Project Drone Delivery

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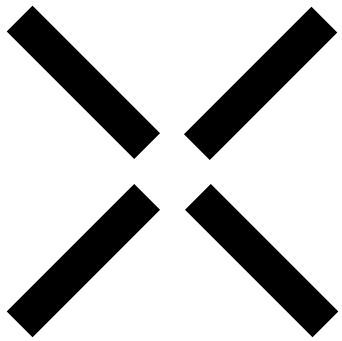

Abstract

This project will serve as a proof of concept for drone deliveries in Austin, TX, during the SXSW technology festival. The initial prong of this venture includes the following:

1) Develop a drone capable of delivering a 16 oz package for the distance of a mile and come back to a base-station with atlas 50% of its battery still intact.

2) Develop a mobile application capable of identifying a unique user, tracking a user's location, identifying whether the user is within a target zone, and talk to an API that handles the drone deliveries.

3) Develop a cloud application capable of handle the intricacies of delivering a package to a specified GPS location.

The Drone

The drone consists of these components:

1) The physical housing, and delivery mechanism

The drone has a physical housing, there are certain limitations to this housing. For example the propellers are 10 inches in diameter, therefore, the arms of the quadcopter have to be larger than a certain length to compensate for that. The quadcopter cannot be too big as it would drain the battery too much. More details can be found in the **[PHYSICAL HOUSING]** section.

2) The Electrical Circuit (PID) controls

The circuitry is composed of two processors, one that takes care of the flight characteristics and the other that takes care of path planning and the communication to a home base. The circuit must contain a GPS, an Altimeter, a Gyroscope and an Accelerometer, as well as a communication module capable of either RF or Cellular communications. Physical Indicators such as GPS Check Lights, Open and close Buttons for the delivery hatch also need to be engineered into the system.

3) The Path Planning Software and Communications

This software handles the communication protocol between the drone and the base station, and ultimately the API. A defined set of responses and requests, is needed to identify how a drone know's what to deliver when, etc…

The Mobile Application

The mobile app consists of these components:

1) Google Maps, Integration

The mobile app must tie into Google maps to show the user where the drone is, where their delivery is going to be, ETA's and such. Think Uber but for drone delivery.

2) Facebook Login

The mobile app has to tie into Facebook to identify a user as unique. If we were to integrate a marketing campaign, we can't have a certain set of users abusing the application.

3) Stripe Payment (OPTIONAL)

If we were to not secure any funding for the project we would need to set up a stripe payment system so that people could purchase certain goods on our API, and get them deliver to their location.

4) Drone Delivery API

Develop some RESTful calls to the drone delivery api, to make it possible for the drone to deliver the packages to the particular location. An access-token must be used to send the longitude and the latitude of the user to the server. The method is described in more detail in the Cloud Application Spec.

The Cloud Application

The cloud app consists of these components:

1) A queuing system

To process all of the requests coming into the server. This is to prevent the server from crashing from excess requests.

2) An authentication system

Validate that the users are who they say they are, via the Facebook token. The system must keep track of the users that already have ordered tacos and such so that double dipping doesn't occur.

3) Request Handler

Handle delivery requests, and manage the communication with the drone. A user will order a taco or a delivery. The request is processed and validated. The request is also queued and fulfilled by the drone.

THE DRONE

Physical Housing

Components required

- LiPo Battery
- Drone Chip
- 4 ESC's
- 4 Motors
- Power Distribution Board
- Servo

Specs

LiPo Battery Dimensions

- Battery Dimensions (5.35 in x 1.69 in x 0.75 in)
- Hole's for Xt60 connector to fit through (0.62 in x 0.32 in)

Drone Chip Dimensions

- 3.15 in x 3.15 in x 0.75 in
- Molex Connectors for open and close buttons [2 pin] (0.4in x 0.2 in)
- LED's for battery indicators (5mm diameter hole)
- Hole for antenna (9 mm diameter)
- Molex connector, and hole for Servo [3 pin] (0.5 in x 0.2 in)
- Molex connector, and hole for GPS [4 pin] (0.6 in x 0.2 in)

ESC's

- Dimensions of ESC's (3.94 in x 1.97 in x 0.79 in)