Project Deliverable C:
Design Criteria

GNG 1103
Group C6

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Introduction

The **objective** of this deliverable is to define a list of prioritized design criteria and benchmark and determine target specifications which can be used in the development of our final solution.

Based on our list of interpreted needs, we will define a list of prioritized design criteria, including functional and non-functional requirements, as well as constraints and metrics. Additionally, we will perform benchmarking and determine a target range of design specifications such as minimum or maximum weight, speed, dimensions, etc. We will benchmark by comparing three different types of pulse oximeters and their specifications. Benchmarking will help us evaluate potential solution ideas and provide measurable design goals which can be fulfilled by our final solution.

Translating Needs into design Criteria

#	Customer Statement/Needs	Criteria	Rank(1-5)
1	I need a device that can be used by users who are alone.	- Good UI (Y/N) - Independent Use (Y/N)	4 4
2	I want a device that allows people to use 2 hands when preparing drugs.	- Obtrusiveness (Y/N)	5
3	I need the device to be affordable for average trades salary.	- Cost ($)	5
4	I need the device to be small, so it will be less likely to be seen or stolen.	- Discreteness - Concealability - Weight - Size	3 3 3 4
5	Due to stigma, I need the appearance of the device to make people not feel embarrassed about it.	- Disguesability	3
6	I need the device to be resistant to day to day use.	- Element Resistance ()	2
7	The device needs to have more than a day of battery life.	- Battery (Days)	4
8	It needs to be able to be worn for at least 24 hours with no risk of failure.	- Durability (Y/N)	3
9	I need a device that provides the user with a quick response, be it calling for help or administering a drug.	- Response time (mins)	5
10	I need the device to work well so that it may be used to save someone.	- Reliability (%)	5

11	I need the device to call the paramedics for help.	- GPS accuracy (m)	5
12	I need the device to monitor the breathing of a person.	- Oxygen Saturation Accuracy (%)	5
13	I need the device to use both oxygen and heart rate to measure if an overdose is occurring.	- Heartbeat/Oxygen Saturation monitor (Y/N)	5
14	Lights on the pulse oximeter must penetrate the skin.	- Depth of penetration (cm)	3
15	Due to the volatile circumstance of the product, I need the device to not be held liable so that distribution can be possible.	- Safety	4

Design Criteria and Constraints

Functional Requirement:

- Independent Use (Y/N)
- Battery (Days)
- Response time (mins)
- Reliability (%)
- GPS accuracy (m)
- Oxygen Saturation Accuracy (%)
- Heartbeat/Oxygen Saturation monitor (Y/N)
- Depth of penetration (cm)

Non-functional Requirements:

- Good UI (Y/N)
- Element Resistance ()
- Durability (Y/N)
- Safety

Constraints:

- Obtrusiveness (Y/N)
- Cost ($)
- Discreteness
- Concealability
- Weight
- Size
- Disguesability

Benchmarking Part 1

Specifications	Product Name		
	MAXREFDES117#	**ZHZ PULSE OXIMETER CMS50D**	**ViATOM Wearable Oxygen Monitor**
Company	MAXIM INTEGRATED PRODUCTS	ZHZ	ViATOM
Cost ($)	20.00	35.00	155.99
Weight (g)	3.5	100	99.8
Main Material	Fiberglass	Plastic	Plastic
Size (cm)	1.27 x 1.27	5 x 3 x 3	9.2 x 9.2 x 7.2
Type of Battery	N/A	Lithium Ion	Lithium Polymer
Battery Life (hours)	Battery Dependant	32	16
Intrusivity (low,mid,high)	Low	Mid	Mid
User Interface	N/A	Colour OLED display	Phone compatibility
URL	MAXREFDES117# Link	ZHZ PULSE OXIMETER CMS50D Link	ViATOM Wearable Oxygen Monitor Link

Benchmarking Part 2

Colour	Red	Yellow	Green
Rating	**Worst = 1**	**Moderate = 2**	**Best = 3**

Specifications		Product Name		
		MAXREFDES117#	**ZHZ PULSE OXIMETER CMS50D**	**ViATOM Wearable Oxygen Monitor**
Company	Value	MAXIM INTEGRATED PRODUCTS	ZHZ	ViATOM

Cost ($)	5	3	2	1
Weight (g)	3	3	2	2
Size (cm)	4	3	2	1
Battery Life (hours)	5	1	3	2
Intrusivity (low,mid,high)	5	3	2	2
User Interface	4	1	3	2
Total		60	57	43

According to the results in the table above, the **MAXREFDES117#** has the highest benchmarking specifications.

Engineering Design Specifications

#	Design Specification	Relation	Value	Units	Verification Method
	Functional Requirements				
	Independent Use	=	Yes	(Y/N)	Analyse
	Battery	>=	24	(hours)	Test
	Response time	<=	3	(mins)	Test
	Reliability	>=	99	(%)	Test
	GPS accuracy	>=	20	(m)	Test
	Oxygen Saturation Accuracy	>=	100	(%)	Test
	Heartbeat/Oxygen Saturation monitor	=	Yes	(Y/N)	Test
	Depth of penetration	>==	2.2	(cm)	Test
	Constraints				
	Obtrusiveness	=	No	(Y/N)	Analyse
	Cost	<=	100	($)	Analyse

	Discreteness	=	Yes	N/A	Analyse
	Concealability	=	Yes	N/A	Analyse
	Weight	<=	200	(g)	Test
	Size	<=	12x12x12	(cm)	Test
	Non-functional Requirements				
	Good UI	=	Yes	(Y/N)	Analyse
	Element Resistance ()	=	Yes	(Y/N)	Test
	Durability	=	Yes	(Y/N)	Test
	Safety	=	Yes	(Y/N)	Analyse

Conclusion

The target specifications have been realized in the table above. After completing the benchmarking of three different possible pulse oximeter candidate devices, we have been able to identify certain specifications that our product must have in order to succeed. As seen in the benchmarking table 2, MAXREFDES117# has the highest value of benchmarking specifications which tells us that this product is the most practical reference we could use when designing our product. As well, the customer needs have been turned into design criteria and have been ranked which will allow us to prioritize certain needs above others and focus on those in depth.

As we reflected on our last client meeting, we were able to prioritize what design criteria was the most important, which is ranked and shown above. The meeting with the client was crucial for this process as it gave us a better understanding of what the most important specifications for the opioid overdose detection device are.