The Incredible Code Machine with Swift Playgrounds

Facilitator Guide

Welcome

Lead your own EU Code Week event

Celebrate EU Code Week — host your own coding event with Swift Playgrounds on iPad. EU Code Week is an initiative by the European Commission that aims to bring coding and digital literacy to everybody in a fun and engaging way.

Plan your event from start to finish

Use this guide to set up and lead your event with Swift Playgrounds. You'll find tips and activities to help you before, during and after the event.

Get started with Swift Playgrounds

Swift Playgrounds is a free iPad app that makes learning to code fun and interactive with real Swift code. The app comes with a complete set of Apple-designed lessons.

 During EU Code Week, try the Incredible Code Machine. Become a master builder and create your own machine with code. This challenge is recommended for 12-to-14-year-olds.
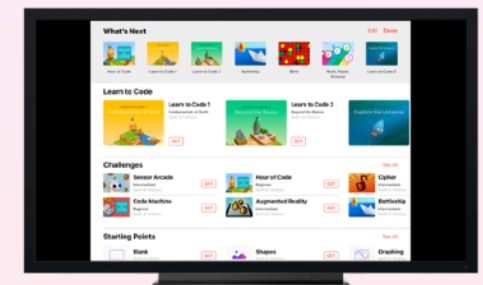
What you'll need

An iPad running iOS 10 or later for each participant is recommended.† Participants can also share iPad devices and code together.

The Swift Playgrounds app. Download here.

Optional: display for guiding participants through the activities

†Compatible with iPad Air or later, iPad mini 2 or later and all iPad Pro devices.
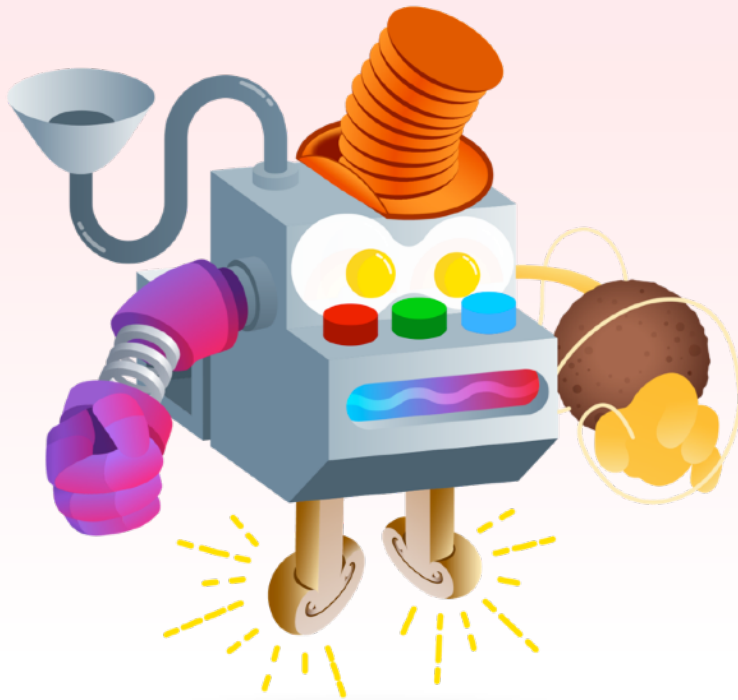
Before the event

1. Plan and invite

- Set a date and find a location for your event.
- Announce your event to teachers, parents and your community on social media using the hashtags #EveryoneCanCode and #CodeWeek.
- Register your event on the EU Code Week website and include the hashtag #EveryoneCanCode.
- Invite your group to attend.
- Explore more tools to promote your EU Code Week event.

2. Prepare

Here are some things you can do to prepare in the days leading up to your event.

- Watch these helpful video lessons* on coding concepts that are introduced in the Code Machine challenge:
  – Introduction to Commands
  – Introduction to Functions and Loops
  – Introduction to Arrays
- Explore the Code Machine challenge in Swift Playgrounds.
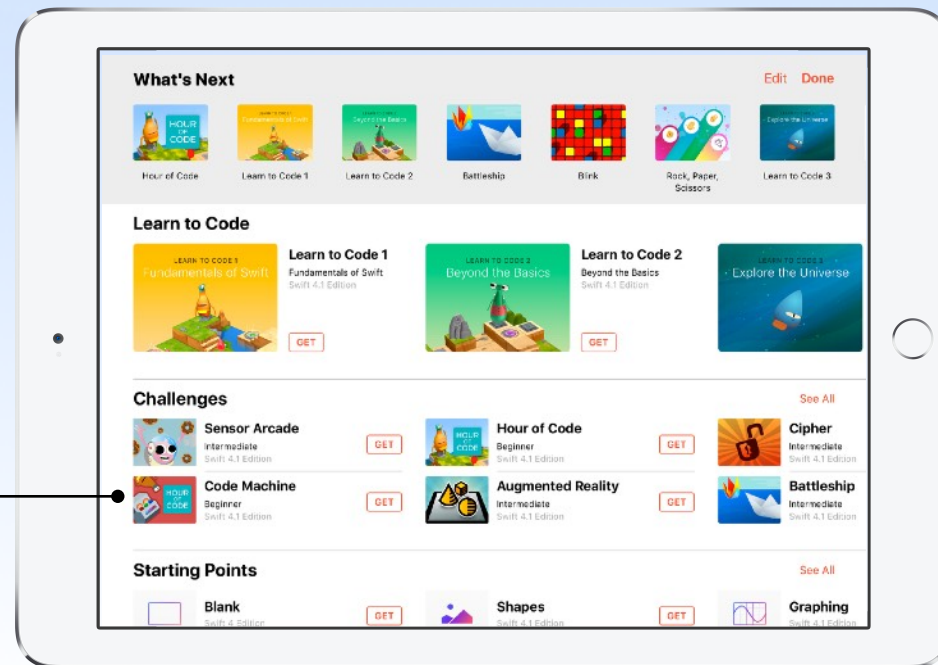
*Videos are in English only.

3. Set up the iPad devices

To get ready for your EU Code Week event, follow the steps below to prepare the iPad devices.
If you're using school-owned iPad devices, work with your IT admin to install Swift Playgrounds.

Participants using their own iPad devices will also need to follow these steps to prepare for
the event:

1. Download the Swift Playgrounds app.
2. Open the Swift Playgrounds app.
3. Scroll down to Challenges and tap the Code Machine challenge.
4. Tap Get, then tap Open.

Tap the Code Machine
challenge.

Event Overview

- **Introduction** (5 mins)
- **Warm-up Activity** (10 mins)
- **The Incredible Code Machine** (40 mins)
- **Wrap-up** (5 mins)

During the event

Intro (5 minutes)

Welcome your group to the event and take a few minutes to introduce coding and Swift Playgrounds. Remind participants how code powers virtually everything around us. When you want a pizza, code places your order online. And when you use your favourite apps, code lets you send a message, share a photo or swap faces with your cat in a photo.

If you have a video display or projector, show this inspiring video about how developers got their start (4 minutes, includes sound).

Explain that Swift Playgrounds is an app for iPad that helps you learn and explore coding with Swift, the same powerful programming language used to create popular apps in the App Store.

Warm-up Activity: Inputs and Outputs (10 minutes)

Help participants understand how computers interact with code through inputs and outputs.

Play a game of Pass the Message with the group. Start the chain by whispering a simple phrase, such as "I went on a bike ride this weekend and saw a giant robot", to the first person, who then whispers what they heard to the next person, and so on.

Here's the catch: each person needs to change one word in the sentence. It could be any word in the sentence from 'I' to 'robot'. The sentence doesn't have to make sense by the end of the activity. What sentence did the group end up with?

Before moving into the app, lead a brief discussion about the activity. When each person passed on the message, they provided an input to the next person. They then applied a rule — to change one word — and then outputted the result. This is similar to what a computer does with code. It takes in input, processes it and then provides the output.

Ask the group

Q. **What are some ways you can provide input to a computer?**

A. Keyboard, camera, microphone, Bluetooth, GPS and so on.

Q. **What are some ways a computer can provide output?**

A. Speakers, screen, printer and so on.

Q. **What are some everyday activities that you do with a computer and what are the inputs and outputs?**

A. Use Siri to message a friend: input message into a microphone, output message on a screen. Use the Calculator app to add: input maths problem into a keyboard, output answer on a screen. Create in GarageBand: input music into a screen, output sound through speakers.

Now we'll use these concepts in the Swift Playgrounds app.

Input: what's put in, taken in or used by a device or system.

Output: what's produced by a device or system.

The Incredible Code Machine (40 minutes)

In the Swift Playgrounds app, tap to open the Code Machine challenge. Explore the Incredible Code Machine together and learn what it can do and how it works. The machine is missing some parts. The challenge is to use logic and basic coding skills, like functions and loops, to figure out how to create new parts for it. By the end of this challenge, you'll have a fully restored machine, complete with customisable parts.
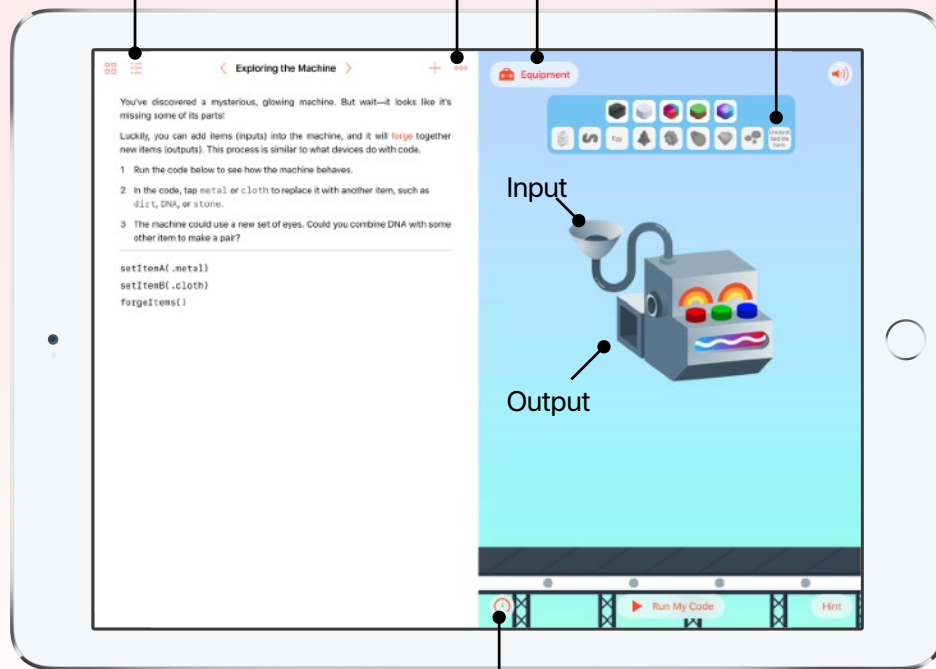
Participants may try to create more parts than needed on the first pages. Move them on as necessary.

Tap the Table of Contents icon to return to the Introduction, or to jump to other pages in the challenge.

Messed up your code? Try resetting the page..

Tap Equipment to track your new parts..

You can combine these items. For new items you create, you can tap them to see the 'recipe'.

Input

Output

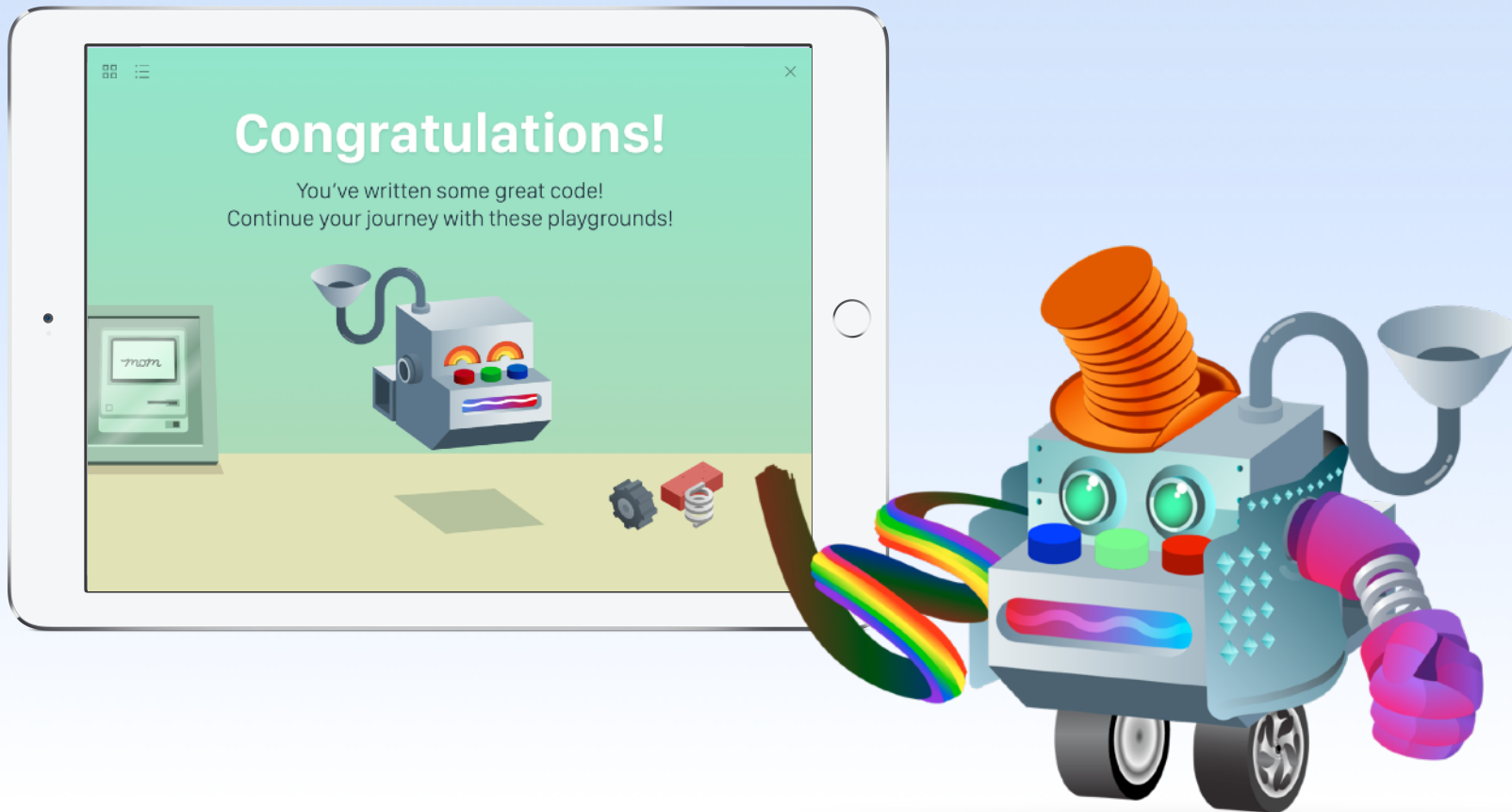Use Step Through My Code to highlight each line of code as it runs.

Regroup and review the experience together:

- Ask the group to show off their machine with the new parts they've added.
- Were there any patterns to the combination of items and the types of new parts? For example:
  - The red light typically applied 'heat' to make items like fried eggs.
  - Combining metal usually results in something with metal in it.
- What strategies did you use to create all the parts? (loops, arrays and so on)
- How does the machine work, and how does it relate to the Pass the Message game?

Wrap-up (5 minutes)

Congratulate your group for completing their challenge with Swift Playgrounds. At the end of the session, show them how to use the Table of Contents to see their Swift Playgrounds participation certificate. You can use Twitter to share screenshots of participants' unique Incredible Code Machine with the Apple Education community. You can tag it @AppleEDU and use the hashtags #EveryoneCanCode and #CodeWeek.

Remind them that they can keep learning by downloading the Learn to Code 1 and 2 playgrounds. Encourage them to keep coding so that one day they can build apps that bring their ideas to life.
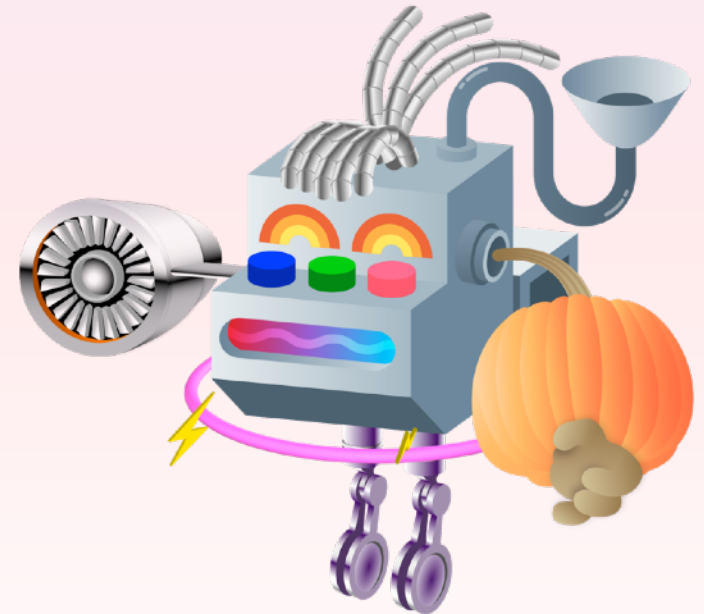
Explore more

Everyone Can Code is a program designed to give everyone the power to learn, write and teach code. Tap the links below to explore free teaching and learning materials we created to make it easy to continue coding with Swift.

For primary school on iPad

- Get Started with Code 1 Teacher Guide provides lessons to help any teacher guide students in years 1 to 3 through coding basics with visual-based apps like codeSpark Academy and Tynker.

- Get Started with Code 2 Teacher Guide continues the coding journey with students in years 4 to 6, taking them through fundamental coding concepts using a visual-based app like Tynker.

For secondary school and above on iPad

- Swift Playgrounds is a free iPad app for first-time coders with a complete set of Apple-designed Learn to Code lessons that make getting started fun and interactive.

- Swift Playgrounds: Learn to Code 1 & 2 Teacher Guide provides lesson plans, evaluation rubrics, downloadable presentations and more to help any teacher bring Swift Playgrounds into the classroom.

- Swift Playgrounds: Learn to Code 3: Teacher Guide helps teachers build on coding skills from Learn to Code 1 & 2. It includes story activities, code review lessons, Keynote presentations, journal prompts and more.

For secondary school and above on Mac

The Intro to App Development with Swift course introduces students to the world of app development and the fundamentals of Swift and Xcode. The course culminates in a final project where they can choose one of two basic iOS apps to build.

- Intro to App Development with Swift
- Intro to App Development with Swift: Teacher Guide

App Development with Swift takes students further, whether they're new to coding or want to expand their skills. By the end of the course, they'll be able to build a fully functioning app of their own design.

- App Development with Swift
- App Development with Swift: Teacher Guide