Lesson 7: Programming Your Drone 1*

Key Concepts:
- Programming a drone.

Objectives:
- Cadets will learn the basics of programming a Drone.

Time: 1 hour

Supplies:
1. Circuit Scribe Drone Builder Kit or Drone Builder Classroom Kit
2. iOS or Android-enabled device
3. CS Pilot App

Instructor Background:
Open the iOS App Store or Android Play Store and search for the "**CS Pilot App**". If you already have the app, then you can move on to the next step. If you have an older version of the app, we suggest you *delete it* and download it again.
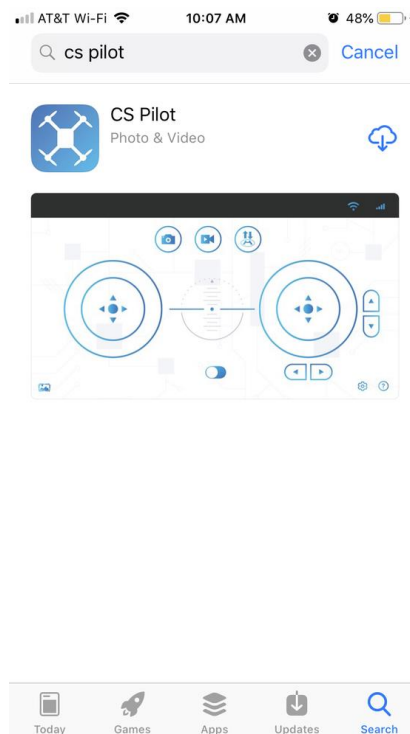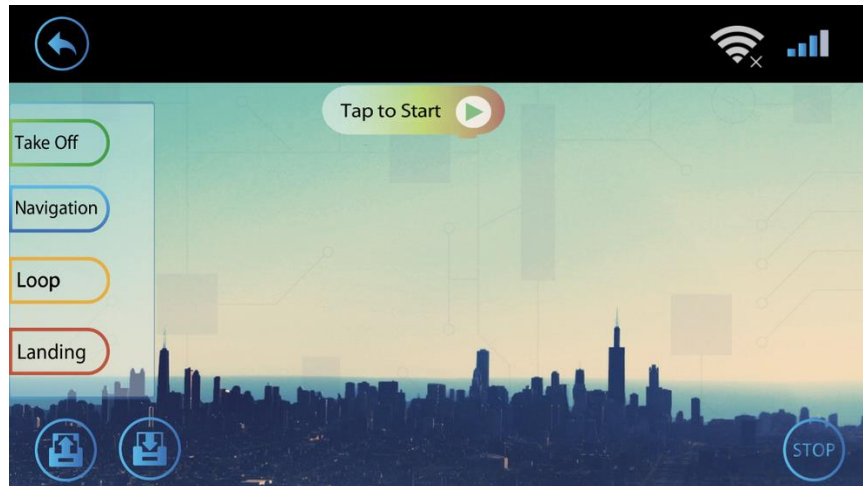
Using the App

When you open the app, there are two modes: "pilot" and "programming". The "pilot" mode is how you manually fly the Drone. That is what we used for the previous Drone lessons. The "program" mode lets you control the Drone using instruction blocks.
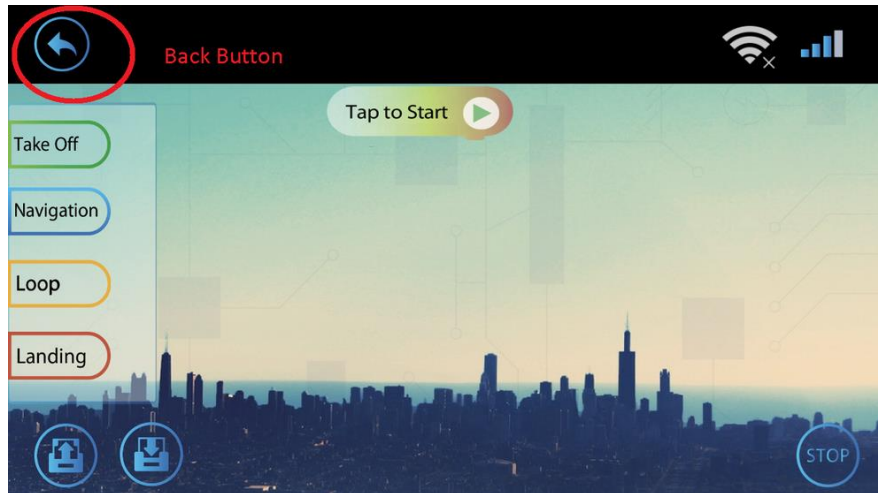

Programming Mode

The programming canvas will open and have different buttons you can interact with.


Back Button

Start from the top right. The button circled in red will take you back to the main menu where you can select the "Piloting" or "Programming" mode.

The icons on the top left are the signal strength and battery life indicators. These will show you the strength of the Wi-Fi signal that you are getting from the Drone and the amount of battery life left.

Abort Button

The button in the bottom right of the screen is the Abort button. This button can only be pressed once a program has started. It will turn red while a program is active and, if pressed, will cause the Drone to halt its program and land immediately.
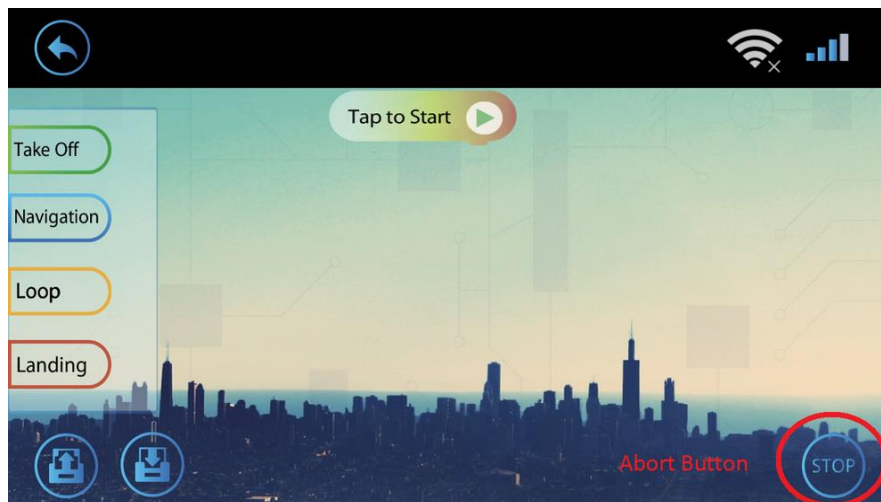

Saving and Loading

The buttons on the bottom right are for saving and loading programs that you have built. The button with the down arrow allows you to **Save** while the button with the up arrow lets you **Load** programs that have been saved. You can name your programs whatever you like. The name and date of the program will appear when you open the load menu.
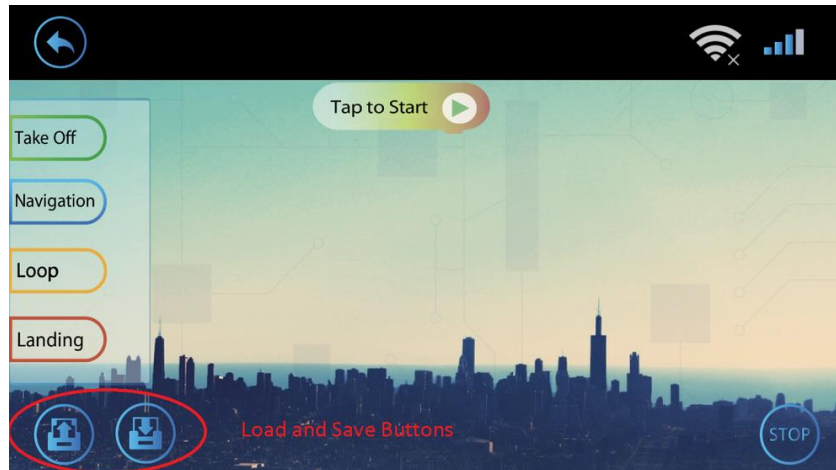
Instruction Blocks

The buttons on the right are the instruction blocks that we use to give the drones commands. There are four categories of instructions: Takeoff, Navigation, Loop and Landing. Once you tap on a category, it will open and let you drag instruction blocks into the program. Navigation and Loop will be covered in Lesson 2 and 3 (Lesson 7, 8 and 9 of the Drone Curriculum Guide).
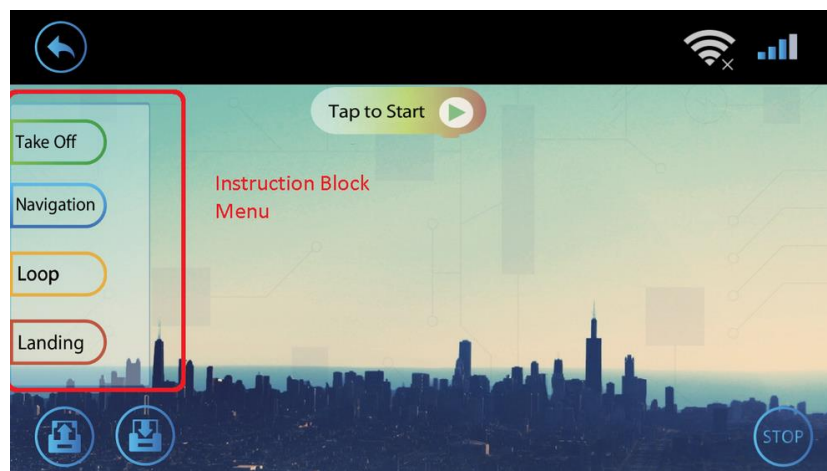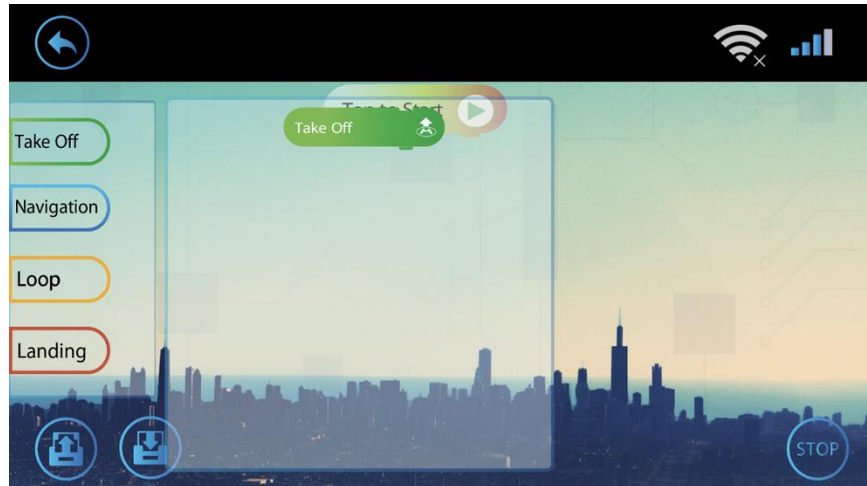

INSTRUCTOR TIP:

Just tapping on an instruction block won't add it to the program you must tap and drag the block to get it.

Takeoff

Drag the Takeoff instruction block to the "Tap to Start" Button. The Takeoff block will snap onto the start button. The Takeoff block must always be the first block after the "Tap to Start" Button. If you hit "Tap to Start", you'll notice that the program won't work. It needs one more block that we will add next.
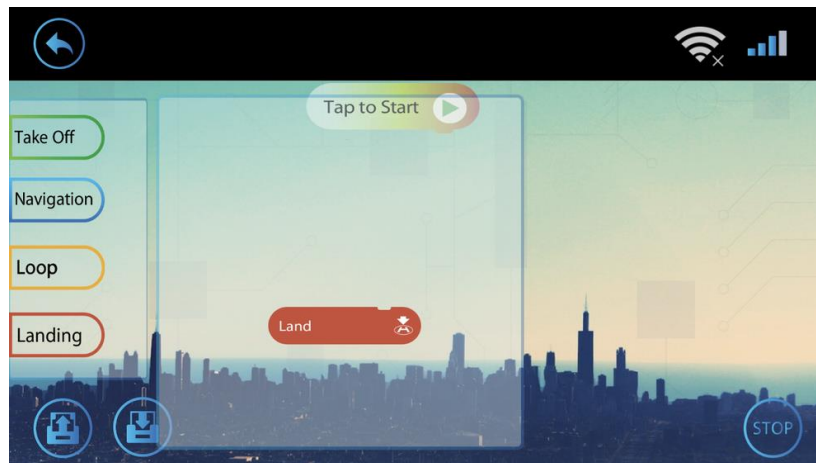
INSTRUCTOR TIP:
All programs must start with Takeoff.

Landing Block

The Landing window lets you add the "Land" block. Drag the Land block to just under the Takeoff block and it will snap in place. The Land block must always be the last block or the program won't start.

Congratulations! You've created your first program.

INSTRUCTOR TIP:
Every set of instructions that you give the Drone must start with Takeoff and end with Land.

First Flight

Place your Drone in a clear area with at least a 5 foot radius of clear space around it. Once the Drone is on and connected to your phone, hit the Tap to Start button. The Drone will take off to a few feet off of the ground and hover for a second before landing.
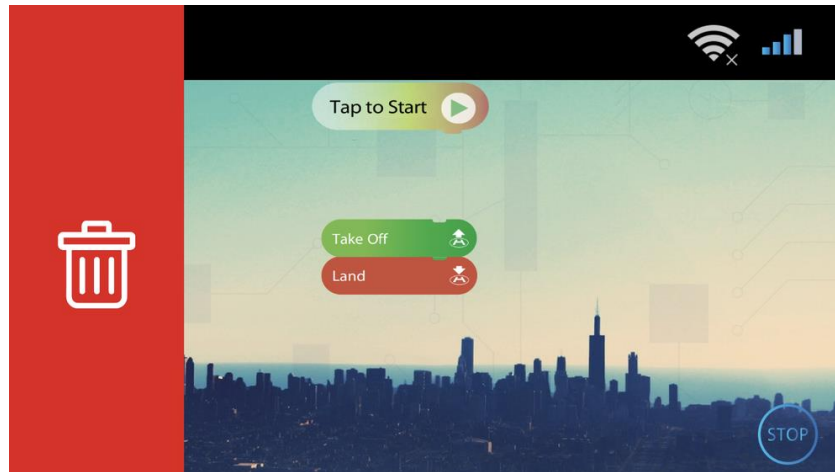
INSTRUCTOR TIP:
Ensure that the Drone hub is flat. The sensors inside the Drone will try to automatically level out the Drone, if it is crooked or tilted.

Deleting Instruction Blocks

Whenever you drag an instruction block around on the screen, a red bar with a picture of a trash can on it will appear on the left side of the screen. If you drag instruction blocks over to the trash can, they will be deleted.

INSTRUCTOR TIP:
You cannot delete the Tap to Start Button since it is where the instruction blocks have to start.

Class Discussion

Offer the cadets a question and answer session after the activity. Once all of the cadets' questions are answered, begin to review the discussions with the whole class.