



Smart Helmet

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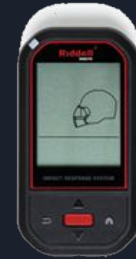


Project Description

- Smart technology and increase protection
- Design for wide range of helmets
- Focus on Football helmets
- <https://www.youtube.com/watch?v=tnAmddi52Y8> (2:07) [1]
- Sponsored by NAU, plan to reach out to more sponsors
- Client: Dr. Hesam Moghaddam

Background and Benchmarking

- Existing “state of the art”
- Companies working on smart helmets
 - Decreasing forces by increasing time of impact
- Riddell Insite training tool
- Analyze impact with 5 sensors
- Transmits the data if impact exceeds threshold



Benchmarking

-Vicis technology

-Innovative helmet padding design

-Morphs shape on impact

-Xonano

-Smartfoam

-Sense impact or pressure





Design Requirements

- Sports helmet
- Similar to current helmets
 - Price
 - Size
- Improve helmet protection capability
- Record and Transmit data



Customer needs

- High Protection
- Similar size of helmet
- Life Expectancy
- More Comfortable
- Transmit Data
- Small Sensor
- Strong battery



Engineering Requirements

- Decrease Impulse
- Maintain Volume
- Increase factor of safety
- Ductility
- Increase power
- Decrease Diameter
- Increase voltage

Table 1: House of Quality

Project: Smart Helmet

Date: 09/23/2018

Input areas are in yellow

		Technical Requirements							Customer Opinion Survey				
Customer Needs	Customer Weights	Decrease Impulse	Maintain volume	Increase factor of safety	Ductility	Increase power	Decrease diameter	Increase voltage	1 Poor	2	3 Acceptable	4	5 Excellent
High protection	5	9	9	9	3	9					C	A	A
Similar size of helmet	4	3	9		3	9						B	AB
Life expectancy	4	9		9		9	3					C	A
More comfortable	3.5	9	3		9	3					A	A	
Transmit data	4.5	9	3			9							
Small sensor	3	9	3				9				BC	A	C
Strong battery	2					9		9			B		A
Technical Requirement Units		N.S	m^3	N/A	N/A	W	m	v					
Technical Requirement Targets		192	114	81	59	140	74	30					
Relative Weight %		27.9	17	12	8.5	20	11	4.4					
Rank order		1	3	4	6	2	5	7					

Legend

- A Vics
- B Ridell
- C xonano



Budget

- Football helmet \$30-664.99 [2],[3]
- Data memory \$35.49 [4]
- Battery \$6.99-7.69 [5]
- Viscoelastic \$30-250 [6]
- Transmitter \$19 [7]
- Radar System \$99.99 [8]
- Arduino \$59.99-150 [9]

Schedule

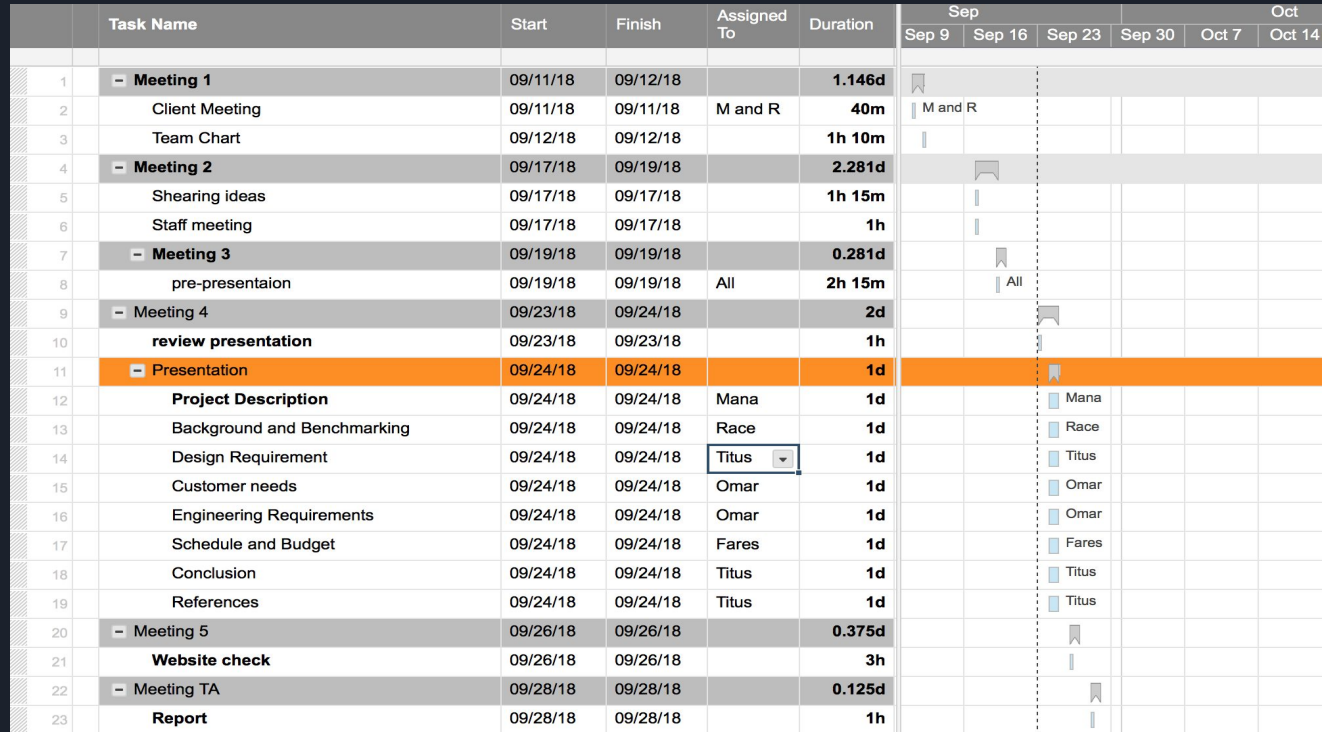


Figure 1: Gantt chart

Schedule(Continued)

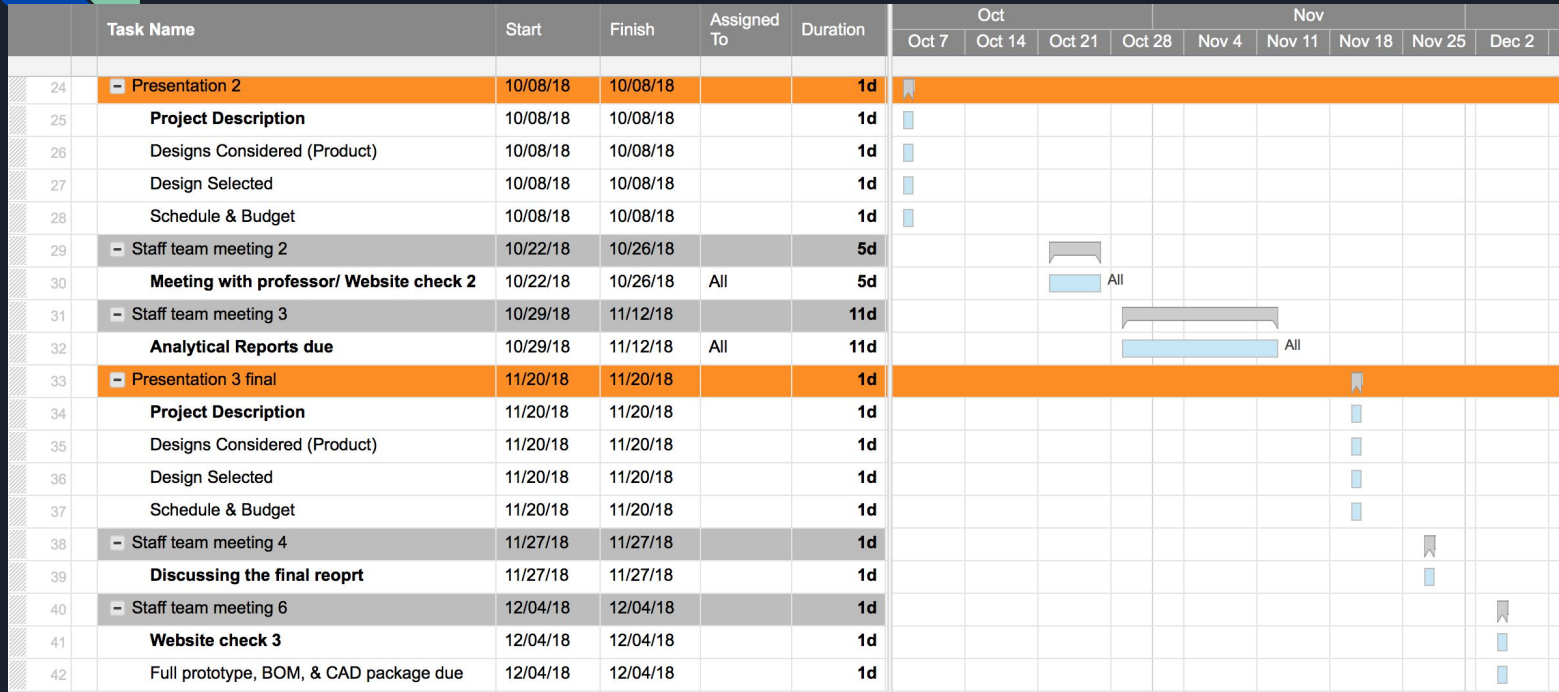


Figure 2: Gantt chart 2



Conclusion

- SMART helmet for athletes
 - Focus on football
- Vicis - “State of the art”
- Customer needs/ engineering requirements
- Budget
 - Estimation of \$1500



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