EUROPEAN UNIVERSITY R. MACEDONIA

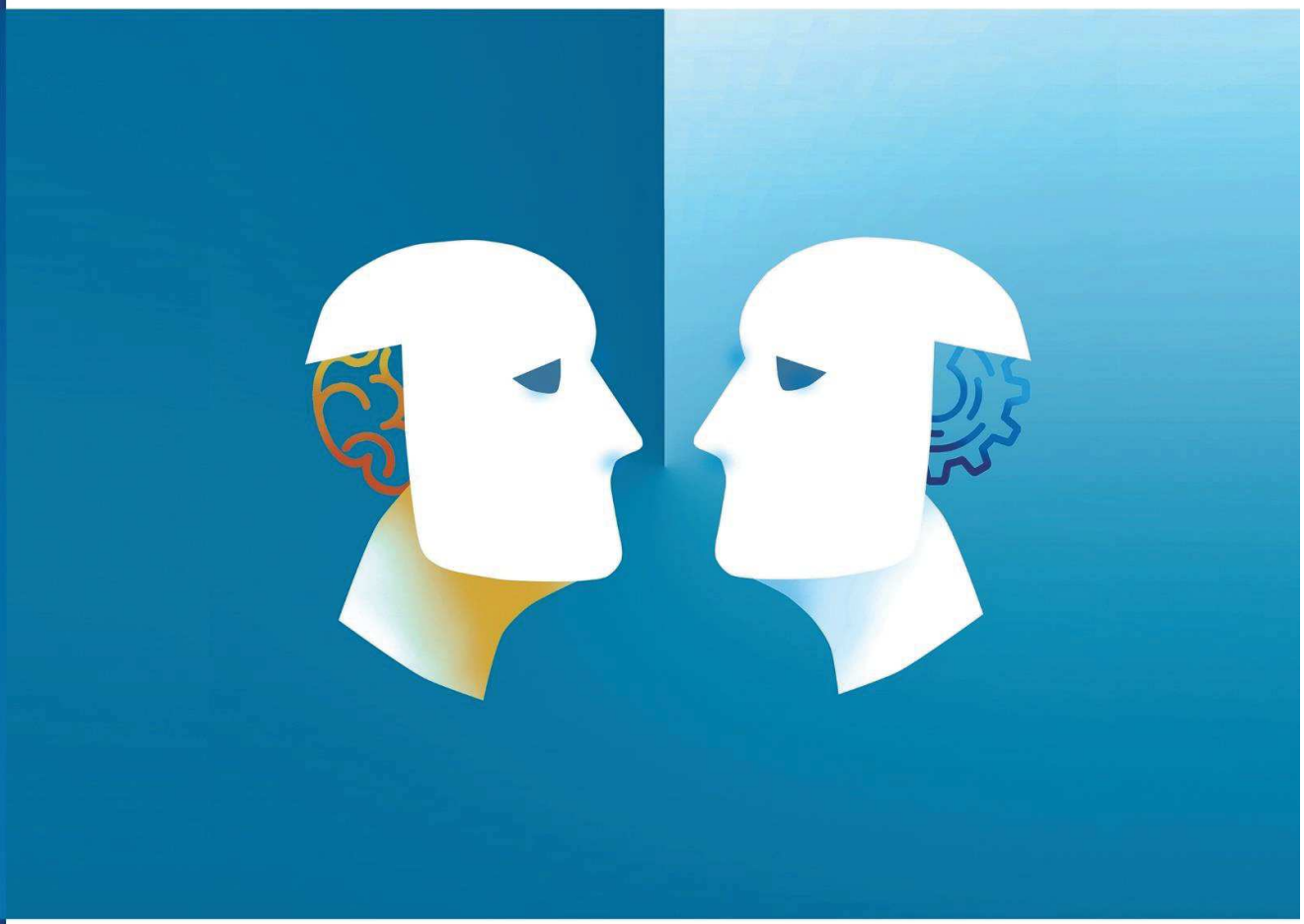
UDC 33

ISSN: 2545-4552 (Print)
ISSN: 2545-4560 (Online)

IDEA

International Journal *of* Science and Arts

ИДЕЈА Меѓународно списание за наука и уметност



IDEA Int. J. Sci. Arts ИДЕЈА Меѓунар. Спис. Наук. Умет.	VOL. ГОД. 2	No. Број 3	pp. стр. 1 - 176	Skopje Скопје 2018

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IDEA Int. J. Sci. Arts **ИДЕЈА Меѓунар. Спис. Наук. Умет.**	**VOL.** **Изд.**	**2**	**NO.** **Број.**	**3**	pp. стр.	**1-176**	**Skopje** **Скопје**	**2018**

International Journal of Science and Arts – IDEA
Меѓународно списание за наука и уметност – ИДЕЈА
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European University – Republic of Macedonia
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Frequency: 2 Issues Per Year
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Skopje 1000, Macedonia
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Email: idea@eurm.edu.mk
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Почитувани читатели,

Како современа област во полето на информатиката, вештачката интелигенција опфаќа изградба и развивање *интелигентни машини.* Вештачката интелигенција се заснова на концепцијата дека човечката интелигенција може да биде до тој степен автоматизирана до кој ќе може да биде симулирана од страна на некоја машина. Примената на технологиите кои се засновани на вештачка интелигенција опфаќа интеракција човек – компјутер преку препознавање на лица, говор и допир; анализа на текст и генерација на природен јазик; машински платформи за учење; виртуелни агенти; хардвер оптимизиран со вештачка интелигенција; менаџмент на одлуки; биометрика; како и развој и примена на роботиката.

Овие технологии можат да придонесат кон подобрување на продуктивноста, остварување повисоко ниво на ефикасност и спроведување многу посложени истражувања со кои се внесува креативност и иновации во секојдневниот живот, што го зголемува ентузијазмот за понатамошно унапредување на секој сегмент од општеството. Наспроти ваквите ставови, многубројни истражувања и автори укажуваат дека развојот и примената на вештачката интелигенција може да придонесе кон губење на работни места и целосна замена на луѓето со роботи. Според тоа, може да се каже дека вештачката интелигенција е тема која се дискутира со огромен оптимизам но, истовремено и со определена доза на страв, кој произлегува од неизвесноста за иднината со која може да се соочи човештвото. Како што изјавил Стивен Хокинг: „Развојот на вештачката интелигенција може да биде најдоброто или најлошото нешто што ќе му се случи на човештвото“.

Имајќи ја предвид актуелноста и интригантноста на оваа проблематика, следните два броја на нашето меѓународно списание се посветени токму на истражување на развојот и примената на вештачката интелигенција, како и на проблемите и предизвиците со кои е соочена нејзината практична имплементација. Во презентираните трудови на авторите, предмет на разработка се теми поврзани со: изградба и примена на технологии засновани на вештачката интелигенција; виртуелни агенти и роботи хуманоиди; трансхуманизам и иднината на човештвото; влијанието на вештачката интелигенција врз економијата, маркетингот и човечките ресурси; социо-економски и политички димензии на примената на вештачката интелигенција; етички и правни импликации на вештачката интелигенција; дигитализација и вештачка интелигенција за идната здравствена заштита; примена на вештачката интелигенција во уметноста; ризиците од вештачката интелигенција за безбедноста; вештачка интелигенција и трансформацијата на општеството.

Се надеваме дека презентираните сознанија и заклучоци на авторите, во голема мера ќе ја доближат оваа проблематика до секој од вас, а воедно ќе претставуваат мотив и инспирација за понатамошни истражувања во оваа област.

Главен и одговорен уредник

доц. д-р Анита Скрческа

Dear readers,

Artificial intelligence, a modern field of computer science, refers to the construction and development of intelligent machines. Artificial intelligence is based on the concept that human intelligence can be automated to the extent that it can be simulated by a machine. The application of technologies based on artificial intelligence involves human-computer interaction by recognizing faces, speech and touch; text analysis and natural language generation; mechanical learning platforms; virtual agents; hardware optimized with artificial intelligence; decision-management; biometrics, as well as the development and application of robotics.

These technologies can boost productivity, increase efficiency, and refine research by introducing creativity and innovation in everyday life, and driving enthusiasm for further advancement of every segment of society. In spite of such views, a number of research studies and authors suggest that the development and application of artificial intelligence can contribute to job losses and full replacement of people. Accordingly, one can argue that artificial intelligence is a topic discussed with great optimism, but at the same time with a certain degree of fear, which stems from the uncertainty about the future of the human kind. Stephen Hawking raised this point when he stated that: "The development of artificial intelligence can be the best or worst thing that will happen to mankind."

With the urgency and intrigue of this issue in mind, the following two issues of our international journal will be dedicated precisely to researching the development and application of artificial intelligence, as well as to the problems and challenges that its practical implementation is facing. The presented works discuss topics related to: development and application of technologies based on artificial intelligence; virtual agents and robots humanoids; transhumanism and the future of mankind; the impact of artificial intelligence on the economy, marketing and human resources; socio-economic and political dimensions of the application of artificial intelligence; ethical and legal implications of artificial intelligence; digitization and artificial intelligence for future health care; application of artificial intelligence in art; the risks of artificial intelligence related to security; artificial intelligence and the transformation of society.

We hope that the presented findings and conclusions will stir up important debates and will also serve as a motivation and inspiration for further research in this area.

Assist. Prof. Anita Skrcheska, PhD, Editor-in-Chief

IDEA Int. J. Sci. Arts ИДЕЈА Меѓунар. Спис. Наук. Умет.	VOL. 2 Изд.	NO. 3 Број.	pp. 1-176 стр.	Skopje 2018 Скопје

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ARTIFICIAL INTELLIGENCE AND USE OF DRONES IN MODERN MILITARY OPERATIONS

UDC: 004.89:623.746.2-519 *Reviews*

Prof. Ferdinand Odjakov PhD[1], Prof. Andrej Iliev PhD[2], Prof. Aleksandar Glavinov, PhD[2]

[1]Ministry of Defense on Republic of Macedonia

[2]Military Academy "General Mihailo Apostolski"-Skopje

Abstract

Terrorism, as definitely the most dangerous asymmetrical threat of the 21st century, causes death of thousands of people every year. It is interesting that counterterrorism does the same, maybe even more. In order the number of the innocent victims to be as lower as possible, there is a tendency by authorized counterterrorism institutions to use drones in counterrorism activities. We could notice that use of drones didn't decrease the number of death or injured innocent people and even that their number is still relatively very high. Based on that, there is a dilemma: should be drones used as counterrorism tool or not?!

Key words: *artificial intelligence, drones, modern operations, terrorism*

Introduction

Science leaders believe that technological advances very soon will develop the final steps of artificial intelligence (AI) which will be capable to exceeds the cognitive human capabilities. The ongoing revolutionary technology development of artificial intelligence will increase the efficiency of National power and security on tactical, operational and strategic level in peace and time of a crisis and conflicts. Artificial intelligence, according to scientists and national security experts are very important for the commanders for efficiently conducting the overall military operations during the crisis and conflicts. During 2015 year Future of Life Institute (FLI) which is a conglomerate of senior business and science leaders, including Tesla/Space X founder Elon Musk and theoretical physicist Stephen Hawking, released a letter of warning of existential risk presented by the next phase of artificial intelligence (AI) for the humankind. In this open letter they explain the economical advantages of this technology for the world and the humankind1.

On the tactical and operational levels, the military decision makers and leaders should prepare to counter enemy artificial intelligence (AI) on the battlefield with structured problems in order to challenge its superior, but probably linear, decision-making processes. On the strategic level, senior national security leaders should

1 The Future of Life Institute. Research Priorities for Robust and Beneficial Artificial Intelligence: An Open Letter, The Future of Life Institute, 2015, 7-9.

establish national and international regulations governing the development of strong AI and its use in national security affairs. A brief survey of the history of AI development, the impact of strong AI on national security and potential risks involved with the introduction of this new technology informs this conclusion. If we want to understand the potential impact of strong AI on national security, it is important to first define it. For this paper, AI is a sub discipline of Cognitive Science as an interdisciplinary field of study that examines the mind and intelligence[2].

AI is the scientific field dedicated on how to create artificial systems which "thinks." These systems, known as "artificial agents," should be able to have a sense for environmental variables, analyze them and then make the best possible decision taking those variables into account[3]. Artificial intelligence became an official field when American computer scientist John McCarthy and others organized a summer research project on it at Dartmouth College in 1956[4].

In this period of time, the US government funded several other Artificial intelligence projects with RAND Corporation dedicated on developing assorted defense systems based on this technology.

Research and interest in AI have gone through several cycles of promise and disappointments. Jim Howe from the University of Edinburgh writes that the field experienced its first winter when Sir James Lighthill, an applied mathematician, published a report in 1973 that questioned AI's fundamental capability to solve problems in the real world due to the almost infinite number of variables involved. Howe contends that the Lighthill report caused a significant drop in interest and funding for AI projects (including DARPA funding for defense-specific projects)[5].

Artificial intelligence will increase the efficiency and intensity of armed conflicts. Overall this will presume the advantage of the human cost for going to war[6].

Sending an Army with autonomous unmanned weapons systems to fight would be for more acceptable than sending people of that state. Sending machines to kill human beings is hard to swallow for most individuals but is acceptance of drone strikes today to indicate its proclivity to support such ethically dubious behavior in lieu of placing its own soldiers to risk[7].

The idea for developing modern autonomous system returns to initial point of warning. What will happen to the world if in near future perfect autonomous, strong AI systems appear? While the answer risks wandering into realms of science fiction, it is important to consider this for national security experts willing to look into our perhaps not-so-distant future.

---

2 Nayef R.F. Al-Rodhan. The Politics of Emerging Strategic Technologies: Implications for Geopolitics, Human Enhancement and Human Destiny, London: Palgrave Macmillan, 2011, 152.

3 David Poole, Alan Mackworth, Randy Goebel, 1998, Computational Intelligence: A Logical Approach, New York: Oxford University Press, 1998, 23-25.

4 John McCarthy, M. L. Minsky, N. Rochester, and C. E. Shannon. A Proposal for the Dartmouth Summer Research Project on Artificial Intelligence," Stanford University: John McCarthy's Home Page, 1955. http://www-formal.stanford.edu/jmc/history/dartmouth/dartmouth html

5 DARPA is the "Defense Advanced Research Projects Agency." Founded in response to the surprise Soviet 1957 launch of Sputnik, DARPA pursues the use of emerging technologies to promote U.S. national security; Jim Howe, 2007, "Artificial Intelligence at Edinburgh University: A Perspective," University of Edinburgh School of Informatics, http://www.inf.ed.ac.uk/about/AIhistory html.

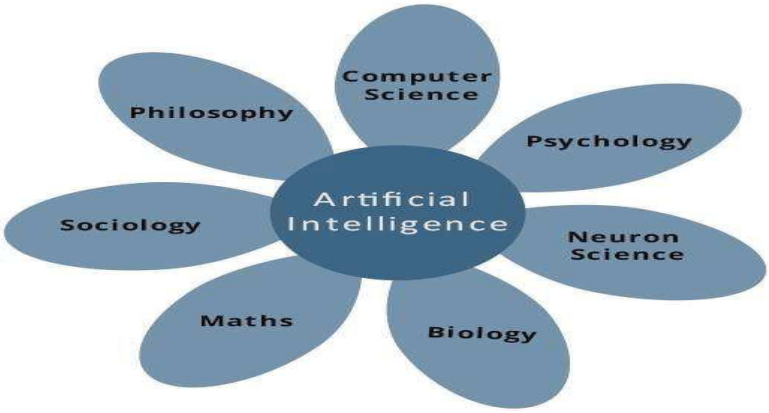
6 Al-Rodhan, The Politics of Emerging Strategic Technologies, 164.

7 A Spring 2015 AP poll indicates that sixty percent of Americans think it is acceptable to use unmanned aerial drones against terrorists. Ken Dilanian, and Emily Swanson, 2015. "AP Poll: Americans approve of drone strikes on terrorists," AP: The Big Story, May 1, Accessed May 2, 2015 ,http://bigstory.ap.org/urn:publicid :ap.org :922aad9300ed4868b89e 9 99f7cd02bf7

Strong AI will be a threat because it may act in ways not intended by its designers. The race in the scientific field of artificial intelligence motivate designers to add concepts including: self-protection, resource acquisition, replication, and efficiency to the systems. This motivation race in this scientific field will make autonomous AI systems, who will behave in inhuman and chaotic way[8]. Continuous development of artificial intelligence soon may become a super intelligence[9]. According to a British philosopher Tim Crane in near future is possible for the artificial intelligence to be a reach the ethics, emotions and better overall reasoning and problems solving than human intelligence[10].

In 2016 year the White House of USA report about artificial intelligence that will require low efforts of many people to achieve same or better goals with less people. Autonomous systems have been used in warfare since at least WWII. Delegation of human control to such systems has increased alongside improvement in enabling technologies[11].

Fig 1. Implementation of Artificial intelligence in science[12]



Simple systems that use a sensor to trigger an automatic military action are the land mines which are used for centuries. After the WWII information technology have taken more responsibility of force than the human factor in the time of crisis and conflicts. During the WWII computer systems were first linked with sensors which have dynamic control on a lethal force. For example, onboard sensors and computer allow on missiles to be guided to its target without other communications operator following initial target selection and fire fluctuation.

8 Omohundro. Autonomous Technology and the Greater Human Good, 313.
9 Jonas Stewart. Strong Artificial Intelligence and National Security: Operational and Strategic Implications, USA, 2015, 20-25.
10 Tim Crane, 2009, Philosophy and the Human Situation: Artificial Intelligence, Audio Podcast, June 23; This is akin to the classic argument, posed by philosopher René Descartes, that humans, by virtue of possessing an intangible soul, have a form of intelligence far beyond that of animals. AI could be added to the animals group in this respect because it lacks the soul required for human-like thought. Rene Descartes, 1637, Discourse on Method of Rightly Conducting One's Reason and of Seeking Truth in the Sciences, Project Gutenburg, (Part V), Mentioned in Crane, Philosophy.
11Greg Allen, Taniel Chan. Artificial Intelligence and National Security, Harvard Kennedy school, 2017, 13.
12Oteri Omae. Introduction to Artificial Intelligence, 1-st edition, UK, 2012, 20-25.

The use of artificial intelligence and drones in modern military operations

The Boston Consulting Group during the time of 2000 to 2015 year all over the world were increased the spending of their financial funds on cybernetic industry for military purposes. According to this they tripled their financial funds from $2.4 billion to $7.5 billion and is expected to more than double again to $16.5 billion by the year 2025. With this we can understand the impact of increased adoption of falling unit prices and the increasing overlap between commercial and military systems.

One type of robot, the Unmanned Aerial Vehicle, better known as a drone, has seen major commercial price declines over just the past few years. Bill Gates argued that robotics is poised for the same reinforcing cycle of rapid price declines and adoption growth that personal computers experienced. According to Gates during the period of 15 years from 1998 to 2013 year the price of average personal computers fell more than 90%. If the high-quality of drone today cost a couple of thousands of euro in near future their price will be not more than 50 euro[13]. Expanded use of machine learning, combined with market growth and price declines, will greatly expand robotic systems' impact on national security.

The impact of cyber space is increasing the utilization of robotics and autonomous systems and its one big fact for increasing the power of state and non-state actors.

The introduction of the cyber domain had benefits for all types of actors. Major states built powerful cyber weapons, conducted extensive cyber-espionage, and enhanced existing military operations with digital networking. Since cyber capabilities were far cheaper than their non-cyber equivalents.

Usually the smaller states with less powerful militaries also made use of cyber domain. Ethiopia and many other governments, for example, used cyber tools to monitor political dissidents abroad.

Armed forces of the world's leading military powers all recognize the qualitative edge AI systems are likely to give them today and tomorrow – soldiers who often "face problems of scale", complexity, pace and resilience that outpace unaided human decision making[14].

The future of AI for the military purpose is tied to the ability of engineers to design autonomous systems which will demonstrate independent capacity for knowledge and expert based reasoning. There aren't entire autonomous systems current military operation. Most ground robots are operated by telecommunications devices which means that the humans are still directly controlling a robot from some distance away from virtual extension. Most military UAVs are slightly more sophisticated and they have some low-level autonomy which allows them to navigate and in some cases freely to land without human intervention, but almost all of them require significant human intervention to fulfill their mission. Even the UAVs which are used for military purposes or exactly for intelligence with target to capture images have more autonomous level than other similar devices with them.

Soon the advances in AI will develop more autonomous robotic support for warfare who will be more effective in modern military operations. Initially, technological progress will deliver the greatest advantages to

13Scharre, Paul. "Robotics on the Battlefield Part II: The Coming Swarm." Center for a New American Security, 2014, 14. Accessed March 1, 2017. https://www.cnas.org/publications/reports/robotics-on-the-battlefield-part-ii-the-coming-swarm

14 Artificial Intelligence · Lockheed Martin," accessed September 21, 2016, http://www.lockheedmartin.com/us/ atl/research/artificial-intelligence.html

large, well-funded and technologically sophisticated militaries, just as Unmanned Aerial Vehicles (UAVs) and Unmanned Ground Vehicles (UGVs).

In the time of restricted budget for modern military operations in Iraq and Afghanistan, NATO allies cope with this financial problem with their abilities for constant developing of their technologically advances for the military purposes. This pattern is observable today: ISIS is making noteworthy use of remotely-controlled aerial drones in its military operations. Soon they or other terrorist groups will increase the use of autonomous vehicles. Though advances in robotics and autonomy will increase the absolute power of all types of actors, the relative balance of military power may or may not shift away from leading nation15.

According to NATO allies their enemy Islamic State's drone program lies less in their technical modification and more in the collection of simple, low-cost, and replaceable devices that made up the group's drone fleet as well as the group's use of those drones in a number of creative ways. Islamic State engineer knew this technical capabilities and financial resources of the United States and its other state adversaries in Iraq and Syria outmatched the group's own. These planners are recognized the surveillance, propaganda and operational benefits of fielding commercial and homemade drones, including their potential to enhance the group's ability to surprise.

So, with developing their own drone capabilities, the Islamic State kept things simple and took some creative short cuts. Because the group and its actions were under a considerable amount of international pressure. Islamic State developed their own homemade drone platforms and privileged the acquisition and deployment of relatively low-cost commercial, drones with wing-fixed drone platforms which is available in various countries around the world16.

Fig 2. *ISIS production of drones for military operations17*

15 Watson, Ben. "The Drones of ISIS." Defense One. January 12, 2017. http:// www.defenseone.com/ technology/ 2017/ 01/ drones-isis/134542/.
16 Dan Gettinger. Drones Operating in Syria and Iraq. New York: Center for the Study of the Drone, 2016) and Ben Watson, "The Drones of ISIS, Defense One, January, 2017.
17 Don Rassler. The Islamic state and drones, West Point - Combating terrorism center, July 2018, 3-4.

ISIS and its affiliated groups have already tried to use commercial drones outside of Syria and Iraq. For 2016 year they released a video with an overhead view of a battle in Benghazi that was taken by a drone[18]. Also, it was reported that ISIS has been used a drone in Yemen as well. ISIS has made tactical and operational advantages with developing their low-cost drone program for military purposes.

They can acquire commercially available drones and creatively outfit and use them in innovative ways. With regaining the operational element of: surprise, countermeasures and maximize both body counts, and publicity will be predictable that the Islamic State will try to develop different drone tactics, different drone targets and use of different types of drone weapons.

It isn't clear whether these potential, future changes will be effective or whether it will be other parties inspired by the Islamic State's drone actions that will implement them. But there are some indications that the potential different targets for more sophisticated drones' weapons will be more dangerous[19].

Conclusion

New technological breakthroughs should be primarily focused on the operational exigencies of military operations. Given the still predominantly industrial-kinetic nature of those operations, this means that the focus should be on our operators and their weapon systems, which are still seen as the most powerful effectors. Based on this premise the logical implication is that AI should be used to improve the kinetic capabilities that 'win wars' as: target detection and acquisition, autonomous weapon systems, planning and support tools and etc. Every non-state actors or terrorist organizations have better success if they have made effort early to indentify security gaps of the targeted enemy or state actors, which in most of the case are the NATO allies. Best results for counterterrorist organization have the NATO Special operations Force, which have the capability to maintain and predict the element of surprise of the non-state actors. The ISIS trough the time has achieved significant impact with source of commercial drones and their related components.

The group's innovative cobbling together of commercial drones with cheap, add-on components made it easy to transform stock quad copters into more nefarious and moderately capable devices. And while the Islamic State's drone program has been placed under pressure and the scale of the group's program has been significantly curtailed and rolled back, what the group was able to achieve with commercial drones unlocks a genie of sorts, as the group demonstrated what was possible with a little bit of sinister engineering.

Terrorist organization such as ISIS always will be able to find and produce supply chains as drones. Through the time this means their actions will be more unpredictable. From commercial drones and rockets they make unbelievable killing machines.

18 Thomas Luna, "DJI Drones are Getting Shot Down in the Battle of Marawi," WeTalkUAV.com, July 17, 2017; Tom Allard, "One week to cross a street: how IS pinned down Filipino soldiers in Marawi," Reuters, September 25, 2017; "Maute-ISIS bandits use drone in Marawi to evade pursuing soldiers," GMA News Online, June 19, 2017; Kaye Imson, "Marawi Crisis: Govt forces retake Maute's stronghold in Dansalan College," News5, July 4, 2017.

19 David Axe, "Great, Mexican Cartels Now Have Weaponized Drones," Motherboard-VICE, October 25, 2017.

As a final recommendation of this paper, we can mention the reports of many Forums and security conferences, which identified five pillars for the military future:

- Autonomous deep learning machine systems which are able to see the patterns through the chaff of hybrid warfare, to give early warning that something is happening in gray zone conflict areas (such as the Ukraine)20.
- Human machine collaboration, which will include the promotion of so-called 'Centaur' war fighting, going from the observation that teams combining the strategic analysis of a human with the tactical acuity of a computer, reliably defeat either human-only or computer-only teams across many games21.
- Assisted human operations, whereat electronics with upload able combat apps; heads up displays, exoskeletons, and other systems, can enable humans on the front line to perform better in combat22.
- Advanced human-machine combat teaming where a human working with unmanned systems is able to take better decisions and undertake cooperative operations.
- Network-enabled semi-autonomous weapons, where systems are both linked to survive cyber attack.

Final according to our final hypothesis should be drones used as counterrorism tool or not?! We can conclude that: drones are very successful tool for effective terrorist operations and opposite is not a good tool for decreasing the number of death or injured people as a act of terrorism or violence on them. In this sense drones are very useful for intelligence operations or exactly for a observation operations. Using drones as a tool for intelligence operations or precisely as a observation tool is good for taking a early protection measures for evacuation of innocent people who are subjects of terrorist attack. Second, using the drones for observation tasks is good for taking early information about the position of the terrorist groups and organization and final we can conclude that: drones for the terrorist groups and organization is a excellent tool which increases their effects in the time of a attack and for the other side or NATO allies is most effective as a observation tool for intelligence and information gathering operations.

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