A NEW PERSPECTIVE ON THE FUTURE OF AVIATION AND THE EMERGENCE OF SELF-FLYING TECHNOLOGY

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Abstract. *Self-flying planes, also known as autonomous aircraft, are a rapidly advancing technology that has the potential to revolutionize the aviation industry. In this article, we provide an overview of the software components that make self-flying planes possible and explore the potential impact of this technology on the aviation industry and beyond. We begin with a brief history of self-flying planes and discuss the technical components that enable them to operate without human intervention. We then examine the benefits of self-flying planes, including increased safety, faster travel times, and the potential to reduce operating costs. However, we also consider the drawbacks and technical challenges to consider, as well as ethical concerns surrounding job losses and passenger trust. We conclude that self-flying planes offer many potential benefits, such as improved safety and efficiency, as well as increased accessibility for air travel. As self-flying plane technology continues to evolve, the aviation industry will need to adapt to these changes in order to stay competitive and safe.*

Keywords*: autonomous flights, flying machine, self-flying planes, software components.*

Introduction

Over the past few decades, rapid advancements in technology have revolutionized various aspects of our lives, including the aviation industry. Autonomous aircraft, or self-flying planes, represent a cutting-edge technology that has been gaining significant attention in recent years. While the idea of planes operating without human pilots might seem like something out of science fiction, it is rapidly becoming a reality. Self-flying planes rely on sophisticated software and sensor technology to navigate and operate without human intervention. In addition, looking through the lens of the ratio between the number of accidents and the volume of annual traffic, air transport has proven to be the safest mode of transport in recent years [1]. In this article, we will explore the history of self-flying planes, the various software components that make their autonomous operation possible, and the potential impact this technology could have on the aviation industry and beyond. By examining the current state of the technology, the challenges that remain, and the potential benefits and drawbacks of implementing self-flying planes, we hope to provide a comprehensive overview of this exciting and rapidly evolving field.

The Changing Face of Aviation: A Historical Overview

The concept of flying in a flying machine seemed unbelievable to most people from the past centuries. But there have always been illustrious people who did not give up when they set a goal. Two of these people were the Wright brothers, Orville Wright and Wilbur Wright. They spent four years of research and development to create the first successful powered airplane, the 1903 Wright Flyer. It first flew at Kitty Hawk, North Carolina, on December 17, 1903, with Orville at the controls [2]. But, although that was a great advance in transportation technology, flying this plane required quite a lot of physical work. To fly that machine, the pilot had to lie on his stomach and push and pull levers.

But since then, flying a plane has become much less physical thanks to automation and autopilot features that do a lot of the pilots' work for them [3]. Just nine years after the Wright brothers' invention, Lawrence Sperry created the first functional autopilot, who was known as "gyroscopic automatic pilot," or "George," as many pilots nicknamed it. Its function was to automatically balance the plane in flight, so the pilot didn't have to deal with it.

Over the years, the field of aviation has seen tremendous progress, with commercial airplanes becoming more advanced and sophisticated. In the 1950s, the cockpit of a commercial airplane required five crew members, including a flight engineer, a radio operator, a navigator, and two pilots. However, with technological advancements, the first three roles became unnecessary, resulting in significant cost savings for airlines [3]. As a result, the aviation industry experienced a surge in investments in automation during the 1970s. This was partly due to analysis that revealed that approximately 80% of airplane accidents occurred due to human error, while only 20% resulted from equipment failures [4].

The trend towards automation in aviation has continued to accelerate, with the emergence of self-flying planes, also known as autonomous planes. These aircraft can operate without the need for a human pilot, thanks to advanced technologies such as artificial intelligence and machine learning [5]. These technologies enable self-flying planes to perform many of the same functions as a human pilot, making them a promising development for the future of aviation [6,7].

The Software Components of Autonomous Aircraft: A Technical Overview

In order to develop such advanced technologies, it is necessary to invest in the development of complex software systems. They must be able to allow the planes to act correctly in any less predictable situation. Some of the components that should be part of the software of self-flying planes are the following ones. First of all, because it regards planes, they should be equipped with a Flight Control System [8]. It is responsible for controlling the flight of the aircraft, and includes a variety of software components such as flight management systems, autopilots, and navigation systems. These systems work together to control the movement of the aircraft, including its speed, altitude, and direction.

Next, because plane should avoid any eventual obstacles, they should have a Sense and Avoid System [5, 8]. This is designed to detect and avoid obstacles in the aircraft's flight path. This system typically includes a variety of sensors such as radar, lidar, and cameras, as well as software algorithms that can process the sensor data and identify potential obstacles.

Any aircraft should have means of communication with the crew on the ground [8]. Therefore, another important component that the software should have is good Communication Systems. Self-flying planes rely on a variety of communication systems to transmit and receive data, including information about weather, traffic, and other aircraft. These systems include satellite communication systems, ground-based radio systems, and other wireless communication systems.

Also, another important part for these new technologies are their Cybersecurity Systems. With the increasing use of software and connectivity in self-flying planes, cybersecurity has become an important consideration. Software security measures such as encryption, authentication, and access control are typically used to protect the plane's systems and data from unauthorized access or tampering.

And perhaps one of the most important parts of a device based on self-improvement – its Data Storage and Analysis Systems [6, 9]. Self-flying planes generate large amounts of data, including flight data, sensor data, and communication data. Software systems are used to store and analyze this data, which can be used to improve the performance and safety of the aircraft, as well as for maintenance and troubleshooting purposes.

These are just a few examples of the software parts that may be used in a self-flying plane. The specific software components used can vary depending on the design and purpose of the aircraft, as well as the regulatory requirements of the country where it operates.

Impact on the aviation industry

The impact of self-flying planes on the aviation industry can be significant and far-reaching, including improvements in efficiency, safety, and cost reduction. Self-flying planes can operate around the clock, without the need for rest periods. They will never make a mistake due to fatigue. That's not true of today's overworked pilots. This means that these planes can increase the number of flights and reduce the time spent on the ground. With autonomous planes, companies wouldn't need to worry about pilots and crew getting stuck in other cities [10]. And they could schedule as many flights as they wanted at odd hours — without restrictions based on worker hours or coordinated schedules. Flight crews would work on the ground, and focus mainly on monitoring self-piloted flights. This increased efficiency could lead to reduced travel times, lower ticket prices, and increased profitability for airlines.

Another impact of self-flying planes on the aviation industry is improved safety [5]. Self-flying planes can use advanced sensors and artificial intelligence to avoid collisions with other aircraft, as well as detect and respond to unexpected weather conditions or other potential hazards. In addition, self-flying planes can operate in high-risk environments, such as search and rescue missions, without putting human pilots in danger. This increased safety could lead to increased public confidence in air travel, which could lead to increased demand for air travel.

Self-flying planes could also have an impact on the aviation industry in terms of cost reduction. Without the need for human pilots, airlines could reduce the costs associated with pilot training, salaries, and benefits. In addition, self-flying planes could be used to transport cargo, which would reduce the need for human labor in the cargo industry [10]. This cost reduction could lead to lower ticket prices and increased profitability for airlines.

Finally, self-flying planes could make air travel more accessible to a wider range of people. For example, people with disabilities or limited mobility could benefit from self-flying planes' increased accessibility and convenience.

But there are also some factors that could slow down the development of such technologies. One of the primary drawbacks of self-flying planes is the potential cost. Developing and implementing self-flying plane technology could require significant investment [11], as well as ongoing maintenance and training costs for pilots and maintenance personnel. There are also ethical concerns to consider. Removing human pilots from planes could lead to job losses and could impact passenger trust and comfort [11]. Additionally, there is the question of who would be responsible in the event of an accident or malfunction with a self-flying plane. These ethical concerns will need to be addressed as self-flying plane technology continues to develop.

Conclusions

In conclusion, self-flying planes represent a significant technological leap forward that has the potential to revolutionize the aviation industry. While there are still many challenges to overcome, the benefits of this technology are clear. Self-flying planes offer increased safety, faster travel times, and the potential to reduce operating costs. Moreover, they could improve accessibility to air travel and help to address issues such as pilot shortages.

However, there are also concerns to consider, including technical challenges and ethical questions around job losses and passenger trust. As self-flying plane technology continues to evolve, the aviation industry will need to adapt in order to fully realize the potential benefits and address the challenges. This will require continued research and development, as well as regulatory and safety frameworks to ensure that self-flying planes are safe and reliable.

Overall, the advent of self-flying planes marks an exciting new chapter in the history of aviation, one that offers both opportunities and challenges. As we continue to push the boundaries of what is possible in air travel, it is important to remain mindful of the potential impact on safety, the workforce, and society as a whole.

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