move aspirating/dispensing pipette
- SolidWorks implemented **to 3D print parts of pump, base, and shaking platform**
- Used **Arduino Uno/Nano as microcontroller**
  - Connected to driver boards to control motors
- **Design included aseptic technique** in mind
  - O-ring clamping allows for easy switching of pipettes or pipette tips



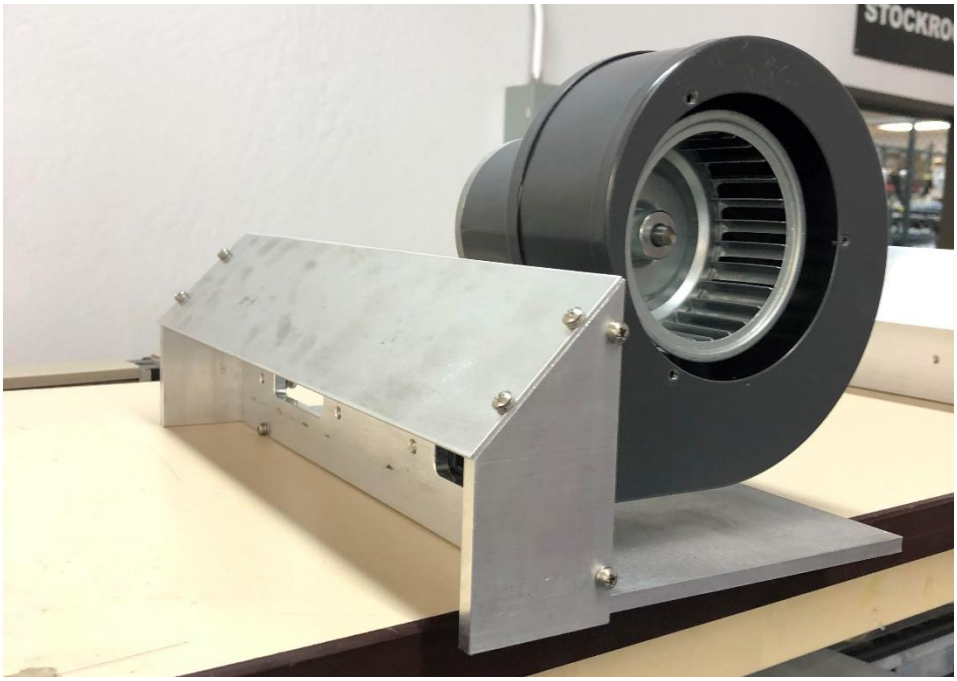
Completed Circuitry and Pump

References & Acknowledgments

- Materials and supplies were funded by UCLA's Department of Bioengineering
- Technical mentorship was provided from Design Team Project Managers Ryan Tsang, Smiti Narayanan, and Willie Wu, and Build Team Project Manager Gregory Suematsu
- Support was provided by UCLA's chapter of Biomedical Engineering Society
- Materials and equipment courtesy of UCLA Engineering Innovation Lab

June – September 2020: Internship Project at dB Control

Blower Test Fixture:



Variac Transformers:

Power Supply Test Fixture: