THE EFFECTS OF ARTIFICIAL INTELLIGENCE IN MILITARY TECHNOLOGY

THE ETHICS OF ARTIFICIAL INTELLIGENCE IN UNMANNED AERIAL VEHICLES

A Thesis Prospectus
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By
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On my honor as a University student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments.

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We are currently in the information age, where technology is rapidly taking many of the tasks that were previously done by people. As we are placing more and more trust in technology alongside its rapid improvements many tasks are now being automated. Unmanned aerial vehicles (UAVs) are one form of this improvement and they are able to operate with less and even without the control of a human (Li, Wang, Wu and Chen, 2018 p. 4-5). The technical topic will be focus on the effects of Artificial Intelligence (AI) on military technology. Artificial Intelligence is defined as any artificial system that performs tasks under varying and unpredictable circumstances, without significant human oversight, or that can learn from their experience and improve their performance.... They may solve tasks requiring human-like perception, cognition, planning, learning, communication, or physical action" (Hoadley, Lucas, 2018, p. 1). The STS topic is loosely coupled with my technical topic and will focus on the ethics of artificial intelligence on UAVs. These topics will examine the subcategories of artificial intelligence to better understand their effects on parts of society. Currently the project personnel of this paper are Vinay Garimella, fourth year at the University of Virginia studying Computer Science. This research will be carried out over the course of this summer and the STS 4600 class next semester.

OBJECTIVES AND APPROACH

The technical topic my objective is to research affects that artificial intelligence has on military technology, including the improvements, benefits and drawbacks. I will be using various research articles which show how artificial intelligence has improved or changed military technology. The available resources that will be used for this paper are the UVA online library as well as online new articles. I hope that this paper will help programmers and engineers

understand how they are impacting military technology and believe that it will show the improvements that artificial intelligence will bring alongside the new challenges. The findings will be delivered in a state-of-the-art report.

The STS topic my objective is to research the ethics of UAVs, especially in connection to human values. I will be using the Social Construction of Technology (Garimella, 2020) as my STS approach. This is because the rules of artificial intelligence will be shaped by both the individuals and collectives of society.

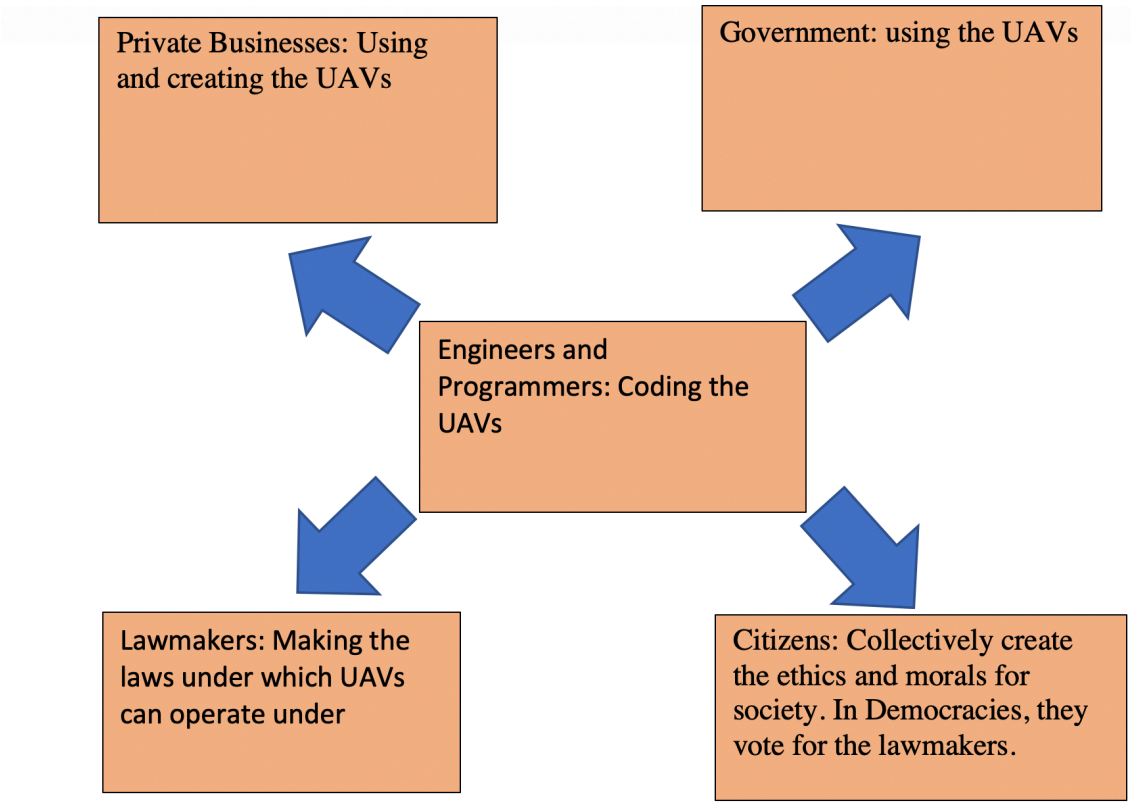

Figure 1: Social Construction of Theory (SCOT) model. This shows the Engineers and Programmers who create the UAVs how they interact with the private businesses, government, lawmakers, and citizens (Garimella, 2020)

As shown in Figure 1, relevant social groups are the government, private businesses, lawmakers, citizens of the country, and the engineers and designers of the UAVs. The lawmakers because they will write the laws under which the UAVs can operate, the citizens because they will vote for the lawmakers based on their morals and ethics and the designers because they will be coding the artificial intelligence within the UAV. The government because they will be using the technology in military applications and non-military applications. The programmers and engineers are responsible for following the laws and ethics of the lawmakers and citizens to ensure that they are working in the best interest of society and make sure that they are keeping the private businesses and customers happy with the product.

IMPORTANCE OF ARTIFICIAL INTELLIGENCE

Artificial intelligence is important because the speed and precision of artificial intelligence is a major improvement on human's speed and precision. This is in large part due to how Artificial Intelligence are programs that allow a machine to perform a task (Kumar, et al. 2016, p. 111). One such application is a "completed project that improves the Landing Signal Officer's decision making when guiding the landing of aircraft on aircraft carriers" (Richards, 2002, p. 1). The AI in this case has a task, which is to help the Landing Signal Officer (LSO) land the aircraft, and uses the information such as the flight trajectory predictions into the program to produce an output that can help the LSO (Richards, 2002, p. 1). This shows that artificial intelligence can improve a person's capacity to perform a given task, such as landing an aircraft.

BENEFITS OF ARTIFICIAL INTELLIGENCE

Artificial Intelligence carries many benefits while applied to military technology, especially when concerning the jobs considered "dull, dirty, and dangerous" (Li. S, et al, 2018 p. 337). This means that as artificial intelligence's involvement in the military increases, the risk for the military personnel decrease. It can also help find solutions to various complex tasks in a quicker manner while also finding said solutions in a similar manner as humans (Kumar, et al. 2016, p. 111-114).

The "super-intelligence" capability of AI is capable is faster than a human's capacity when it comes to solving problems (Kumar, et al. 2016, p. 111). AI can help the LSO land aircraft, due to the program using a "fuzzy logic approach" (Kumar, et al. 2016, p. 111-112) to help predict where the aircraft is going to land based on degrees of accuracy. This shows that human predictions can be improved upon using data and existing software.

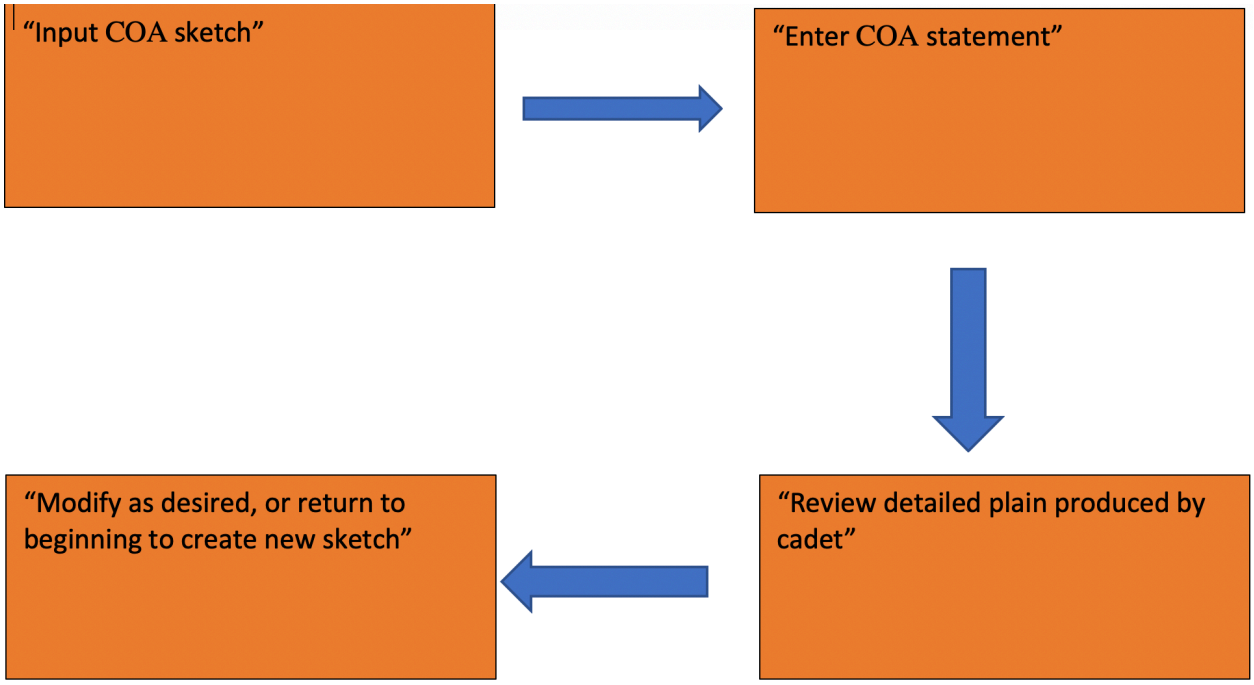

Figure 2: This figure Rasch, Kott, and Forbus shows how to create an "Integrated Course of Action Critiquing and Elaboration System" (Rasch, Kott, and Forbus, 2003, p. 21).

As seen in Figure 2, programs can help to predict, plan and allocate tasks to help people predict enemy actions (Rasch, Kott, Forbus, 2003, p. 18-19, 21). Just as AI can be used to help improve human predictions, it can also be used to help the handlers to create designs and plans. This can lower the bar for necessary expertise and experience as it can "create natural sketch-based interfaces that domain experts can use with little training" (Rasch, Kott, Forbus, 2003, p. 25). This shows that artificial intelligence can help the military in "numerous areas that need dramatic improvements" (Rasch, Kott, Forbus, 2003, p. 19).

DRAWBACKS TO ARTIFICIAL INTELLIGENCE

Just as artificial intelligence can help the military improve its technology, other countries' militaries also have the ability to add artificial intelligence to their technology as well. Because UAVs are smaller than a person, they can also be difficult to find, which will make any "counter-attack maneuver" hard (Husodo, et al. 2019, p. 35). This means that the military will also need to develop technology that can sense these problems by using newer techniques. Artificial Intelligence will be needed to help close the gap between the current "anti-UAV attack system and the capabilities of commercial UAV attack maneuvers" (Husodo, et al. 2019, p. 35), by using machine learning and image recognition to help detect these newer threats (Husodo, et al. 2019, p. 35-40).

CONCERNS ON ETHICS

Because artificial intelligence is so new, it will be difficult to dictate exactly how they should act to remain ethical. Due to this, we must strongly consider society's ethics and imprint them onto the artificial intelligence itself. This is because if society can figure out where the boundaries are for this new technology, then it will run into less problems and accidents. But how can we know if artificial intelligence is running ethically? With UAVs, the machine must run in a way that can achieve "similar performance in comparable roles" (Sparrow, 2008, p. 171). We ensure that an inferior machine is not making decisions that can affect people by holding UAVs to such standards.

In addition to this we must also consider the rules that the artificial intelligence will operate under. We must consider their Macro-Dilemmas and Micro-Dilemmas (de Swarte, 2019, p. 293-294). Macro-Dilemmas in the context of UAVs say that they "cannot use drones without precise rules of engagement" and Micro-Dilemmas "are the operational processes by which a drone performs an action (de Swarte, 2019, p. 293-294).

Making sure UAVs are used ethically is increasingly important because UAVs are becoming more commonplace, and are even being used now to help stop the spread of Covid-19 ("Drones used in Effort", 2020). In New York City, there are drones flying around that are keeping watch on people to send out announcements to make sure that people are keeping a 6-foot distance at all times ("Drones used in Effort", 2020). Palo Alto, uses drones to enforce the speed limit as well (Torincheef, 2016). This has sparked some civil-liberties issues, because how can a drone be allowed to enforce the speed limit (Torincheef, 2016). This brings us back to the problem. As drones or UAVs are becoming more commonplace, there need to be clear rules set to ensure that the rights of people are not being encroached upon. Society needs to make sure

that these drones are being used in an ethical manner and discourage the misuse of the new technology.

HUMAN VALUES

The reason that it is so important to make sure that AI is being used ethically is because it needs to follow human values. This is especially important in context of military applications where human rights violations can be especially serious. In order to make sure that human values are being considered, we must make sure that "UAVs must be studied on the basis of military ethics and human values" (de Swarte, 2019, p. 291). The ethical issues that arise come from the dilemma of using "lethal autonomous weapons systems" (LAWS) (Kumar, et al. 2016, p. 114). While the "command chain" will be making the decision for the drone or UAV to be deployed (de Swarte, 2019, p. 294), it is still the drone which is performing the action, in which case there need to be proper coding so as to ensure that the task is carried out cleanly and minimize the risk on innocent lives.

We also need to make sure that the values of both the society of which the drone is operating in and the individual operating the drone are considered. This is to ensure that there is minimal encroachment on the rights of the individual and the collective. Where the line is drawn will be defined by the "individual or community of which [the drone] is intended to serve (Albas, et al., 2019, p. 4). This includes problems such as collision avoidance and information gathering where the rights of the community and the individual can be in conflict (Albas, et al. 2019, p. 1-5). This is especially important in cases such as Covid-19 where drones are being deployed to check on the populace ("Drones used in Effort", 2020). The ethics of Artificial Intelligence can be considered from the moral and written laws of society (Bryson, Kim, 2011, p. 1641-1646).

By focusing on AI in the military and ethics of UAVS, we can learn how artificial intelligence is changing human society in a narrower lens. This is important because the technology is rapidly changing while being so new, so it is difficult to make sure that the technology is being used in an ethical manner. Artificial intelligence is improving the capacity of our technology giving people new problems to watch out for. This paper focuses on both the benefits and downsides that AI and UAVs provide in hopes to get people focused on mitigating any misuse or downsides.

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