Liquid Emission Aerial Drone

Andy Nguyen, Daniel Plante, Mohamed Elhafyun

Faculty Member: Dr. Puteri Megat Hamari

ECET Department, Minnesota State University, Mankato

MINNESOTA STATE UNIVERSITY
MANKATO

The Idea

Our device is a, "multipurpose tool", it is a remote controlled flying drone with an added apparatus used for emitting a selected liquid over an area or object. This could be used for many situations in which the targeted location for the liquid is out of reach due to physical/safety complications. Our favorite specific ideas are to; spray pesticides over crops that could benefit from it, spray water over dry spots that are at a risk for fire danger, or to cool down an overheated crowd at a concert or festival with a mist of water overhead. These are just the scenarios that we've thought of and it definitely doesn't end there, but at the users imaginable intentions. The device can massively change in practicality by appropriately changing the size of the frame, motors, propellors, battery, and liquid container, to match the intended purpose.

Device Design

Flight Controller

An Arduino Nano is programmed to appropriately use flight data from the user transceiver/controller and the MPU 6050 gyroscope accelerometer ,on-board, to control the speed of each propellor, individually, through their motors while flying.

Motors/Propellors

A 4 prop design is used for ease of balance. The motors take the given electric power to spin the propellers and lift the device at an optimal of 2:1 for thrust to weight ratio.
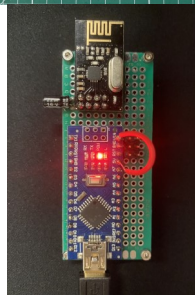
Software

The flight controller processes data with the help of a software called "multiwii", The software gives a useful visual on live data, as well as a library of code to use for your specific device.
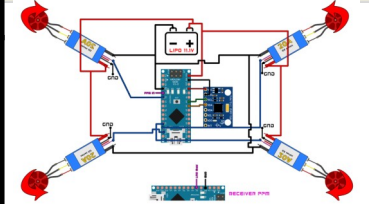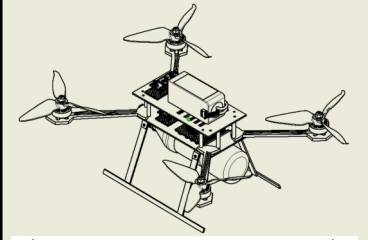

Transceiver

A custom made controller running off an Arduino mini is what we are using for user control. User Input from this is sent to the receiver.

Receiver

Wireless communication sends the users input to a receiver that gives the data to an Arduino nano.

Frame

The components are attached to a frame of carbon fiber cut to specifications. The main body for computing components including the battery, the arms to attach the 4 motors, and the landing gear to keep the spraying apparatus from damage upon landing and take-off.

Future Considerations

- The transceiver contains an MPU 6050 which could be integrated for use as motion control for the drone which would be very cool.

- We would love to do more research into the sizes of components required for any specific liquid container size

- 3d printed customized nozzles for attachment

Spraying Mechanism

The device sprays the liquid from a container mounted on the bottom side, it uses a dc motor and propellor to pull water through a 3d printed tube.
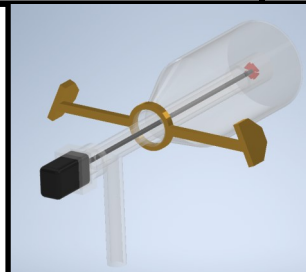
Reference/Software

Flight controller—http://www.multiwii.com/

Arduino IDE—https://www.arduino.cc/en/software

Contact Information

Andy—
andynguyen22497@gmail.com

Daniel—
planteda@mnstate.edu

Mohamed—
hafyanco@gmail.com