

Artificial Intelligence based Drone Control for Monitoring Military Environment and its Security Applications

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Abstract—Artificial Intelligence (AI) in UAV control Unmanned aerial vehicles are being employed in numerous industries for a wide range of functions, and demand for them has been rising exponentially in recent years. The potential of these technologies increases with the addition of artificial intelligence. Although artificial intelligence has many advantages, it can also make operating unmanned aircraft more straightforward and effective. Drones with artificial intelligence need a lot more computational power and energy. The analysis of artificial intelligence's entry into unmanned aerial vehicle control is the main subject of this paper. A comparative examination of research works on artificial intelligence and unmanned aerial vehicle control is presented in this paper. Monitoring artificial intelligence powered autonomous drone for military security and disaster management the work presents unique modeling techniques that are highly effective in identifying, tracing, controlling, and coordinating drones in an environment where terrorist group operations are highly prevalent. In the modern workplace, people need to imitate their environment to increase comfort and efficiency. The capacity to replicate an individual's daily tasks has advanced significantly. A simulation is an attempt to mimic the real-world operation of a system or procedure.

Keywords— Applications, Artificial intelligence, Drones, Monitoring, security, UAV

I. INTRODUCTION

The necessity for developing new methods and tools for high throughput wireless data processing and communication is growing as wireless networks become more complicated. As unmanned aerial vehicles (UAVs) find new applications and novelties like UAV swarms are created, the demand for this is becoming more urgent. Since millimeter-wave offers the increased bandwidth required for 5G wireless communication and beyond, it aids in meeting the throughput demand [1]. However, there are drawbacks to these higher frequencies as well, like shallow signal penetration depth. Predicting the ever-changing radio environment with accuracy is the primary problem in modern wireless networks.

II. UNMANNED AERIAL VEHICLE DRONE SERVER APPLICATIONS AND BIG DATA ANALYSIS

This thesis primarily suggested a novel approach to improving the effectiveness of the conventional survey-mapping measurement method and resolving flight safety issues by analyzing huge data from the unmanned aerial

vehicle (UAV) platform during the operation process with the appropriate software[2]. Applications of UAV with automate, autonomous, and intelligent are genuinely implemented through the use of a sizable database server of UAV with the associated industries processing applications and network applications. In the meantime, multiple times or greater efficiency are reached in several fields, such the survey-mapping of UAVs, making its applications easier, more precise, safer, and faster.

III. DRONE CONTROL WITH ARTIFICIAL INTELLIGENCE

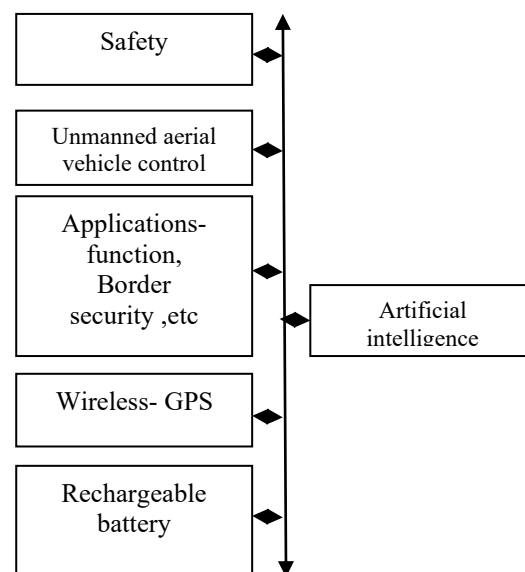


Fig. 1. Artificial Intelligence (AI) Integration in Drone

Figure 1 shows the Drone parameters that are influenced by Artificial Intelligence (AI). Machine learning and unmanned aerial vehicles have begun to attract the interest of academic and industry researchers. The ability to control and keep an eye on activities from a distance has been increased thanks to unmanned aerial vehicles. Artificial intelligence fit into the military intelligence landscape AI-driven intelligence enables the army to identify possible threats by analyzing data from all sectors. It is possible to prevent any unforeseen outcomes, such as border conflicts, civil unrest, terrorist attacks, and so forth. The armed forces can make better decisions in a variety of fields thanks to the abundance of data and the

development of AI models. There is a glaring worldwide struggle to improve military process.

It has been demonstrated how quickly and effectively extensive scientific study may be conducted in order to discover novel applications for the technology already available and to pinpoint methods for optimizing unmanned vehicle control [3]. It has been demonstrated that the development of the drone control system can lead to qualitatively novel outcomes in terms of gathering diverse data and resolving logistical issues in harsh environments or unpredictable circumstances. The primary driving forces behind the ongoing development of data science algorithms, which enable the optimization of numerous human activity-related activities, are outlined below.

It becomes clear how crucial it is to use server storage for gathering and analyzing vast amounts of diverse data. Instructions for data processing and the construction of machine learning algorithms are provided as features of the mathematical model transformation. The rationale behind the increased adoption of artificial intelligence as a tool for efficient managerial decision-making is disclosed. The primary avenues for optimizing unmanned aerial vehicle management and operation with artificial intelligence are outlined below[4]. A conceptual framework for the gathering, aggregation, and processing of heterogeneous data produced by different drone-mounted instruments is provided, along with instructions for utilizing artificial intelligence to produce useful outcomes. It has been demonstrated how quickly and effectively pattern recognition technology can be improved, enabling more precise evaluation of the many components of the external environment and boosting the effectiveness of the deployment of logistics systems. It has been demonstrated that artificial intelligence may be used to make decisions in uncertain situations without the involvement of humans and to provide ongoing training tailored to the specifics of the interaction between external and internal environmental components[5]. It has been demonstrated how quickly and easily extensive research on the formation of contact between a specific number of unmanned aerial vehicles can be carried out with artificial intelligence. It has been determined how effective the drones' group use, which is based on coordination algorithms and an artificial intelligence-powered control system, is. It has been demonstrated that the unmanned aerial vehicle system can interact and adopt optimal decisions in a timely manner based on the way environmental conditions manifest themselves.

IV. 5G'S DRONES WITH ARTIFICIAL INTELLIGENCE

Unmanned aerial vehicles, or UAVs, are drones that are employed in a variety of applications these days. AI and ML are now being used to teach drones for a variety of applications. Compared to other technologies, drones are more efficient and capable since can travel through the air and finish tasks quickly. Turkey, and Iran are among the nations where UAVs are now in use. India is developing AI drones at the moment. Drones are currently employed in medical and military defense, but will eventually be crucial to every industry. Ability of an unmanned aerial vehicle to be controlled The essay addresses the issue of using computer algebra and interval analysis to analyze an unmanned aerial

vehicle's controllability. A criterion for the controllability of the system under investigation was derived using interval mathematics [6]. Interval mathematics library was utilized in software development. The dynamic characteristics of energy, economic, and other nonlinear systems, as well as automatic control systems, can be studied with the help of the developed software that carries out the recently established interval arithmetic operations.

V. APPLICATIONS OF AI AND WEB APPLICATIONS FOR DRONES DELIVERING MEDICINE

The last several months have seen a boom in the growth of drones used for the delivery of medication. People are being forced to use automation more and more by this rapid evolution. Thousands of people lose their lives as a result of the world's inability to supply medicines more quickly, despite technological advancements. In this study, artificial intelligence (AI) and web apps are used to allow drones to provide medication to patients. The development of semi-autonomous drone technology has forced environmental advancements across[7]. Without involving a person, the user can register and order the medication using the program. The device will deliver the medication to the precise spot if the user shares their location with it. The purpose of this computer system is to benefit everyone in the universe.

VI. AN AUTONOMOUS NAVIGATION MECHANISM FOR INNOVATIVE TECHNOLOGICAL DRONES WITH VARIOUS USES

Drones equipped with autonomous pilot technology have ushered in a new era of unmanned aircraft systems, opening up a wide range of possibilities. The significance and possibilities of autonomous pilot planes are examined in this abstract, highlighting how will revolutionize a variety of industries, including surveillance and agricultural. Intelligent navigation is necessary for unmanned aerial vehicles (UAVs), which are outfitted with advanced artificial and sensing systems to allow them to function independently without continual human supervision. A quickly expanding area of aerospace and robotics technologies Wheels In order to demonstrate this, the paper offers a thorough that covers important ideas, difficulties, and current advancements in autonomous automation into the box.

It also explores how machine learning and artificial intelligence improve drone autonomy, discussing and educating readers about the vital significance of real-time operations, the vital role of obstacle detection and avoidance systems, and the usage of GPS and optical-based navigation. The study also examines the several advantages and possible uses of autonomous drone communications, ranging from precise agriculture distribution to search and rescue operations. 2013 saw a rise in interest in and funding for this technology, demonstrating its potential to completely change sectors and pave the way for enhanced performance and safety in the future.

VII. COMPARATIVE STUDY OF TRACKING ALGORITHMS FOR APPLICATIONS IN DRONE MONITORING

Rapid developments in mobile technology have led to a major shift in how individuals conduct their daily lives in recent years. These days, smart phones and other mobile devices are commonplace and have ingrained themselves into daily life[8]. Consequently, there is an unmatched need

for software that is tailored to operate on mobile devices. This paper presents the idea of "Drone Track," a dedicated smart phone application created especially for tracking unmanned aerial vehicles. "Drone Track" is a specialized program designed to support unmanned aerial vehicles (UAVs) that carry out delivery duties. Throughout the delivery process, the program is intended to give consumers real-time information about where the drone and its package are. This application, which leverages the concepts of geo location and geo mapping and is implemented using a combination of Kotlin and Java, attempts to provide a new era of tracking and monitoring capabilities. It has a captivating user interface that makes important information about the ongoing delivery process easy to access for users[9]. The system provides the recipient with an engaging and user-friendly experience by integrating this mobile application. Because of this connectivity, users may actively participate in the delivery progression and receive quick updates, greatly increasing ease. For the purposes of tracking, verification, and communication, this application acts as a central hub. Furthermore, the application guarantees openness and fosters user confidence.

VIII. UNMANNED AERIAL VEHICLES TO SECURE TECHNOLOGY-ENABLED SERVICES

Drone technology is an innovation that is expanding quickly. It has seen exponential growth in a number of areas, including e-commerce, healthcare, hospitality, and disaster recovery and management[10]. Drones offer incredible potential that has been realized by business enterprises, government institutions, and amateurs thanks to features like low cost, easy maneuverability, greater customer satisfaction, and little operational requirements. This study examines a few of the modern uses for drones, including safe package delivery, helping the community and providing aid to victims of both man-made and natural disasters. Several current technologies that can help multiple industries profit from drone technology are assessed. These include facial recognition, object identification, voice-based control, visual aided navigation, and tracking via global positioning systems. In order to safely deliver items, this article suggests a drone delivery model that makes use of a voice-based OTP authentication system.

IX. MONITORING THE ENVIRONMENT WITH A WIRELESS SENSOR NETWORK POWERED BY DRONES

One of the main factors closing the gap between the real and virtual worlds is embedded electronics and sensors. The Internet of Things is envisioned to be made possible by billions of devices, including wireless sensor nodes, wearables, smart watches, smart phones, and medical implants. These devices are utilized in vital applications, such as the remote collection of atmospheric greenhouse gas emissions data via wireless sensor nodes, and frequently include confidential or proprietary data. Furthermore, some of the data collection equipment are placed in remote locations with limited accessibility and limited network connectivity, making it impossible to transmit data for processing. Further more, it has been demonstrated that using wireless sensor nodes speeds up, reduces labor requirements, and lowers the cost of data collecting. In this research, offer

an effective way to gather data from three wireless sensor nodes remotely.

This initiative aims to remotely monitor a river and lake . An unmanned aerial vehicle is used by the system to gather data from a distant stream site[11]. The process by which an adapted unmanned aerial vehicle flies to a location where a wireless sensor node may be connected, creating a communication channel to upload and store the data until it is analyzed[12]. The approach used is demonstrated through an environmental case study that highlights the benefits of deploying a wireless sensor node, such as continuous data gathering, access to a remote site, and a decrease in the labor and expenses related to field data collection techniques. The demonstrate the efficiency of our node's power and energy consumption.

X. AUTONOMOUS DRONE PROTOTYPE

Recent years have seen a rise in the popularity of autonomous and sophisticated robotic systems because of their many uses, especially in manufacturing, logistics, and other sectors requiring exact or repetitive labor. Because these technologies remove the need for humans to execute dangerous or repetitive operations, have been shown to prioritize worker safety while increasing efficiency, productivity, and cost savings[13]. An overview of the design and development of an autonomous drone system is given in this paper, with a focus on the system's primary characteristics and functionalities. This work suggests a novel approach for the design and development of an autonomous drone system that can reliably and precisely carry out predetermined tasks without the assistance of a person[14]. The prototype has a number of cutting-edge technologies, including weather monitoring sensors and onboard obstacle avoidance sensors. The flight controller uses a variety of algorithms to process sensor data and use it to manage the drone's fly path, navigate waypoints, and avoid obstacles on its own. Successful autonomous flying demonstrations that highlight the drone's capability to finish challenging missions will be among the study outcomes[15]. This article focuses on the design and development of an autonomous drone system, showing how, when applied responsibly and ethically, it has the potential to revolutionize a number of industries while also enhancing efficiency, safety, and sustainability. For a more thorough discussion about autonomous drones, see the other topics.

XI. GPS SIGNALS DRONES RESCUE MODE LAUNCH LOCATION

Drone usage for non-military objectives has increased recently. Drones are employed by the government, business, and leisure sectors[16]. Modern drones are capable of long-distance flight, and many of them come with cameras and GPS chips that let users control them from a distance. Security and privacy issues are raised by this[17]. Drones operating in prohibited zones, for instance, or spying on people and things with the camera This study tackles this problem and suggests a way to counter drone violations by taking advantage of GPS systems' lack of source verification. In this study, suggest a method to locate the launch point and ground infringing drones[18]. Our method is distinct in that it not only grounds infringing drones but also locates their launch position[19]. This is accomplished by first

entering the rescue mode and then using radio frequency software-defined radios to broadcast altered GPS signals. Present the proposed method in this work[20]. The performance of the suggested system is then shown via a simulation and hardware tests[21]. The field of products transportation has experienced a paradigm shift due to the introduction of contemporary technology innovations, particularly the use of drones for creative and effective goods movement. This essay examines the difficulties and developments in drone delivery systems, highlighting the vital importance of precise and safe parcel handover procedures. The present a unique light communication system based on an LED array for drone delivery that overcomes the limitations of conventional verification procedures. Utilizing a Raspberry Pi single-board computer and an integrated smart phone application for smooth operation, the device makes use of pattern recognition technology. Our research demonstrates the efficacy and potential of the suggested approach in transforming parcel delivery services through extensive testing and analysis.

XII. FUTURE SCOPE

Drone technology has advanced significantly as a result of the use of Artificial Intelligence (AI) tools and approaches. In addition to its military uses, drones are finding increased usage in mobile wireless communication, agriculture, construction, security and surveillance, logistics and cargo transportation, and exploration. Drone autonomy has advanced significantly as a result of the collaboration between AI and drones; these machines can now carry out challenging tasks without direct human supervision. The impact of AI on enhancing drone autonomy is examined in this state-of-the-art study, which covers everything from automation to sophisticated real-time decision making. The paper offers thorough illustrations of the most recent advancements and uses.

XIII. CONCLUSION

The growing acceptance of commercial drones across a range of sectors and uses during the past few years has been noteworthy. Swarming, auto piloting, and video streaming are just a few of the cutting-edge capabilities that these contemporary drone systems have to offer. These trends are displayed visually. The study's conclusions suggest that AI-based control algorithms could significantly improve UAV technology by boosting its accuracy, versatility, and dependability. Advanced machine learning methods, multi-agent systems, security protocols, moral frameworks, human-AI cooperation, environmental effect analyses, and urban integration will be among the future objectives. These efforts hold great potential to influence UAV development in the future by generating new capabilities and addressing pressing issues.

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