Autonomous Drone for Delivery of Parcel in Medical Emergencies

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Abstract:
Drone Delivery system will track live location of consumer and hence provide assured delivery of package to the correct place and correct person. GPS Drone delivery system will locate the consumer through GPS and detect the live location and deliver the package accurately and within a stipulated time as per the date of delivery. GPS will be inbuilt in the drone and live tracking device will detect the location of users. There will be a main warehouse and some sub-warehouses, the drone will pick up the package from the nearest warehouse of the delivery location. It will behave like any home delivery app where both the customer and the dispatcher will be able to trace the live location of the package. Courier delivery system in the recent time is still not 100% efficient. Several times it does not reach the consumer because of incorrect delivery details or wrong address detection. Sometimes it reaches late, that is after its requirement day and the other times it does not reach. After it returns, customers have to go and collect it themselves. Several times it does not reach the consumer because of incorrect delivery details or wrong address detection. Sometimes it reaches late, that is after its requirement day and the other times it does not reach. After it returns, customers have to go and collect it themselves. GPS Drone delivery system will locate the consumer through GPS of the tracking device and detect the live location to deliver the package accurately within a stipulated time as per scheduled delivery. It will ensure that the package reaches the customer and he does not have to hassle for collecting the package.

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INTRODUCTION

The use of parcel delivery drones has grown rapidly in recent years, with many companies and organizations exploring the potential of unmanned aerial vehicles (UAVs) for delivery services. Ardupilot flight controller has emerged as a popular choice for building parcel delivery drones due to its reliability, flexibility, and open-source nature. Ardupilot is an open-source autopilot software that can be installed on a variety of drone platforms, including fixed-wing, quadcopters, hexacopters, and octocopters. It provides a robust suite of features for autonomous flight control and navigation, including GPS positioning, waypoint navigation, altitude hold, and obstacle avoidance. To build a parcel delivery drone using Ardupilot, a suitable drone platform needs to be selected based on the payload capacity and range requirements. Typically, a quadcopter or hexacopter with a payload capacity of 1-2 kg and a range of 10-15 km is suitable for small-scale parcel delivery operations. Once the drone platform is selected, an Ardupilot flight controller is installed and configured according to the specific requirements of the parcel delivery mission. The Ardupilot software can be customized using the Mission Planner or APM Planner 2.0 ground control station software to set up the drone's flight plan, waypoints, and delivery locations. The drone's payload delivery mechanism can be designed and integrated into the drone platform using 3D printing software, such as Tinkercad or Fusion 360. The payload delivery mechanism typically includes a cargo compartment or container, a release mechanism, and a landing gear system to ensure safe and accurate delivery. To ensure the safe and reliable operation of the parcel delivery drone, rigorous testing and evaluation are necessary. Flight tests should be conducted to assess the drone's flight stability, payload capacity, and range capabilities. Additionally, the drone's obstacle avoidance and emergency procedures should be thoroughly evaluated to ensure safe operation in a variety of

scenarios. In summary, the use of Ardupilot flight controller has facilitated the development of reliable and efficient parcel delivery drones. With the increasing demand for unmanned delivery services, Ardupilot-powered drones are likely to play a significant role in the future of the parcel delivery industry.

LITURATURE SURVEY

In [1] Assem Alsawy; Alan Hicks article "An Image Processing Based Classifier to Support Safe Dropping for Delivery-by-Drone" (published in the International Journal of Engineering and Advanced Technology in 2020) presents a comprehensive study on the design and implementation of a Drone in healthcare facilities. The article highlights Autonomous delivery-by-drone of packages is an active area of research and commercial development. However, the assessment of safe dropping/ delivery zones has received limited attention. Ensuring that the dropping zone is a safe area for dropping, and continues to stay safe during the dropping process is key to safe delivery. This paper proposes a simple and fast classifier to assess the safety of a designated dropping zone before and during the dropping operation, using a single onboard camera. This classifier is, as far as we can tell, the first to address the problem of safety assessment at the point of delivery-by-drone. Experimental results on recorded drone videos show that the proposed classifier provides both average precision and average recall of 97% in our test scenarios. [1]

In [2] Sreenivas Eeshwaroju; Praveena Jakkula “An IoT based Three-Dimensional Dynamic Drone Delivery (3D4) System”Information System & Engineering Management, Harrisburg University of Science and Technology, Harrisburg, Pennsylvania, USA The article highlights The next decades will witness a huge growth of cities whether from a population or an infrastructure standpoint. Consequently, services like last-mile delivery will be harder to manage and operate due to the complex city ecosystem (people, infrastructure, and services). Due to the increase in population, more high-rise buildings will be seen in cities. In addition, the rapid growth in information and communication technology will require smart ways to meet the delivery needs of people. This paper proposes a “Three-Dimensional Dynamic Drone Delivery (3D4)” system that aims to enable vertical deliveries by adding an extra dimension (Z-axis) to the conventional two-dimensional delivery systems. The proposed system enables the user to receive shipment anywhere as requested. [2].

In [3] Kazuya Matsutani; Shigetomo Kimura article "Delivery Routing to Reduce Calculation Load of Drones on Divided Logistics Areas for Drone Logistics Networks" (published in the Proceedings of the 6th International Conference on Information Technology for Cyber and Social Computing in 2018) The article highlights the a drone logistics system, a message delivery system in which the drone delivers messages for other users on the way to a parcel delivery destination has been proposed. To reduce the complexity of message delivery routes, this paper proposes a message delivery method that divides logistics areas and determines the message delivery routes in each area. The method also makes it possible for a later departure drone and an early departure drone to exchange information to add, cancel, and/or exchange their messages and delivery points. The simulation experiments show that compared with the previous method, the proposed method has lower computational complexity and can be assumed to cover almost the same the average delivery distance. It is also shown that when an early departure drone and a later departure drone exchange many message delivery points, the average delivery distance is reduce.[3].

In [4] Ishii Keita; Harashima Katsumi research paper "Optimal Layout of Purchased Delivery Drones at An Outlet Mall" (published in the International Journal of Engineering Research & Technology in 2018). The article highlights the importance of Optimal Layout of Purchased Delivery Drones at An Outlet evaluates highly efficient drone deployment in a drone-based shopping purchase delivery system. This delivery system divides an outlet into multiple areas, and each area has a collection point where shopper's shopping purchases are consolidated. In principle, drones that are not delivering purchases should wait in the area allowed to them. Therefore, the way have shown 13 Autonomous Drone for Delivery of Parcel in Medical Emergencies Department of Electronics & Telecommunication Engineering that efficient delivery efficiency. Simulation experiments have shown that efficient delivery can be achieved when there is a lot of overlap in drone delivery routes. emphasizing the importance of a real-time monitoring system for intravenous drip in healthcareto ensure patient safety and minimize the risk of adverse reactions.

AIM & OBJECTIVES

- The objective of using Ardupilot flight controller in parcel delivery drones is to provide a faster, more efficient, and cost-effective solution for delivering packages.
- The software enables the drone to navigate to the delivery location autonomously, drop off the package, and return to the base station, all without the need for human intervention. This reduces the time and cost associated with traditional delivery methods, making it an attractive option for businesses.
- To provide a cost-effective solution

MOTIVATION

When the robot stage is chosen, an Ardupilot flight regulator is introduced and arranged by the particular prerequisites of the package conveyance mission. The Ardupilot programming can be modified utilizing the Mission Organizer or APM Organizer 2.0 ground control station programming to set up the robot's flight plan, waypoints, and conveyance areas. The robot's payload conveyance component can be planned and coordinated into the robot stage utilizing 3D printing programming, for example, Tinkercad or Combination 360. The payload conveyance component commonly incorporates a freight compartment or holder, a delivery instrument, and an arrival gear framework to guarantee protected and exact conveyance. To guarantee the protected and solid activity of the package conveyance drone, thorough testing and assessment are fundamental. Flight tests ought to be directed to evaluate the robot's flight soundness, payload limit, and reach capacities. Furthermore, the robot's deterrent evasion and crisis systems ought to be entirely assessed to guarantee safe activity in various situations. In synopsis, the utilization of Ardupilot flight regulator has worked with the advancement of solid and effective bundle conveyance drones. With the rising interest for automated conveyance administrations, Ardupilot-fueled drones are probably going to assume a critical part in store for the bundle conveyance industry

SYSTEM ARCHITECTURE

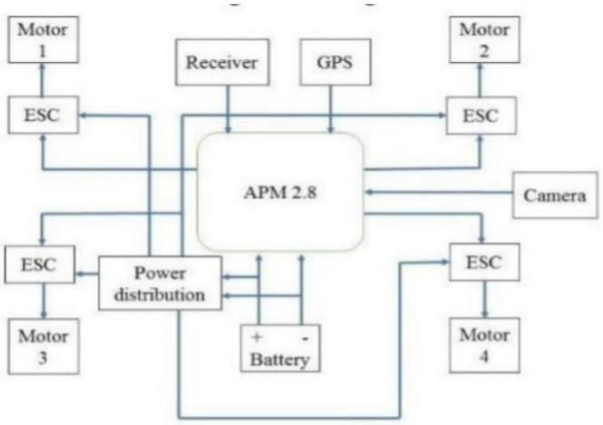

Fig -1: System Architecture Diagram

FUNCTIONAL & NON-FUNCTIONAL REQUIREMENTS

Functional requirements: may involve calculations, technical details, data manipulation and processing and other specific functionality that define what a system is supposed to accomplish. Behavioral requirements describe all the cases where the system uses the functional requirements; these are captured in use cases.
Nonfunctional Requirements: (NFRs) define system attributes such as security, reliability, performance, maintainability, scalability, and usability. They serve as constraints or restrictions on the design of the system across the different backlogs.

Performance Requirement:

1. Response Time
2. Capacity
3. User Interface
4. Maintainability
5. Availability

CONCLUSION

In conclusion, delivery drones have undergone significant advancements in performance, transforming the way goods are transported and delivered. Over the years, we have witnessed improvements in payload capacity, range and endurance, speed, autonomy and navigation, weather resistance, safety features, communication and connectivity, and regulatory compliance. Modern delivery drones are capable of carrying heavier payloads, covering longer distances, and achieving faster speeds. They have become more autonomous, relying on advanced navigation systems and obstacle avoidance technology to navigate complex environments. Additionally, they have become more resilient, with improved weather resistance and redundant systems to enhance reliability and safety. The evolution of delivery drones has been driven by technological advancements in areas such as battery technology, motor systems, sensor technology, and communication systems. These advancements have enabled delivery drones to operate more efficiently, providing faster and more reliable deliveries.

REFERENCES

[1] Assem Alsawy; Alan Hicks article "An Image Processing Based Classifier to Support Safe Dropping for Delivery-by-Drone" (published in the International Journal of Engineering and Advanced Technology in 2020) presents a comprehensive study on the design and implementation of a Drone in healthcare facilities

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[4] Ishii Keita; Harashima Katsumi research paper "Optimal Layout of Purchased Delivery Drones at An Outlet Mall" (published in the International Journal of Engineering Research & Technology in 2018).

[5] Babar Shahzaad; Athman Bouguettaya. research paper "Service-Oriented Architecture for Drone-based Multi-Package Delivery" (published in the International Journal of Innovative Technology and Exploring Engineering in 2019) presents a study on the design and implementation of a real- time monitoring system

[6] Batool Madani; Malick Ndiaye research paper "Hybrid Truck-Drone Delivery Systems: A Systematic Literature Review" (published in the International Journal of Engineering and Technology in 2018)

[7] Desheng Wang; Peng Hu; Jingxuan Du “Routing and Scheduling for Hybrid Truck-Drone Collaborative Parcel Delivery With Independent and TruckCarried Drones” published in IEEE Internet of Things Journal (Volume: 6, Issue: 6, December 2019)

[8] Mao Nishira; Satoshi Ito; Hiroki Nishikawa research paper "An ILP-based Approach to Delivery Drone Routing under Load-dependent Flight Speed" (published in the International Journal of Innovative Research in Science, Engineering, and Technology in 2018)