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ARTIFICIAL INTELLIGENCE TECHNOLOGIES IN COMBAT USE OF MILITARY AVIATION

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Abstract: Today's era is unimaginable without technology, modern technologies have their place in every field of our life, these technologies are education, defense, medicine, art, agriculture and many others. plab also covered other areas. It is also entering all areas of the military sector. The impact of modern technologies on military aviation is partially covered below.

Keywords: aviation, planning, artificial intelligence, artificial neural networks, militant action.

Today's era is unimaginable without technology, modern technologies have their place in every field of our life, and these technologies affect education, medicine, art, agriculture and many other fields. covered. It is also entering all areas of the military sector. The impact of modern technologies on military aviation is partially covered below.

The British company "BAE Systems" disclosed information about some technologies that can be used in the military aviation of 2040.

Three-dimensional printing of drones directly on board aircraft, self-healing aerodynamic surfaces, and high-power lasers were reported. The development of these technical tools is already underway, but it remains somewhat unclear at what stage the projects are. If such technologies are really created, they may cause a new era of armaments among developed countries[1].

An example of this is the "Military Conflict in Karabakh" that occurred in 2020. The actual use of unmanned aerial vehicles during the battles in this situation means that a new era of technological armament is beginning. This technological armament is considered to be effective in every way [2]. Taking unmanned aerial vehicles as an example, it is not necessary to train military pilots for these vehicles, instead it is sufficient to train a small number of control operators, the development of an unmanned device requires less cost than military aviation, and it has many other advantages.

"Bayraktar" is an unmanned aerial vehicle developed by the Turkish state

Transformer: One of the promising promising technologies, British engineers named "Transformer".

The essence of promising technology is the ability to combine several independent aircraft into a single whole. Each of these devices (manned or unmanned, BAE systems can be) is designed to perform a specific task: intelligence, surveillance, reconnaissance, destruction or delivery of food. By combining these drones, they are able to travel long distances while saving fuel.

According to BAE Systems, combining the aircraft into a single aircraft will significantly reduce drag (compared to multiple malfunctioning aircraft), and this type of transformation can significantly reduce fuel consumption.

Mother ship or transformer project

In general, when a certain point is reached, the aircraft can be separated to perform the tasks assigned to each of them. The drones or planes can then regroup. BAE Systems presented a short transcript of the Transformer, which showed a purely humanitarian mission - delivering food. However, it is not 100% guaranteed that these technologies will be used for any tasks if they are introduced into actual development[3].

Print in Parzov: If we are talking about the project of the family of combat aircraft systems, then another technology that BAE Systems told the Pentagon may be of interest. This is a technology for directly printing drones on other aircraft. In this case, efficient 3D printers and automated assembly

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should be used. Somewhere in the future, a human operator in a control center will select the type of drone depending on the specific task.

After the command is transferred to "print in flight", layers of unmanned aircraft designed to perform a strictly defined task are created and quickly released from the aircraft.

BAE Systems engineers say it will be able to launch two aircraft-type drones for reconnaissance and surveillance, as well as multipurpose drones capable of evacuating wounded soldiers.

After completing the task, the printed drones can self-destruct or land in a safe place - at the operator's discretion. It is believed that this technology will create a universal aircraft with a production function, which can be used in missions among unknown tasks. BAE Systems did not specify which three-dimensional printing technologies could be used[3].

Existing 3D printing technologies are now considered reliable enough for military use. In particular, in January 2014, the Tornado GR.4 fighter jet of the British Air Force made its first flight, on which several "printed" metal parts were installed. Tests conducted by BAE Systems were also found to be successful.

Drones printed using a 3D printer

In the future, it is planned to manufacture some spare parts for British fighters by layering. According to the UK Ministry of Defence, the use of "printed" parts in Tornado fighters will save up to 1.2 million pounds over four years.

Modern management concept

At the end of 2013, the American company Solid Concepts "printed" the current model of the M1911 .45 ACP army pistol from metal. Weapon tests were successful. The details for the Tornado fighter jet and the "printed" weapon are combined with technology - the direct metal laser sintering method, which uses a laser to "print" layer by layer by melting metal powder. Parts made by this method do not require additional processing. In May 2013, using a 3D printer, the Liberator plastic single-shot machine gun was also printed and successfully tested.

Self-healing: Finally, British engineers also announced the possibility of using self-healing technology in future aircraft. Such aircraft can "heal" injuries during flight.

The essence of the technology is that the fuselage and wings of the aircraft are made of composite materials based on the use of carbon nanotubes. These nanotubes contain a slightly viscous liquid. After being damaged, the nanotubes collapse and the rapidly solidifying liquid begins to flow out of them.

BAE Systems is confident that the use of "self-healing" technology will increase the life of military aircraft several times and work even in the most dangerous areas. However, it is clear that "self-healing" is useful when the non-mechanized aerodynamic surface of the aircraft is damaged. It's not clear how the BAE systems would help with partial or complete damage to, say, an aeron or slat.

Perhaps in this case, another technology will help, the development of which is carried out by the Japanese company Mitsubishi Heavy Industries as part of the combat project - ATD-X as a demonstrator of Shinshin technologies[4].

This is self-healing flight control (SRFCC). The essence of this technology is that the on-board computer can automatically detect damage to various aerodynamic structural elements and adjust them in such a way as to fully restore the controllability of the rest of the elements. Most likely, it will be carried out on the Mitsubishi F-3 fighter, which is scheduled to be put into the air for the first time in 2024-2025.

Planning of combat operations: The enemy's use of advanced forms and methods of armed struggle leads to the fact that the planning model of combat operations becomes ineffective in combating him in new conditions, and it is required to introduce new changes and clarifications based on the conditions.

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It should be emphasized that war is a special type of human activity, because in it, not the tactical details of weapons, but the psychological and physiological aspects and preparation of a person come to the fore. And this situation plays a decisive role in aviation, because tasks are performed in an environment not intended for humans, usually over enemy territory, in the presence of resistance from anti-aircraft missiles and fighter planes, as well as in conditions of strong radio-electronic interference.

For example, the planning methodology developed in peacetime should be easily adapted to the conduct of real combat operations.

In order to solve the task of aviation combat action planning, rather than conventional algorithmic methods, the use of artificial neural network (SIT) technologies can meet modern requirements, because they are a powerful tool for parallel processing of data in a number of algorithms. has the qualities of calculating difficult or impossible tasks.

One of the main features of the artificial neural network is that it can change its internal model depending on the changes in the environment.

Changing the internal model in order to fulfill the task can be done by a person or independently. Based on the weapon systems and conditions of the opposing parties, this quality can be modeled empirically and through calculations, and the results of hostilities can be clarified. Therefore, the planning system based on the artificial neural network can plan the combat operations of aviation even in the conditions of incomplete information about the enemy and can change accordingly depending on the changes in the armed struggle.

The next main feature of the neural network is that it is protected from obstacles. A trained network can tolerate some uncertain incoming data, and it can extract useful signals from them that have undergone little change.

This feature makes it possible to overcome algorithmic systems that require strict accuracy, and allows planning of combat actions in conditions of availability of ambiguous or conflicting information about the operational-tactical situation.

Another feature of the neural network is that it can perform the function of multi-criteria coordination in a short time despite the volume of information.

This, in turn, makes it possible to allocate forces and tools to objects and tasks regardless of the size of information, taking into account many criteria and restrictions in real time. This feature enables rapid real-time planning.

With the help of a neural network, it is possible to solve tasks such as determining the rational directions of aviation to strike objects, breaking through the enemy's air defense system [6]. Such technologies can build self-learning systems by modeling training, the course of combat operations, and the end results. For such systems, conflicting or insufficient information about the operational-tactical situation cannot be an obstacle to quality planning.

In conclusion, we can say that the speed of technology development shows that many new changes will be implemented in every field soon, and these changes will certainly be reflected in the military field. In order not to lag behind technological processes like the above, it is necessary to train personnel in these directions in our country, and if necessary, give many benefits to the employees of this field. Developed countries are already paying a lot of attention to technological directions, and the results of this are visible. For this reason, it is appropriate to implement similar reforms in our country.

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