

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 4th - March 10th

* **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:** Conduct early prototype testing of slide through design. Make design improvements based on that testing.

* **Summary of Design Accomplishments:** Assembled prototype and proved that design mechanism is functional. No sample tubes have been uncapped, so the next step is to determine the necessary rigidity of the gear shafts that will provide enough friction to open caps while still accounting for the various cap sizes.

* **Summary of Team Role Accomplishments:**

Katie (Leader) – Maintained communication with teammates

Alec (Communicator/BSAC) – Attended BSAC meeting; Set up initial prototype

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		Assembled prototype and ran initial testing of motor and mechanism	3	3	13.5
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		Assembly of initial prototype and testing of design mechanism (1.5)	11.5	1.5	13

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

* **Individual Goals:**

Katie – Ensure progress report completion and submission; assist in prototype fabrication and assembly

Sam – Determine what shafts need to be purchased

Alec – Conduct testing of initial prototype and make design iterations as needed. Specifically, I wish to decide on what amount of rigidity of the spinners is best for our needs

Jake – Update the team website, optimize spacing between rollers for proper torque on tube caps

* **Difficulties:** Mounting the plastic gears to a metal rod is the biggest challenge we currently face. We are considering either using glue or soldering the gear to the metal rod, but we have limited gears, so we must be careful about not ruining any gears unless we know that the approach will work.

* **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	