Smart Drone Delivery System

Article · October 2020

CITATION
1

READS
12,718

1 author:

Jyoti Waykule
Sanjay Ghodawat Group of Institutions
18 PUBLICATIONS **16** CITATIONS

SEE PROFILE

Smart Drone Delivery System

Aniket Magdum[1], Vivek Nikam-Patil[2] ,Vinayak Mokashi[3],Prof. Jyotiwaykule Tate[4]

[1,2,3]Student of B.E. Electronics& Telecommunication Department, SGI,Atigre, ShivajiUniversity, Kolhapur, India

[4]Assistant Professor of Electronics& Telecommunication Department, SGI,Atigre, ShivajiUniversity, Kolhapur, India

Abstract-The rapid increase in usage of online ordering has increased the requirement of manpower to deliver in multiple folds. Drone based technology is being used to meet this requirement. A quadcopter can achieve vertical flight in a stable manner and be used to monitor or collect data, delivery in a specific region. With advancing drone technologies and increasing commercial usage, we believe the last mile shipping industry is ripe for disruption by delivery drones. Drones can significantly accelerate delivery times and reduce the human cost associated with the delivery and also to the drone manufacturers. This report examines the value chain and opportunities in the delivery drones market. It also discusses the barriers for adoption. It concludes with our case for drones to handle the last mile of delivery of most lightweight packages.

This report represents Quadcopter (QC) as a low weight and low-cost autonomous flight capable Unmanned Aerial Vehicle (UAV) for delivering parcel ordered by online by using an android device as its core on-board processing unit. This QC by following Google map can locate and navigate destination. This paper demonstrates the QCs capability of delivering parcel ordered by online and coming back to the starting place. The promising result of this method enables future research on using QC for delivering parcel.

Keywords-Drone, Smart Drone,Autonomous,Online ordering, low cost, secured, unmanned.

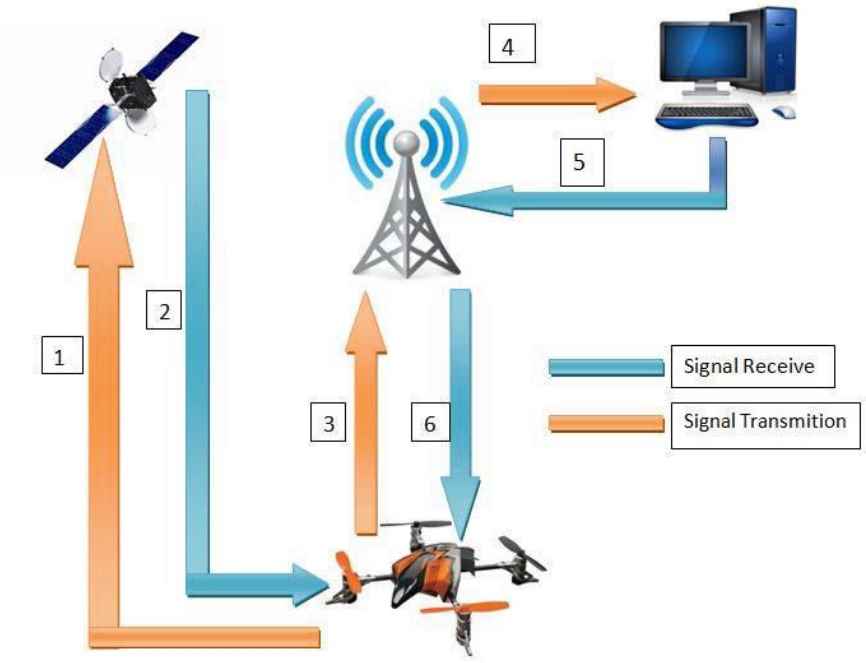
Introduction-As the demand for commercial deliveries increases within cities, companies face a fundamental limitation in surface road capacity. Drone delivery aims to overcome that limitation by exploiting the vertical dimension above city streets. This report explores the vehicle design aspects of the delivery drone problem, including flight efficiency, energy consumption, noise, and safety, which are central to the viability of delivery drones. Importantly, key design constraints and expected performance levels also speak to the potential scalability of the concept.

A brief analysis of the requirements shows that a 10- to 15-mile delivery radius is likely sufficient to cover most of the urban areas. A vertical takeoff and landing (VTOL) delivery drone can ease operations at the terminal area at a cost to flight efficiency. The limited delivery range and payload requirements, coupled with the power efficiency of electric motors at small scales, make VTOL viable. The relatively scale-free nature of electric propulsion further reduces the cost of mounting separate and optimized cruise and hover motors. This helps to bridge the longstanding gap between good hover and cruise performance in VTOL aircraft (at least for small, short-range applications). To better understand the short-term technical viability and future prospects of delivery drones, we developed and tested a simple delivery drone performance model. The model takes in a host of vehicle and mission parameters and assumptions, chief among which are the aerodynamic, structural, and propulsive efficiencies and the battery energy density.

The model is high level, and the parameters are based on analogous systems. We do not attempt to create detailed aerodynamic and structural designs to produce detailed vehicle configurations. Rather,

the vehicles are designed against notional mission requirements framed in terms of payload, range, and hover and climb requirements. The primary outputs of interest are the energy consumptions and masses of converged delivery drones, which have been properly sized (including cruise, hover, and reserve flight segments) to carry all the payload and onboard systems. In technical terms, we use fixed-point iterations to converge the empty weight of the drone designs.

Logic Diagram



Working Principle:-
The basic QC design consists of four complete rotor assemblies attached at equal distances from each other and a central hub. All the rotors are located within the same plane and oriented such that the thrust generated by each rotor is perpendicular to the vehicle as shown in Fig. 1. If the rotors are comprised of parts with the same specifications and expected performance, each will produce the same amount of thrust given a specific power input. The angular momentum of any of the four rotors generates a torque about the inertial center of mass of the vehicle which can be effectively counter balanced by the torque created from the opposing rotor [1].
This configuration requires that opposite rotors spin in the same direction while adjacent rotors spin in opposite directions. An immediate advantage to the quad rotor design is that, it is not necessary to implement additional equipment such as control moment gyroscopes with the sole purpose of negating extraneous torques on the vehicle [2].

Methodology-The work of delivery of the order by drone, involves here the circuitry with Raspberry Pi B Model, with the pi interfacedwith camera interfacing, video streaming, ESE and Flight controller programming for GPS handling, GSM Module and SD card slot. When the order is placed using the website after entering the details like Name, email-id, mobile numberand location of delivery, a pin is

generated which will be sent tothe ordering person and one to the GSM which is on the drone.Arduino will fetch the pin and location and will directcommand to drone to fly to the location once the parcel isready to deliver. Once the drone starts from its location theGPS will start tracking the location of the drone and store thedata in SD card, the GPS which is also interfaced to Arduino.When the drone reaches to the location, the need to enter thepin as pass code, which was sent at time of ordering , torelease the parcel. If the pin matches, the parcel will getreleased from some locking mechanism otherwise the dronelocation. If the location at which the drone reached is wrong,By this delivery system the issue of security that what ifsomeone stole it in the absence of the intended customer whenthe drone drop the parcel, is overcome. Also, if need to changethe location can edit the location, the changed location isupdated in drone through GSM. This is the additional feature provided.

Expected Outcome:-

The Autonomous QC will Pickup from the pickup location and will Fly on & will deliver the goods to the Desired Location with the respected given co-ordinates.

The one additional feature in this Autonomous QC that it will have the ultrasonic sensor which will avoid the object by pre-detecting it and will avoid the collision.

CONCLUSION & FUTURE SCOPE:-

This paper deals with a systematic process of online delivery with an autonomous QC using an interfaced android device as its core processing unit. QC will deliver the parcel to the customer by following Google map which will reduce both time and manpower using for delivery. Battery power will be replaced by solar system as a power source in future. This process will be continued to optimize the cost of delivering products through QC so that poor people can use these systems more easily.

REFERENCES:-

1) Castillo, Lozano &Dzul, “Modelling and Control of Mini-Flying Machines,” Special issue ©2005 Springer PP-39-59.

2) Gabriel M. Hoffmann, Haomiao Huang, Steven L. Waslander, “Quadrotor Helicopter Flight Dynamics and Control:Theory and Experiment” Special issue:- 23 Aug 2007 PP:-1-20 AIAA.

3) Setting Manual for Black or Blue version (Atmega168) Volume[1]PP-1-12[On-line]. Available: http://www.kkmulticopter.kr/?modea=manual][Special issue March 29, 2014]

4) GSM modem interfacing with microcontroller 8051 for SMS, PP-3-8 [On-line]. Available: http://www.zembedded.com/gsm-modem-interfacing-withmicrocontroller-8051-for-control-of-industrial-equipments [Special issue March 29, 2014]

5) Michael Russell Rip, James M. Hasik, “The Precision Revolution: GPS and the Future of Aerial Warfare,”Volume [3][Naval Institute Press. Pp 1-12. ISBN 1- 55750-973-5. Retrieved Special issue January 14, 2010

6) Michael Leichtfried, Christoph Kaltenriner, Annette Mossel, "Hannes Kaufmann Autonomous Flight using a Smartphone as On-Board" Volume[1]PP-1-9 ACM 978-1-4503-2106, MoMM2013, 2-4 Special issue December, 2013

7) David Roberts, "Construction and Testing of a Quadcopter,"Volume[1]PP-1-6 California Polytechnic State University, San Luis Obispo, CA, 93407, Special issue June, 2013