

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:** March 11th - March 17th

* **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:** Develop a functioning prototype before we leave for spring break.

* **Summary of Design Accomplishments:** Our first test tube uncapped! And several after that! We now know that the mechanism of our design is functional. Requested 3D printing cartridge for final casing.

* **Summary of Team Role Accomplishments:**

Katie (Leader) – Maintained communication with teammates

Alec (Communicator/BSAC) – Attended BSAC meeting; Conducted testing of initial prototype that tested the mechanism of our design.

Jake (BWIG) – Updated website

Sam (BPAG) – No purchases necessary

*** Activities:**

Date	Person	Task (hours)	Previous Total	Weekly Total	Semester Total
1/26	Katie (Leader)	<i>Progress Report (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
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
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) 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
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) 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

* **Team Goals:** Determine optimal rigidity of gear shafts for sample tube cap removal. Also, to begin the CAD design of a finalized casing for our design.

* **Individual Goals:**

Katie – Ensure progress report completion and submission

Sam – Continue working on prototype after spring break

Alec – Decide on what amount of rigidity of the spinners is best for our needs

Jake – Update the team website

* **Difficulties:** Our next challenge is to design and test the mechanism that will hold the test tubes in place within the rack. Right now, we are deciding between using a coil spring or a leaf spring to accomplish the task of pressing the test tube against the wall of the rack.

* **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
Total			\$15.75	