Design Criteria and Target Specifications

GNG 1103, Team 2
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Introduction:

The next stage in our team's design process is to define design criteria and set target specifications. This needs to be done by interpreting, prioritizing, and revising the clients needs into a more specific list of criteria and specifications. This covers all areas of design including functional specifications, non-functional specifications, and constraints. The set design criteria is crucial to our team's progress as our design must follow the set specifications and constraints to completely resolve the client's problem.

Defined and Prioritized Design Criteria

#	Category	Need	Design Criteria	Priority
1	Gameplay	Experience should maintain users' attention. Users should interact with the robot.	User interaction, robot interaction.	1
13	Program	Clean code, no bugs. Well documented.	Code, range of error.	2
3	Gameplay	Challenging, create potential ideas to win (but not allow a win).	Difficulty, encouragement in problem solving, end result.	3
11	Product Feel	Experience must be clear in its view on autonomous weapons. No upsides suggested to users. Illustrate ethical concerns of autonomous weapons while convincing important figure heads of the dangers of LAWS. Convincing, clear and powerful message.	End result, user emotions, message delivery.	4
6	Gameplay	Program created for robomaster, targeting the users. Robot needs to be able to function in a set environment.	Robot mobility, targeting range, recognition abilities.	5
12	Program	Free of triggering real world biasses.	Triggering material.	6
9	Accessibility	Clear communication by robot, through multiple methods.	Visual communication, auditory communication.	7
7	Accessibility	Simple setup (no adhesives, etc.) Easy to follow setup instructions for Mines Action staff.	Set up time, difficulty.	8
10	Accessibility	Experience does not require constant surface conditions, and can handle varied lighting. Gameplay is readily transmissible.	Environment, light levels, portability.	9
8	Accessibility	Generic accessibility, no specialized knowledge required for users.	Required user knowledge.	10
4	Gameplay	Clear "gameplay" (straightforward instructions),Co-operative amongst users.	Number of players, difficulty.	11
5	Gameplay	Small scope (small group, brief).	Area of gameplay, length of gameplay.	12
2	Gameplay	Experience cannot be "won". Experience should instill feelings of hopelessness, wrongdoing.	End result.	13

Now that our design criteria has been defined and prioritized, research needs to be done to set target specifications and constraints.This allows us to assign qualitative and quantitative values for each criterion.

Technical Benchmarking

It is important to research existing products in a variety of fields as they might relate to the group's project. Many of the client's needs that were interpreted from the meeting can be interconnected with a variety of products on the market. Researching existing products can help the group develop and brainstorm new ideas or concepts that are relevant to the interactive experience that the client wants.

One of the interpreted needs that the group has gathered from the client meeting was that the interactive experience needs to be challenging. The final project should allow the users to create and experiment with potential ideas to win but the actual chance of them winning is slim to none. An experience that satisfies this interpreted need is arcade/carnival games where the games are slightly tweaked to make the games look simple and easy to win, but are extremely difficult to complete successfully because of the altered equipment. Another product includes lottery tickets, many users will continue to purchase tickets with a hope of winning or getting lucky despite knowing that their chances of winning are one in a million. Both these products encourage the user to play and attempt to win but cannot be won. The group must incorporate these elements into the interactive experience but make it even more impossible to win in order to communicate the main message that LAWS should be banned.

A second interpreted need was that the experience should be straightforward and instructions should be kept simple. The main goal is to allow users of all ages and knowledge backgrounds to be able to participate; it should not target a certain demographic. A game that satisfies these needs is “Rock, Paper, Scissors”. This game is extremely straightforward and can be played by people of all ages. The instructions are simple and can be taught to anyone in less than a minute. The goal of the group project should be to explain the rules and instructions in a similar amount of time. This is an important need since our client would like to reach as many users as possible in the least amount of time.

Another important aspect is for the experience to be set up quickly. Sports such as frisbee and jump ball are great examples of sports that are fun, inclusive and easy to set up. These sports only require one object and involve a group of players. Not only are these games fun to play but they are extremely simple and can also be explained in a short amount of time. The interactive experience that needs to be created for the client should be similar in these aspects. It’s important that there are limited pieces to the interactive experience because it needs to be set up quickly and can be portable; minimal parts to the project helps minimize the stress of transportation. Decreasing the parts of the interactive experience also makes it easier for the Mines Action Canada staff to follow the setup instructions.

Generic accessibility is a huge need to be considered in the project design. No specialized knowledge should be required of the users upon entering the interactive experience. This allows the client to reach a larger number of users and demographic. The goal is to create something that is simple and easy to comprehend so that the greatest number of people can interact with and learn from the experience. Products on the market that fit this need include: tic-tac-toe and bowling.

The experience that is being created should not require constant surface conditions and can be handled in varied lighting. The client mentioned in the meeting that the experience should be able to be set up at concerts or other public events. One product on the market that fits this need is a Nintendo Switch as it is an extremely portable product and can be used anywhere. This product is compact and should be something that the group looks towards when designing the immersive experience.

When designing and creating a project it is always important to research existing products that already satisfy the interpreted needs since it can be used as inspiration or used as a good starting point when setting metrics.

Using benchmarking and the given constraints from MAC, we can assign values to the set of defined criteria

#	Design Specifications	Relation (=,>,<)	Value	Units	Verification Method
	Functional Requirements:				
1	User and robot interaction	=	Yes	N/A	Test
6	Robot mobility (x,y)	=,>	1	ft/second	Test, analysis
6	Robot mobility (turret)	=,<	180	degrees/second	Test, analysis
6	Targeting range	>	12	feet	Test, analysis
6	Recognition abilities	=	Yes	N/A	Test, analysis
9	Communication (visual and auditory)	=	Yes	N/A	Test
10	Required physical environment	=	No (No specific environment)	N/A	Test
10	Lighting requirement	=	No	N/A	Test
10	Portable size	<	22x14x9	inches	Test
13	Range of error	<	5 (aim for no error)	%	Test, analysis
13	Bugs in code	=	0 (clean code, no bugs)	N/A	Test, analysis
	Non-Functional Requirements				
2	End result	=	Loss	N/A	Test
3,4	Difficulty	=	Easy	N/A	Test, analysis
3	Problem solving encouragement	=	Yes	N/A	Test, analysis
8	Required user knowledge	=,>	Minimal	N/A	Test, analysis

11	User emotions	=	Frustration, understanding of issues	N/A	Test, analysis
11	Illustrated message	=	LAWs are unethical	N/A	Test, analysis
12	Triggering material	=	No (avoid)	N/A	Test, analysis
	Constraints				
4	Player count	=	3-5	players	Test
5	Area of gameplay	<	20 x 20	feet	Test
5	Length of gameplay	<	10	minutes	Test
7	Set up time	<	1	minute	Test
5	Equipment must fit within volume of carry-on bag	<	22 x 14 x 9	inches	Test

How Our Client Meeting Influenced Our Design Criteria and Specifications

When we met Mines Action Canada (MAC), we found out what their main objectives are, and their specific needs for the project. This was a great discussion because it allowed us to get a better understanding of what MAC actually wants from us and how we can design an experience that meets those needs.

Key Points from the Meeting

Understanding the Client's Goals:

MAC is interested in spreading awareness of the dangers associated with 'Lethal Autonomous Weapons Systems' (LAWS) through the experience. This goal had a big impact on our design criteria. To that end, we must build something that not only attracts users but also conveys the serious ethical problems surrounding LAWS.

Engagement:

The client clearly stated that the experience must be interactive, which we believe is a very important aspect. As a result of this feedback, we chose to put user interaction and a feeling of challenge above other criteria in our design. For instance, the experience should be designed to have the users feel that they cannot 'win'. This instills a feeling of hopelessness that can be related to the real world issues with LAWs. This was a big change compared to our first thoughts where we might have just played a game without bothering to think about the deeper context.

Specifications:

In the meeting we learned that the product must be easy to set up and use, and that any modifications must be quick and easy. After understanding this, we must adjust our technical specifications to satisfy this criteria.

***Feedback on Accessibility**:*

The client stated that the experience should be understandable by anyone, not requiring specialized knowledge. This feedback helped us to define criteria by which the product can be enjoyed by people, whatever their background.

Updated Criteria and Needs

In light of the results of our client meeting, we reviewed the initial project needs description derived in Deliverable B, and revised it in line with the results. This taught us to focus on user engagement, user accessibility, and emphasis on the ethical issues involving LAWS, so that our final design was clearly on track towards the client's mission.

***Updated Needs**:*

Enhanced User Engagement: At first, we may have thought of user engagement in terms of entertaining the user. We now know that engagement includes making users critically think about the ethical implications of autonomous weapons. The client wanted to emphasize this need more since they were very much looking to create a strong emotional punch from the user.

Clarity on Ethical Message:

We realized that the product needed to carry a clear message about the dangers of LAWS. The new design criteria now prioritize that the experience should demonstrate ethical concerns directly. In Deliverable B this was not as clearly defined and we might have missed the point.

Simplified Setup:

The need to set up quickly and easily was highlighted in the meeting. The first time we might not have considered how long it would take to prepare the robot for use. But now we have to make sure our design is flexible for simple modifications without complicating things, to use it in many places.

***Accessibility**:*

We realized that the experience should be offered to a broad user base, including those who don't know the topic. As a result, we set a priority of design criteria that will make the game easy to understand as well as participate in, therefore being inclusive for everyone.

Importance of the Updated Criteria:

Now, the criteria are more critical since they are closely related to MAC's objectives. Updating our design criteria to these needs is important so that our project satisfies the requirements perfectly and ethically. We will align the content we produce to the client's specific objectives, to help ensure all that we create is impactful and communicates the urgency around the issue with LAWS.

Conclusion

Using the client's needs and benchmarking to develop design criteria and target specifications is essential to the design process. Without it, the work will continue with less focus and can stray from what the client expects. Now that we have successfully defined a list of design criteria and target specifications, we can progress with a focused view on how to design a proper solution for the client's presented problem.