UVU SWAG LAUNCHER CAPSTONE

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UTAH VALLEY UNIVERSITY MECHANICAL ENGINEERING

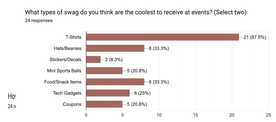
1-INTRODUCTION

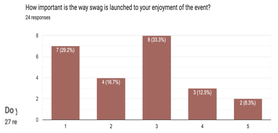
Utah Valley University is known for many accomplishments, one of which is their fan base. Often during sporting events UVU facility will hand out merchandise or otherwise known as “SWAG”. The SWAG launcher aims to increase the delivery and speed of certain types of swag to better increase the number of fans receiving their gear.

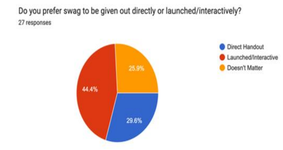
2-CUSTOMER & PRODUCT RESEARCH

Two surveys were sent out to fans and mascots separately. One survey gathered information on the type of swag fans received while the other questioned what performance upgrades were most important to the mascots.

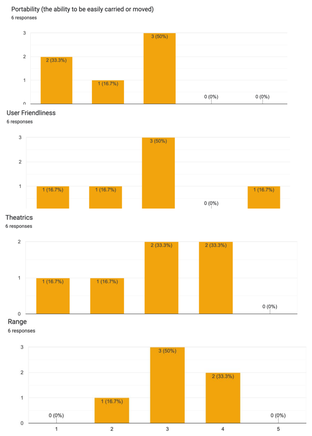
Fan Survey Results







Mascot Survey Results



The results of the survey showed a strong desire for T-shirts as the main form of swag with 87.5% of surveyors overwhelming supporting it. Fans were also in a 44.4% majority support of the swag being launched instead of handed out directly. On the mascot side, their survey highlighted the importance of the project’s ability to clear enough range, the ability to be user friendly, and the capability of easy portability, with all 3 sections receiving a 50% vote from the surveyors.

3-CONCEPT GENERATION

Once product customer research was complete, the team began to brainstorm concepts which could improve upon the basic T-shirt launcher which UVU had used.

	CONCEPTS	DEFINITION	Chris	Conner	Andre	Steven	Tom	Jacob	
2	Water Balloon slingshot	Big Y shaped slingshot with basket	☑	☐	☐	☐	☐	☑	2.5
3	Catapult		☐	☑	☐	☐	☑	☐	2
4	Pitch Machine	Pitch machine size. Feeding tube	☑	☐	☑	☑	☑	☑	5
5	Civil War Cannon		☐	☐	☐	☑	☑	☐	2
6	Drone		☐	☐	☐	☐	☑	☐	1
7	Ping Pong Gun	Bazooka sized ping pong gun	☑	☑	☑	☐	☐	☑	4
8	Capsule		☐	☐	☐	☐	☐	☐	1
9	Dog Ball Stick		☑	☑	☑	☐	☐	☑	4
10	Crowd War Gun		☐	☐	☐	☐	☐	☐	0
11	Bike Launcher		☐	☐	☐	☐	☐	☐	0
12	Spin Launch		☑	☑	☑	☑	☑	☑	6
13	Big Nerf Gun		☑	☑	☑	☑	☑	☑	6
14	Wrist Rocket		☑	☑	☐	☑	☐	☑	4
15	Rail Gun		☐	☐	☐	☐	☑	☐	1
16	Parachute Gift (Shotgun Style)		☐	☐	☐	☑	☐	☐	1
17	Hampster Tube		☐	☐	☐	☐	☐	☐	0
18	Hot wheels web track		☐	☐	☐	☐	☐	☐	0
19	Water Blob		☐	☑	☑	☐	☐	☐	1
20	Teeter totter		☐	☐	☑	☐	☐	☐	1
21	Shirt Rain from roof		☐	☐	☐	☑	☐	☐	1
22	Tom brady throw		☐	☐	☐	☐	☐	☐	0

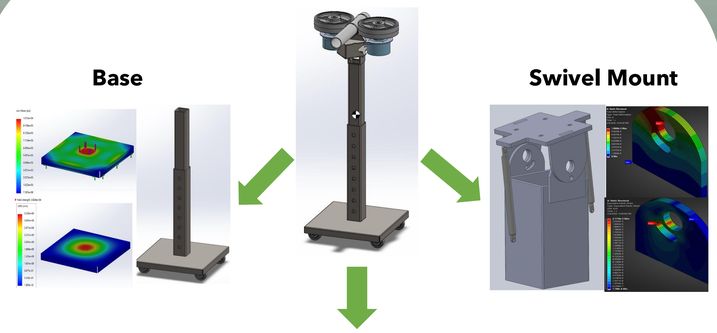
Once concepts had been recorded the team voted on selecting the top 7 concepts from the generation. Those 7 ideas were then plugged into a Scoring matrix where the team voted on the effectiveness of each category and then added up the total. From there the scores were compared and the Pitching Machine was chosen due to its highest score.

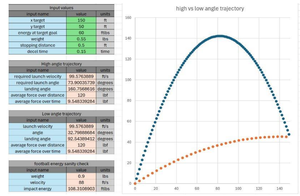
SWAG - Scoring Matrix

	Description	Importance Factor	W.B Slingshot ranking	W.B Slingshot score	Pitch Machine ranking	Pitch Machine score	Ping Pong ranking	Ping Pong score	Dog Ball ranking	Dog Ball score	Spin Launch ranking	Spin Launch score	Big A** Nerf ranking	Big A** Nerf score	Wrist Rocket ranking	Wrist Rocket score	T shirt cannon ranking	T shirt cannon score	Arm throw ranking	Arm throw score
1	Portability	Overall size. Easy to move it off and on the court	0.17	6	1.02	9	0.68	8	1.36	10	1.7	3	0.51	9	1.53	3	0.51	9	1.53	10	1.7
2	Range	Can it reach the upper bowl of UCCU Center	0.25	8	2	9	2.25	3	0.75	5	1.25	8	2	6	1.5	5	1.25	7	1.75	0	0
3	User friendliness	Can anyone pick it up and use it?	0.31	5	1.55	8	2.48	2	0.62	9	2.79	3	0.93	6	1.86	3	0.93	3	0.93	3	0.93
4	Theatrics	Hype factor, does the crowd think its cool	0.27	8	2.16	6	1.62	5	1.35	2	0.54	9	2.43	5	1.35	9	2.43	5	1.35	1	0.27
5	Loading time	The quicker the better	0.13	4	0.52	9	1.17	3	0.39	7	0.91	2	0.26	4	0.52	4	0.52	4	0.52	8	1.04
6	Frequency	How many SWAG items per second	0.17	3	0.51	8	1.36	7	1.19	5	0.85	6	1.02	6	1.02	2	0.34	5	0.85	5	0.85
7	Weight	<15 lbs. Can be held by one person	0.1	5	0.5	3	0.3	6	0.6	10	1	1	0.1	6	0.6	2	0.2	5	0.5	10	1
8	Cost	Cost to manufacture	0.05	8	0.4	2	0.1	9	0.45	10	0.5	1	0.05	5	0.25	9	0.45	3	0.15	10	0.5
9	Feasibility	Can we reasonably prototype	0.2	9	1.8	6	1.2	6	1.2	8	1.6	3	0.6	8	1.6	7	1.4	8	1.6	0	0
10	Capacity	How many swag items can it hold at one time	0.15	3	0.45	5	0.75	4	0.6	1	0.15	6	0.9	2	0.3	8	1.2	2	0.3	1	0.15
11	T-Shirt Factor	How well can it launch a T-Shirt	0.2	10	2	4	0.8	3	0.6	2	0.4	10	2	2	0.4	10	2	2	0.4	9	1.8
		Total Score		69	12.91	64	12.7	56	9.11	69	11.7	52	10.8	59	10.9	62	11.2	53	9.88	57	8.24
		Rank			1		2		7		3		6		5		4				

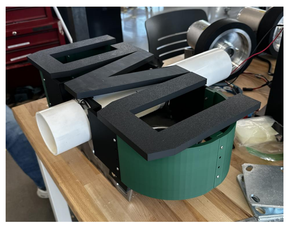
4- METHOD & DEVOLPMENT

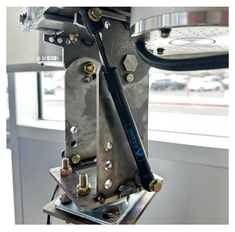
Once the pitch machine was selected the team began to research into existing designs. After thorough inspection, a two-wheeled system was chosen as the main launching mechanism with a barrel for added support. The team then spilt the project into 3 distinct parts, those being the base, swivel, and launcher mechanisms. CAD models were drawn up and FEA was performed. Analytical modeling of the launcher was created to estimate the range of flight with the given launch angle as well.





RESULTS & CONCLUSION







Design Requirement	Goal	Actual Outcome
Theatrics	Increase fan engagement	Willy's manager reviewed the system and loved everything we built
Distance	150 ft (top of UCCU Center)	Max: 90 ft • Average: 70 ft
User Friendliness	Easy to use	Very easy to load and operate
Portability	Easy to roll and transport	Caster wheels and pivots allow for smooth transport
Loading Time	1 shirt every 10 seconds	10 shirts every 10 seconds
Feasibility	Constructible at school	Fully designed, built, and assembled at UVU