

# UCSD STUDENTTECH 2020

## Drone Science for Middle School Students

Sponsored by the San Diego Supercomputer Center,  
University of California, San Diego

**It's a Bird! It's a Plane! It's a Drone!**

**Learn Everything You Need to Know to Fly Your Very Own Drone!**

**Monday- Friday, June 22-26, 2020**

Class meets on the campus of UC San Diego from 8:30am- 3:00pm.

### Course Overview

Students will gain an understanding in simple Drone Technology through experimentation and repetition. In pairs, students will learn to navigate drones together as a team. Each student will learn to fly (hover, pitch, roll, etc...) simple drones hands on. Students will also learn the law concerning drones and their use.

### Introduction:

- Instructor (who am I?)
- Classroom
- Breaks | Restrooms
- Week Schedule

### Schedule:

- Meet your Partner | Where are you from? (5-10min.)
- Drone Discussion (What do you know? How much do you know?) (10min.)
- What drone are we using? Battery Life? Charging Stations IMPORTANT (5-10min.)
- Drone Videos (YouTube: search "[The Ultimate Visual Experience](#)") (3min.)
- Drone Video (YouTube: search "[Why Should you fly Freestyle at 800mW](#)") (5min.)
- Facility & Safety Concerns (Where to Fly, Eyewear at All Times, Spotters, Know the Rules)
- Show OVERHEAD/BIRDSEYE VIEW OF FACILITY. Make sure students understand ONLY PLACES TO FLY AND WHERE TO AVOID.
- \*\*\* NO STUDENT WILL FLY WITHOUT AN OBSERVER AND MYSELF IN THE DIRECT AREA.

## Laws and Drones: What You Can and Cannot Do

FAA's points below | [UNMANNED AIRCRAFT SYSTEMS \(UAS\)](#)

- Follow community-based safety guidelines, as developed by organizations such as the Academy of Model Aeronautics (AMA).
- **Fly no higher than 400 feet and remain below any surrounding obstacles when possible.**
- Keep your eyesight at all times, and use an observer to assist.
- **Remain well clear of and do not interfere with manned aircraft operations, and you must see and avoid other aircraft and obstacles at all times.**
- **Do not intentionally fly over unprotected persons or moving vehicles, and remain at least 25 feet away from individuals and vulnerable property.**
- Contact the airport and control tower before flying within five miles of an airport or heliport.
- Do not fly in adverse weather conditions such as in high winds or reduced visibility.
- Do not fly under the influence of alcohol or drugs.
- Ensure the operating environment is safe and that the operator is competent and proficient in the operation of the sUAS (Small Unmanned Aircraft System).
- **Do not fly near or over sensitive infrastructure or property such as power stations, water treatment facilities, correctional facilities, heavily traveled roadways, government facilities, etc.**
- Check and follow all local laws and ordinances before flying over private property.
- **Do not conduct surveillance or photograph persons in areas where there is an expectation of privacy without the individual's permission (see AMA's privacy policy).**

<https://www.faa.gov/uas/>

## What To Expect for the Week

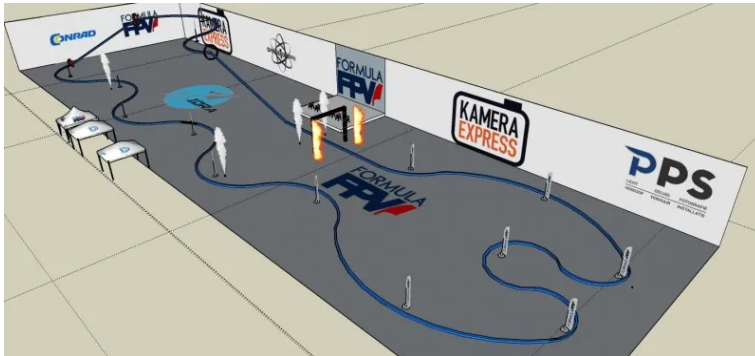
**TOPICS:** fixed-wing drones, indoor flight training, what is safety, insurance, industry applications, the future of drones, and the latest FAA policies.

1. WELCOME
2. FAA DRONE 107 PREP - QUESTIONS

3. WEATHER - INDOOR V OUTDOOR
4. SAFETY - ISSUES OF EACH FLIGHT AREA
5. HOW TO'S - PITCH, ROLL, YAW & LANDINGS
6. EMERGENCY LANDINGS & OBSERVER RESPONSIBILITIES
7. LET'S FLY!

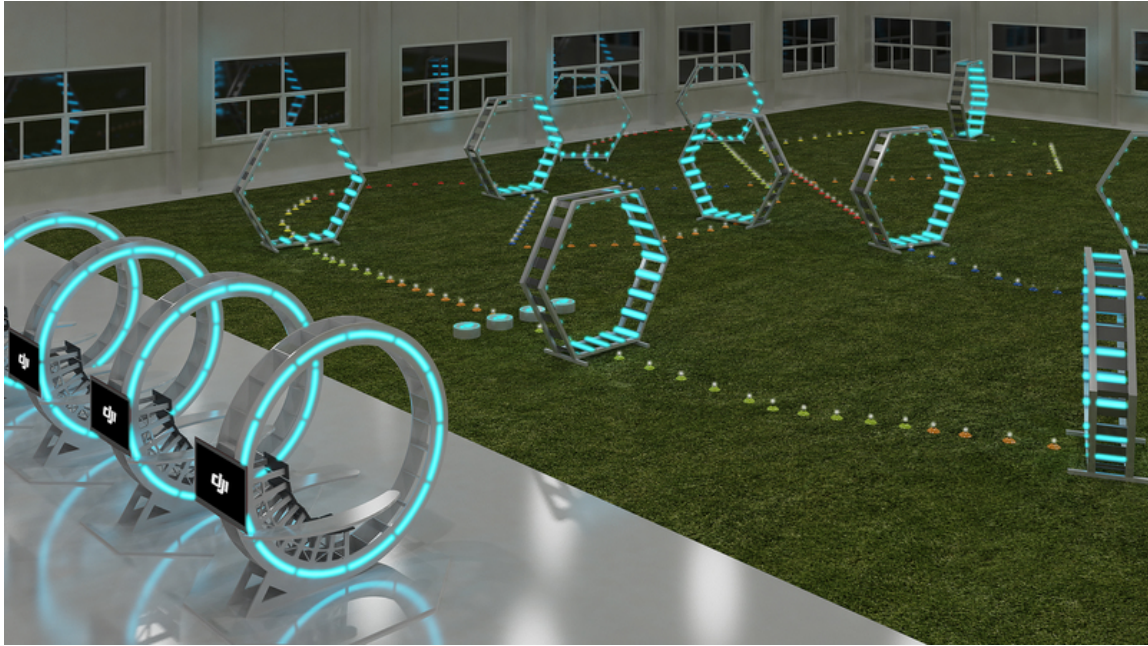
## DRONE COURSE PREP (Q&A NEW QUESTIONS)

1. TINKERCAD - CREATE A COURSE ONLINE FREE



2. VIDEO'S - DRONE RACING
  - [RACE](#) | [RACE II](#)
1. SETUP OUTSIDE COURSE
2. SKILLS REVIEW
3. INDIVIDUAL COURSE FLIGHT
4. COMPETITIVE COURSE FLIGHT

**BREAK**

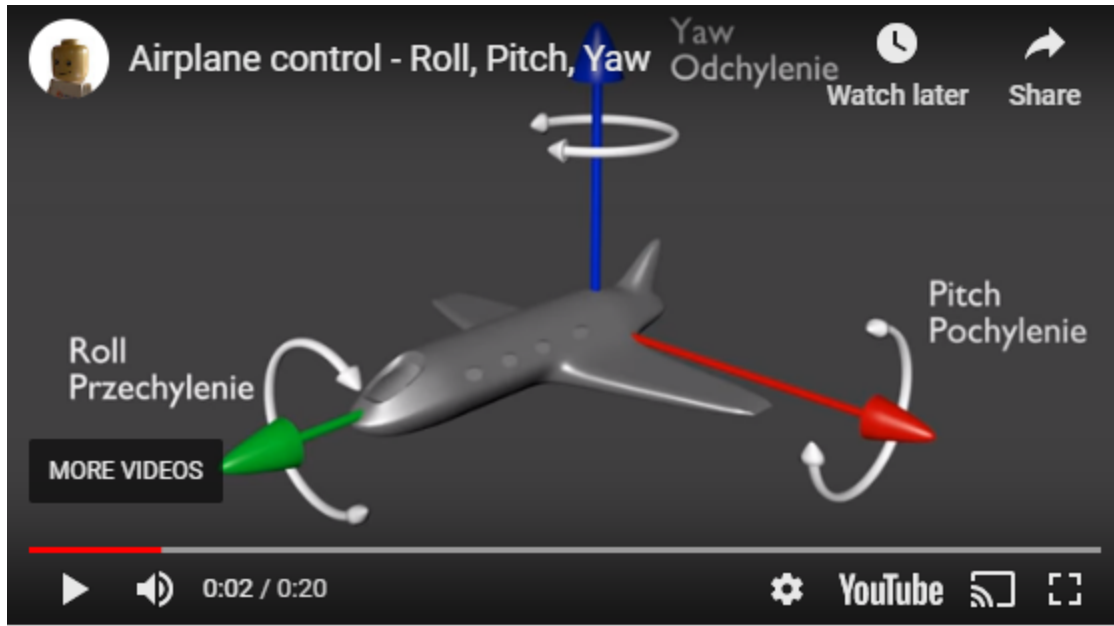


## 1. PROPELLOR REVIEW - HOW DOES IT FLY? DIRECTIONAL PROPELLERS



## 2. HOW DOES THE DRONE ACTUALLY WORK?

<https://www.dronezon.com/learn-about-drones-quadcopters/how-a-quadcopter-works-with-propellers-and-motors-direction-design-explained/>



### 3. CREATE A DRONE VIDEO ON LAPTOPS USING WEVIDEO OR PH

#### LET'S GO! - KEY TERMS

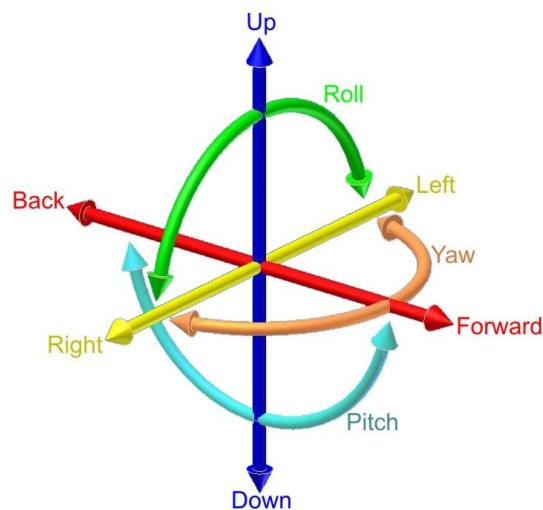
- **"DRONE"** - bee inspired pre-programmed aircraft first used in WWII.
- **Headless Mode** - Eliminates the need to keep track of the orientation of the quadcopter.
- **UAV** – Unmanned Aerial Vehicle.
- **FPV** - First Person Drone
- **UNDERSTANDING NAVIGATION FLIGHT CONTROLLER.** The **"Brain"**. This control is the key component to flight.

#### Dwi Dowellin Drone

- 23Mins Long Flight Time: 1600mAh battery, flight time up to 20-23 minutes, 4times more than others camera drone. NOTE: While charging, the charger light will display a red light; When charging is complete, the light will turn OFF.



- HD Camera & WiFi FPV Transmission: Equipped with 720P HD Camera to capture quality pictures and video. Download the APP and connect the WiFi, then you can control the flight and watch a live video on your phone. You can also Draw the flight route to achieve Trajectory Flight Functions.
- One Key Take Off, Easy to Fly: After paired and calibrated the drone, press one key takes off button to fly the drone and press again to land it, perfect for kids or beginners. Press emergency landing when the drone is in danger of flying into trees.
- Flips & Rolls, Lots of Fun: These drones with flips and rolls function can flips in 4-ways(left, right, forward, backward). Powerful air pressure ALTITUDE HOLD FUNCTION allows it to keep hovering at the current height once the throttle was released. More stable to flips and take quality photos or videos.
- Suitable for All Levels of Players: 3 SPEED ADJUSTMENT, helpful for beginners or kids to achieve a variety of flight actions. If you are new to a drone, fly it in a low speed to make sure it under your control
- **FRAME** – The structure or “*Skeleton*”. The UPPER & LOWER CHASSIS, ARMS & PROP GUARD.
- PROPELLER DIRECTIONS – WHY AND HOW A DRONE FLY'S. YouTube: search- “[Quadcopter motor orientation and propeller direction](#)” THICK PART OF PROPELLER SHOULD ROTATE TOWARDS THE INSIDE OF THE DRONE.
- WHAT IS **PITCH**, **ROLL** AND **YAW**? YouTube: search “[Basics of Drone Flight - Aerobatics](#)” | “[Pitch, Roll & Yaw](#)”



Pitch - Tilt Front, Back (nose up, nose down)

Roll - Left, Right Downward Movement (bank left, bank right)

Yaw - Left, Right Lateral Movement

# TAKE OFF!!!

- ARMING THE DRONE. TURNING ON, VERIFYING DRONE IS INTACT AND OPERABLE.
- VERIFY SURROUNDINGS AS CLEAR AND SAFE FOR TAKEOFF.
- 1. **HOVER** – EACH STUDENT WILL LEARN TO HOVER VIA REPETITION. POWER UP, HOLD, LAND, POWER DOWN. *REPEAT – REPEAT – REPEAT.*
- 2. BECOME FAMILIAR WITH **PITCH**. ROTATION OF SIDE TO SIDE AXIS.
- 3. BECOME FAMILIAR WITH **ROLL**. ROTATION OF FRONT TO BACK AXIS.
- 4. BECOME FAMILIAR WITH **YAW**. ROTATION OF VERTICAL AXIS.

