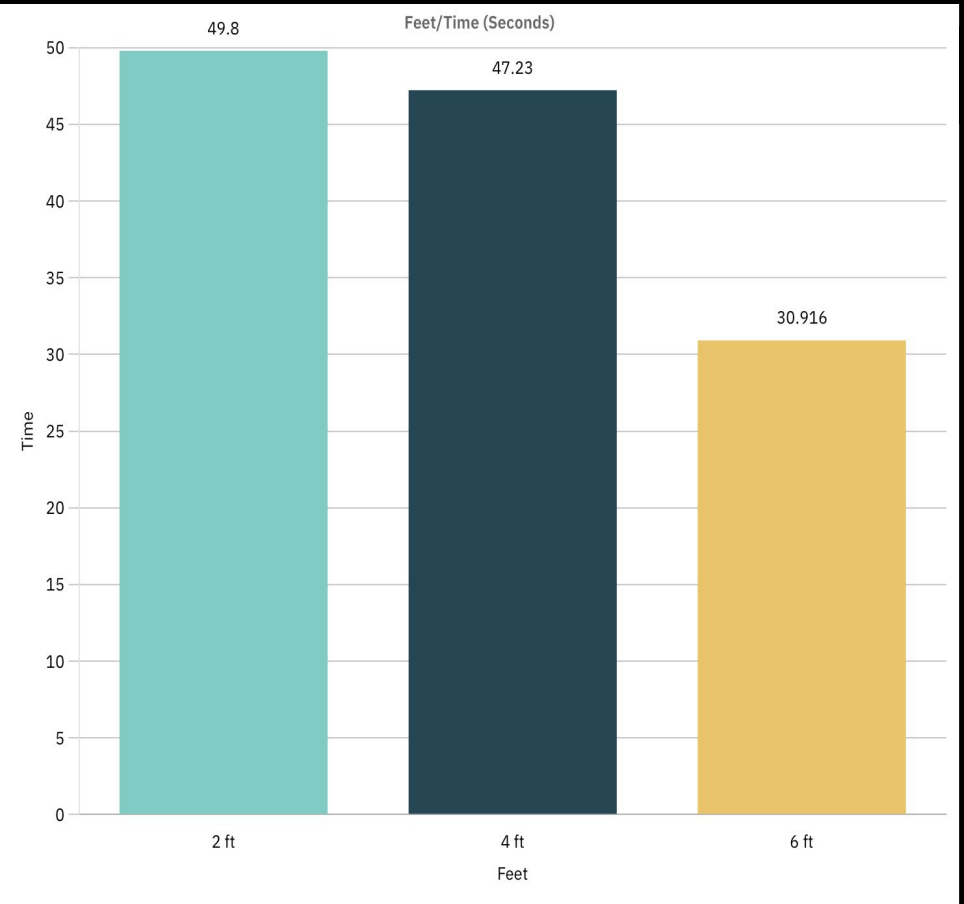
Up, Up, and Away

Does the altitude of flying a drone affect how fast the battery drains?

Procedure

1. Charge the drone for 5 mins exactly.
2. Mark three hover heights: 2 ft, 4 ft, 6 ft.
3. Take off and hover at the first height.
4. Start timer as drone lifts.
5. Stop timer when drone lands or battery is low.
6. Record flight time.
7. Repeat 3 times per height and calculate average.

Results and data visualization



00:51.84 00:49.94 00:31.23

00:49.12 00:45.34 00:31.05

00:47.62 00:47.23 00:30.47

2FT 4FT 6ft

1.41 2.36 3.19

Time it takes to go the the feet

Discussion and interpretation

The results obtained indicated that battery drain was affected by the height at which the drone hovered. When the drone hovered at higher heights (2 ft, 4 ft, 6 ft), the time it could fly was reduced, thus supporting our hypothesis.

This could be due to the increased power exerted by the motors to stabilize the drone at higher heights. The higher the power, the more the energy, which in turn drains the battery faster.

These findings are significant in practical applications of drones, such as delivery and aerial photography.

Implications and Ideas for Future Research

Implications

This experiment is very important for increasing the efficiency of drones in real-life applications such as the delivery of packages and surveillance, where the longer battery life of the drone is of utmost importance. This is because understanding the effect of hover height on battery life will enable engineers to design drones that use their energy in the most optimal way.

Ideas for Future Reasearch

Higher heights (10 ft, 15 ft, etc.)

Hovering vs. moving flight

Outdoor experiment with wind

Different drone models or batteries

Battery percentage used instead of time

Formula

Model Formula

$$T(H) = (E - P_c(H / v)) / (P_0 + kH)$$

Where:

H = Hover height
E = Total battery energy
P_c = Climb power
v = Climb speed
P_0 = Hover power near ground
k = Power increase per foot

What This Means

- Higher height → more energy used to climb
- Ground effect decreases as height increases
- Hover power increases with altitude
- Total flight time decreases

Simplified Experimental Model

$$T(H) = a - bH$$

a = max flight time near ground
b = battery drain increase per foot

References

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