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ARTIFICIAL INTELLIGENCE AND AI APPLICATION IN AVIATION

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Artificial intelligence (AI) is a field of computer science, the life cycle of which includes the development of intelligent computer systems. The main technologies are Machine Learning, neural networks, genetic algorithms and expert systems. Artificial intelligence systems can learn from experience, be able to make decisions independently, optimize processes and adapt to new situations, as the human brain does [1]. Modern aircraft are already sophisticated enough to fly most of the way on autopilot with limited supervision by a human pilot. Nevertheless, many aviation accidents are still associated with the human factor, according to historical data on aircraft crashes [2].

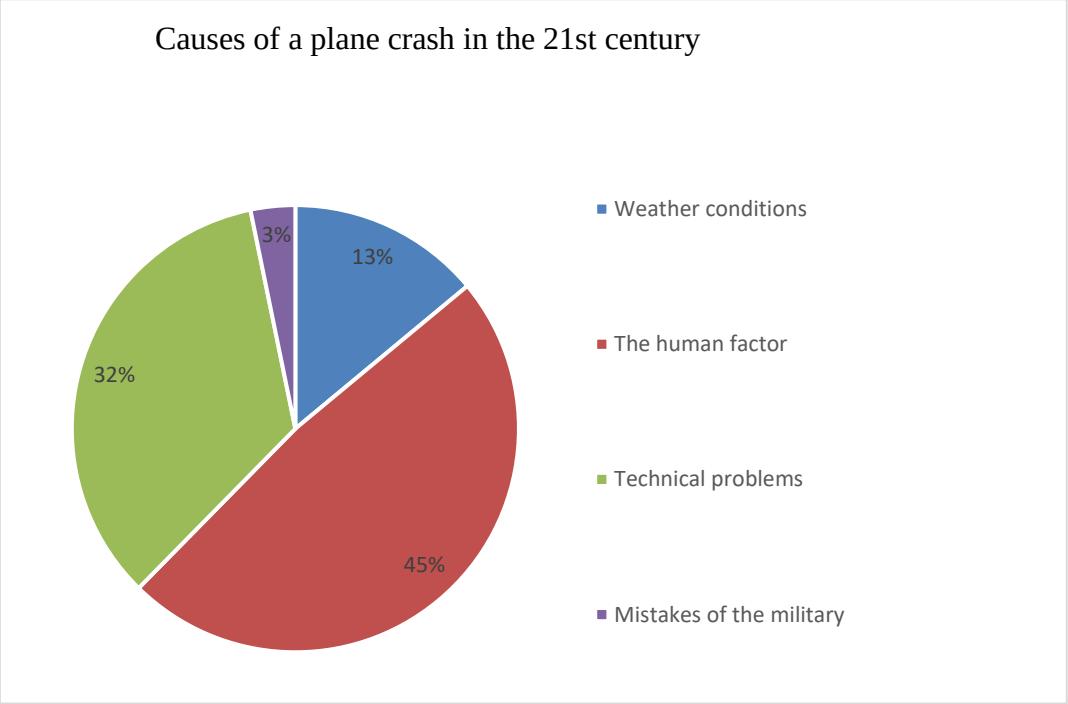

Figure.1 Causes of plane crash in the 21st century

According to the data, it is clear that the cause of most of the plane crashes is the human factor. This is not necessarily due to the unskilled pilots and crew, it's just that in stressful situations a person cannot always think clearly. Computing programs have no such problems. Artificial intelligence can choose an algorithm of actions that can not only reduce the risks of dangerous situations in the sky, but also, if necessary, save all passengers.

Artificial intelligence is one of the most promising technologies in aviation. Over the next few years, AI is projected to bring several breakthroughs in the aerospace industry by cutting costs, shortening design processes, eliminating duplication, experimenting, augmentation, support, production, and upgrading things [4]. We would like to focus on some main applications of artificial intelligence in aviation.

Artificial intelligence has the potential to benefit various processes and activities like analytics, software configuration, and customer service through its ability to interpret data effectively. Several fields, including finance, retail advertising, and health, have already seen the advantages of AI technologies.

In addition, aerospace companies can leverage AI to expedite manufacturing processes and enhance safety measures. Moreover, AI systems can effectively analyze and process significant volumes of data from different sources more efficiently than humans. This enables aerospace businesses to conduct more accurate and streamlined examinations of various aspects. AI in aircraft can also facilitate the development of applications that conserve/monitor fuel, identify areas for improvement, and assist in air traffic management. By incorporating AI algorithms, vehicle manufacturers have the ability to utilize generative structures to construct various components. Iterative design is a repetitive method where designers and engineers utilize design specifications, limitations, and attributes like resources, materials, and budget to create an optimal product development. Through the use of advanced design programming and AI, product designers can analyze numerous design possibilities rapidly, resulting in the production of new, cost-effective, and lightweight products. AI simulations combined with interactive virtual frameworks can enhance flight training for pilots. Additionally, the use of AI is set to revolutionize air travel further by assisting pilots during flights. By monitoring and alerting pilots about fuel levels, weather conditions, and other crucial factors, AI-enabled cockpit adjustments can gradually optimize the flight path for maximum safety and efficiency [5]. In fact, the use of artificial intelligence is limitless, it can significantly reduce the time spent on the implementation of the project, as well as provide unique ways to solve problems related to the aviation industry.

Artificial intelligence and its introduction into the production of aircraft, management, marketing and security systems is just beginning. But already today it is possible to identify the pros and cons of using this technology.

Pros:

1. Improving flight safety: artificial intelligence can predict possible malfunctions and emergencies, which allows you to take timely measures to prevent disasters.

2. Process optimization: Artificial intelligence allows you to automate and speed up many operations, reducing fuel costs and reducing the time for maintenance and repair of aircraft.

3. Improving the accuracy of meteorological forecasts: Artificial intelligence has the ability to process large amounts of data and create more accurate weather forecasts, which helps prevent delays and cancellations of flights.

4. Improving passenger comfort: Artificial intelligence can analyze the behavior and preferences of passengers, offering personalized service and creating a more comfortable atmosphere on board.

Cons:

1. High cost of implementation: the development and implementation of artificial intelligence systems requires significant financial and time costs.

2. Risks of cyber-attacks: Artificial intelligence may be vulnerable to cyber-attacks, which may lead to a violation of flight safety.

3. Risk of errors: like any technology, artificial intelligence can make mistakes, which can be dangerous for flight safety.

4. Unpredictability: Some aspects of the behavior of artificial intelligence can be unpredictable, which can lead to undesirable consequences.

Finally, the introduction of artificial intelligence in aviation is one of the most striking examples of the application of new technologies in the field of transport. This is confirmed by the interest shown by airlines in innovative solutions that will improve flight safety, increase automation and optimize processes on the ground and in the air. Despite a number of limitations and disadvantages, the use of artificial intelligence today allows airlines to significantly improve the quality of service for passengers, reduce fuel costs and aircraft maintenance, as well as reduce the risks of emergencies.

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