

BME 301 Progress Report

Automated Bioanalytical Chemistry Sample Tube Uncapping and Capping Device

* **Names:** Jake Jaeger (jjaeager4@wisc.edu)

Alec Onesti (onesti@wisc.edu)

Sam Perez-Tamayo (spereztamayo@wisc.edu)

Katie Werth (kwert@wisc.edu)

* **Client:** Dr. Robert Radwin (ISyE, BME)

* **Advisor:** Dr. Chris Brace (Dept. of Radiology)

* **Report Period:** April 15th - 21st

* **Project Overview:** Employees in a commercial laboratory cap and uncap more than 500-700 test tubes per day for a rapid, high throughput analyzer. This is causing undesired stress in the lab technician's fingers and hands. A design of a completely automated sample bottle cap cassette is desired that will eliminate much of the manual work by the technician during use of the analyzer.

* **Last Week's Goals:** Assemble prototype of final design and begin testing as soon as possible.

* **Summary of Design Accomplishments:** Sample tubes are being uncapped! The final device has been assembled and is undergoing testing.

* **Summary of Team Role Accomplishments:**

Katie (Leader) – Maintained communication with teammates

Alec (Communicator/BSAC) – Conducted 3D prints, worked on assembling prototype, worked on arranging meeting with Covance in May

Jake (BWIG) – Updated team website

Sam (BPAG) – No purchases required

*** Activities:**

Date	Person	Task (hours)	Previous Total	Weekly Total	Semester Total
1/26	Katie (Leader)	<i>Progress Report Development (0.75)</i>	0	0.75	0.75
2/1		<i>PDS (1)</i>	0.75	1	1.75
2/9		<i>Update PDS, Design Matrix Criteria (0.5)</i> <i>Research Biology/Physiology (1.5)</i> <i>Brainstorm/Sketch Design Idea (1.5)</i>	1.75	3.5	5.25
2/15		<i>Preliminary Presentation (2)</i>	5.25	2	7.25
2/18		<i>Prototype Planning (2)</i> <i>Team Notebook (2)</i> <i>Preliminary Report (1.5)</i>	7.25	5.5	12.75
3/4		<i>Assembled Prototype (0.5)</i> <i>Modified Mounting Plate - CoE Shop (0.5)</i>	12.75	1	13.75
3/30		<i>Fabrication Plan and Timeline Development (2)</i>	13.75	2	15.75
4/1 4/5		<i>Final Design Development (3)</i> <i>Executive Summary (0.75)</i>	15.75	3.75	19.5
4/12		<i>Executive Summary (0.5)</i>	19.5	0.5	20
4/17 - 4/20		<i>Assembly (2)</i> <i>Executive Summary (0.5)</i> <i>Poster/Report (0.5)</i> <i>Notebook (1)</i>	20	4	24
1/26	Sam (BPAG)	<i>Brainstorm capping mechanism (0.75)</i>	0	0.75	0.75
2/6		<i>Research potential motor upgrades (0.75)</i> <i>Sketch design idea (1.0)</i>	0.75	1.75	2.5
2/15		<i>Preliminary Presentation (2)</i>	2.5	2	4.5
2/18		<i>Brainstorm, sketch rack holder design ideas (1.5)</i> <i>Preliminary Report (1.5)</i>	4.5	3	7.5
2/27		<i>Advancement of holder designs, specifics of device mechanism (2.0)</i>	7.5	2.0	9.5
3/3		<i>Worked on prototype (0.75)</i>	9.5	0.75	10.25
3/29		<i>Refine holder design</i>	10.25	1	11.25
4/5		<i>Executive Summary (1.75)</i>	11.25	1.75	13.0

4/17		Prototype assembly (4.0) Researched possible contamination testing (1.0)	13.0	5.0	18.0
1/26	Alec (Comm./ BSAC)	<i>Initial Contact with Advisor and Client (0.5)</i>	0	0.5	0.5
2/1		<i>PDS formation (1)</i>	1	1	1.5
2/8		<i>PDS update(0.5)</i> <i>Design Matrix Criteria(0.5)</i> <i>Brainstorm design idea(1)</i>	2	2	3.5
2/15		<i>Preliminary Presentation (2)</i>	2	2	7.5
2/28		<i>Worked on assembling initial prototype (3)</i>	3	3	10.5
3/4		<i>Assembled prototype and ran initial testing of motor and mechanism (3)</i>	3	3	13.5
3/11		<i>Continued work with prototype and finished testing of mechanism (4)</i>	4	4	17.5
3/25		<i>Began design of CAD model of final design (4)</i>	4	4	21.5
4/1		<i>Worked on CAD model of final design (4)</i>	4	4	25.5
4/2		<i>Created files for 3D print (1)</i>	1	5	26.5
4/11		<i>Finished CAD model of final design and created files for 3D print (4)</i>	4	4	30.5
4/18		<i>Worked on assembling prototype (5)</i>	5	5	35.5
1/26	Jake (BWIG)	<i>Fix up existing device (1)</i>	0	1	1
2/1		<i>PDS (1)</i>	1	1	2
2/6		<i>Brainstorm uncapping mechanism (1)</i>	2	1	3
2/8		<i>Design slide-through uncapping mechanism (2.5)</i>	3	3.5	5.5
2/15		<i>Preliminary Presentation (2)</i>	5.5	2	7.5
2/18		<i>Prototype Planning (2)</i> <i>Preliminary Report (1.5)</i>	7.5	3.5	11
2/28		<i>Research of flexible motor shafts (0.5)</i>	11	0.5	11.5
3/4		<i>Assembly of initial prototype and testing of design mechanism (1.5)</i>	11.5	1.5	13

3/12		<i>Researched ideas for hold-in sprocket (1)</i>	13	1	14
3/27		<i>Researched materials for hold-in sprocket (1)</i>	14	1	15
4/1		<i>Worked on CAD model for final design (4)</i>	15	4	19
4/5		<i>Executive summary (1.5)</i>	19	5.5	21.5
4/18		Worked on assembly of prototype (2.5)	21.5	2.5	24

*** Team Goals:** Finalize assembly of device and begin functional testing. Additionally, develop a draft of the final poster and polish and submit the executive summary.

*** Individual Goals:**

Katie – Polish executive summary, assist in device assembly and testing, and develop a draft of the final poster.

Sam – Finalize executive summary, finish prototype, begin testing

Alec – Finish testing of prototype in time for poster presentation next friday

Jake – Finish prototype fabrication and testing

Website															
Updates	X		X	X	X	X	X		X		X	X	X		

* **Difficulties:** Determining the ideal angle for the rotating parts that contact the sample tube caps is the challenge we are facing right now. The rotating parts must be able to remove the sample tube caps of the big 3 that were provided to us, and preferably any other test tube that the client uses too.

* **Expenses:**

Material	Date Ordered	Company	Cost	Funding
12V DC Motor	Fall 2016	ServoCity	N/A	N/A
Plastic Gears	2/18	Amazon	\$6.79	Team
Rubber Stoppers	2/18	Amazon	\$8.96	Team
5mm Rods	2/18	CoE Scrap Room	\$0.00	N/A
Mounting Plate	2/18	CoE Scrap Room	\$0.00	N/A
3D Printer Cartridge	3/27	Sindoh	\$49.99	Dr. Radwin
Econ Gear Motor	4/17	Servo City	\$9.99	Dr. Radwin
Set Screws	4/17	CoE Shop	\$0.00	N/A
Screws	4/17	CoE Shop	\$0.00	N/A
Total			\$75.73	