**University of Ottawa**

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**GNG 1103: Engineering Design**

**Deliverable C – Design Criteria**

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# Introduction

This document illustrates the established design criteria and target specifications for this project. This is aimed at addressing the consequences of armed conflicts and the ethical concerns surrounding autonomous weapons. These criteria encompass a range of factors such as visual impact, storytelling, emotional engagement, and societal responsibility. Additionally, it outlines measures to ensure the project meets both functional and non-functional requirements.

Table 1:Project’s design criteria

|  |  |  |
| --- | --- | --- |
|  | **Needs** | **Design criteria**  |
| 1 | Make a short video to show what might happen if we don't act quickly | * Visual Impact
* Short video
 |
| 2 | Use engineering software to simulate how civilians in virtual cities protect themselves during armed conflict. | * Living environment
* Civilian’s lifestyle
 |
| 3 | Make a video to let people intuitively feel the sharp contrast between the before and after of a city due to war conflicts. | * Story telling
* Time travel
 |
| 4 | Show the disconnect and lack of accountability that comes from not having a person, but an AI being what decides who dies | * Show the lack of emotion.
* Show the lack of decision making
 |
| 5 | The experience should utilize creative, unique and unexpected ways to win the hearts of viewers. | * Storyline
* Music
* Video’s colour
 |
| 6 | Make a powerful video that doesn’t contain graphic violence and gore. | * Good storyline
* Emotionally focused situations
* Music
* Video’s colour
 |
| 7 | Make a simple, cost effective and straightforward video. | * Cost
* Length
* Simplicity
 |
| 8 | Make a video that balances between fear and concern. | * Good storyline
* Music
* Video’s colour
 |
| 10 | Figure out what sensor data the autonomous weapon will use to lock on to its target and list them. | * Technological accuracy
* Informative about dangers
 |
| 11 | Make a feasible video showing how people should avoid being targeted by autonomous weapons, or what behaviors they should use when they are likely to be targeted to avoid being harmed. | * Paranoia / impending danger
* Dystopian lifestyle
 |
| 12 | The video should simulate the current or upcoming years in terms of the general appearance of cities with modern architecture. | * Demonstrate the crisis nature of the situation
* Graphical familiarity
 |
| 13 | Any environment/ group of people can be depicted in the video, but ignorant portrayals and racial, ethnic, etc generalizations must be avoided. | * Avoids offence
* Informed representation
 |
| 14 | It would benefit the experience if it had familiarity for the viewers. The goal is to introduce a familiar world with added elements of survival among killer robots. | * Realistic & modern environment
 |
| 15 | The video should be credible/believable enough to make the viewer want to stop the designing of these robots today, rather than making them want to test them in real life first. | * Do not rely sole on the portrayal of accidents
 |

# Benchmarking

## Nuclear weapons

***Who:***

The mandate adopted by the United Nations General Assembly on December 23, 2016, arranged for two negotiating meetings on a comprehensive ban on the development, manufacture, possession and use of nuclear weapons.

The Treaty on the Prohibition of nuclear weapons was first proposed to the United Nations by Costa Rica and Malaysia in 2007.

***How:***

1. **Provide and support the philosophy of the bill:**

A treaty to ban nuclear weapons would constitute a "clear political commitment" to achieve and maintain a world free of nuclear weapons

1. **The treaty's preamble [15] explains the "catastrophic consequences" of the use of nuclear weapons,** their risks and the motivations of atomic bomb survivors (the surviving victims of the 1945 Hiroshima and 1945 A-bombings). Nagasaki) and victims of nuclear testing, deterred by the "slow pace of nuclear disarmament" and "continued reliance on nuclear weapons in military and security concepts."
2. **Propose specific measures in the treaty**
	1. prohibits the development, testing, production, stockpiling, deployment, transfer, use and threat of use of nuclear weapons, as well as assisting and encouraging prohibited activities. Finally, any direct or indirect “control of nuclear weapons or other nuclear explosive devices” is prohibited.
	2. Requires each party to declare whether it possesses nuclear weapons of its own or has nuclear weapons deployed on its territory, including by eliminating or modifying related facilities.
	3. Requires parties that do not possess nuclear weapons to maintain their existing IAEA safeguards and, if they have not already done so, to accept safeguards based on the non-nuclear weapon state model under the NPT.
	4. Sets out the general procedures for negotiations with individual nuclear-weapon States that become parties to the treaty, including time limits and responsibilities. If the state eliminates nuclear weapons before becoming a party to the treaty, it requires verification of the elimination by an unspecified "competent international agency" and the state must also conclude a safeguards agreement with the International Atomic Energy Agency to provide credible Assurance: No transfer of nuclear material and no undeclared nuclear materials or activities. If the country has not yet destroyed its arsenal, it must negotiate a time-bound plan with "competent international authorities" for the verifiable and irreversible elimination of its nuclear weapons program.

##  Laser weapons

Humanitarian groups have spent the past fifteen years considering provisions in the laws of war that would regulate or ban laser weapons, but none have been accepted by the international community. Separate arms discussions were held during the 1974-1977 Diplomatic Conference on Humanitarian Law, and although a few countries raised the issue of laser weapons, in addition to the incorporation of Article 23(e) of the 1907 Hague Annex IV into the 1977 Additional Protocol I Article 35(2), the question of whether all weapons are prohibited is deferred.

Subsequently, at the United Nations Conference on Conventional Arms held in Geneva from 1978 to 1980, a very small number of countries once again raised the issue of laser weapon control. However, due to the lack of support from other countries for this plan, this plan was not actively implemented in the end.

During the 25th International Conference of the Red Cross (Geneva, October 1986), Sweden and Switzerland introduced a resolution condemning the blinding effects of laser weapons; the resolution received little support and was strongly opposed by some countries boycotted and therefore was not passed by the meeting. In April 1988, Sweden tried again to raise the issue, but in a much-modified form. It recognizes the legality of the use of lasers to produce a flash effect on combatants; accepts the legality of the use of lasers for ranging, target acquisition and similar military purposes; and recognizes the legality of the use of lasers to blind enemy combatants for the above purposes. However, Sweden is still working hard to propose a ban on the use of lasers as anti-personnel weapons and causing pain to personnel.

***Regarding the proposal of the bill, Sweden and some humanitarian organizations considered the following points:***

1. For countries that are not included in the 1980 United Nations Weapons Alert No. 4, is the use of lasers as anti-personnel weapons consistent with international humanitarian law? What standards should be used for this replacement? (HR, sec. 23(e); PI, sec. 35(2)) [See also "Kills with Blinding Laser Weapons" (Number 4, 1980)]
2. Does laser blinding of enemy soldiers constitute "excessive "Injury or unnecessary suffering", does this mean that the use of lasers is prohibited under international humanitarian law? What counts as “excessive harm”? Is it "unnecessary suffering"? Do these terms only cover physical pain? Or is there also psychological pain? Are these detection terms? And apply investigative standards to determine what constitutes “undue harm and unnecessary suffering”?
3. Rather than evaluating the weapon and/or use in isolation, what is the most appropriate way to determine whether a weapon is "unnecessary suffering" by comparing it to other possible mechanisms of injury suffered by soldiers on the modern battlefield? Should the listening effects of a weapon on a victim (such as the severity of the injury or the intensity of the pain) be balanced against military necessity? Is the decision weighing the harm caused against the ability to carry out the threat? Are these accurate concepts the basis for such a decision?
4. Weapons can cause death but cannot be calculated or intended to cause "superfluous injury or unnecessary suffering,"

Table 2: Target specifications

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Design Specification** | **Relation** **(=, < or >)** | **Value** | **Units** | **Verification Method** |
| **Functional Requirements** |
| Simplicity | = | Yes | N/A | Test, Feedback |
| Emotionally focused situations | = | Yes | N/A | Test, Feedback |
| Avoids offence | = | Yes | N/A | Test, Feedback |
| Good storyline | = | Yes | N/A | Test, Feedback |
| Show the robot’s lack of emotion. | = | Yes | N/A | Test, Feedback |
| Show the robot’s lack of decision making | = | Yes | N/A | Test, Feedback |
| Modern living environment | = | Yes | N/A | Test, Feedback |
| Civilian’s lifestyle | = | Yes | N/A | Test, Feedback |
| **Constraints** |
| Length | = | 60  | Seconds | test |
| Cost | = | 0 | $ | Test |
| Time | = | 3 | Months | Test |
| **Non-Functional Requirements** |
| Music | = | Dramatic | N/A | Test, Feedback |
| Colour scheme | = | Dramatic | N/A | Test, Feedback |
| Graphical familiarity | = | Yes | N/A | Test, Feedback |

# Conclusion

The last meeting with the client helped the development of serval aspects of our design criteria by allowing us to ask questions, utilize interpreted user statements to form need based criteria.

The client meeting made it clear that they insisted on a simple, short, immersive, and appealing experience while still highlighting the consequences of inaction and making the viewer concerned about their future. This came as a surprise and added new criteria. At first, we assumed that there would be a higher level of importance put into striking fear in the viewer, but we realized as the meeting went on.

# References

[https://en.wikipedia.org/wiki/Treaty\_on\_the\_Prohibition\_of\_Nuclear\_Weapons,](https://en.wikipedia.org/wiki/Treaty_on_the_Prohibition_of_Nuclear_Weapons%2C) United Nations, ed. (6 July 2017). "Draft treaty on the prohibition of nuclear weapons". Retrieved 8 July 2017.

Provide and support the philosophy of the bill

 Working paper 34 submitted to the UN open-ended working group on nuclear disarmament, Geneva, 11 May 2016.

The treaty's preamble [15] explains the "catastrophic consequences" of the use of nuclear weapons

"Banning nuclear weapons without the nuclear armed states" (PDF). Article36. October 2013. Retrieved 15 July 2017.

Doswald-Beck, L. (ed.), Blinding Weapons: Reports of the meetings of experts convened by the International Committee of the Red Cross on Battlefield Laser Weapons 1989-1991, Geneva, International Committee of the Red Cross, Annex C, 1993, pp. 367-371]

Martens Clause, Hague Convention IV, preambular paras 8-9; GC I-IV, Arts 63(4)/62(4)/142(4)/158(4) respectively; P I, Art. 1(2); P II, Preamble, para. 4)