

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 26th - 31st

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

* **Summary of Design Accomplishments:** Final product design is nearly complete. Last touches/plans will be made at Thursday evening's group meeting. Additionally, a fabrication plan and timeline will be finalized to ensure that the product is finished in time to conduct testing before the poster session.

* **Summary of Team Role Accomplishments:**

Katie (Leader) – Maintained communication with teammates

Alec (Communicator/BSAC) – Communicated with Dr. Radwin regarding material orders

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
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
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
3/25		<i>Began design of CAD model of final design</i>	4	4	21.5
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
3/27		<i>Researched materials for hold-in sprocket (1)</i>	14	1	15

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

* **Individual Goals:**

Katie – Organize team meeting to discuss fabrication plan/timeline

Sam – Work to begin fabrication of final design

Alec – Finish up CAD model of final design with the help of the other team members

Jake – Work to begin fabrication on final design

*** Project Schedule/Timeline:**

Tasks	January		February				March				April				
	22	29	5	12	19	26	5	12	19	26	2	9	16	23	30
Project Development															
Research	X	X			X										
Brainstorming	X	X	X	X		X									
Design Matrix			X	X											
Materials					X	X									
Final Design					X	X	X								
Fabrication					X	X	X		X	X					
Testing					X				X						
Deliverables															
Progress Reports	X	X	X	X	X	X	X		X						
PDS		X	X												
Preliminary Presentation				X											
Preliminary Report				X	X										
Final Poster															
Final Report															
Meetings															
Team		X		X	X										
Advisor	X	X	X	X		X	X		X						
Client		X			X										
Website															
Updates	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
Total			\$65.74	