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# IOT BASED DRONE FOR IMPROVEMENT OF DELIVERY PRODUCTS USING GPS

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**ABSTRACT**

Drone and the Internet of Things are different technologies, actively utilised and implemented across various fields. Connectivity is the difference between the IoT drone and the regular drone. IoT drones can receive and transmit data and command signals in real-time while being controlled through the IoTnetwork. By implementing both drone and IoT, the flying IoT (IoT-Drone) is built as a new form of IoTdevice. This work improves how to use the drone effectively in many aspects; data transferring, data collecting, real-time monitoring, and control. With the emergence of the Internet of Things, Artificial Intelligence, and advanced communication, the IoT drone technology has been utilized in many fields, especially in agriculture and inspection, and discussed in smart cities, logistic delivery, and the military. This paper reviews the IoT drone implementation in those fields and reviews the researchers' discussion and studies on IoT drone optimization.

**Keywords**:

Internet of Things (IoT); IoT; Drones,GPS.

## INTRODUCTION

Unmanned Aerial Vehicles (UAVs), commonly known as drones, have evolved into one of the most versatile tools in modern technology. Their ability to perform tasks in areas that are otherwise difficult, dangerous, or time-consuming for humans has opened up numerous possibilities. Drones equipped with high-resolu

tion cameras are particularly beneficial as they enable high-quality aerial photography, video recording, and surveillance. The use of these drones is expanding rapidly in industries such as agriculture, construction, security, and media, where they provide real-time data collection, efficient monitoring, and in some cases, a safer alternative to human intervention.

This project focuses on the design and development of a drone equipped with a sophisticated camera system, capable of capturing stable, high-definition imagery. The drone's primary purpose is to capture aerial views for a wide range of applications, including environmental monitoring, agricultural surveys, infrastructure inspections, and video production. The combination of cutting-edge flight control systems and advanced imaging technology ensures the system's precision, reliability, and overall performance in diverse conditions.

The practical applications of this drone are vast. In the field of agriculture, it can be used for monitoring crop health, assessing field conditions, and surveying large areas with minimal human intervention. In construction and infrastructure inspection, drones can be employed to assess the condition of hard-to-reach structures like bridges and tall buildings, reducing both time and risk.

In this project, the drone will be fitted with a lightweight, high-definition camera designed to capture clear and detailed images from various altitudes. The system will also incorporate features such as image stabilization, real-time video streaming, and automated flight control to ensure that the drone operates efficiently and produces high-quality visuals. Additionally, the integration of GPS-based navigation allows for precise positioning, flight paths, and autonomous operation, further enhancing the user experience and the drone's ability to perform complex tasks.

The primary objective of this project is to create an accessible, reliable, and effective drone system that meets the needs of industries requiring aerial data collection. Through optimizing flight time, camera quality, and operational efficiency, the drone system will serve as a cost-effective solution to challenges faced by various sectors. The success of this project could significantly enhance the use of drones in everyday applications and open new possibilities for their integration into future technological advancements.

**LITERATURE SURVEY**

This paper provides an in-depth review of the use of unmanned aerial vehicles (UAVs) in aerial photography and surveillance. It outlines the evolution of drone technology, highlighting improvements in camera systems, stabilization mechanisms, and flight control algorithms. The study discusses various applications of drones, particularly in the fields of environmental monitoring, security, and search-andrescue operations. Additionally, it emphasizes the role of GPS and real-time video transmission in enhancing drone functionality. Key challenges highlighted include the optimization of battery life, the need for lightweight components, and the complexities of autonomous flight control. The paper concludes with a discussion on the future potential of drone-camera systems, suggesting that continued advancements in AI and machine learning will enable drones to perform increasingly sophisticated tasks.

This research discusses the integration of drones with high-resolution cameras to support precision agriculture. The paper focuses on the design aspects of UAV systems that can monitor crop health, assess soil conditions, and optimize irrigation. The authors explain how multispectral and thermal imaging cameras are integrated into drones to provide real-time data on crop stress, pest infestation, and other factors critical to farming. The study also covers data processing methods, including machine learning algorithms to interpret the gathered data for actionable insights. Challenges like GPS interference in certain regions and the need for robust image stabilization techniques in windy conditions are addressed. The paper concludes that drones are an efficient, cost-effective, and scalable solution for modern agriculture.

This paper focuses on the challenges and solutions in real-time video transmission from drones equipped with cameras. The authors review various communication protocols such as Wi-Fi, LTE, and 5G for transmitting high-definition video streams. They emphasize the importance of

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minimizing latency and optimizing bandwidth for continuous and clear video feed, particularly in high-speed flight scenarios. The study presents case studies where drones have been used for live broadcasting events and surveillance operations. It also highlights the limitations posed by wireless interference, long-distance communication, and the need for robust error correction techniques. Finally, the paper discusses future advancements, particularly with 5G technology, which promises to revolutionize real-time video streaming for drones.

In this study, the authors investigate methods for enhancing image stabilization in drone-mounted cameras to ensure smooth and clear footage, even under turbulent flight conditions. The paper discusses different stabilization technologies, including mechanical gimbals and electronic stabilization algorithms. Comparisons are made between these techniques, and their impact on image quality is evaluated. The study also touches upon the integration of these systems with real-time flight control to maintain stability during rapid movements and gusty winds. The paper concludes by suggesting that advancements in sensor technology and image processing algorithms will continue to improve the stabilization capabilities of drone cameras.

## EXISTING SYSTEM

In this section, we solely focus on existing concepts specific to drone logistics, which have been addressed in the literature so far. A detailed literature review based on the identified technical requirements and challenges within our work will follow in Section.

The current market situation in the logistics industry is in the process of being revolutionized by the introduction of delivery drones. The autonomous aerial vehicles make it possible to transport packages efficiently, fast, and environment-friendly. A leading player in this field is the company Amazon, which has been actively experimenting with drone parcel delivery for several years. In addition, DHL and FedEx are prominent players in the drone-based parcel delivery industry as well. Iceland's leading eCommerce company, AHA, has teamed up with Flytrex to introduce drone deliveries in Reykjavik (Smith, 2017). By integrating Flytrex's drone system with their existing vehicle network, AHA has notably reduced delivery times. In 2019, Wing, an Alphabet-owned drone company, launched Canberra's first public drone delivery service, serving around 100 households initially (Chung et al., 2020).

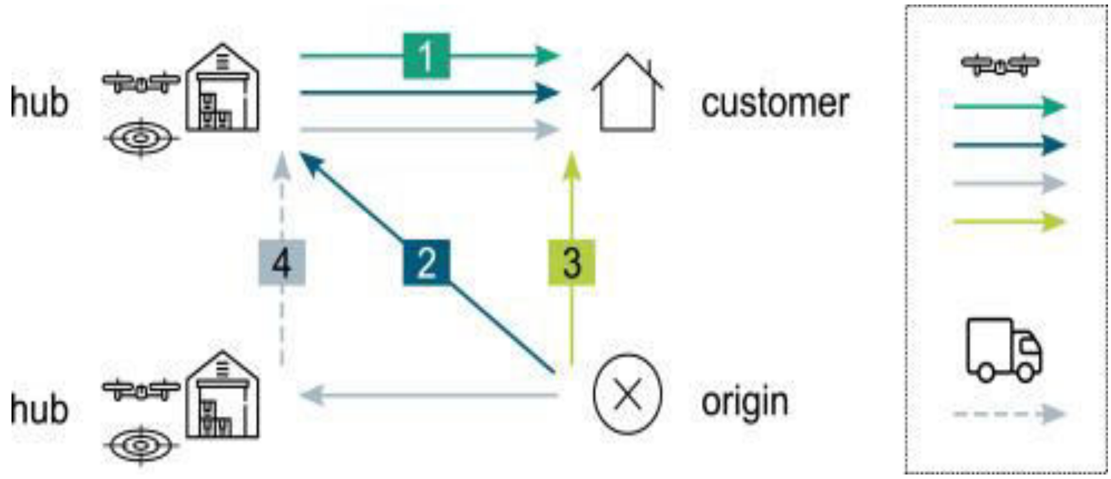


Fig.1.Existing system block Diagram

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UPS and Google also operate licensed drone delivery programs. Among many start-ups actively penetrating the drone delivery market, Wingcopter has successfully partnered with various companies and secured significant investments to accelerate drone delivery. Furthermore, the largest retail company in the US, Walmart, has been offering drone delivery services for more than two years, collaborating with multiple drone companies, including DroneUP and Wing. Two other significant enterprises, namely Manna and Zipline, have carved out distinctive niches in the domain of drone-enabled delivery. Manna's specialization lies in the transportation of food and time-sensitive commodities within urban landscapes, while Zipline's expertise shines in the domain of medical deliveries to remote and often hard-to-access regions, notably in African countries where road transportation imposes challenges.

The regulations and technologies to plan and control drone flights greatly improve the safety and security of the airspace. In addition to Air Traffic Management (ATM) systems, the Unmanned Traffic Management (UTM) serves as a framework for managing UAV operations in uncontrolled environments. Unlike traditional ATM in aviation, which depends on manual methods like voice communication, individual controllers, and take-off/landing permissions, the UTM introduces an ecosystem to control UAVs. With the aim of unifying drone regulations, the European Union (EU) has formulated a shared regulatory framework. U-Space, the European UTM concept, has already seen legislation announced in Germany for 2023. The U-Space infrastructure includes various systems and technologies that provide a comprehensive operational and regulatory framework such as surveillance, communication, geofencing as well as identity management systems

Standard parcel delivery services transport packages within a predetermined time window, typically larger than that of express delivery services, and this timing is not guaranteed. In the case of express services, delivery times are guaranteed. Another special service is the so-called 'Same-Day Delivery', available in urban areas, where customers can pay extra for guaranteed same-day delivery. However, offering this service conventionally everywhere is typically not profitable from both logistical and economic perspectives.

While drone delivery is a promising logistics concept for enhancing efficiency especially in the last-mile, it faces limitations when employed solely without the support of other means. According to a survey, many people do not have the ability to provide a special area for the landing maneuvers of drones.

## PROPOSED SYSTEM

The package delivery process utilizing Drones is a unique and efficient method that uses GPS location technology to navigate the Drone to the designated destination. The schematic diagram of the proposed system and the flow diagram of facial pattern are shown in the Figures 1 and respectively. The Drone is equipped with advanced sensors, such as a facial recognition sensor, to ensure accurate and secure delivery. Prior to placing an order, customers are prompted to provide their facial features which are then stored in the server's database. When the Drone reaches the delivery location, it captures an image of the recipient and sends it to the server for comparison. Once the server verifies the recipient's identity, it sends a message to the customer to retrieve the package. If the facial recognition sensor is unable to verify the recipient's identity, the Drone returns to the hub.

The server is connected to the Drone and the Drone signal is captured to the Global Positioning System (GPS). The GPS signal have control over camera through which user can have control over it. All the signal is returned back to the server. Then the signal is generated to check the facial pattern of the person. If the facial pattern maps with the recorded pattern then the package shall be delivered as per the command. If the facial pattern doesn't maps then the package will be holded.

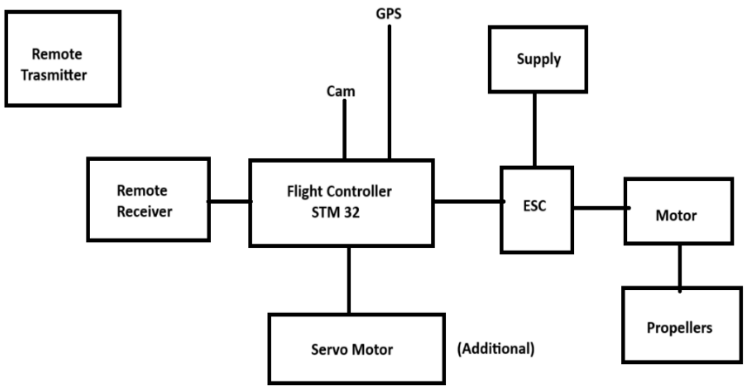


Fig.2.Proposed system block diagram

The package delivery process begins with a consumer placing an order through a specially designed app created by the host. As part of the registration process, the consumer provides their personal information such as their address, contact number, and a facial scan to be used for verification purposes. Upon receiving the order, the host prepares the package and loads it onto a Drone, along with the consumer's address and facial scan. The Drone then utilizes GPS to navigate to the consumer's location, mapping the shortest distance and making its way to the exact destination. Upon arrival, the Drone sends a signal to the host, and a message is sent to the consumer to come and collect the package. The Drone captures the consumer's facial pattern and compares it to the one provided by the host at the time of loading. If there is a match, the Drone releases the package and returns to the hub. If there is no match, the Drone displays an "incorrect match" message and returns to the hub.

1.REMOTE TRANSMITTER:

A remote transmitter is the handheld device you use to control a drone. It's part of a radio communication system between the controller (transmitter) and the drone (receiver).The receiver passes these signals to the flight controller, which adjusts the motors to move the drone as commanded. This wireless communication allows real-time control of the drone's movement.

2.REMOTE RECEIVER:

A remote receiver is a component in a drone that receives signals from the remote transmitter (controller). It operates on radio frequencies like 2.4 GHz or 5.8 GHz. The receiver is usually connected to the flight controller inside the drone. It interprets incoming commands like throttle, pitch, yaw, and roll. Each stick movement on the transmitter sends a signal to the receiver.The receiver ensures the drone follows the pilot's instructions in real time. Some receivers also send telemetry data back to the controller (e.g., battery level, GPS). Most drones have a bind process to pair the receiver with the transmitter. If the receiver loses signal, a fail-safe is triggered (e.g., return-to-home). It plays a critical role in maintaining stable and responsive drone flight.

3.FLIGTH CONTROLLER:

A **flight controller** is the brain of the drone. It receives signals from the receiver and processes data from sensors (like gyroscopes, accelerometers, GPS). Based on this input, it adjusts the motors to control the drone's movement and stability. It ensures smooth flight, balance, and responds accurately to pilot commands.

4.SUPPLY:

Motors are crucial components in various applications, including robotics, drones, electric vehicles, and industrial machinery.The **power supply system** in a drone is essential for ensuring stable and efficient operation of all onboard components, including motors, ESCs, the flight controller, sensors, and payload. It primarily involves the battery, power distribution system, and voltage regulators.

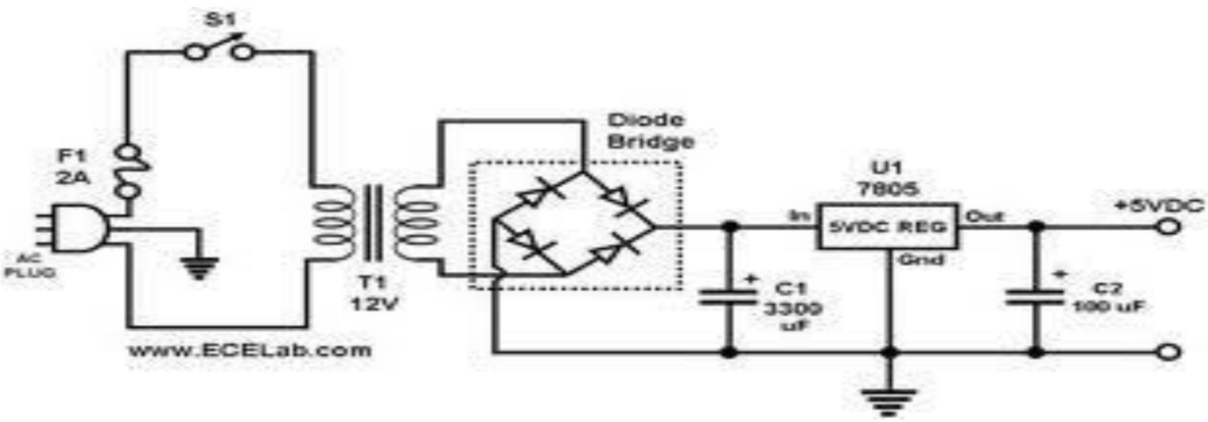


Fig3:circuit Diagram of power supply

5.GPS:

Fig.shows the GPS Module used in the project. A computer can connect to the mobile network by using a modem when it is connected to a PC. These GSM modems are most commonly used for mobile internet connectivity, but many of them may also be used to send and receive SMS and MMS messages.

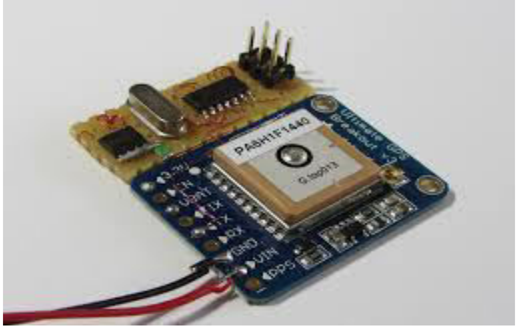


Fig.4.GPS Module

6.CAM:

ESP32-CAM is the latest small size camera module released by Essence. The module can work independently as the smallest system, with a size of only 2740.54.5mm, and a deep sleep current as low as 6mA. ESP32-CAM can be widely used in various IoT applications, suitable for home smart devices, industrial wireless control, wireless monitoring, QR wireless identification, wireless positioning system signals and other IoT applications. It is an ideal solution for IoT applications .

ESP32-CAM adopts DIP package and can be used directly by plugging in the bottom plate, realizing the rapid production of products, providing customers with high-reliability connection methods, which is convenient for application in various IoT hardware terminal occasions.


Fig.5.ESP32-Cam

7.MOTOR:

The DC motor has two basic parts: the rotating part that is called the armature and the stationary part that includes coils of wire called the field coils. The stationary part is also called the stator. Figure shows a picture of a typical DC motor, Figure shows a picture of a DC

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armature, and Fig shows a picture of a typical stator. From the picture you can see the armature is made of coils of wire wrapped around the core, and the core has an extended shaft that rotates on bearings. You should also notice that the ends of each coil of wire on the armature are terminated at one end of the armature. The termination points are called the commutator, and this is where the brushes make electrical contact to bring electrical current from the stationary part to the rotating part of the machine.

Fig.6.Motor

## CONCLUSION

In conclusion, the drone with a camera project successfully demonstrates the potential of combining advanced UAV technology with high-resolution imaging to provide efficient, cost effective solutions for various industries. By integrating stable flight control systems, real-time video transmission, and versatile camera capabilities, the drone can perform a wide range of tasks, including aerial surveillance, environmental monitoring, and infrastructure inspections. The project highlights the importance of precision, automation, and real-time data analysis in enhancing operational efficiency while reducing human risk. As drone technology continues to evolve, this project serves as a foundation for exploring further innovations, ensuring that drones with cameras will play an increasingly pivotal role in modern-day applications across diverse sectors.

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