

# BME 301 Progress Report

## Automated Bioanalytical Chemistry Sample Tube Uncapping and Capping Device

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

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

\* **Report Period:** April 1st - 7th

\* **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:** Finalize final product design and have all necessary materials in hand by next week.

\* **Summary of Design Accomplishments:** Completed first round of 3D printing and have begun fabrication of final device.

\* **Summary of Team Role Accomplishments:**

**Katie (Leader)** – Maintained communication with teammates and organized meetings

**Alec (Communicator/BSAC)** – Conducted 3D prints, worked on CAD model of final device

**Jake (BWIG)** – Updated team website

**Sam (BPAG)** – No purchases required

**\* Activities:**

<b>Date</b>	<b>Person</b>	<b>Task (hours)</b>	<b>Previous Total</b>	<b>Weekly Total</b>	<b>Semester Total</b>
1/26	<b>Katie</b> (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		<b>Final Design Development (3)</b> <b>Executive Summary (0.75)</b>	15.75	3.75	19.5
1/26	<b>Sam</b> (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		<b>Executive Summary (1.75)</b>	11.25	1.75	13.0
1/26	<b>Alec</b> (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) Design Matrix Criteria(0.5) 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</i>	3	3	13.5
3/11		<i>Continued work with prototype and finished testing of mechanism</i>	4	4	17.5
3/25		<i>Began design of CAD model of final design</i>	4	4	21.5
4/1		<i>Worked on CAD model of final design</i>	4	4	25.5
4/2		<i>Created files for 3D print</i>	1	5	26.5
1/26	<b>Jake (BWIG)</b>	<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) 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

\* **Team Goals:** Develop final CAD models of casing, sprockets, and gears. Print components and ensure their functional success. Develop a draft executive summary.

\* **Individual Goals:**

**Katie** – Assist in final CAD model design and help develop executive summary

**Sam** – Help with fabrication of final design

**Alec** – Finish up CAD model of final design. Continue to 3D print parts for our device.

**Jake** – Work to begin fabrication on final design



Website															
Updates	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
<b>Total</b>			\$65.74	