Surveillance

SOLUTIONS TO THE ETHICAL ISSUES SURROUNDING THE TECHNOLOGY USED FOR LETHAL AUTONOMOUS WEAPON SYSTEM

FIT1055 IT PROFESSIONAL PRACTICE AND ETHICS | 8TH OCTOBER 2022
ASSIGNMENT 2

No Comment

Foo Kai Yan | 33085625
Tan Yi Jin | 33263213
Tang Wei Yao | 32694849
How Yew Wai | 33182140
Ethan Yong Yu Heng | 33201951
Andrew Huan Zhen Xiang | 32618867

Background – Problem Statement

The military of countries all around the world have undergone several advancement and transformation due to the recent evolution and growth of the Internet Technology (IT) industry. Artificial Intelligence (AI) is one of the many new developments of the IT industry that has helped to improve the overall military force. AI has helped in the development of lethal autonomous weapon systems (LAWS) where AI systems were developed to control these LAWS. LAWS main purpose was to detect, identify, locate and eliminate their assigned targets without any form of human interference (Boisboissel, 2015) which has been impacting civilians, governments, military soldiers, policy makers and developers negatively.

Critical decisions like who will be eliminated or spared will be made and decided by the algorithms integrated into LAWS themselves and this worries and threatens many civilians all around the world ("Global Survey Highlights Continued Opposition to Fully Autonomous Weapons", 2021). Peoples like the International Committee of the Red Cross (ICRC) has firmly stated their position and has highly advocated that LAWS must be regulated firmly and strictly by laws and policy that should be laid out by the government and policy makers ("Lethal AWS", n.d.).

LAWS must be subjected to International Humanitarian Law (IHL) as it is treated as a weapon whose decisions made could affect and restrict the civilians' human rights and freedom (de Ágreda, 2020) as well as implicating their lives and deaths. LAWS must also follow Laws of War (LoW) (Boisboissel, 2015) to ensure no innocent lives were taken unjustified by LAWS but the problem regarding this issue would be there is, for now, no way to allow LAWS to make ethical decisions that adhere to these laws.

To summarize, LAWS falls under the surveillance category in the IT industry and this report is done with the purpose to provide and propose an ethical solution in the context of social, environment, and legal aspects arising from the ethical issues surrounding the technology used for LAWS. This report will start with a background of the topic on LAWS, followed by the methodology, which is the Ethical Reasoning Framework (ERF), as well as the techniques and methods used for teamwork management. This report will end with the proposed solution for the problem statement and a conclusion. Reference is provided at the end of the report where additional links are given to be used for further reading regarding this topic.

Methodology – Ethical Reasoning Framework

2.1 RESULTS OF RESEARCH

After the identification of the problems, members were assigned to do further research on which stakeholders were affected negatively with the presence of LAWS. The research mainly focuses on how and why these stakeholders were affected. Some solutions were discovered during the research and were recorded down to help in future steps in ERF.

The stakeholders that were affected include the government, developers, policy-makers, military and civilians.

According to Etzioni & Etzioni (2017), the government will be responsible for any deaths of civilians if the blame cannot be pushed onto somebody due to IHL. LAWS has already been used to kill an Iran scientist back in 2020 so this technology may also incite malicious people to attempt to eliminate important political figures to cause chaos amongst the country (Kleinman, 2020).

With the introduction of LAWS, policy-makers have been tasked to establish policies that ensure LAWS can be used in an ethical manner. Some policies include controlling what user information can be collected, as without this, LAWS may give rise to user privacy or intellectual property problems (Etzioni & Etzioni, 2017).

The military were also implicated as they are now tasked with working alongside a new system that they may not understand fully (Kwik, 2022). This may cause them to be unable to make appropriate decisions due to possibly insufficient knowledge of the system (Kwik, 2022).

If any issues arise with LAWS, the programmers that created LAWS may be sued with no way to justify themselves due to product liability, which states that the manufacturer of a specific product can be held responsible for selling or distributing a faulty or defective product (Marvin, 2022).

Of all of the issues that could arise from LAWS, civilians are under the most risk as if LAWS fail to distinguish their targets and civilians, civilians may be accidentally eliminated by LAWS (Asaro, 2020).

The idea of establishing the law on no human target and the idea of having human controlled LAWS was conceived throughout the research ("Lethal AWS", n.d.). To research this efficiently, the technique of teaming was used to split the group into pairs to find the information surrounding the stakeholders of the issue to come to this conclusion eventually.

2.2 PROBLEM IDENTIFICATION

According to the result of research, LAWS have been shown to breach several Code of Ethics such as ACM Code of Ethics 1.2, 1.6 and 2.9. ACM Code of Ethics 1.2 states that systems developed by computing professionals should never result in any form of negative

consequence like unjustified injury and destruction. ACM Code of Ethics 1.6 states that computing professionals should respect individuals' privacy with how the data collected should be handled. ACM Code of Ethics 2.9 states that computing professionals should design and implement systems that should be usably secure (ACM Code of Ethics and Professional Conduct, 2018).

This research was done through the use of the technique known as teaming where the group members were splitted up further into three pairs to research and find how and why the ACM Code of Ethics were breached. The research was then done using the brainwriting technique to note down how and why the ACM code of Ethics was breached.

2.3 GUIDING PRINCIPLES

After compiling the research, the group used three fundamental types of ethical theories as guiding principles to produce ideas for possible solutions. These ethical theories are virtue ethics, deontology and utilitarianism (Nailah, 2022).

Virtue ethics encourages decisions made in light of favored virtues such as Justice or Honesty (Nailah, 2022). One of the key points brought up was to prevent unjustifiable damage on both people and property especially in urban areas. Another point was to enforce honesty and responsibility by ensuring that the LAWS undergo adequate amounts of testing that will be publicized to the public. This gives the public a sense of security as the public would understand how and why LAWS will be operated in the public.

Deontology encourages the idea of people being treated with dignity and respect, as well as identifying one's duty accordingly (The Arthur W. Page Center, n.d.). One point found here was that the government, military, or just in general the users of LAWS should take responsibility for any actions done by the LAWS unit. The developers also hold the responsibility of securing data and ensuring that no data leaks can ever happen.

Utilitarianism enforces the making of a decision based on what will benefit the majority of the people (The Arthur W. Page Center, n.d.). As this ethical theory revolves around making decisions that benefit the majority, the strongest point that can be given in light of this topic is to ban the development of LAWS. However, this will most likely only be possible if an agreement between all countries were made, henceforth making this very unlikely.

When researching this, the teaming method was used where the members were splitted to three pairs to research on this in relation to the ACM code of ethics. From here, each pair uses the same brainwriting technique to note down all important points researched and discussed in the meeting.

2.4 IDEATION

Design thinking method was used to act as a general guideline for each of the team members to brainstorm as many ideas as possible to address all of the problem statements from stakeholders during the meetings through zoom.

Through the team's brainstorming, three main ideas for solutions were thought of to be satisfying. The first solution being "Human Control". This solution involves allowing the use of LAWS only under strict rules and regulations of each country to reduce the risk of harm that may potentially occur (Brian Stauffer, n.d.). This retains some form of human control for decision making operations in order to adhere to IHL laws (Army University Press et al., n.d.). This solution also restricts the use of LAWS in highly populated areas. Implementation of strict policies allow the collection of necessary data by LAWS to be controlled which prevent the breach of data privacy laws (Killer Robots: Negotiate New Law to Protect Humanity, 2021).

The other solution that was thought of is "Restrict Unpredictability". This solution involves implementing new and stricter policies to restrict the use of LAWS during operations. This restricts the use of LAWS in urban areas and only allows the use of LAWS only after passing multiple practical tests (Position on Autonomous Weapon Systems, 2021). Developers in this solution play the role of halting the development of LAWS that show consistent flaws or malfunction on field (Jones, 2021). Developers should also create a backdoor software as a safety measure to remotely terminate a LAWS unit incase of emergencies such as unintentionally harming civilians or unwanted malfunctions. Not only that, LAWS personnel should ensure that LAWS operators are well trained and are able to make calm and effective decision making which reduces the probability of an operator making a mistake.

The last solution that was brainstormed is "No Human Targets". The role of the military in this solution is to only allow LAWS to be used as active protection for the lives of citizens and soldiers. LAWS would be used against only a specific range of objects that has a legal qualification as a military object like tanks, helicopters and submarines (Position on Autonomous Weapon Systems, 2021). To help put this solution into action, policy-makers would have to implement policies that completely restrict the use of LAWS towards humans. Military would have to rely on ground soldiers to handle all human targets and to restrict the use of LAWS in a more limited space of conduct (Position on Autonomous Weapon Systems, 2021).

2.5 DELIBERATION

Capital of Israel, Jerusalem, has been a part of many conflicts. Knowing this, it is understandable that Israel has one of the most advanced military technologies today, ranking at the 18th place out of 142 countries. One of the more advanced military technologies used by them is the world's first AI-guided drones used in combat at the Gaza Strip (QS Study, 2021).

As tensions are high between Israel and their surrounding forces, it is no surprise that these AI-guided drones have been designed to be capable of opening fire at human targets without human control. Ethically, this is wrong and therefore human control should be implemented to ensure that there can be a human held accountable for any unintentional consequences caused by LAWS unfavoured by the IHL.

The implementation of human control would allow the system to respect human rights and human intellect in making its own moral decisions in the matters of life and death as long as the operator also respects the rights of humans. This is especially important as with the

current technology regarding machines where there is no concrete method to "code" morals into machines. This implementation also allows the system to be more reliable as if there is a human in the loop, it is less likely for accidents to occur with the system.

As these AI-guided drones were also using supercomputing to flick through information and identify new targets in the Gaza Strip, information should be heavily prioritized and protected from any breaches as well (QS Study, 2021). With a human at the reins at all times, cases of information breach also have a much higher chance to be countered quickly to prevent information breaches.

When deliberating, the brainstorming technique was used to gather ideas on how Israel's policies, history and culture would have an effect on the implementation of the solutions thought up during the Ideation process. Brainstorming was done face to face together using the rooms in the Hive.

2.6 PRODUCE SOLUTION

The final solution was decided based on having each member thoroughly read through and analyze the three solutions then vote on whichever solution was more preferable. "Human Control '' was voted to be the solution used for the topic. The main problem faced by LAWS is that LAWS is completely automated which means no one could be held accountable incase of a malfunction or the potential of it being hacked and used for malicious intent which may cause distrust towards the government (BBC News & Zoe Kleinman, 2020). No scientific evidence could prove machines could do accurate target identification, situational awareness and appropriate decision making in accordance to different situations (Army University Press et al., n.d.). Without the supervision of an operator, if a LAWS unit were to be hacked or stolen by terrorists, there would be no way to know the whereabout of the LAWS unit or to even perform a memory wipe which may not only cause leakage of personal data stored inside the LAWS unit but also lead to mass production of LAWS units by terrorists due to its source code being retreived from the unit.

Thus, having a human control over LAWS would allow more morale sounding and decisive decisions to be made. Having human control over LAWS also prevents misidentification of targets and data leakages to occur.

Certain parts of the ERF and potential solution was illustrated in a shared mind-map amongst the group to record down the ideas real-time during the meetings conducted. The link of the mind-map is shared as followed: https://mm.tt/map/2445042612?t=1Xb2rTO6f1

Techniques/Methods for Teamwork

Fig 1. Tuckman's Theory Graph showing steps a team goes through from formation to completion

Tuckman's theory is the method used to incorporate team working processes within the team. There are five steps in Tuckman's theory which is Forming, Storming, Norming, Performing and Adjourning as illustrated in the diagram above.

During the forming step, everyone was just familiarizing with each other as not everyone was familiar with each other. To begin, there was time allocated to conduct an ice-breaking session and personality test. This was especially helpful in bringing the group together as most members in the group were introverted which allowed the group to understand the various personalities present in the group. Every member was assigned to a role according to their personality test result and were added to a Whatsapp group and a Google Drive folder which are applications to facilitate continued communication and collaboration between members of the team.

After the forming step was the storming step where some conflict happened on which topic was to be chosen to be the main topic of this current assignment as everyone in the team did different topics but in the end, the leader decided that a voting session is to be held to assist in the decision on which topic was to be chosen for the assignment. In order to restrict impulsive votes from being made, time was allocated for each group member to read through and come up with key information such as possible solutions to help us decide which topic to proceed with. Through the voting session, LAWS under surveillance was chosen as the main topic of the assignment.

Throughout the norming stage, the leaders' guidance and assistance helped with the flow of the assignment which allowed progress to be made on every meeting held. These meetings were usually held on Zoom with the exception of the brainstorming process where it was agreed that it would be done physically face to face to encourage active participation in the brainstorming process. One effective method that was used during the brainstorming sessions was the use of mind maps which helped each member project their ideas without any constraints during each meeting. The use of a mind map allows the members to view and filter ideas effectively as a mind map allows the ideas presented to be displayed in an organized manner. Although there were some minor conflicts happening within the team, it was quickly solved with a voting and debate session where the option with the majority vote was picked. Even though there was some joking around by certain members in between each session, all tasks were completed on time.

To come to the concluded features to be present in LAWS, possibility ranking, which is a decision making technique, was used to determine the best and most crucial features that required to be implemented first (Dagher, 2021). To do this, a voting session was hosted in order to decide which features required to be prioritized. The order of priority was decided based on its importance and capability in fulfilling the ethical algorithm and AI principles.

Throughout the whole project, the members' performances ranged from adequate to well-done. Few relatively good and effective features of solution were thought of and these solutions were further refined with the contribution of every member present. Extra research was done to assist in report writing, hence, the actual process of writing the report went amiably well.

Although the synergy between members allowed work to be completed, there were still issues that arose during meetings. One such example of this will be when work was to be allocated to each member. When allocating work, the group leader would always ask for any preferences but the members would often be unresponsive. This has led the leader to allocate tasks in accordance to the capabilities of each member. As there was a coding assignment that was due much sooner than this, the group chat would tend to be inactive even when asked about individual progress. This all led to putting the group behind the planned schedule which was only solved after the coding assignment was completed by organizing more meetings which led to a higher workload to be completed under a shorter time frame by each member.

The last step of Tuckman's theory is adjourning but since the next assignment requirement is that the same team is to be used so the team was not disbanded.
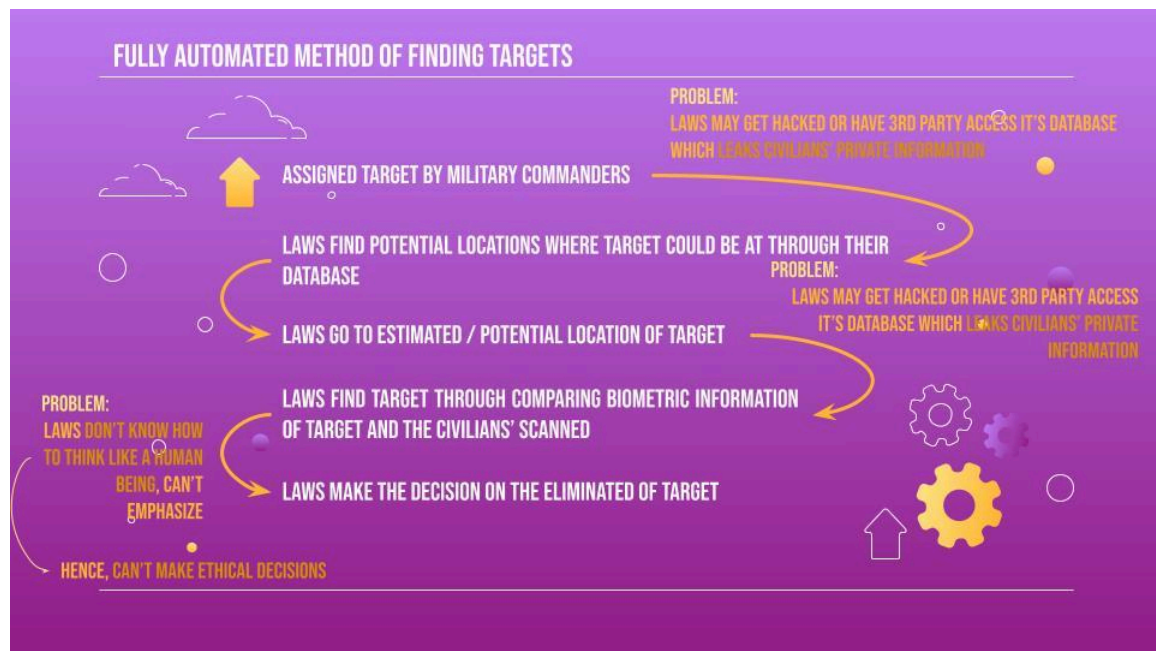
The Proposed Solution

During the deliberation step, three work-flow diagrams of the process of how the military detect, locate and deal with the targets were illustrated.

The first diagram indicates the method of finding targets where humans are fully in control of the process of finding and eliminating the targets. The military was not assisted by AI during the whole process. This method allows the military to have full control on the decision made regarding how to proceed after each step and how the target should be dealt with. The problem with this method is that throughout the process, humans' thinking may be affected by their emotions which may allow these military soldiers to make unforgivable errors that may put their comrades in risk.

The second diagram illustrates the method of using fully automated LAWS where the AI is responsible to conduct the whole process of searching and eliminating the target and making decisions. This is a very fast and efficient method to search for targets, however, it has a major downside that breaks multiple ACM code of ethics. AI cannot comprehend human senses and only focuses on eliminating the target, hence accidents such as, damaging the environment or even harming innocent bystanders while pursuing the target could happen.

FULLY AUTOMATED METHOD OF FINDING TARGETS

PROBLEM:
LAWS MAY GET HACKED OR HAVE 3RD PARTY ACCESS IT'S DATABASE WHICH LEAKS CIVILIANS' PRIVATE INFORMATION

ASSIGNED TARGET BY MILITARY COMMANDERS

LAWS FIND POTENTIAL LOCATIONS WHERE TARGET COULD BE AT THROUGH THEIR DATABASE

PROBLEM:
LAWS MAY GET HACKED OR HAVE 3RD PARTY ACCESS IT'S DATABASE WHICH LEAKS CIVILIANS' PRIVATE INFORMATION

LAWS GO TO ESTIMATED / POTENTIAL LOCATION OF TARGET

LAWS FIND TARGET THROUGH COMPARING BIOMETRIC INFORMATION OF TARGET AND THE CIVILIANS' SCANNED

PROBLEM:
LAWS DON'T KNOW HOW TO THINK LIKE A HUMAN BEING, CAN'T EMPHASIZE

LAWS MAKE THE DECISION ON THE ELIMINATED OF TARGET

HENCE, CAN'T MAKE ETHICAL DECISIONS

The third diagram describes the method of using partially automated LAWS where the solution of human control is implemented. This method combines the two previous methods where AI still conducts the process through its encoded algorithm, but it will be under supervision and controlled by a person of high authority if required. The operator will be making the decisions whether the LAWS should execute a task or not.

REDESIGNED AUTOMATED METHOD OF FINDING TARGETS

LAWS IS COOPERATING WITH THE COMMANDERS & CONTROLLERS
ALL MILITARY PERSONNEL SHOULD HAVE ACCESS CARD WHICH GRANTS CLEARANCE LEVEL FOR THEM (LIMIT THE INFORMATION MILITARY PEOPLE OF DIFFERENT RANKING CAN ACCESS)

ASSIGNED TARGET BY MILITARY COMMANDERS

LAWS FIND POTENTIAL LOCATIONS WHERE TARGET COULD BE AT THROUGH THEIR DATABASE WITH THE ACCESS CARD OF THEIR CONTROLLERS

SUPERVISION TO ENSURE THE ACTIONS DONE BY LAWS ARE ACCEPTABLE AND ETHICAL (RESTRICT UNPREDICTABILITY)

LAWS GO TO ESTIMATED / POTENTIAL LOCATION OF TARGET

LAWS FIND TARGET THROUGH COMPARING BIOMETRIC INFORMATION OF TARGET AND THE CIVILIANS' SCANNED WHILE THEIR CONTROLLERS ARE SUPERVISING THE PROCESS

HUMAN BEING MAKES THE DECISION REGARDING HOW THE TARGET SHOULD BE DEALT WITH IN ACCORDANCE

DECISION MAKING ON THE LIFE-AND-DEATH OF THE TARGET IS DONE BY THE CONTROLLERS

HUMAN CAN THINK LIKE A HUMAN AND IF ANYTHING GOES WRONG, THE COMMANDER WILL SHOULDER THE RESPONSIBILITY OF THE ACTIONS OF LAWS

Based on the deliberation step, final features that were collectively agreed upon are recorded in the table below. It was decided that these features are required within LAWS'

algorithm to fulfill the ethical algorithm and AI principles. Hence, the features are presented alongside with the pros and cons of implementing human control to LAWS below with a table.

Solution	Features	Pros	Cons
Implement human control onto LAWS	The algorithm will allow the human to take control of the LAWS when a decision is needed to be made	Responsibility for the actions made could be shouldered by LAWS' operators	- Not fully automated, human labor cost is required to hire veterans operators Deep learning through
		Adheres to IHL, when humans make the decisions on behalf of LAWS, the decisions made will not breach IHL	- Deep learning through a general data set (the operator), may cause biases
	Recruit military personnels that have high cognitive abilities (Dahlmann & Dickow, 2019)	Able to make cool headed and decisive decision making	Takes a long time (6-12 months) to train military personnels to have high level of understanding on how to control a LAWS
	Assign more than one operator managing a LAWS unit (Dahlmann & Dickow, 2019)	Better decision making, (Have reassurance of decision being made)	- Ideas may clash, leading to doubts, debates (slows down the operation) - More people will know about the details of the operation (Less secretive and might get leaked to the rival)
		Better focus on the operation as tasks can be divided among multiple people	
	Set filters to filter the types of data collected by the sensory part of a LAWS unit (Dahlmann & Dickow, 2019)	Operators will not be bombarded by overwhelming and unnecessary data	Certain data that may be useful in specific scenarios may be filtered out (Less information to work with)

Despite the features of the solution having certain flaws, it obeys the ACM code of ethics. Humans controlling the LAWS should ensure that the target is a military objective and should refrain from conducting any attacks which are expected to inflict damage or harm to civilians and infrastructures (Cherry & Johnson, 2022). Additionally, an ability to stop or suspend an attack should be present.

If any innocent civilians who were killed, injured or harmed in any ways during the use of LAWS would breach ACM Code of Ethics 1.2. Despite the action being unintentional, operators are to face direct liability for causing these civilian casualties. According to the interpretation given by the 2016 DOD's Law of War Manual, "The law of war rules on conducting attacks impose obligations on persons, not imposing obligations on the weapons themselves since an inanimate object could not assume an obligation in any event." Humans must comply with the law of war (Scipione, 2021). Operators should always ensure that any actions taken will not breach IHL since unlawful acts caused by the LAWS are nevertheless reasonably predictable even if not intended (Docherty, 2015).

Enlisting military personnels with strong cognitive talents (Dahlmann & Dickow, 2019) is one of the features of implementing human control on LAWS that help prevent the breach of ACM Code of Ethics 2.9. According to Simon (2019), humans are capable of understanding political settings, shifting tactics, overarching goals and strategies due to cognitive capacities that LAWS do not yet have and may never learn through deep learning. Although a lot of effort is required to properly train military personnel to have a high level of proficiency on how to control LAWS effectively. It is more preferable for thoughtful decisions that are actionable and not over relying on the AI of LAWS to be made. Having too much faith in the AI of LAWS may cause complacency due to automation bias (Kwik, 2022) which is not preferable as LAWS should be made to not be biased.

In the majority of foreseeable circumstances, LAWS interacts with several users who have varying responsibilities for managing and controlling the LAWS. An example would be one user for targeting features and the other user for navigation systems (Boulanin et al., 2020). Thus, several operators should be assigned to manage a LAWS unit (Dahlmann & Dickow, 2019) to enable better and quicker decisions made during high level of operations which provide reassurance of the decision being made. This feature obeys the ACM Code of Ethics 2.9. Although operators are more attentive to the operation since tasks are distributed among several people, there might be instances where ideas may clash and so leading to heated discussions or debates. Furthermore, the operation might be less secretive as more individuals will be aware of the specifics of the operation. Due to that, there might also be a possibility of the details getting leaked to third parties.

Moreover, filters can be set to restrict the kinds of data that a LAWS unit's sensory component collects to prevent operators from being inundated with excessive and pointless data (Dahlmann & Dickow, 2019). The selection of the filtering technique is extremely crucial to the outcome and may make assigning blame more difficult as the filters have an impact on the information that reaches the operators of LAWS in a way that cannot be managed by humans. There might be a possibility of essential information for a specific situation being filtered out which may lead to a wrong decision being made.

Furthermore, it is important to ensure that the user-interface for LAWS is user-friendly and easy to maneuver to assist the operators to control the LAWS unit better, a complicated user-interface might confuse the operators and slow down the process. Implementing Virtual Reality (VR) technology to the LAWS unit's controls is a great and efficient way to tackle this issue as through VR, the operators can get a better understanding of the operations. This provides a realistic encounter as it makes the operators feel like they are conducting the operation themselves. Military personnels would have undergone training

and simulation of a real operation before being a LAWS operator. Hence, a first person view of the live situation on site allows the operators to adapt to the scenario and make appropriate decisions. It will be the equivalent of participating in the operation in person excluding the risks and disadvantages such as injury, fear, limited physical strength and death.

Conclusion

This report contains the solutions to ethical issues surrounding the technology used for LAWS. The solution was to implement human control on LAWS. After much deliberation, the final features of the solution were borned.

One of the features of the LAWS algorithm is to allow operators to take control of the LAWS when a decision is made which adheres to IHL as humans were the one to make the decisions on behalf of LAWS. Besides that, the responsibility for the action made by LAWS can be borne by the operators of LAWS.

In addition, the military should recruit military personnels with high cognitive capabilities. It is because these people will be cool-headed during decisive decisions making but if these were to be recruited or trained, a long time taken will be spent to train these people to have a high level of understanding on how to control LAWS.

Furthermore, the military should also assign more than one operator to manage and control a LAWS unit as this can help to have a better decision made. There are some risks for this feature where ideas and decisions made by multiple operators may clash which will lead to doubts and debates. This could essentially slow down the operation.

Additionally, the developers should set filters to filter the types of data collected by the sensory part of a LAWS unit. Thus, the operators will not be bombarded by the overwhelming and unnecessary data compiled by the LAWS itself but the risk that comes with this would be that some useful data might be filtered out before it reaches the operators which will implicate the decision made negatively.

To summarize, implementation of human control on LAWS is the solution. The features mentioned are required within LAWS' algorithm so LAWS could fulfill the ethical algorithm and AI principles as required by all the other systems developed all around the world.

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