



Delivery Quadcopter

Project Based Learning - Report 1



SYMBIOSIS

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Abstract

Traditionally, road transport has been the backbone of the logistics industry. But as urban settlements are getting more congested, it is getting hard to reach remote areas with no road infrastructure. The delivery industry is beginning to use drones to solve such issues. This project introduces Delivery Quadcopter which aims to pick up and deliver things to the area rapidly. This has numerous benefits ranging from reduced road congestion, carbon emission, delivery time and transportation cost. A delivery quadcopter's design configuration is defined by the use-case of what is being delivered, and where it must be delivered to. Our project aims to deliver food, medicines and posts to remote areas or area of emergency.

Introduction

A quadcopter is an aerial vehicle that uses a multicopter (Quad or 4 Motors) for lift, steering, and stabilization. Unlike other aerial vehicles, the quadcopter can achieve vertical flight in a more stable condition. Furthermore, due to the quadcopter's cyclic design, it is easier to construct and maintain. A fixed-wing configuration provides an order of magnitude increase in range, flight at higher airspeeds, and produces less noise, but requires more space for take-off, delivery, and landing.

There are also hybrid approaches (for example Wingcopter or Swoop Aero) that use multiple horizontal rotors for take-off and landing, and vertical rotors paired with a fixed-wing for forwarding flight. The concept of delivery using drones or quadcopters entered the mainstream with Amazon Prime Air – Amazon.com founder Jeff Bezos' December 2013 announcement that Amazon was planning rapid delivery of lightweight commercial products using UAVs. This concept requires less human behaviour and efforts due to autonomous behaviour. As the technology emerges, the human actions are getting compact & precisely all the actions are performed by the technology which is the whole purpose of this gigantic tech world.

Methodology

A common configuration is a multirotor - such as a quadcopter or octocopter - which is a drone with horizontally-aligned propellers. Another common configuration is a fixed-wing design. A multirotor design provides power to lift the drone and payload, redundancy to powertrain failure, and an ability to hover and descend vertically (VTOL). However, a multirotor configuration is less efficient and produces more noise.

Delivery drones need powerful motors to keep both the drone and payload aloft. Brushless DC motors are most typically used in drones because they have become cheap, lightweight, powerful, and small. The propeller blades of the drone turn at very high speeds, so the optimal material used for these rotor blades maximizes the strength to weight ratio. Some are made from carbon-fibre-reinforced composites while others are made of thermoplastics because they are cheaper so the cost of replacement when the drone crashes is smaller. Lithium-ion batteries are used in most drones because they offer enough energy and power, and they are relatively light so they do not weigh down the drone too much.

Delivery drones rely on ground control systems both for safe operations and for their commercial operations. For safe operations, the drone operator needs to manage its fleet of aircraft and how they integrate into the broader airspace. For commercial use cases, the ground systems allow for receiving and tracking orders.

Expected Outcomes

- I. To successfully design, implement and test a stable unmanned aerial vehicle quadcopter in the structure of X shaped quadcopter.
- II. Develop a wireless transmission system that provides a live feed from a camera to the ground station.
- III. To successfully be able to deliver goods from one point to another.