Dronekenstein: An In-door Blimp

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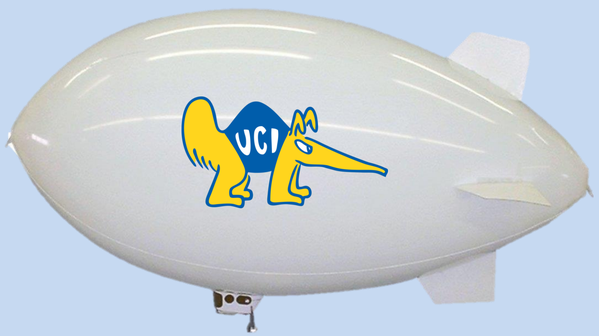
Overview

Our project aims to design an indoor drone capable of having significantly longer fly time than other similar products on the market. To approach this goal, we decided to use a design like a blimp in order to reduce the amount of energy spent on the motors to stay in the air as much as possible. In addition to reduce self-weight, we will also use low current energy efficient motors and low voltage microcontrollers to maximize battery life. There are other things taken into consideration such as safety and controllability, but as for the first quarter, our main concern is maximizing fly time.

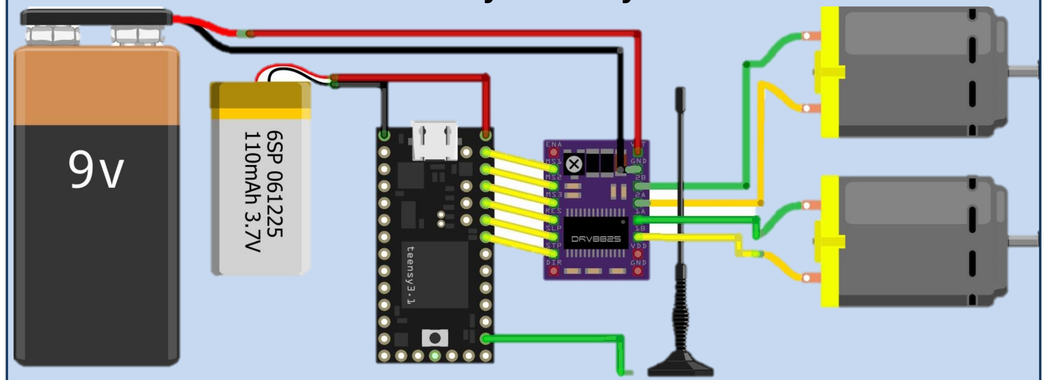


Design Goals

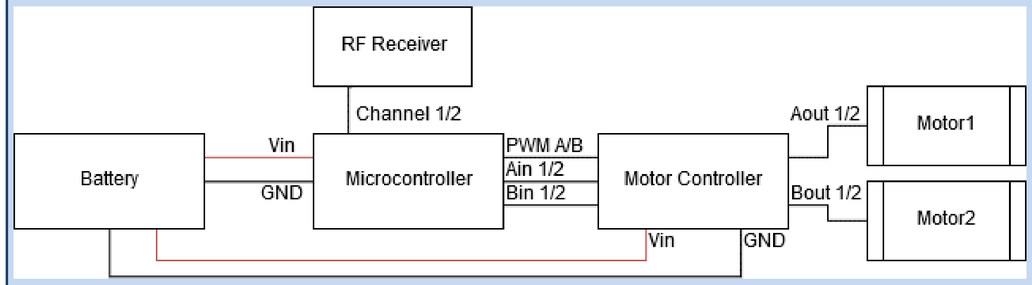
1. Minimal Weight: Our done should be able to float without any external support or lift from motors, having less weight means less gas and smaller balloon.
2. Minimal Size: Large balloon will affect the mobility and accessibility of our drone. To achieve this, we need to reduce weight since it determines the volume of gas needed thus the size of balloon.
3. Maximum Navigation: To maximize the navigation, we would have to use larger battery and more energy-efficient motor while but doing so will add more weight and reduce mobility.
4. Real-time control and video feedback: Users should be able to control the drone in real-time and get video feedback like most drones on the market.

Design:

Electric System Layout

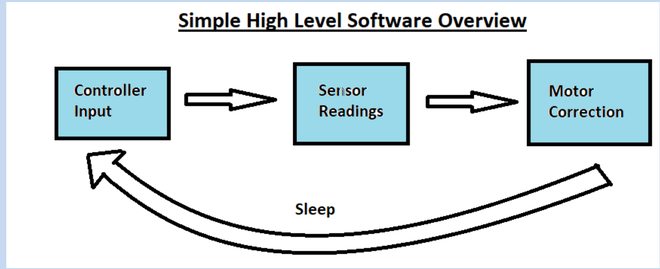


Electric System Schematic



Milestones & Future Goals

Week 4: Test the drone using helium to determine any fault in the design. Place orders for more helium and other hardware components
Week 5: Add software features that will give users additional use. Implement video streaming and PC control. Rework CAD design
Week 6: Design an appealing look onto the drone. Send design to manufacturer to place design on final mylar balloon
Week 7: Debug any errors and perform a test flight
Week 8: Provide reports and prepare documentation for submission. Ensure that reports meet IEEE standards and ABET standards
Week 9: Prepare for demonstration



Materials

Hardware:
- Helium Gas: used inside balloon, provide lift
- Mylar balloons: low leakage
- Gas valve: allow us to inflate/deflate balloon
- 3-D printed shell: hold electrical system

Electrical:
- Microcontroller: central unit that controls I/O
- Camera: provide video feedback to user
- Batteries: provide power to control system and motors
- Controller and Receiver: user input
- Motor Controller: deliver high current to motors
- Low-Power Gearmotors and propeller: main components to drive the drone

References

- S. PC, Mylar vs. Latex Balloons. Accessed: Nov. 2, 2019. [Online]. Available: https://www.education.com/science-fair/article/do-mylar-balloons-last-longer-than-latex-balloons
- “Balloon Lift with Lighter than Air Gases,” May 2002. Accessed: Nov. 2, 2019. [Online]. Available: http://www.chem.hawaii.edu/uham/lift.html
- M. Brain, How Helium Balloons Work, howstuffworks. Accessed: Nov. 2, 2019. [Online]. Available: https://science.howstuffworks.com/helium2.html
“How Long Can a Drone Fly – Maximize Flight Time,” DroneOmega. Accessed: Nov.3, 2019. [Online]. Available: https://www.droneomega.com/how-long-can-a-drone-fly

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