gsneo

Dragonfly Drones

Welcome

Tell us your...

NAME

FAVORITE FLYING ANIMAL

FAVORITE THING ABOUT SPACE

What is Biomimicry?

- Study and learn from nature's designs and processes.
- Use that knowledge to create a solution to a human problem.

Today

Human Problem: Want to explore Titan's dense, low gravity atmosphere.

What design in nature can we study for inspiration?

Titan: Saturn's moon

Saturn and Titan

Titan

- Titan's dense atmosphere means objects needs less energy to fly.
- Titan has low gravity which makes object lighter.
- On Titan, objects are able to fly much easier than they can roll on the surface.

Flight: Dragonfly wings

Dragonflies are efficient in all areas of flying. They beat their wings up and down to hover, cruise and even use aerobatics!

They control the angle and speed of each of their 4 wings independently to fly in any direction (up/down, forward/backward, and left/right).

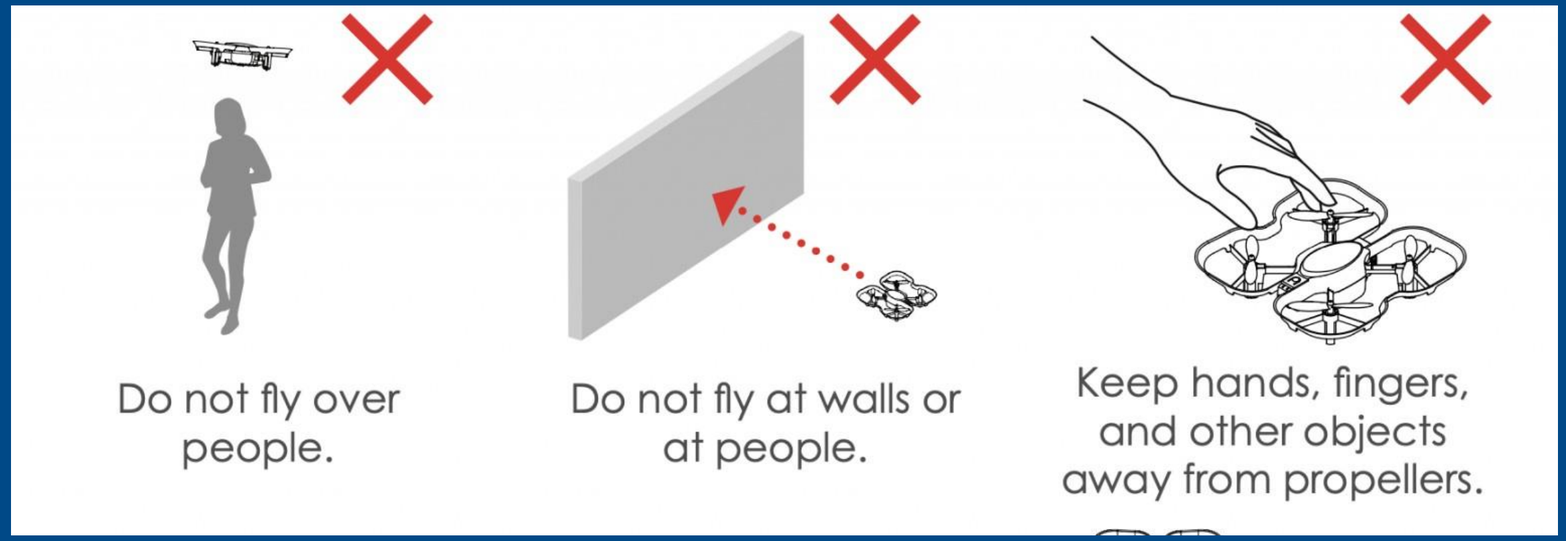
Drones: biomimicry design

- Mimicking the dragonfly, NASA scientists improved their drones so that each of the 4 rotors can fly in any direction by controlling the angle and speed (up/down, forward/backward, and left/right).

Today's activity: Drones-safety first!

Drones can easily get caught in your hair!

Pull your hair back into a ponytail.
*If you need a hair tie, we have extra.



REMEMBER THE NUMBER OF YOUR DRONE!

Today's activity: Drones-set up

Getting started - work in groups of 2-3

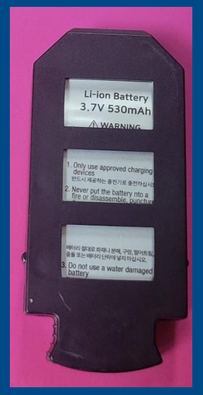
1. Insert the battery into drone as shown.

2. Press and hold power button on controller.

3. Your drone and controller should be paired.
   Lights on drone and controller match colors
   If screen says "Searching", they are not paired
   Press R1 to change colors

Note: Removing the battery from the drone and reinserting can quickly reset and fix errors

FRONT



Practice with the drones first

FRONT

Don’t Press Any Other Buttons!

TAKE OFF or LAND = HOLD L1 FOR 3 SEC

<u>Left Joystick</u>:

Up/Down
Spin Left/Right

<u>Right Joystick</u>:

Forward/Backward
Move Left/Right

Use your drone to explore Titan!

- Each group will take a turn manually flying their drone through one of the 3 Titan exploration arenas. Try your best to avoid bumping into obstacles!
- If another group is waiting, your group will go to the end of the line so your partner member will have a turn to control the drone next time. If no one is waiting, your partner can go. This repeats until everyone has had a turn.
- Next, learn how to code your drone through the course.

Code your drone to explore Titan!

- **Practice using coding blocks until you are ready to try your drone through the obstacle course.**
- **Take turns with your partner!**

- **Beautiful pics of coding blocks :)**

The real dragonfly drone to explore Titan

- We used biomimicry today! We used what we learned from dragonflies to solve the problem of exploring a dense, low gravity atmosphere on Titan.
- NASA is creating an 8 rotor flying drone inspired by dragonflies to launch to Titan in 2028 (artist rendition pictured). The mission will cost over 3 billion dollars!
- Unlike the drones we controlled today, this drone will be autonomous. It will be programmed with many tasks and include cameras to record. The code will tell the drone where to explore and the cameras will provide visual feedback.

Share Out

- What is one thing you learned today about drones?
- How did we use biomimicry today?
- What type of jobs involve using drones?

Extensions

Additional tests:

- **Attempt harder challenges manually, then coding. Challenge #2 could be that they have to include flying in a circle before going through a hoop.**
- **Incorporate a time limit challenge “Who can complete it the fastest?” and add 3 seconds on for obstacles they hit.**
- **Grabber: While exploring, you discover a large pile of space material! You want to bring a piece home to research, but don’t think it’s safe to collect it with your hands. You search and find some materials to build with. Work with your partner(s) to engineer a device to collect a piece of space material!**