Introduction

For our Moonhack, we’re going to create a Australian scene where Scratch imagines himself going to the moon in a rocket. The backdrop for this will be a sky of twinkling stars.

We will add some cool sound effects, including a countdown from the original Apollo 11 mission liftoff. By duplicating sprites and scripts, our animals will appear to walk around, as if they had minds of their own. Finally, we will set up some events within our project to trigger events that re-dress our sprites to take us to the moon.

We’ll learn that:

☐ we can create something cool with only a few scripts for each sprite
☐ once we create one character, other characters are easy
☐ we can use costumes to change a whole scene
Step 1: Getting Started

To make things easier, we’ve created a base project, that includes all the images and sounds that you’ll need. This project requires Scratch version 2.

✅ Activity Checklist

- Load up Scratch, and go to File > Upload from my computer, to upload the base project .sb2 file into Scratch.

- You should now see the Uluru scene and some stars in the sky, and some animals.
• First, let's make those stars twinkle! Click on the sprite marked, 'stars' and create the following script in the 'scripts' tab (top right), by dragging blocks across from the left.

```
when [green flag] clicked
    hide
    switch costume to [costume 1] ▼
    go to x: [0] y: [0]
    show
forever
    set [ghost] [effect] to [40]
    next costume
    repeat [3]
        change [ghost] [effect] by [5]
        wait [pick random] [0.01] to [0.5] secs
```

• Now to position the moon. Click on the moon sprite, and add the
following script in the 'scripts' tab.

![Scratch block diagram]

**Test your project**

Run your project by clicking on the green flag. You should see the stars twinkling in the sky with the moon nearby. If not, go back and make sure that your script matches the code above.

**Save your project**

Click on the 'save now' text in the top right of your Scratch screen. It should change to 'saved'.

**Step 2: A Shortcut to get the Animals Moving**

In this step, we will learn a shortcut for making other characters move around on their own, once you already have a player character coded. We've already given you the basic Scratch astronaut character that can move around using the 'a' and 'd' keys.

**Activity Checklist**

- Click on Scratch the cat to select the sprite. You can see the scripts for Scratch in the 'scripts' tab. It should look like this.
• Copy all 3 scripts to the emu sprite by dragging each of them to the Emu in the sprite window (bottom left of the screen). Check that they have been copied by clicking on the Emu sprite and looking in the ‘scripts’ tab.

• Remove the Think block for the Emu. Now go to the Data section and click on ‘make a variable’. Tick the ‘For this sprite only’ box (important).

• Now create this script for the Emu. This generates a random number for making it walking about.
• Find the script that has two 'if' blocks. It should look like this.

```blocks
when [flag] clicked
set rotation style [left-right ▼]
forever
  if [key A] pressed? then
    point in direction [-90 ▼]
    change x by [-3]
    next costume
  if [key D] pressed? then
    point in direction [90 ▼]
    change x by [3]
    next costume
```

• Change it to look like this. It will use the random number in the `move` variable to control the Emu.

```blocks
when [flag] clicked
set rotation style [left-right ▼]
forever
  if [move] = [1] then
    point in direction [-90 ▼]
    change x by [-3]
    next costume
  if [move] = [3] then
    point in direction [90 ▼]
    change x by [3]
    next costume
```

• Repeat all the same steps for the Wombat.
Test your Project

Run your Scratch project. You should see the Emu walking around on its own, and check that the wombat walks around as well. If they seem to be stuck together, recreate the move variable with 'For this sprite only' set.

Save your project

Step 3: Create our Events

Now we need to send Scratch to the moon. We need to create some events that trigger our sprites to do things at specific times.

These are the events we’ll be creating:

- Takeoff: When our rocket takes off
- Travelling: When our rocket is travelling through space
- Landing: When the lunar lander is preparing to land
- Landed: When Scratch finally lands on the moon

Activity Checklist

- Select the Scratch sprite by clicking on it in the bottom section.
  You should see a script that looks exactly like this.
Now we need to change the bottom if to look like this. Use the drop down on the broadcast to create the takeoff event.

Select the rocket sprite by clicking on it. Add the following scripts. You’ll also be creating the travelling event, for the next step.
Test your project

Run your project and you should hear the countdown when you use the ‘a’ key to walk Scratch off the left of the screen. Once the countdown finishes, the rocket will fly to the top of the screen.

Save your project

Step 4: Travelling Through Space

Now that we’ve created the [takeoff] and [travelling] events, let’s do some space travel!

Activity Checklist
• To create a flying-through-space effect, we need to make the stars appear to fly past our rocket. Add the following scripts to the Rocket sprite's script tab.

```
when I receive travelling
repeat 50
create clone of myself
wait 0.01 secs
broadcast landing
```

```
when I start as a clone
repeat until y position < 170
change y by -7
delete this clone
```

• Add this script to the `ground` sprite.

```
when I receive travelling
hide
```

• Now drag the script to the `Scratch2`, `moon and earth`, `Emu`, `Wombat`, and `background` sprites. This will make them all disappear while the rocket is travelling through space.

• It's silent in space, so we need to stop all sounds. Add this script to the stage (bottom left corner).

```
when I receive travelling
stop all sounds
switch backdrop to space
```
Test your project

Run your project, and let the rocket take off. You should see it travelling through space, with the stars blurring in the background. The stars in the screenshot below aren’t blurred, but yours should be!

Save your project

Step 5: Landing Sequence

You’re almost there! In this step, we will use the landing and landed events to touch down in the lunar lander. Let’s change costumes to create the lunar landscape!

Activity Checklist

- Select the rocket sprite, and add this script.
• Select the ground sprite, and add this.

• Drag that script to the background sprite but set the costume to moon back instead.

• Now select the lunar_lander sprite, and add this script to make it land. As you might know, the moon’s gravity isn’t as strong as earth’s.

• From the moon, we’ll be able to see the earth coming up behind it. Add this script to the moon and earth sprite.
- We only have one more event to go, this will be `landed`. Add one more script to your `Scratch2` sprite.

```blocks
when I receive landed
show
go to x: -27 y: -109
say Congratulations. You did it!
```

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**Test your project**

If you’ve got this far, give yourself a pat on the back! You’ve done it. We got Scratch to the moon! Run your project and press the ‘a’ key to make Scratch run off the left of the screen. Your project should go all the way through to landing Scratch on the moon.

![Congratulations! You did it!](image)

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**Save your project**

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This coursework is developed on GitHub, at [www.github.com/CodeClub](http://www.github.com/CodeClub).
Challenge

Now that you’ve completed the basic project, you can customize all the sprites and add some extra controls. How about creating your own astronaut? Or adding some more animals? Check out the Code Club Dodgeball activity to add some simple jumping (on earth and the moon), or even look at other projects on Scratch for some more advanced techniques.