DroneBlocks Simulator 2.0

Mars Edition

DRONEBLOCKS

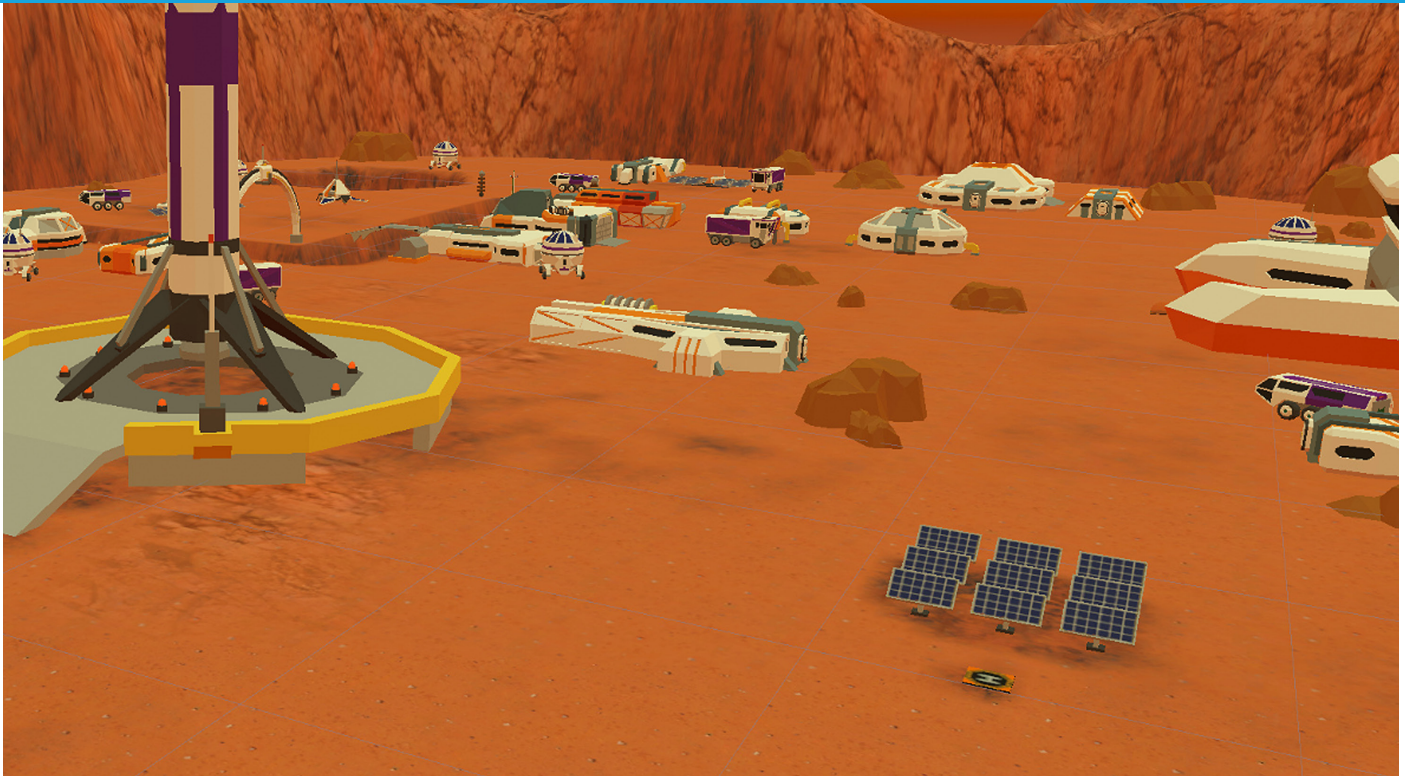# Lesson 01: Welcome To Mars

Block Coding   Mathematics   Problem Solving   Online Research

In July 1997 we saw Sojourner make history by being the first wheeled robot to land on Mars. Fast forward to April 2021 and we had our first extraterrestrial flight by an Unmanned Aerial Vehicle. How amazing is that?!

Lots of cool things are happening on Mars. The iExplore has landed and it is time to start building on Mars. Most of the work outside will be done by robots and drones. Luckily we have an amazing DroneBlocks coder on-board (that's you) to help out.

Objectives

By the end of this lesson you will be able to do the following:

1. Run the new simulator and launch your mission code.
2. Use and understand navigation blocks to explore Mars.
3. Map out a flight path and then simulate it.
4. Solve a puzzle with some "outside the box" problem solving.
5. Tell other students something cool about Mars.

Simulator 2.0 Layout

The DroneBlocks simulator is an amazing learning tool that will allow coders from around the world to code in a drone without having a drone. This is a great way to test code before flying a real drone.

We also get to unlock our imaginations and simulate wonderful worlds like Mars. In the Mars edition of the Simulator V2.0 there are several areas to challenge and improve your coding skills. Let's start by opening the Simulator.

Open any Internet browser and load:

https://dev.droneblocks.io/simulator_v2_mars.html

Once the page has loaded, enter in the password. Access Granted. Now we are going to look at the interface and break it down.

Below is Simulator v2.0 layout.
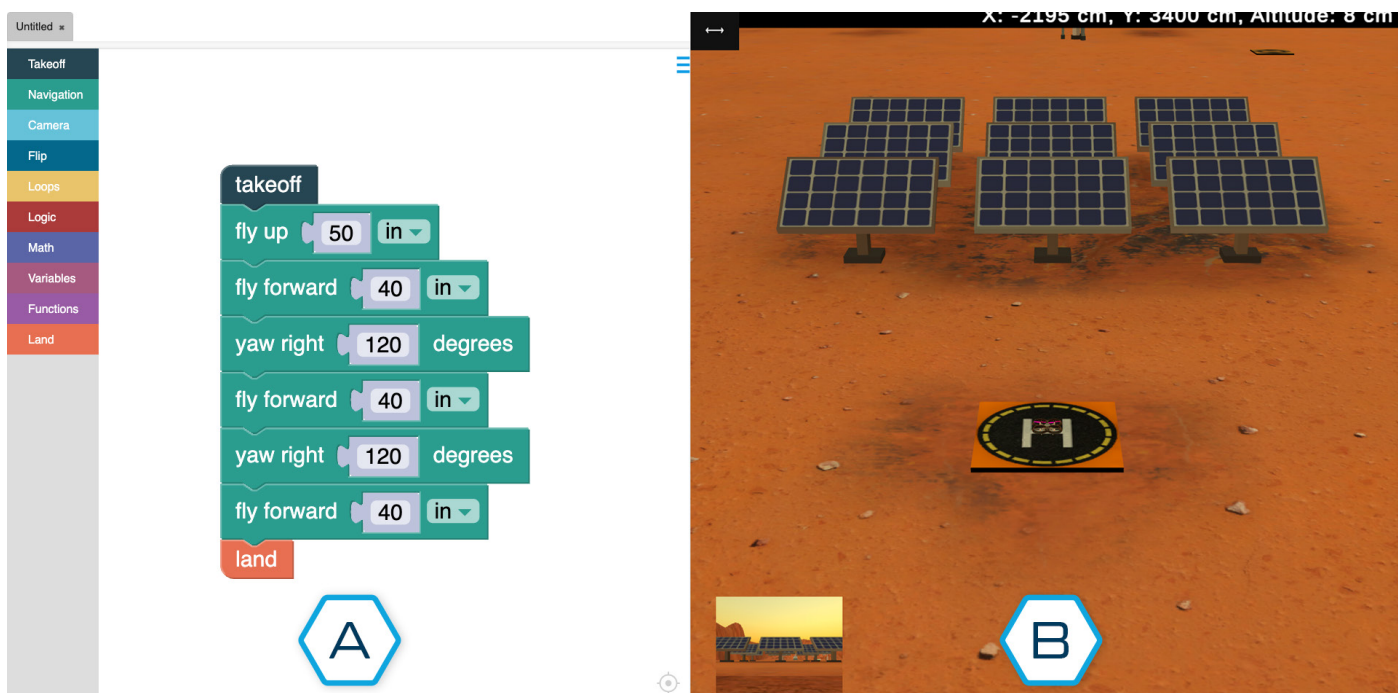
Have a look at the simulator and then tick either A or B in the columns below. Don't worry if you don't know the answer, take a guess. We will explain all on the next page.

Action	A	B
You drag blocks of code here		
You watch the drone fly		
You move around a 360 degree camera		
You create functions		
You add comments to your code		
You see through the drones camera		
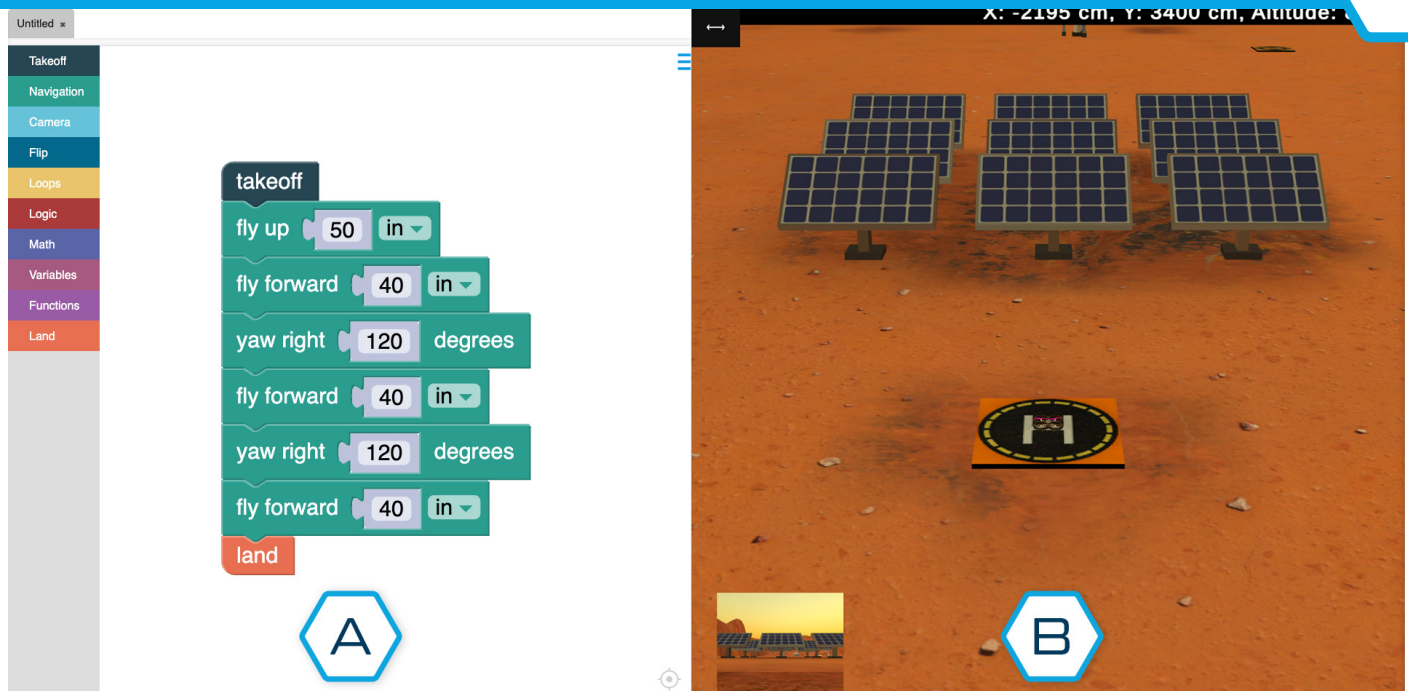
The Simulator 2.0 can be split in two. We are going to call these two sides A and B. This will help explain the different pieces and how it all works.

A This is our coding stage. This is just like the coding stage in our DroneBlocks app we all know and love.

In this area we can place navigation code, loops, functions etc.. All the code we place on the stage will execute and run on the drone on side B.

B This is our simulated drone area. The drone acts out the code from A. There are cool things like simulated physics, which means if you fly into an object, you crash.

You can move the camera by left clicking and dragging your mouse around the screen. On tablets or phones, simply press and hold the screen to move around.

Your mouse wheel zooms in and out of the virtual world. This is really great if you want to zoom out to map out a flight.

The answers to the questions on the previous page are:

Action	A	B
You drag blocks of code here	x	
You watch the drone fly		x
You move around a 360 degree camera		x
You create functions	x	
You add comments to your code	x	
You see through the drones camera		x

Your First Flight

Ingenuity became the first unmanned aircraft to take the Martian skies. It is our turn now! We are about to make our own history and soar.

Drag and drop the following code blocks to the stage:

```
takeoff
fly up  50  in ▾
land
```

Amazing! Our first flight under our belt.

You will notice that there is a yellow line following the drone. This is a great tool to highlight where the drone has been. It's super helpful when examining flight paths.

Ingenuity started with a small take off and land flight. Each flight after that became longer and longer. We are going to do the same now. Let's take a look at some challenges to practice our navigation blocks

Your First Challenge

It is time to get used to dropping code to the stage and flying the drone around in the simulator. While the drone is flying, remember you can click and drag around to move the camera. This is a great way to get a better view.

Your challenge today is:

Fly the drone to make following shapes either over or around the nine solar panels:
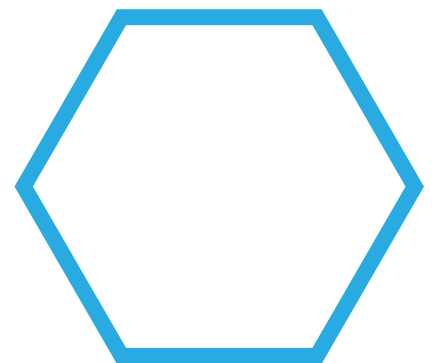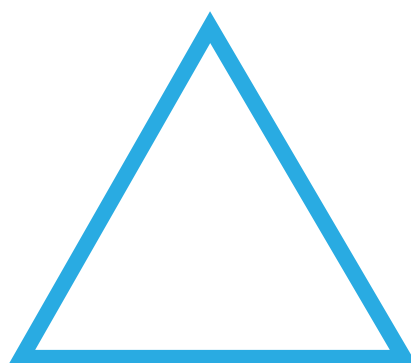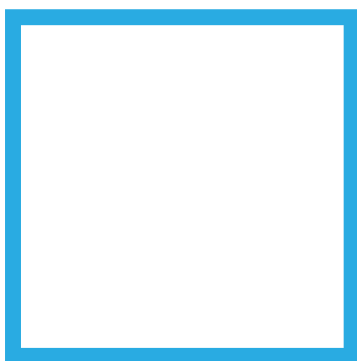
Tips: Remember that you will be starting in the middle of the bottom line of each shape. This means that the first line will be 1/2 the length of the rest of the lines. Grab a pen and some paper and try drawing out your mission plan before running it.
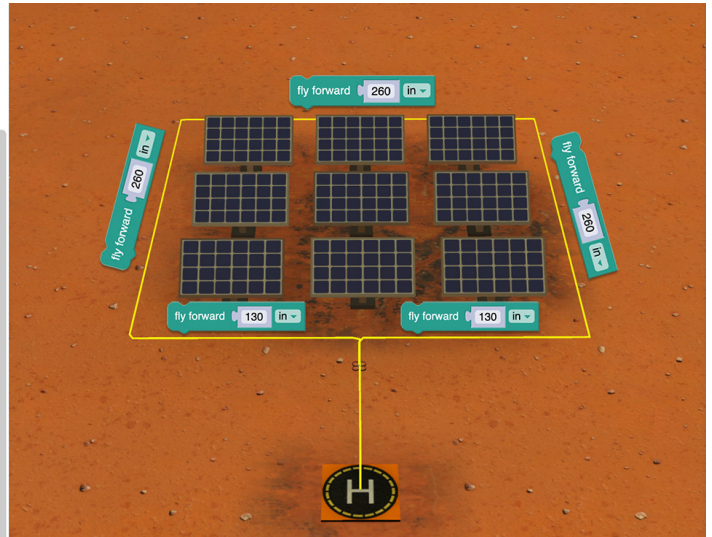
Good luck!

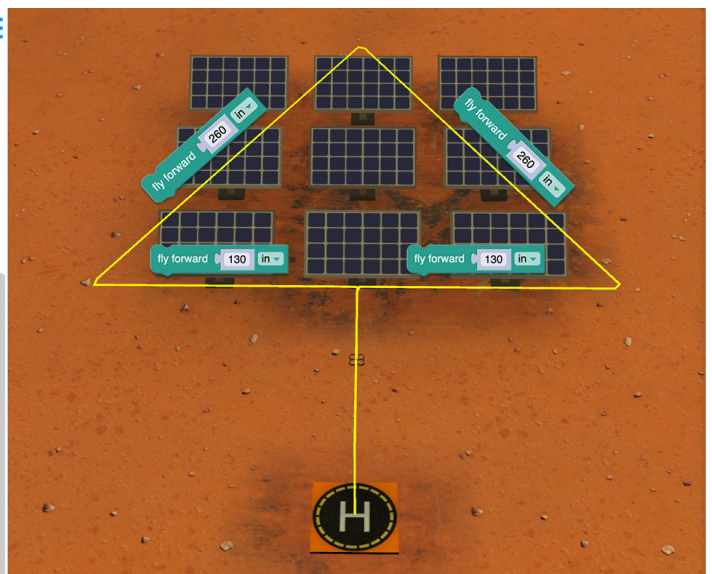How cool is that? The drone flies and leaves a yellow trail of it's path and as we can see, the shapes came out perfectly!

Well done DroneBlocks Coder!

Solar Mission Support

Help us DroneBlocks Coder! We need your help to solve a problem. Mars is a very harsh and dusty planet. We need to make sure that the environment isn't destroying the solar panel field.

Your mission is to create the code that will make the drone fly in a square observing the solar panels. You will need to make sure the drone's camera is always pointing towards the solar panels. Have a think about how you would achieve this.
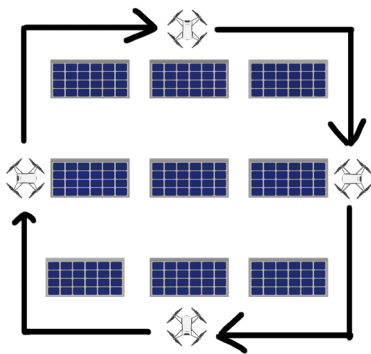
Try and use loops to reduce the amount of blocks in your code.

You can see the code we used at the end of the lesson on the summary page.

This code is really great for using your Tello in the classroom. You can use it to fly around objects in the classroom and other areas of the school, as long as it is safe to do so.

Once you have mastered that bit of code it is time for the next level to begin.

Command Center needs to get footage of the front of all nine solar panels. Command Center will use that footage to make sure there is nothing visibly wrong with the solar panels.
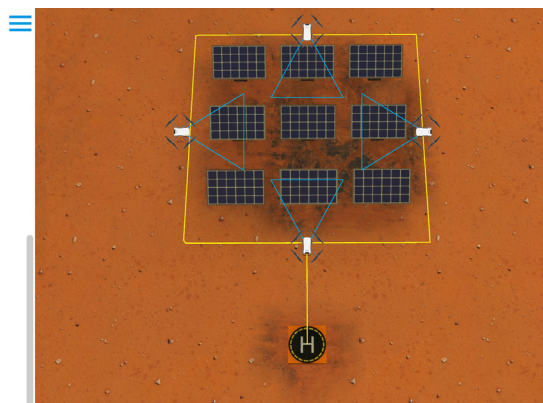
Grab a piece of paper and draw the flight path. Use straight lines and right angles. This will make it easier for the drone to fly. Once you have your idea, drag the code blocks to the stage and launch your mission.

Good luck!

Solar Mission Support Explained

How cool is that!

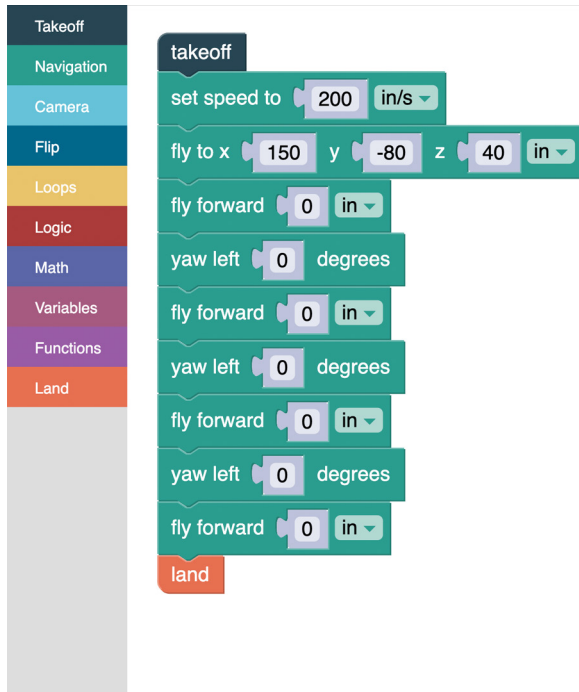The code allowed us to keep our Tello Drones facing the solar panels.

Amazing! Well done for solving another problem.

Flying Outside The Box

The only thing that could make flying a drone in a virtual world more fun and exciting is, solving puzzles in a virtual world!

Command Center has contacted to show off your coding skills by solving a puzzle. You need to fly the drone over the solar panels in a very specific way.

Takeoff
Navigation
Camera
Flip
Loops
Logic
Math
Variables
Functions
Land

```
takeoff
set speed to 200 in/s
fly to x 150 y -80 z 40 in
fly forward 0 in
yaw left 0 degrees
fly forward 0 in
yaw left 0 degrees
fly forward 0 in
yaw left 0 degrees
fly forward 0 in
land
```

The drone needs to fly over all the solar panels using just the code blocks on the left. You can't add or take away any blocks. You can only edit the values.

Hint: Draw 3 x 3 points on a piece of paper. Start with the bottom right point and try connect all the dots using only 4 lines. Once you have that flight path, you can code it into the simulator.

Good luck! I'm super excited to see how you get on.

Summary

Well done on completing the mission. Your code looks super cool. Let's have a look at what you've learned in this lesson:

✓ Run the new simulator and launch your mission code.

✓ Use and understand navigation blocks to explore Mars.

✓ Map out a flight path and then simulate it.

✓ Solve a puzzle with some outside the box problem solving.

✓ Tell other students something cool about Mars.