



Smart Helmet

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Project Description

- Smart technology and increase protection in Football helmets
- Implement sensors that accurately collect speed and acceleration data
- Sponsored by NAU,
Client: Dr. Hesam Moghaddam

Smart Technology

- MR fluid
- Viscoelastic fluid
- Airbag

Design Description

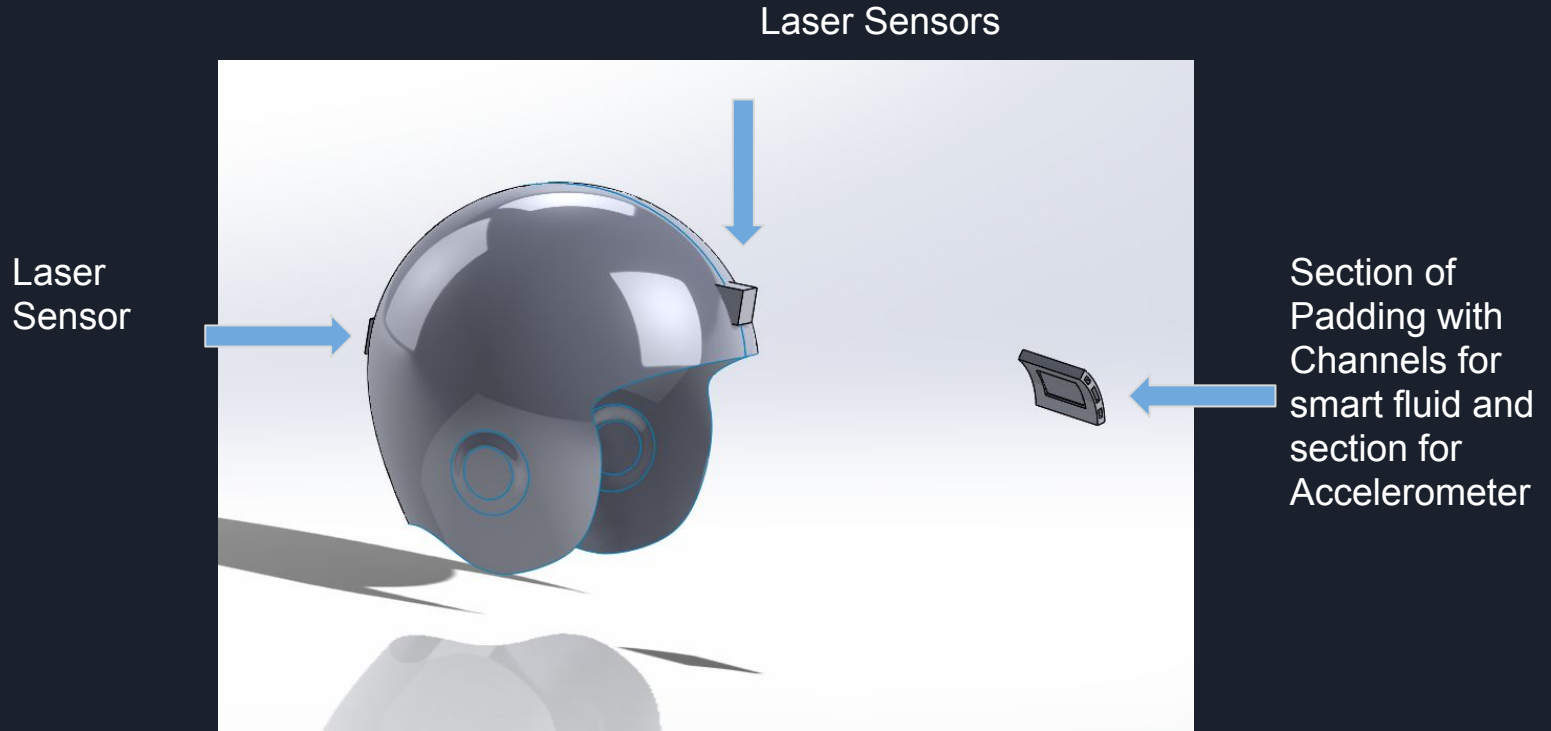


Figure 1: Current CAD Draft

Design Functions/Implementation details

Current Design

- Implementation of Sensors and electronics
- Innovative padding design

Future Plans

- Design and Test
- Design for accurate sensor readings
- Keep the weight of helmet close to current weight of 6lbs

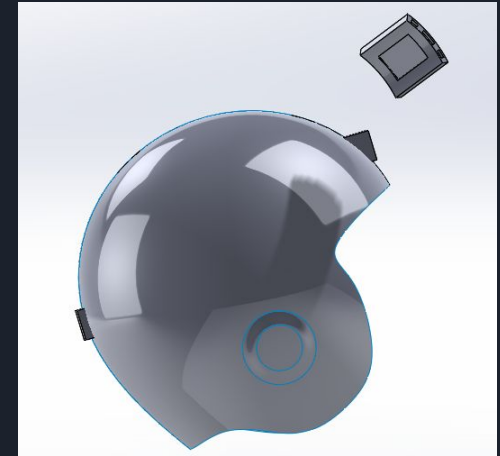


Figure 2: Cad Draft



Customer Requirements

- Safety
- Less weight
- Transmit data
- Comfortable materials
- Small sensors
- Similar type of helmets

Schedule

	Task Name	Start	Finish	Assigned To	Duration	Sep				Oct	
						Sep 9	Sep 16	Sep 23	Sep 30	Oct 7	Oct 14
1	- Meeting 1	09/11/18	09/12/18		1.146d						
2	Client Meeting	09/11/18	09/11/18	M and R	40m	M and R					
3	Team Chart	09/12/18	09/12/18		1h 10m						
4	- Meeting 2	09/17/18	09/19/18		2.281d						
5	Shearing ideas	09/17/18	09/17/18		1h 15m						
6	Staff meeting	09/17/18	09/17/18		1h						
7	- Meeting 3	09/19/18	09/19/18		0.281d						
8	pre-presentaion	09/19/18	09/19/18	All	2h 15m	All					
9	- Meeting 4	09/23/18	09/24/18		2d						
10	review presentation	09/23/18	09/23/18		1h						
11	- Presentation	09/24/18	09/24/18		1d						
12	Project Description	09/24/18	09/24/18	Mana	1d	Mana					
13	Background and Benchmarking	09/24/18	09/24/18	Race	1d	Race					
14	Design Requirement	09/24/18	09/24/18	Titus	1d	Titus					
15	Customer needs	09/24/18	09/24/18	Omar	1d	Omar					
16	Engineering Requirements	09/24/18	09/24/18	Omar	1d	Omar					
17	Schedule and Budget	09/24/18	09/24/18	Fares	1d	Fares					
18	Conclusion	09/24/18	09/24/18	Titus	1d	Titus					
19	References	09/24/18	09/24/18	Titus	1d	Titus					
20	- Meeting 5	10/03/18	10/03/18		0.375d						
21	Website check	10/03/18	10/03/18		3h						
22	- Meeting TA	10/08/18	10/08/18		0.125d						
23	Report	10/08/18	10/08/18		1h						

Figure 3: Gantt Chart

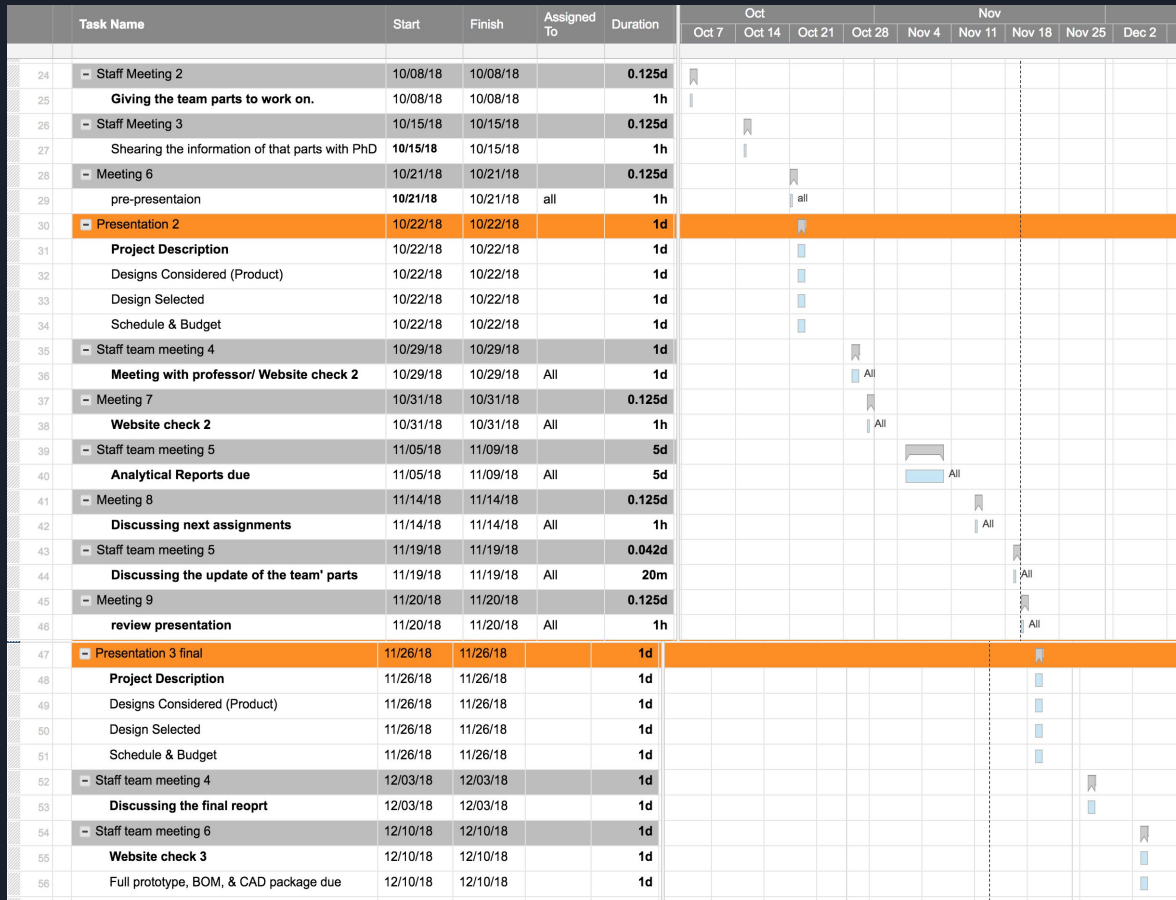


Figure 4: Gantt Chart cont.

Next Semester Gantt Chart

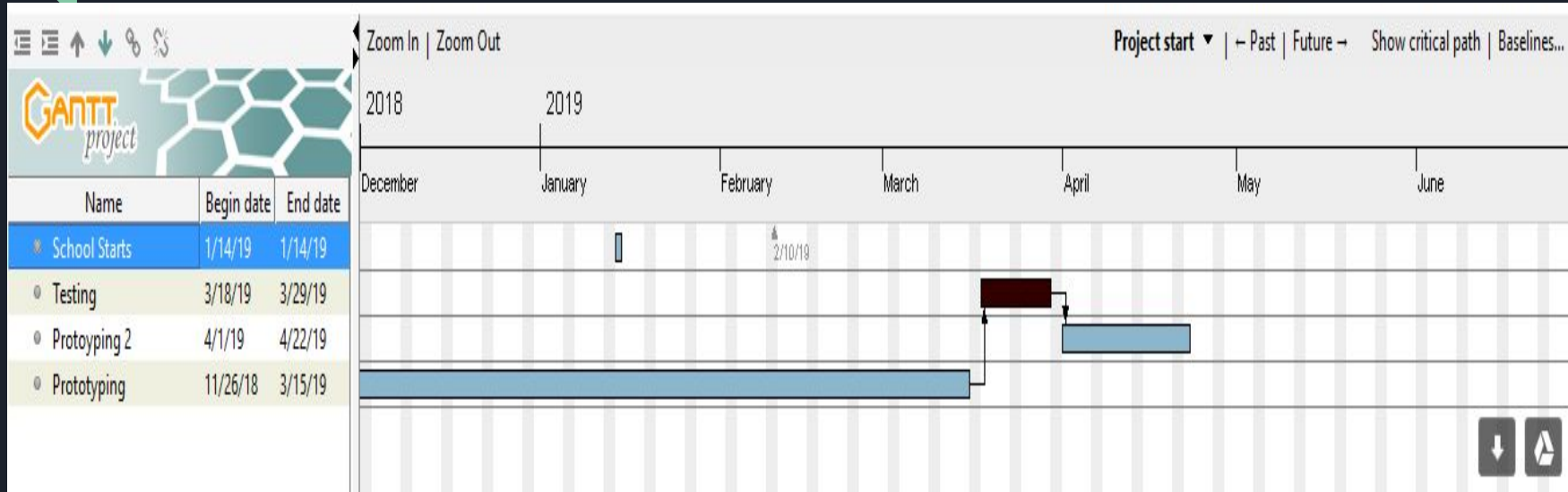


Figure 5: Spring Gantt Chart

Budget

Table 1: Bill of Materials

Parts #	Component Description	Quantity	Total Cost	Ref.
1	Football helmet	1	\$107.95	[1]
2	MR fluid	1	\$800	[8]
3	Battery	1	\$3.91	[2]
4	Viscoelastic	1	\$30	[5]
5	Laser sensor	2	\$28.54	[6]
6	Arduino	1	\$60	[3]
7	Data memory	1	\$19.99	[4]
8	RTCSD-01	1	\$17.95	[7]
	Total		1,068.34	



Conclusion

- Location of Sensors
- New padding
- MR Fluid
- Prototyping for next semester
- Testing



Work Cited

[1] Amazon.com. (2018). [online] Available at:

https://www.amazon.com/Riddell-Kansas-Chiefs-Replica-Helmet/dp/B00ZSZ7IUW/ref=sr_1_9?ie=UTF8&qid=1542653538&sr=8-9&keywords=Football+helmet
[Accessed 26 Nov. 2018].

[2] Amazon.com. (2018). [online] Available at:

https://www.amazon.com/Energizer-Electronic-Specialty-Battery-2032BP4/dp/B00D8P5T0U/ref=sr_1_13_a_it?ie=UTF8&qid=1542653711&sr=8-13&keywords=Battery
[Accessed 26 Nov. 2018].

[3]“Elegoo EL-KIT-008 Mega 2560 Project,” Amazon. [Online]. Available:

https://www.amazon.com/EL-KIT-008-Project-Complete-Ultimate-TUTORIAL/dp/B01EWN00UA/ref=sr_1_2_sspa?ie=UTF8&qid=1537757283&sr=8-2-spons&keywords=arduino+mega&psc=1. [Accessed: 19-Sep-2018].

[4]“EmazingLights CR 2450 Batteries” Amazon. [Online]. Available:

https://www.amazon.com/SanDisk-Memory-Standard-Packaging-SDSDUNC-128G-GN6IN/dp/B0143IISD0/ref=sr_1_10?ie=UTF8&qid=1537586205&sr=8-10&keywords=Data+memory. [Accessed: 19-Sep-2018].



Cont. Work Cited

[5] "ICON Men's Viper Stealth D30 Back Armor | 973-768," *J&P Cycles*. [Online]. Available: https://www.jpicycles.com/product/973-768/icon-men-s-viper-stealth-d30-back-armor?mrkgcl=444&mrkgadid=3298932708&utm_source=google&utm_medium=cpc&utm_term=462833838426_product_type_motorcycles_product_type_gear_product_type_body_armor&utm_campaign=Google Shopping Generic - Gear&product_id=973-768&utm_content=pla&adpos=1o5&creative=278867792399&device=c&matchtype=&network=g&gclid=EAIAIQobChMIIsNzLndTN3QIVDnh-Ch22OA5YEAKYBSABEGIapvD_BwE. [Accessed: 19-Sep-2018].

[6] Industrial, B., Supplies, E., Sensors, O. and Arduino, D. (2018). *Laser Sensor Obstacle Detection Diffuse Reflectance Detector Module for Arduino* | eBay. [online] eBay. Available at: <https://www.ebay.com/itm/Laser-Sensor-Obstacle-Detection-Diffuse-Reflectance-Detector-Module-for-Arduino-/112650278275> [Accessed 26 Nov. 2018].

[7] Mouser Electronics. (2018). *RTCSD-01 OSEPP Electronics* | Mouser. [online] Available at: https://www.mouser.com/ProductDetail/OSEPP-Electronics/RTCSD-01?qs=YCa%2fAAYMW03k4L5cWgx1%252bg%3d%3d&gclid=EAIAIQobChMItMDN3o3h3gIVFR-tBh1IRwLvEAAAYASAAEGI1UvD_BwE [Accessed 26 Nov. 2018].

[8] *MRF-122EG Magneto-Rheological Fluid - 1 Liter*. [Online]. Available: <http://www.lordmrstore.com/lord-mr-products/mrf-122eg-magneto-rheological-fluid>. [Accessed: 21-Oct-2018].