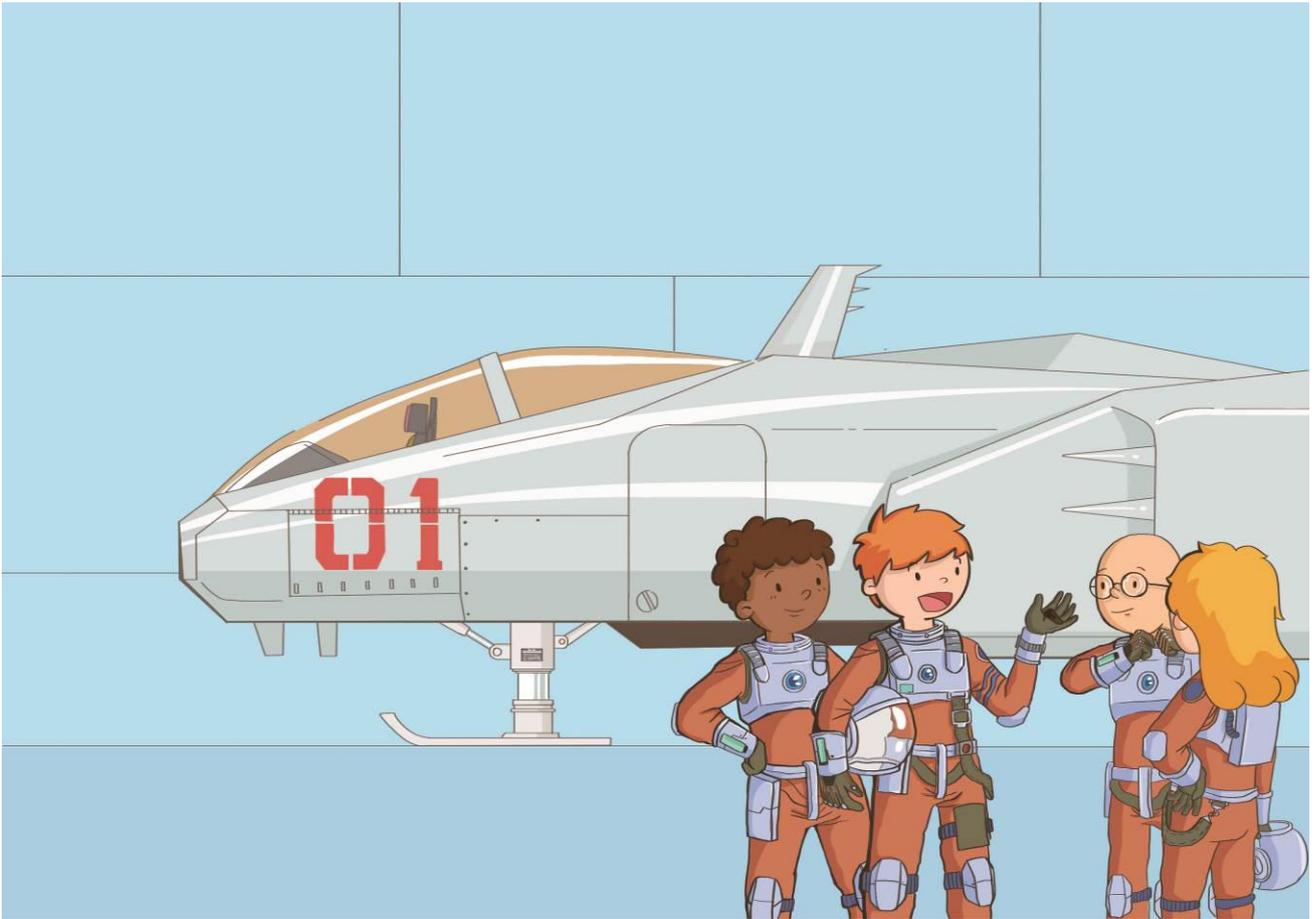


Launch of Interstellar Voyage



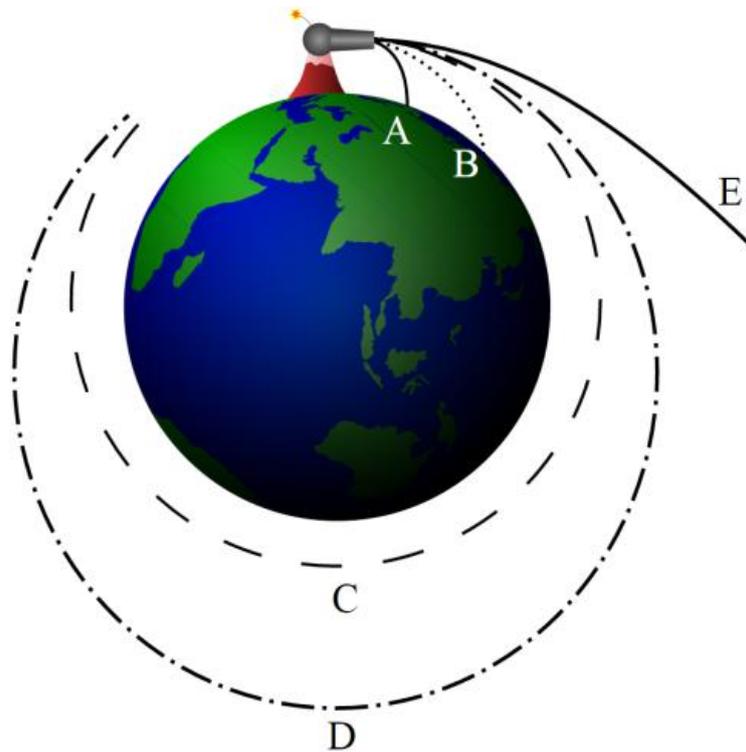
Interstellar Development Agency (IDA) , having lately received a signal message from Mars – the fourth planet from the Sun in the solar system, immediately commands Mark to assemble a group of best taskforce, and set out for the Mars as soon as possible. The problem is – how can Mark escape the earth gravity with well maneuvering his spaceship? Let's try to work it out together.

Learning Objectives

We've learned the method of utilizing variables from last chapter, while in this chapter, we need to apply it into a new sensor - accelerometer / gyroscope with integration of our little mBlock fairy character, to complete all our challenging missions successfully.

Scientific knowledge

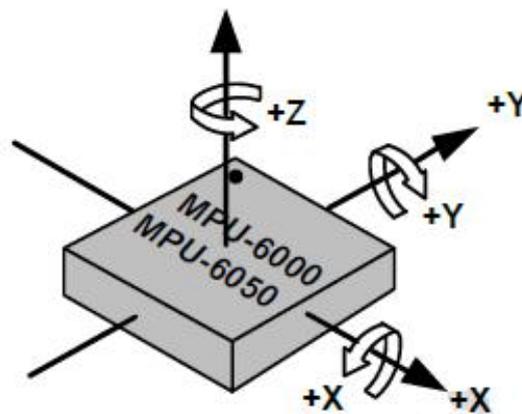
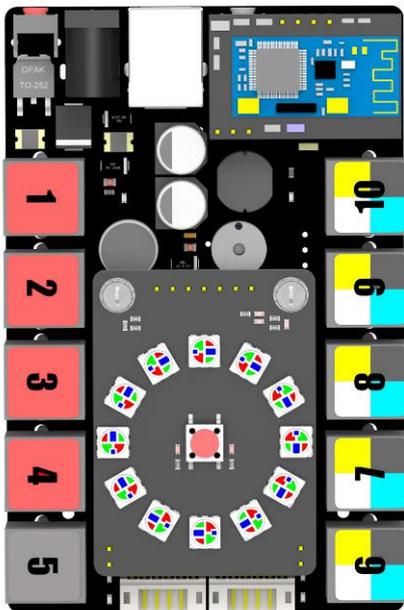
On the Earth, Gravity (Gravitation), as a result of an attractive force by the Earth towards the physical objects nearby ground, gives weight to those objects and pulls them down to the ground. And in the Universe, Gravity helps draw materials altogether to form celestial bodies, then attract these celestial bodies between one another, and further group them into the galaxy, moving in their own orbits severally. As such, once you want to start your journey of "Star Trek", your spaceship or space shuttle must acquire plenty of acceleration, so as to escape from the Earth's gravitational field and get into the space, only then you can travel onto other planet(s).



Tasks

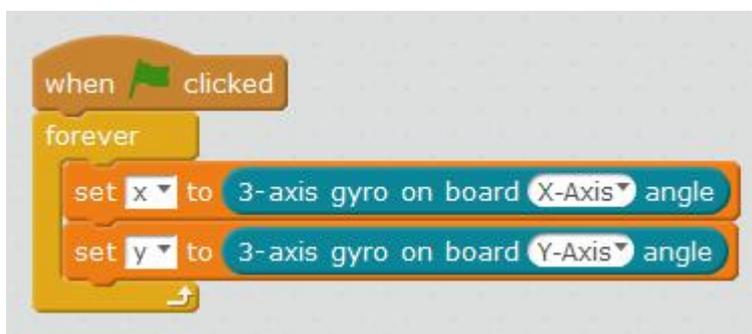
Task 1 - Accelerometer / Gyroscope Modules

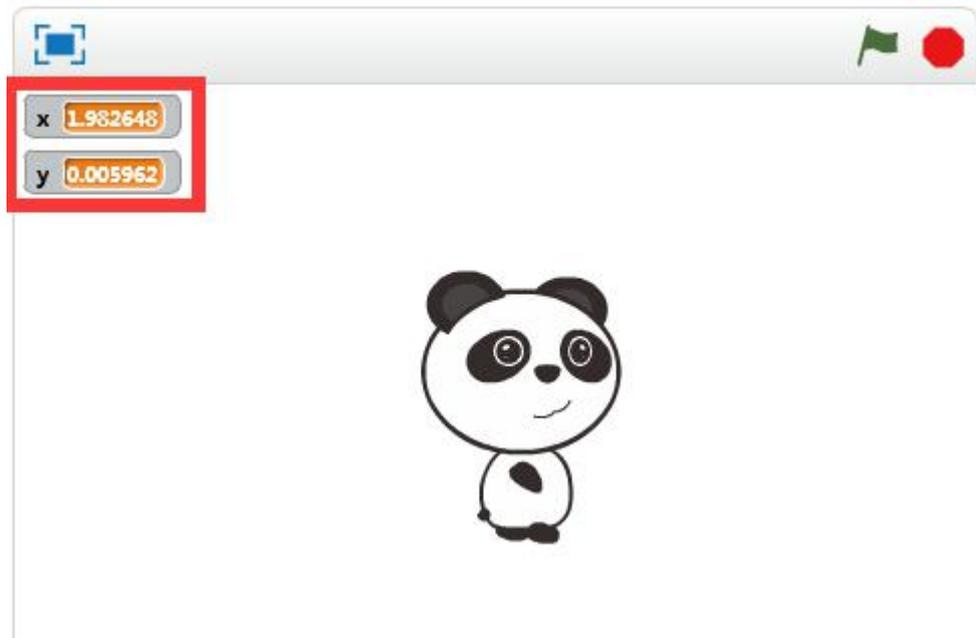
Inside the Ranger's Me Auriga controller, groups of MPU-6050 Gyroscope chips were integrated to help detect the tilt angle values of both axis X (leftward/rightward) and axis Y (forward/backward), as well as the acceleration info of axis Z (spinning in circles).



Task 2 - Observe the Data of Gyroscope

1. Create a variable x, set its value right as the value of axis X's angle in the Gyro instructions.
2. Then create a variable y, set its value right as the value of axis Y's angle in the Gyro instructions.
3. Revolve the Me Auriga controller and observe the data changes.





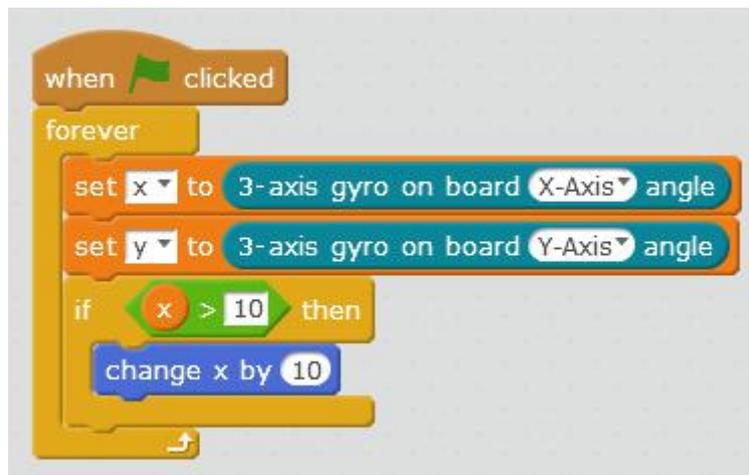
(Auriga Gyro xyz Illustration)

Task 3 – Move the Panda

Use the Auriga Gyro's data changes as movement parameters of our Panda. Make use of [If], i.e. conditions of [If] should be based on [Greater than] ">" or [Less than] "<" under function [Operators].

<p>Scripts Costumes Sounds</p> <ul style="list-style-type: none"> Motion Looks Sound Pen Data&Blocks Events Control Sensing Operators Robots 		<p>If...Then...</p>
<p>Function: Try to judge in accordance with the conditions in hexagonal-shaped grid. If applicable, go on with next step of program [Then]. If not applicable, just skip program [Then].</p>		

Continue with the above steps of your learning task, and try to add a few more [If] instructions, you'll see as variable x is larger than 10, your Panda can move for ten steps.



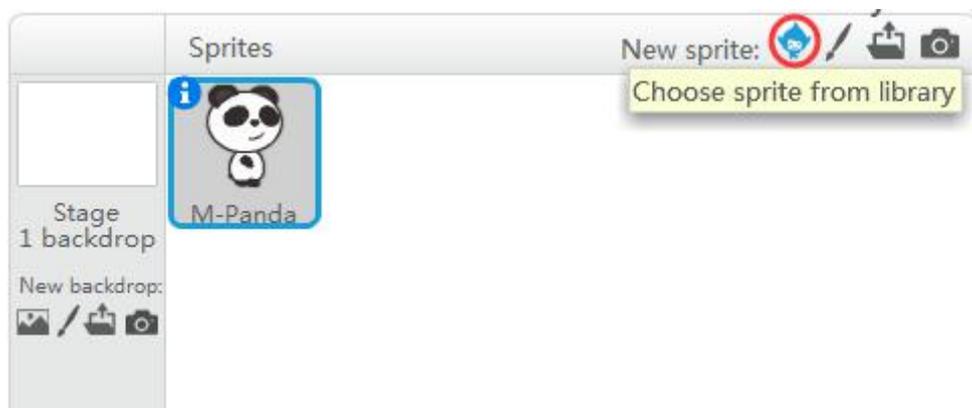
When you finish the entire program, click the green flag and turn your Ranger – does your Panda begin to move?

Learning Tasks

Task 1 — Spaceship with a brand-new Background

Now we're going to switch a Ranger robot into a spaceship... umm... seems impossible, but we can still transform it to the controlling rod of our spaceship!

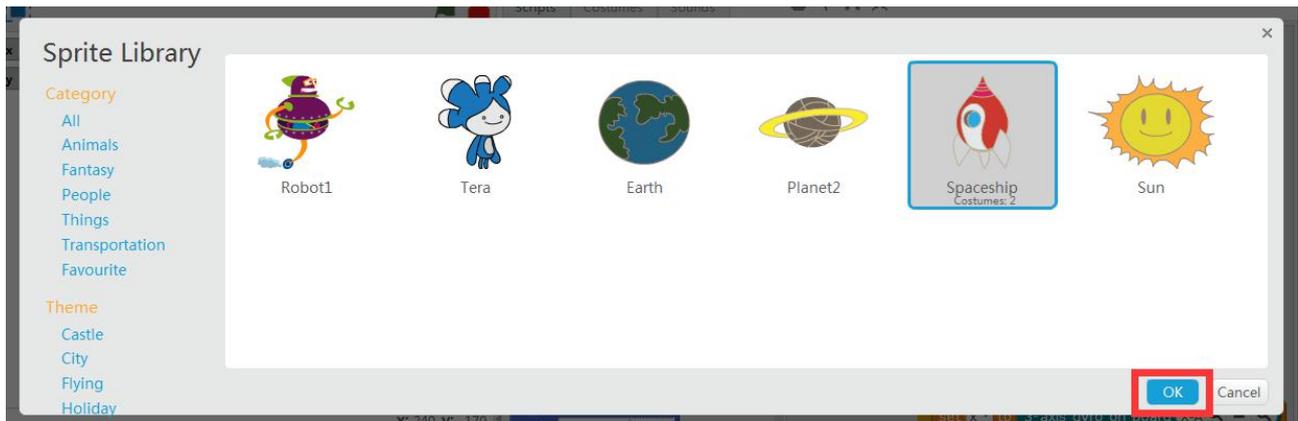
1. Find out “choose sprite from library” tag in mBlock, then click the button of figure icon “M-Panda”



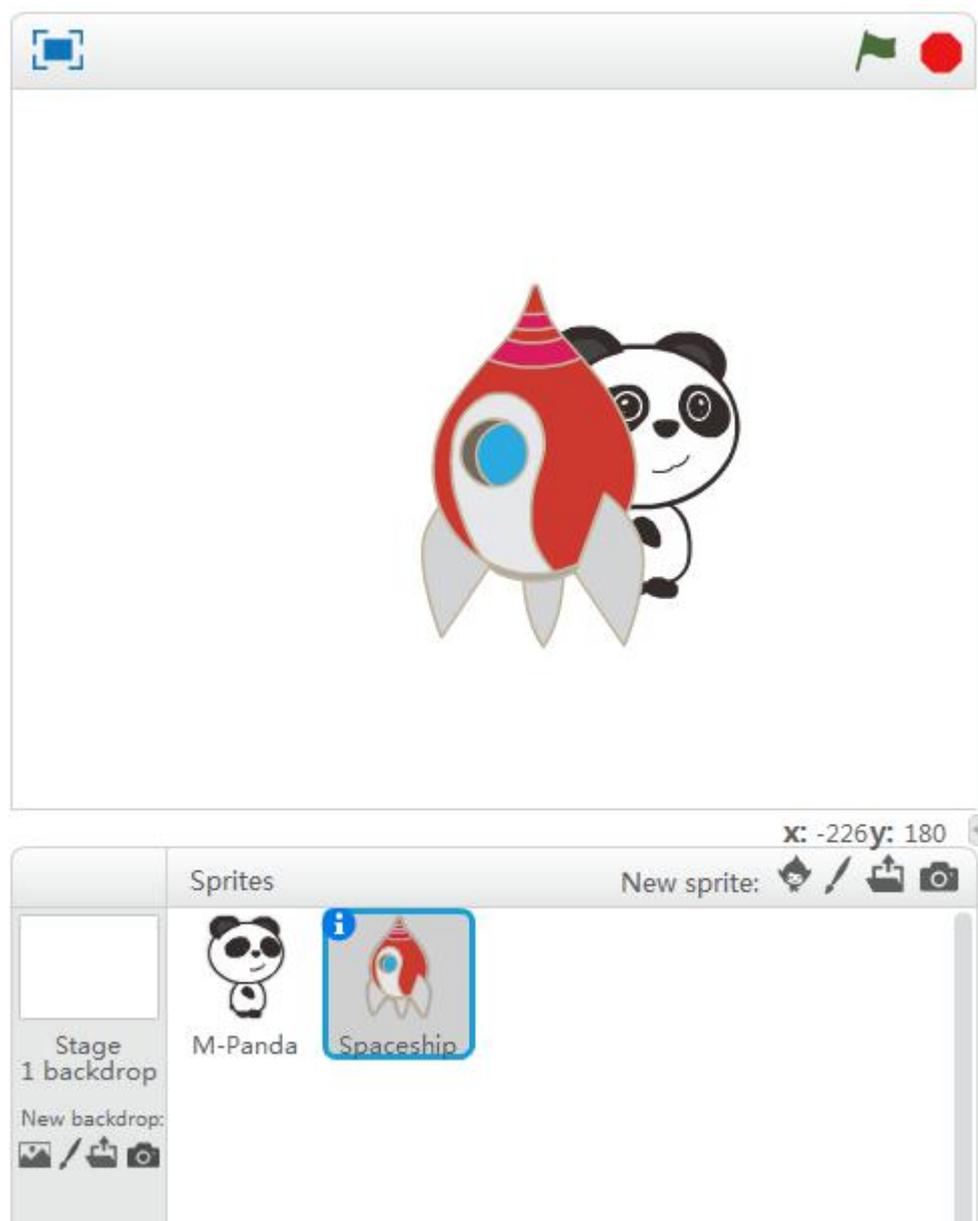
2. Select and click [Space] category on the left side.



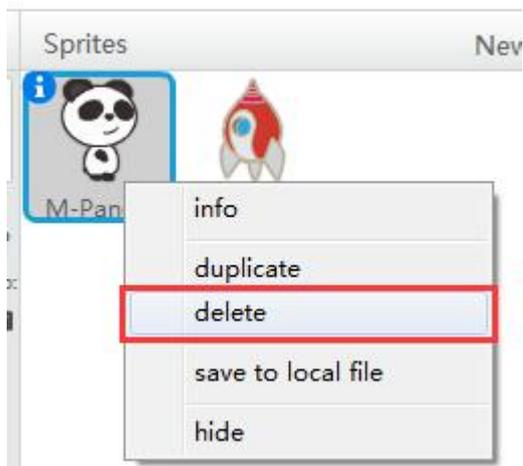
3. Select "Spaceship" icon, and press the [OK] button



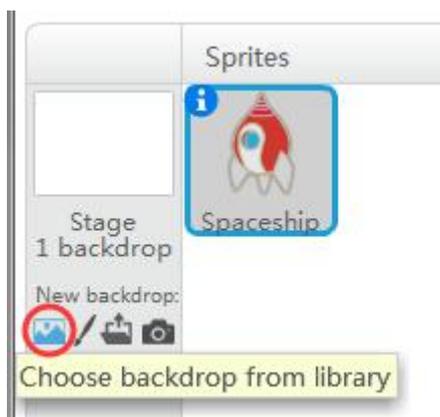
4. Now there are two roles on the stage.



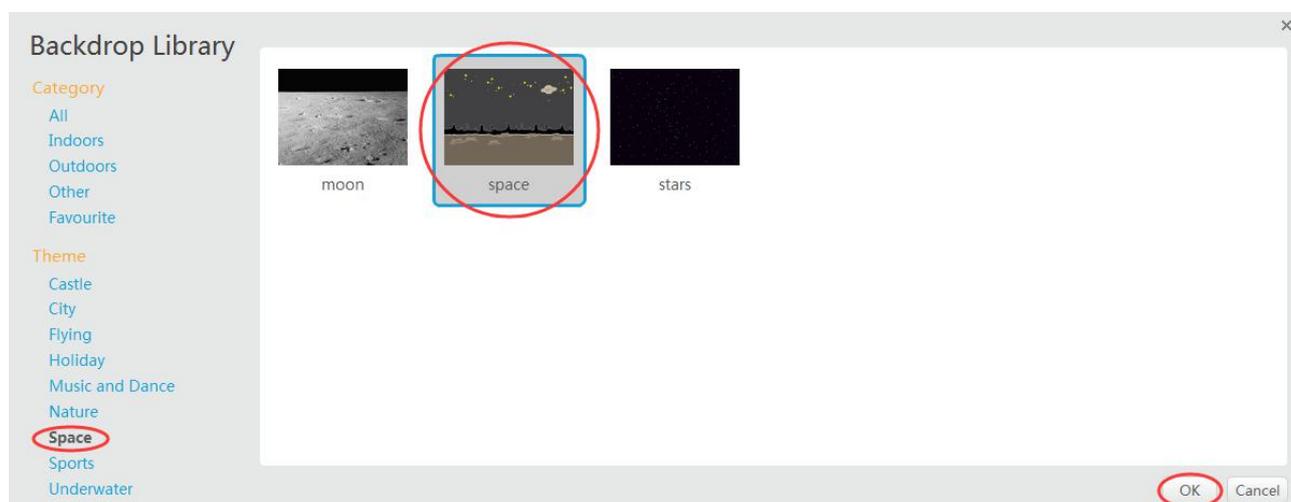
5. You're supposed to keep the image of "Spaceship" and cross out "M-Panda". Right click "M-Panda" button, then click [delete] to complete.



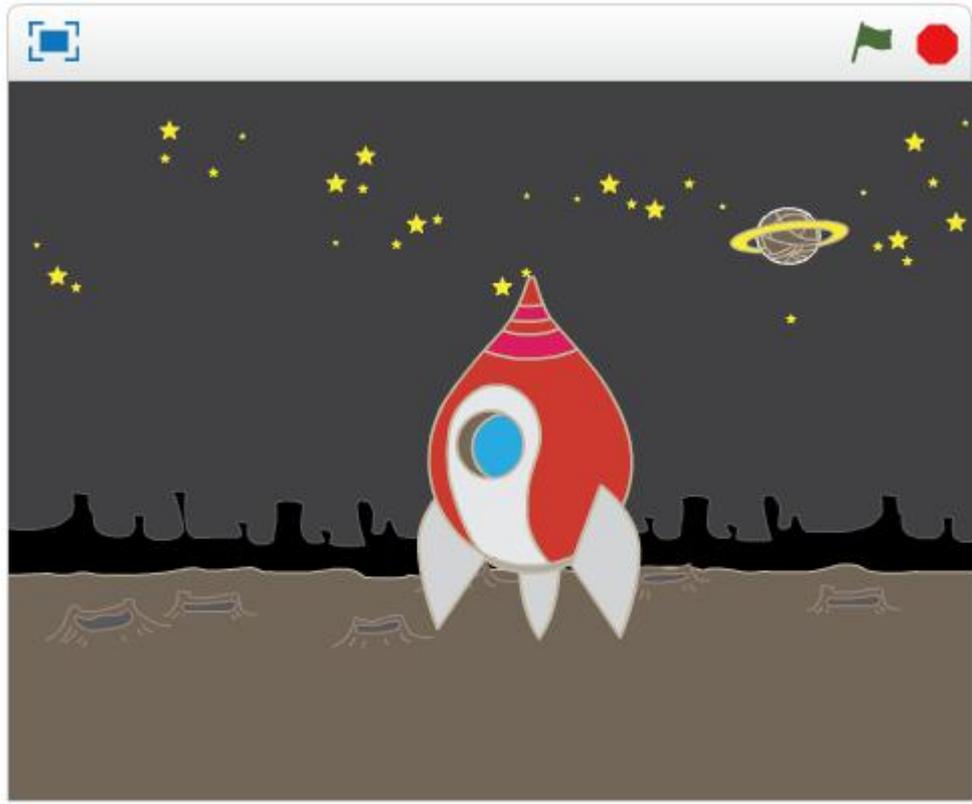
6. In order to make your stage background more colorful, click [New backdrop] icon (ie. choose backdrop from library).



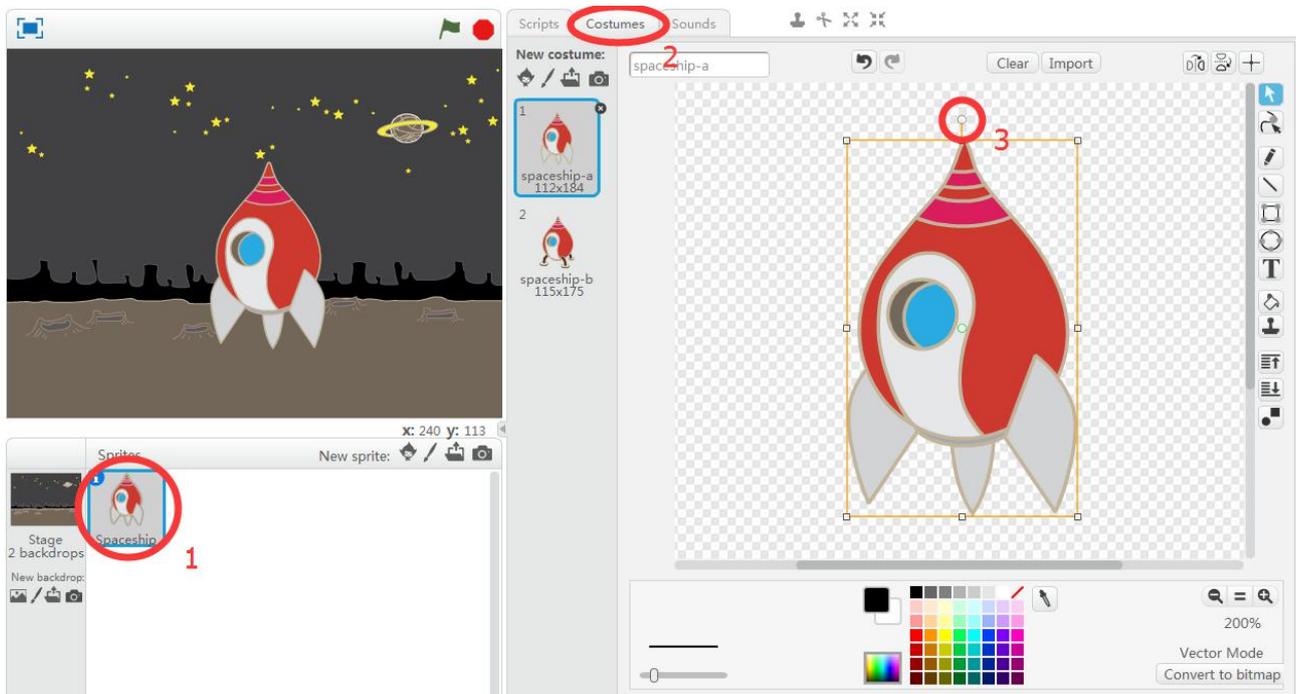
7. Select [Outer Space] on left side, choose the image of "Space", then click [OK].



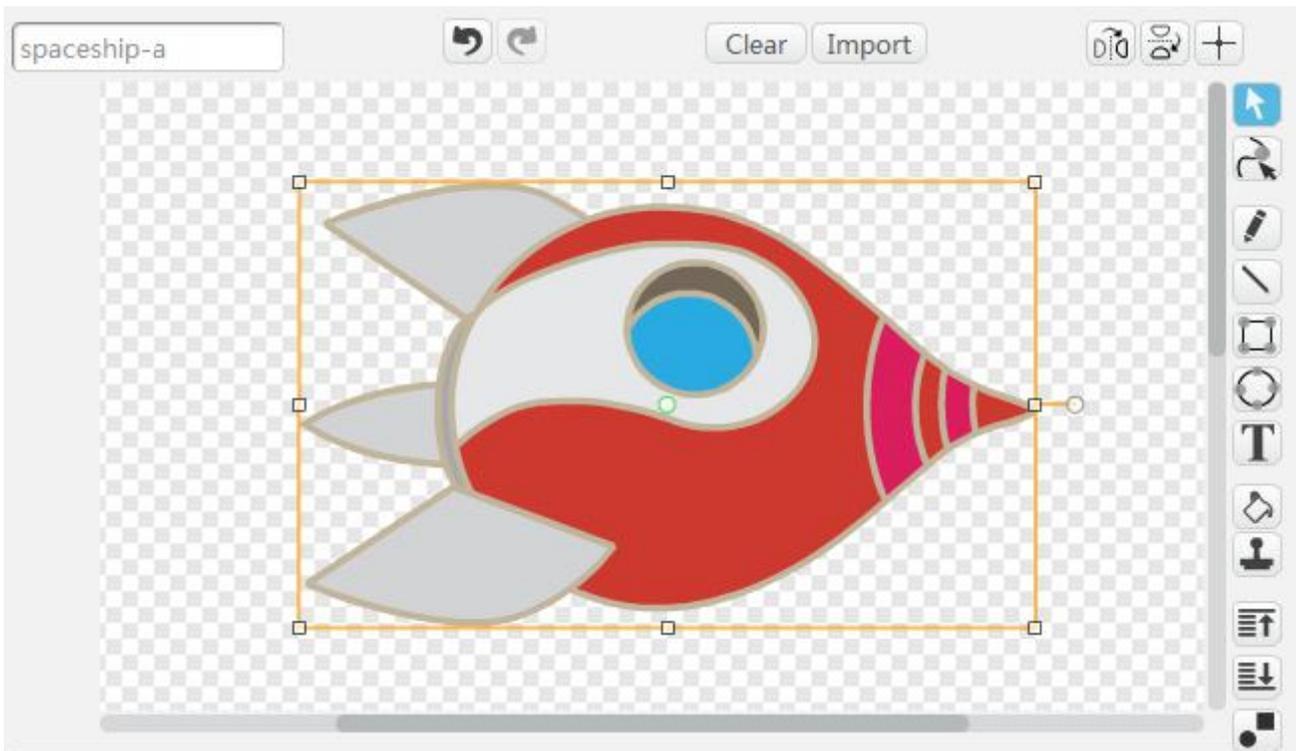
8. You will find your stage filled with the background that was just chosen.



9. Click the Spaceship in [Costumes] category, then select [Costumes]. As we need to edit the angle/ direction of our spaceship, let's click on the image itself in the edit area, then you will see a yellow box.



10. Drag the rotation symbol in the red circle (see the little circle in above picture), direct your spaceship's tip towards the direction of three o'clock.



So you've finished adding a new costume with a fresh backdrop. It's time to get prepared for programming to fly your spaceship.

Task 2 — Manipulating your Spaceship

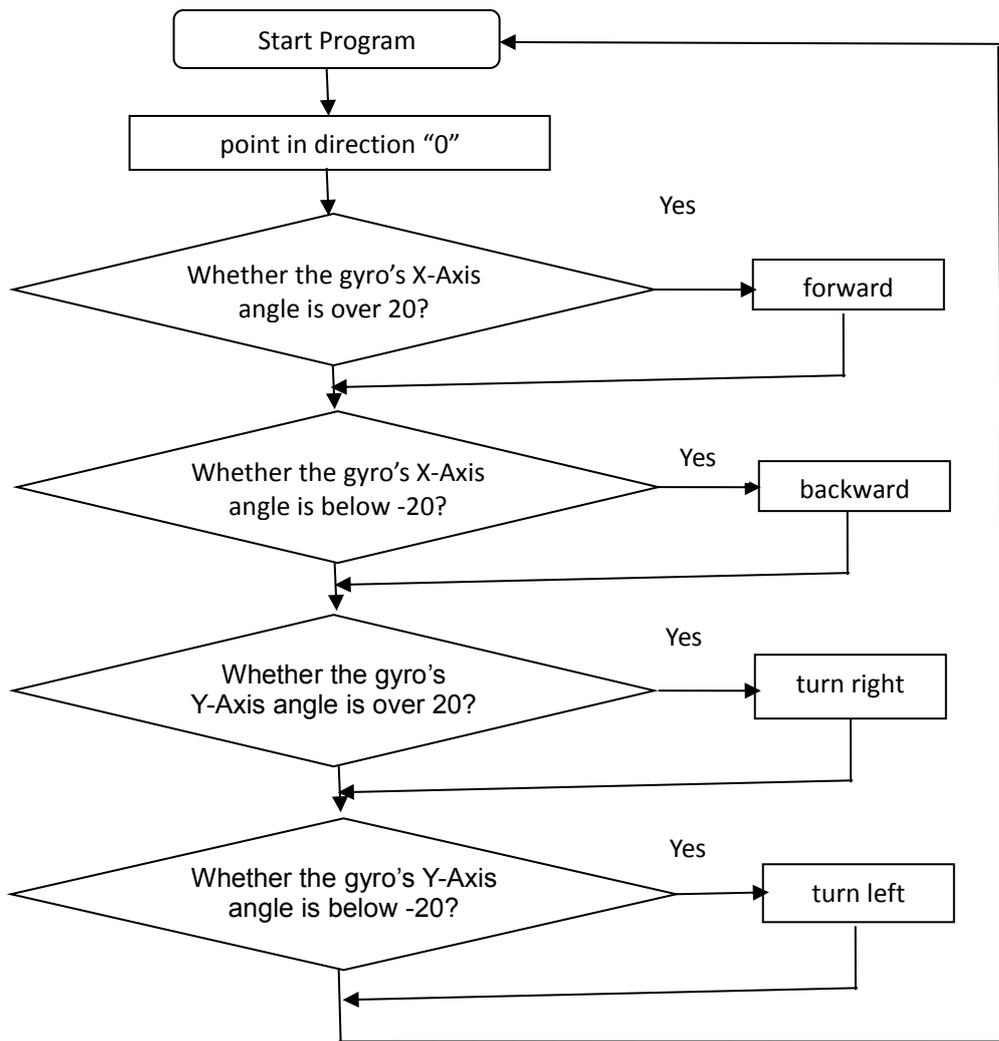
Now your spaceship is ready for flight at anytime. Thus we need to set up Ranger as its manipulator. The best way is to use the gyroscope that we've learned in previous text.

Humanized operation mode would be the most convenient:

1. Ranger being leaned forward (positive value of axis-X) : spaceship moving forward
2. Ranger being leaned backward (negative value of axis-X) : spaceship moving backward
3. Ranger being tilted leftward (positive value of axis-Y) : spaceship rotating to the left
4. Ranger being tilted rightward (negative value of axis- Y) : spaceship rotating to the right

To make the spaceship move along the direction of its head (tip), we also need to set instruction as [point in direction 0].

You may find flow chart of its working process as below:



Detailed Programs for your reference as below:

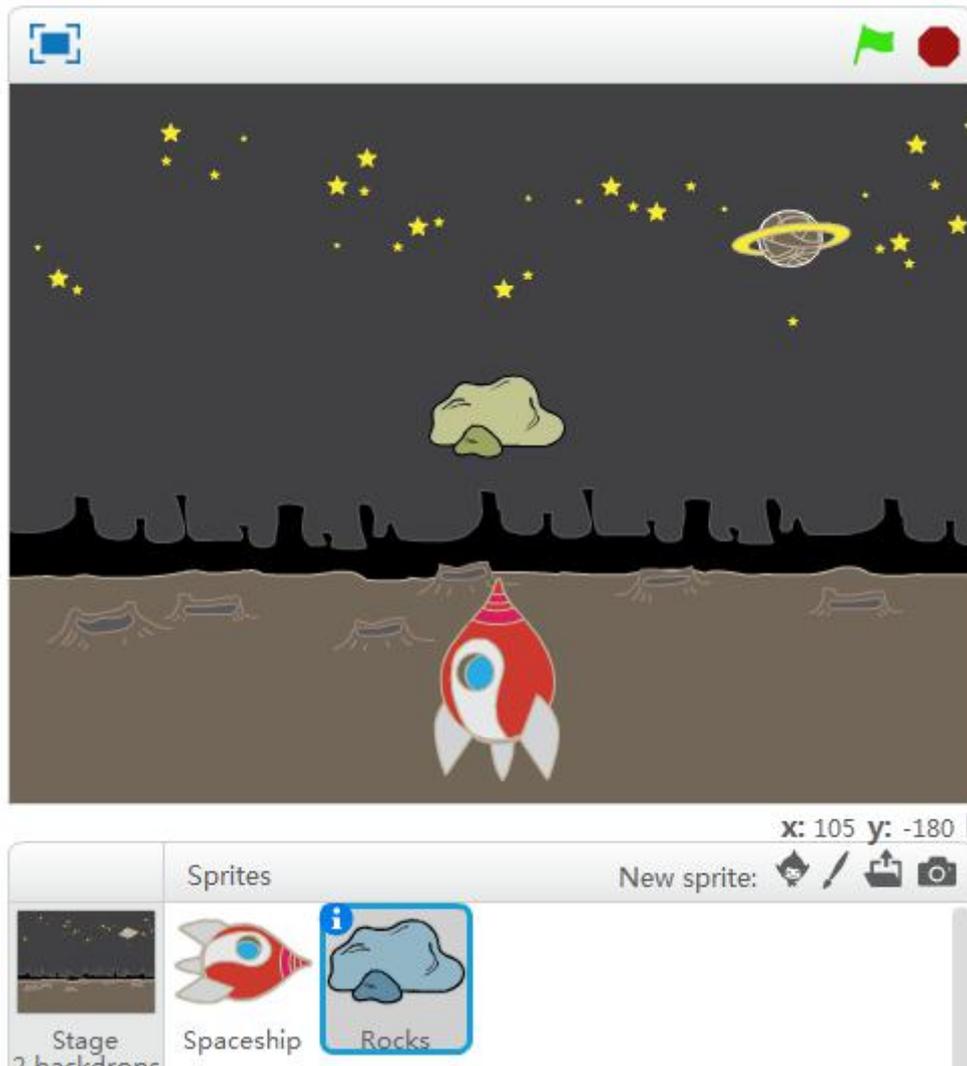
```
when green flag clicked
  point in direction 0
  forever loop
    if 3-axis gyro on board X-Axis angle > 20 then
      move 10 steps
    if 3-axis gyro on board X-Axis angle < -20 then
      move -10 steps
    if 3-axis gyro on board Y-Axis angle > 20 then
      turn 5 degrees
    if 3-axis gyro on board Y-Axis angle < -20 then
      turn -5 degrees
```

We'll operate with Ranger and fly your spaceship smoothly, come on and head towards your goal!

Tasks at challenging level

Challenging Task 1 — Stage mode pass-through

Have you been familiarized with how to manipulate a spaceship? During your journey to the Mars, some space rocks may come up unexpectedly – then how do you maneuver your spaceship and fly all your crew till safe landing?



Actions: Turn your spaceship in a full circle and fly back to your starting point. Watch out those space rocks!

1. Add a new costume by clicking [Rocks]
2. Drag the “Rocks” to stage center
3. Follow steps as below and write your program about space rocks

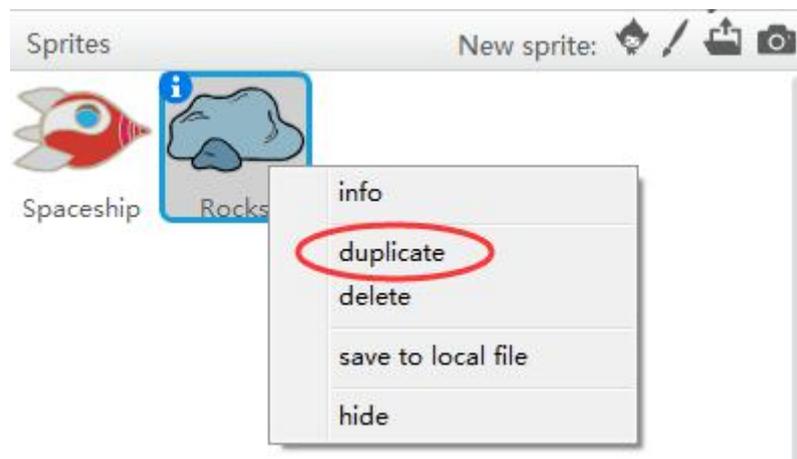


You need to keep detecting trails of space rocks. If touching [Spaceship], then play drum and change [color] effect.

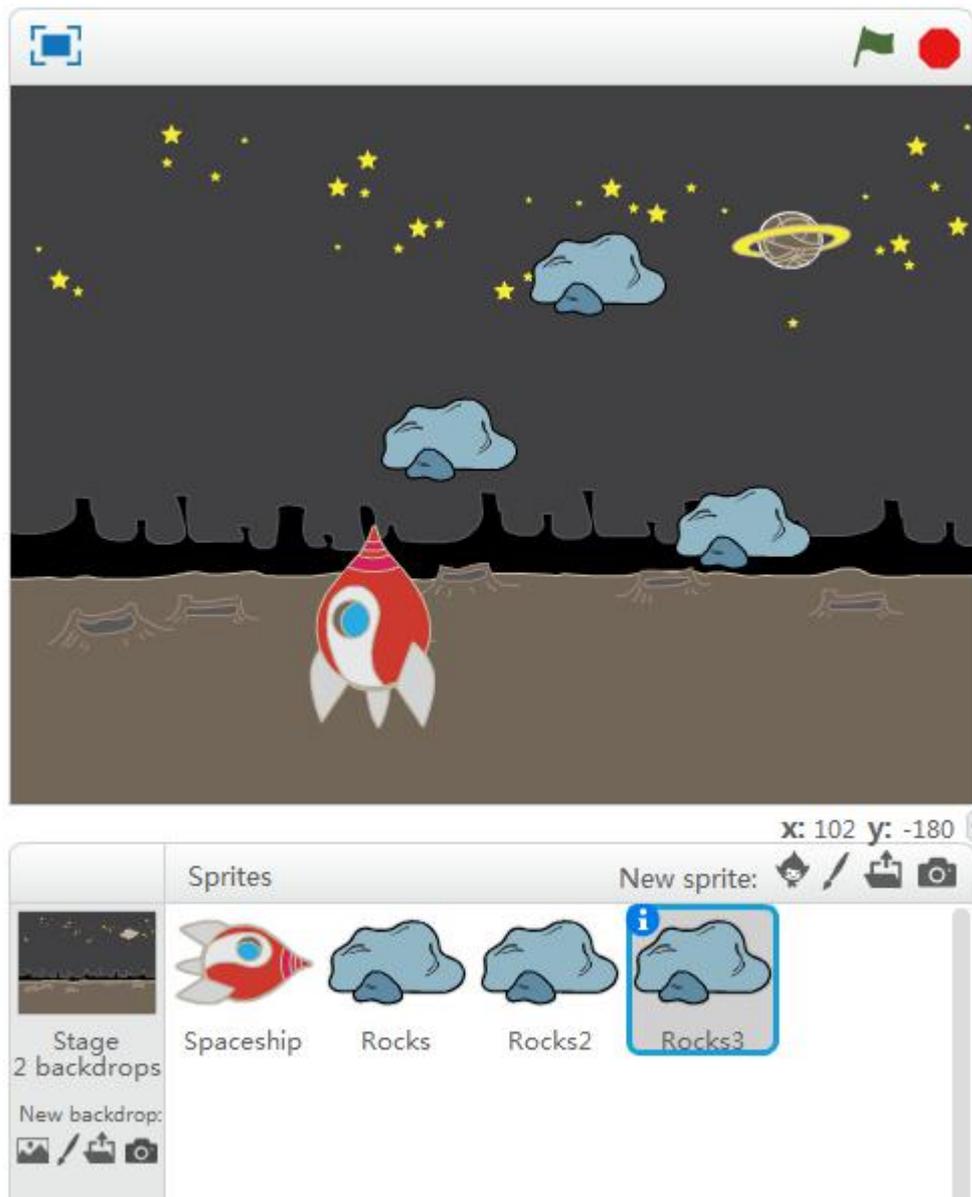
Challenging Task 2—Barrier breakthrough

It looks like so easy to overcome just one space rock, but what if more rocks popping up on your way?

Right click the “Rocks” icon under “Sprites”, select [duplicate] to add a couple of more rocks and set the same detecting program on each block of rocks. mBlock will rename them automatically as “Rock 1, Rock 2”.



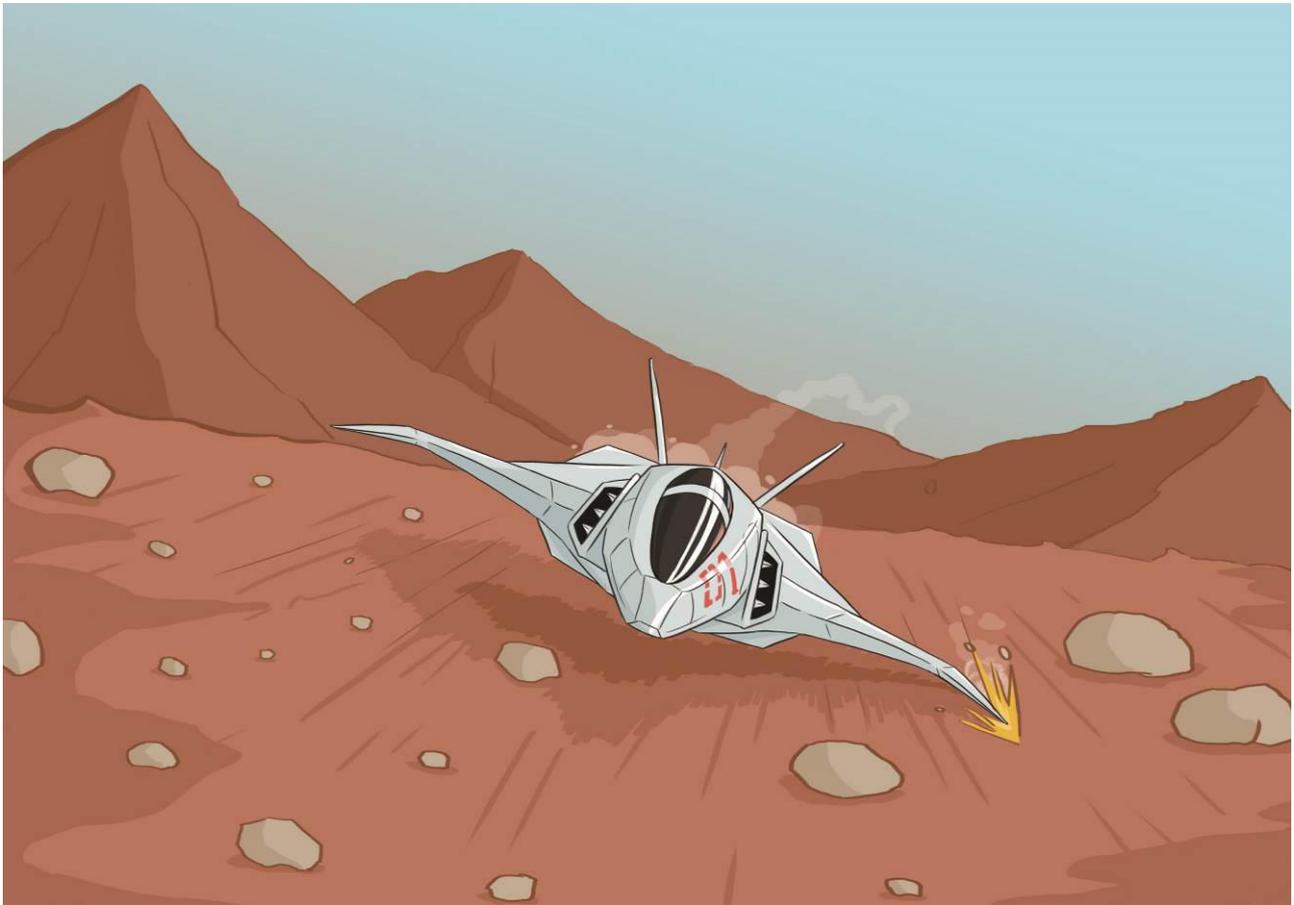
Click and drag all those rocks onto your stage backdrop one by one.



A lot of more challenging tasks are waiting ahead, just fighting! Take on an adventure with Ranger!
Can you design more interesting tasks? Use your imagination and creativity!

Conclusion of this chapter

The consolidation of both software and hardware helps provide an excellent platform to encourage and developing imagination and creativity of our learners. Start enjoying playing games designed by yourself?



“Coming across space debris at launching, then encountered with sudden strong storms before landing. So lucky me huh?!” Mark keeps muttering, but at the meanwhile, he holds his controlling rod tight with both hands and tries his best to balance the fuselage, despite that he doesn’t really like to pilot any vehicle manually. But the storm is just so violent. Without any satellite for A-GPS assistance, Mark determines to carry out an emergency landing. Due to the unexpected sandstorm, his emergency landing spot deviates about dozens of kilometers away from target station. To save energy, the crew decides to leave for the signal projector site through the land route.

Crew of Mars Landing:

Mark: Spaceship Captain

Peter: Spacecraft structural Engineer

Doctor Chiu: Archaeologist

Jennifer: Biologist

Rex: Mark’s assistant Robot