AN INTRODUCTION TO SCRATCHJR

In recent years there has been a proliferation of educational apps and games, full of flashy graphics and engaging music, for young children. But many of these educational apps have been frustrating for parents and teachers. The

problem: very few educational apps provide young children with opportunities to design, create, and express themselves. That's what motivated us to create ScratchJr.

WHAT IS SCRATCHJR?

ScratchJr is an introductory programming language that encourages creativity and expression, enabling five- to seven-year-old children to create their own interactive projects through *coding*, as it is often called these days.

Using ScratchJr, children can snap together programming blocks to make characters move, jump, dance, and sing. They can modify how their characters look, design their own backgrounds, add their own voices and sounds and even photos of themselves—and then use the programming blocks to bring their characters to life.

ScratchJr was inspired by the popular Scratch programming language, used by millions of young people (ages eight and up) around the world. We redesigned the interface and programming language to make it developmentally appropriate, as well as fun and engaging, for younger children.

Based on feedback from children, parents, and teachers, we went through dozens of prototypes for ScratchJr to make it as effective as possible for its purpose. We hope that you find it a useful tool for engaging children.

WHY DID WE CREATE SCRATCHJR?

We believe that every child should be given the opportunity to learn how to code. Coding is often seen as difficult or exclusive, but we see it as a new type of literacy—a skill that should be

accessible for everyone. Coding helps learners to organize their thinking and express their ideas, just as writing does.

As young children code with ScratchJr, they learn how to create and express themselves with the computer, rather than just interact with software created by others. Children learn to think sequentially, explore cause and effect, and develop design and problem-solving skills. At the same time, they learn to use math and language in a meaningful and motivating context.

As children use ScratchJr, they aren't just learning to code, they are coding to learn.

WHO IS THIS BOOK FOR?

This book is for anyone who wants to help children learn to code and, more broadly, to think creatively and reason systematically. It was written particularly for people without coding experience or technical expertise, but it can also be helpful for those who do have expertise but don't have experience working with young children.

ScratchJr was designed especially for five- to seven-year-olds as a precursor to other programming languages. With a little additional support, younger children can enjoy it too, and it can also be useful for introducing older children to coding before they move on to other programming languages (like Scratch).

And, of course, for parents or educators without any coding knowledge, this book is a good way to learn the basics of coding. The best way to learn something new is to teach it to someone else. So as you help young children learn to code, you'll be learning too.

WHAT DO YOU NEED?

You need to have ScratchJr downloaded on a tablet. ScratchJr is available free of charge and runs on iOS and Android devices. There are links to download ScratchJr at *http://www.scratchjr .org/*. You can download it from the App Store for an iPad, and it runs on second-generation or newer iPads. Download it from the Google Play Store if you have a 7-inch Android tablet or larger that runs Android 4.2 (Kit Kat) or later.

WHAT'S IN THIS BOOK?

This book consists of four chapters. Chapter 1 introduces some initial activities to familiarize you with the basic features of ScratchJr. The rest of the book assumes you can make your way around ScratchJr, so don't skip the first chapter! The remaining chapters describe projects that young children can create with ScratchJr. Chapter 2 shows playful animations, Chapter 3 shows how to tell interactive stories, and Chapter 4 shows how to create fun games.

Each chapter is made up of a set of short activities that introduce new programming blocks and features and a final project to integrate all of this knowledge. Each activity reinforces age-appropriate math and literacy skills, and includes tips and challenges for children who want to explore more.

Finally, the appendices have resources and references to help you make the best use of ScratchJr.

HOW SHOULD YOU USE THIS BOOK?

We developed the projects as a sequence of activities that will incrementally teach different aspects of ScratchJr in a developmentally appropriate way. But don't feel as though you need to follow this book step-by-step. Feel free to mix and match and adapt our suggested projects to your own and your child's interests. Follow your child's lead. Every detour is a child-directed learning experience. ScratchJr is a tool for self-expression. Children should feel free to explore ScratchJr's many buttons and features and to use characters and backgrounds that are meaningful to them. This is something we hear frequently from parents and teachers.

And please, do let us know how it's going! Hearing about all the different ways you've used this book will help us to improve ScratchJr further. Send your comments to *info@scratchjr.org*.

Have fun!

CHAPTER 1
GETTING STARTED

Welcome to ScratchJr! The projects that you can make with ScratchJr are limited only by your imagination. If you can dream it, you can make it.

This chapter will teach you the basics of using ScratchJr, and together we'll make a dance party! You'll learn how

to make characters move and speak, how to change the background, and how to save your work so you can build on it again or share it with your friends. You'll also learn how to delete objects and undo steps.

After finishing this chapter, you'll know your way around the ScratchJr interface, and you'll know how to use the programming blocks to bring your characters to life.

ACTIVITY 1: THROW A DANCE PARTY!

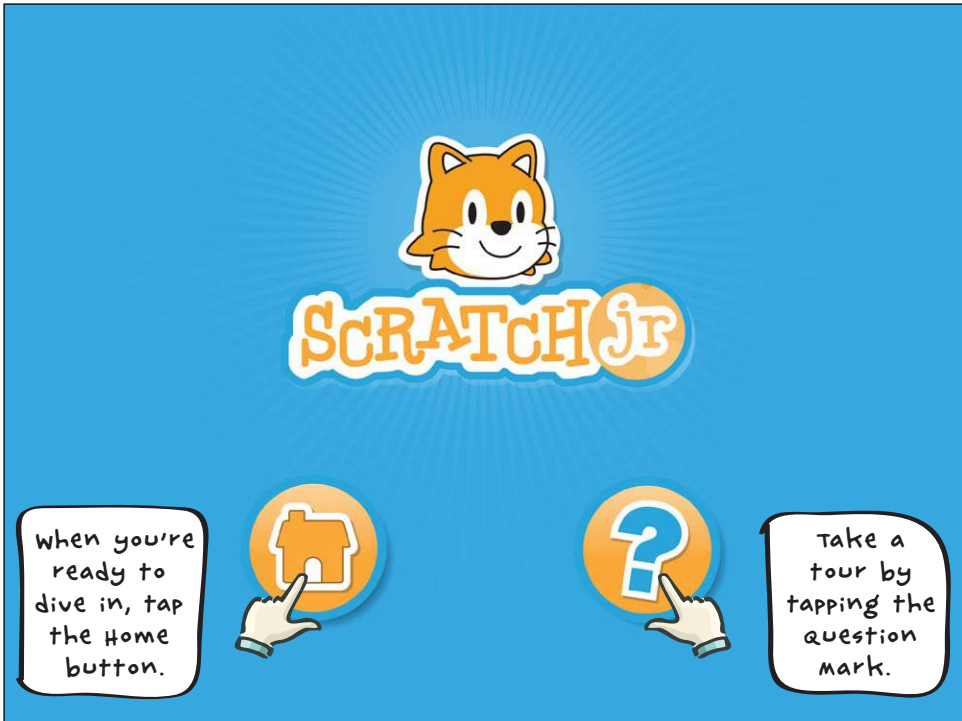Let's get the ScratchJr cat to dance with a friend on a stage.

This chapter will show you how to set up and complete your first project.

STEP 1: OPEN THE APP

This is the first screen you'll see when you open the ScratchJr app. Tap the **Home** button on the left.

STEP 2: MAKE A NEW PROJECT

The home screen shows all of your saved ScratchJr projects. In the following picture, you can see two projects that have already been created. If this is your first project, you'll see only the plus sign. Tap the plus sign to make a new project.
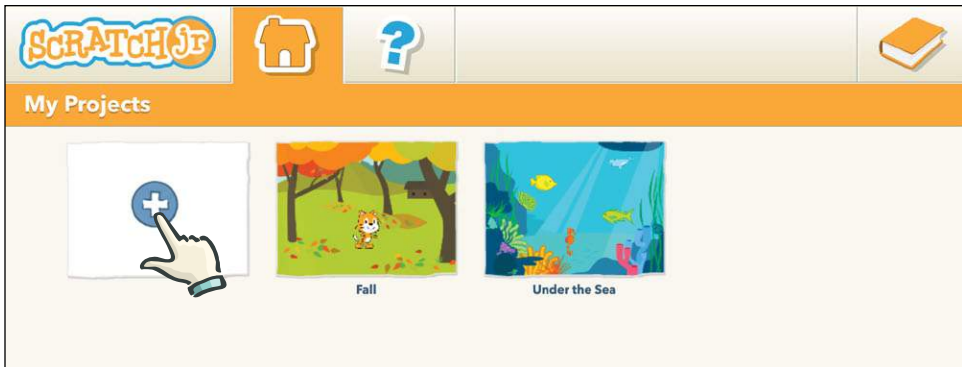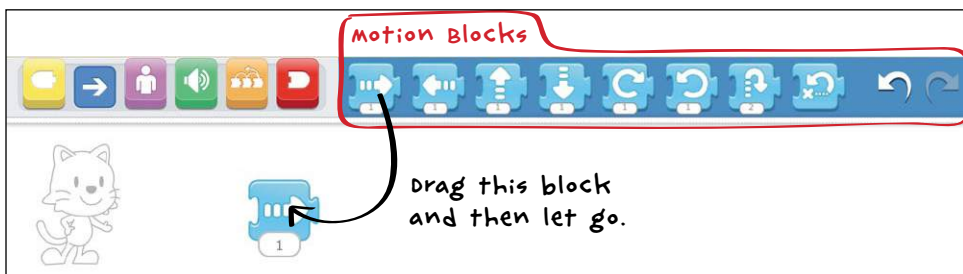
STEP 3: MAKE THE CAT MOVE!

This is where the magic happens! You can make amazing animations, silly stories, and great games—all from the ScratchJr editor. Whatever you make will play in the center of the screen. We call this area the *stage*.

Each new project starts with the ScratchJr cat. To make the cat move, we can use the *motion blocks*, which are in the blue *palette* of programming blocks. Use your finger to drag one of the blue arrow blocks to the *programming area*.

Motion Blocks

Drag this block
and then let go.

Tap the blue block, and the cat moves in the direction of the arrow!

You can drag more blocks to the programming area and snap them together to make a sequence of actions, which we call a *script*.

Add some more blue motion blocks to make the cat dance. Can you guess what movement each block makes? Experiment to see which blocks make the best dance.

To run the script and see the cat dance, tap any of the blocks in the script. Notice that the script runs from the beginning no matter which block you tap, and each block is highlighted as it runs.

Congratulations! You just made your first computer program! Now let's turn it into a dance party!

STEP 4: USE THE GREEN FLAG

There are other ways to make your project run besides tapping on scripts. You can also use the Start on Green Flag block to start your script.

First, tap the yellow button in the *block categories area* to show the *triggering blocks*. Select the **Start on Green Flag** block, drag it to the programming area, and snap it onto the front of your script.
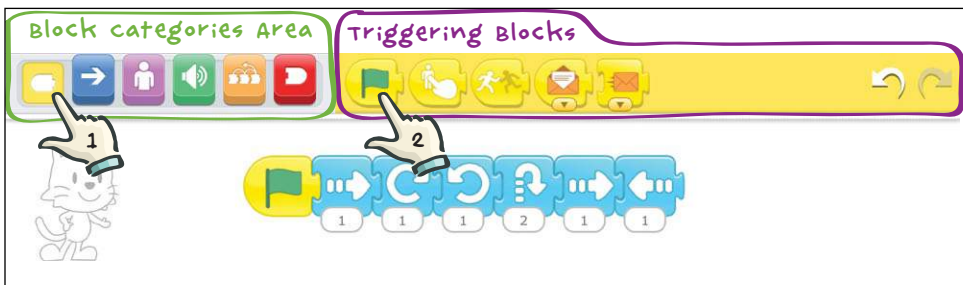
Now tap the **Green Flag** button at the top of the screen.

The cat will dance just like it did when you tapped on the script!

You can see that there are other triggering blocks. You'll find out how to use these as you go through the other projects in this book.

STEP 5: ADD A BACKGROUND

Let's get the cat to dance on a stage, instead of just a plain white background. Select a new background by tapping on the button with the blue sky and green grass at the top of the main screen. This is called the *Change Background button.*

You'll see loads of backgrounds that you can choose from. For our dancing cat, let's choose the theatre. Tap the check mark at the top to load it into your stage.
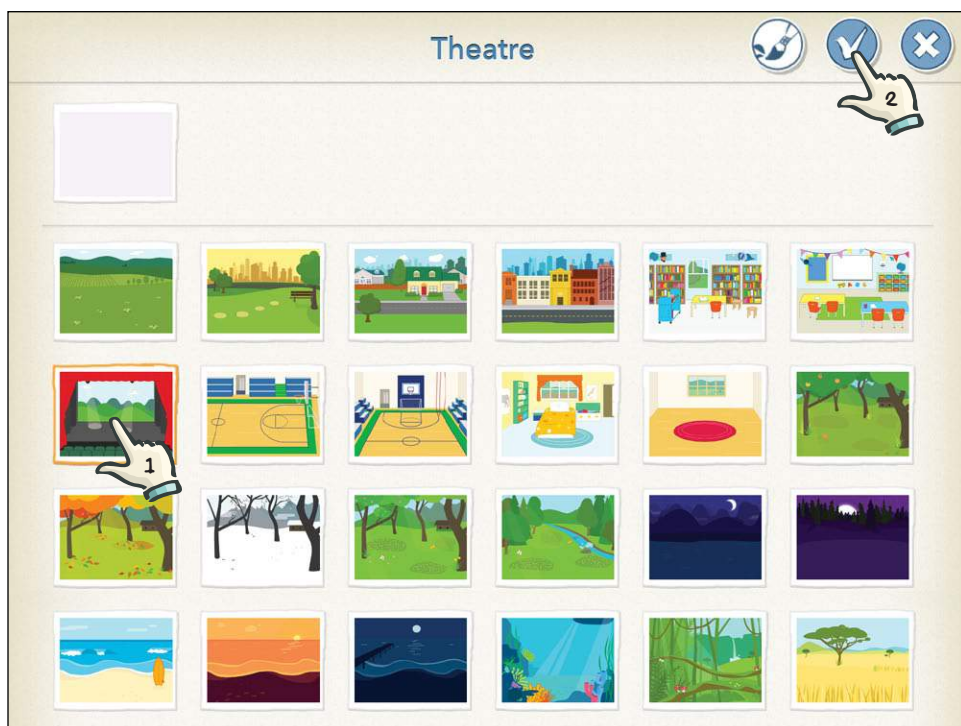
Congratulations! Your cat is a star!

The cat is smiling and dancing, but it looks a bit lonely dancing on its own. . . .

STEP 6: ADD ANOTHER CHARACTER

Let's give your cat a friend. Tap the plus sign on the left side of your screen to add a character.

If you scroll down the page, you'll see the many characters you can choose from. Tap the character you want to add, and then tap the check mark to add it to your project. We've chosen the penguin.

Now there are two characters on the stage. To the left of the stage is the *character area*, which shows you all the characters involved in your project.

The new character will always appear in the middle of the stage. To move the character, use your finger to drag it wherever you want on the stage. We've dragged each of our characters to a spotlight.
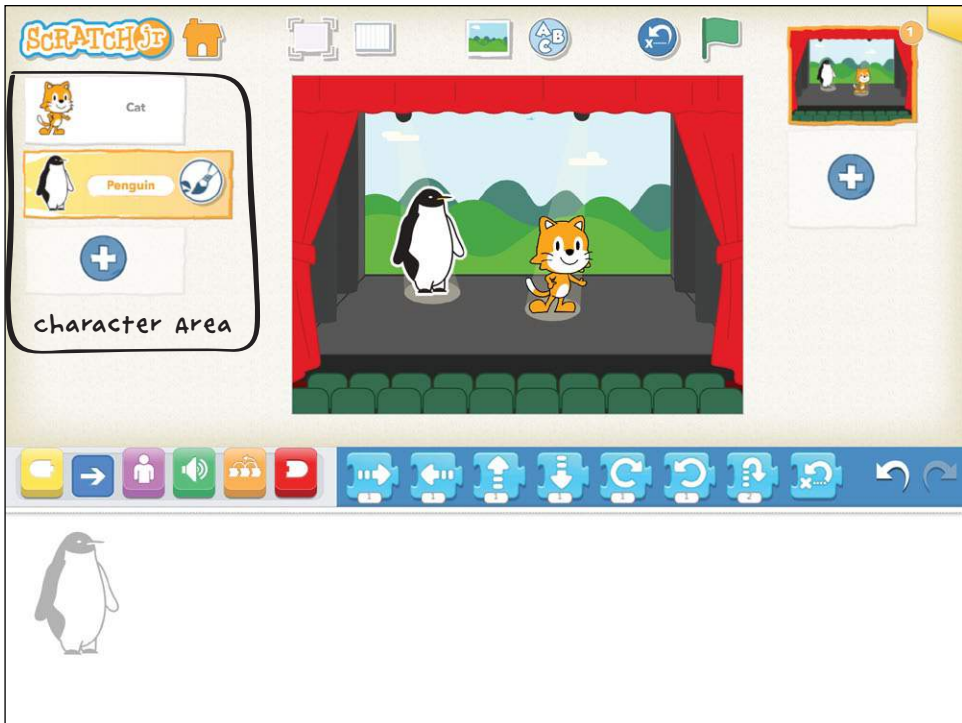
You might notice that the script you wrote for the cat disappeared after you selected a new character. Don't worry: the script is still there! It's in the cat's programming area, and now the screen is showing the programming area for the penguin. Each character has its own scripts, like actors in a play. To see the cat's script, tap the cat in the character area on the left, and you'll see that your script is still there. Then select the penguin again so that you can give it dance moves of its own.

STEP 7: DON'T JUST DANCE, SAY SOMETHING!

Let's make the penguin say something before it dances. You can add speech bubbles for characters using the purple Say block. Tap the purple button in the block categories area to reveal the *looks blocks*.

Drag the **Say** block to the programming area.
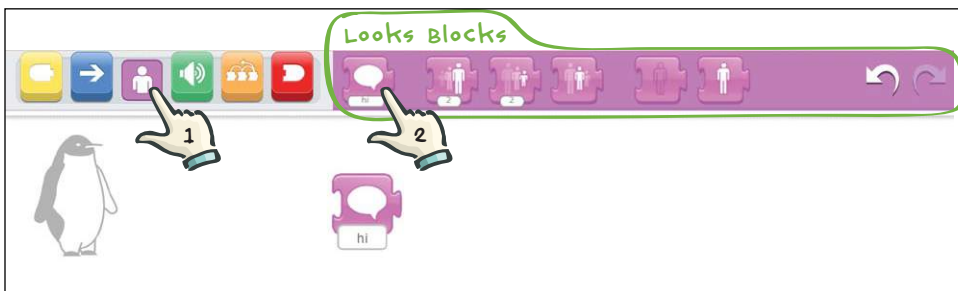
Let's change the text of the Say block from "hi" to "Let's dance!" First, tap the word *hi* to make the keyboard appear. Use the backspace key to delete *hi*, and then type **Let's dance!** or whatever you want the penguin to say.
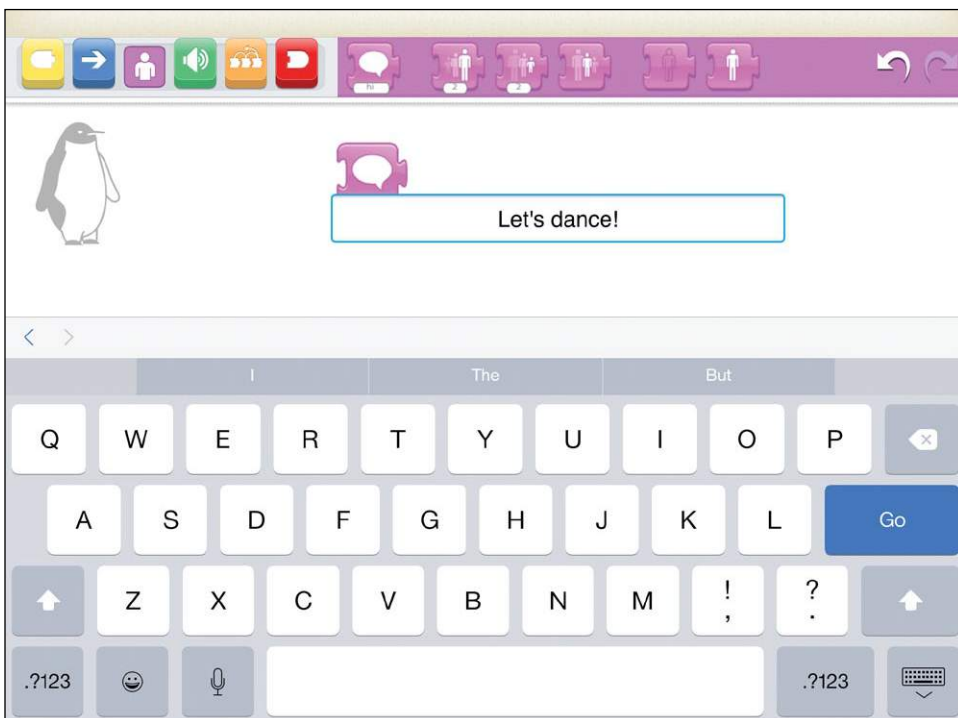
Add some blue motion blocks to make the penguin dance, and then put a **Start on Green Flag** block at the beginning of the penguin's script.

Now try it out by tapping the **Green Flag** button ( ) at the top of the screen.

You'll see that the scripts for the cat and the penguin start running at the same time. When you tap the Green Flag button, it will run every script that begins with a Start on Green Flag block for every character, all at the same time. This will be really useful as you make bigger projects with more characters.

STEP 8: ADD A TITLE

You can display a title on the stage by tapping the **Add Text** button ( ) at the top of the screen. In the window that pops up, type **Dance Party**.

You can drag the title around the screen and place it any-where you want.

You can also use the **Change Size** ( ) and **Change Color** ( ) buttons to change the size and color of the title you give your project. Play around and see what suits your stage best. Press **Go** to try it out on the stage. If you want to edit the title again, you can tap on the words to bring the text window back up.
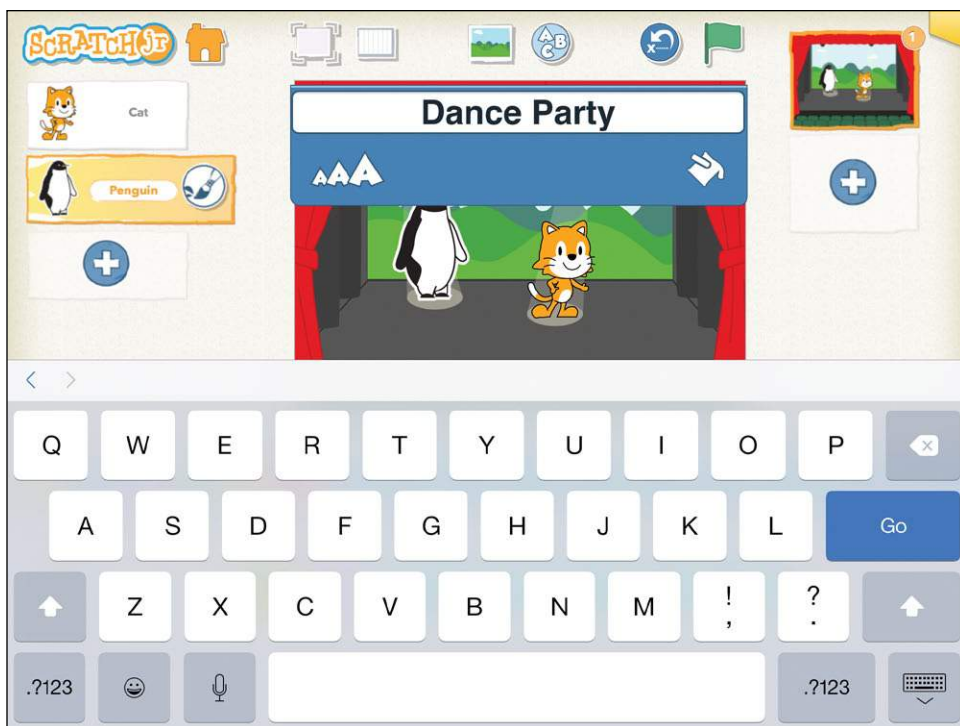
STEP 9: NAME YOUR PROJECT

Now give your project a name so that when you open ScratchJr again and see your projects on the home screen, you'll know which project is which.

To name your project, tap the yellow tab in the top-right corner of the screen. Then delete the current project name (*Project 1*) and type **Dance Party**. When you're ready to return to the main screen, tap the check mark.
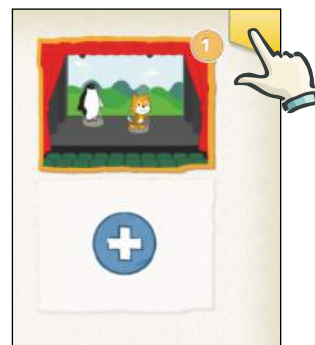
If you want to send your project to someone else who has ScratchJr, you can do that from this screen too. For more details on how to sha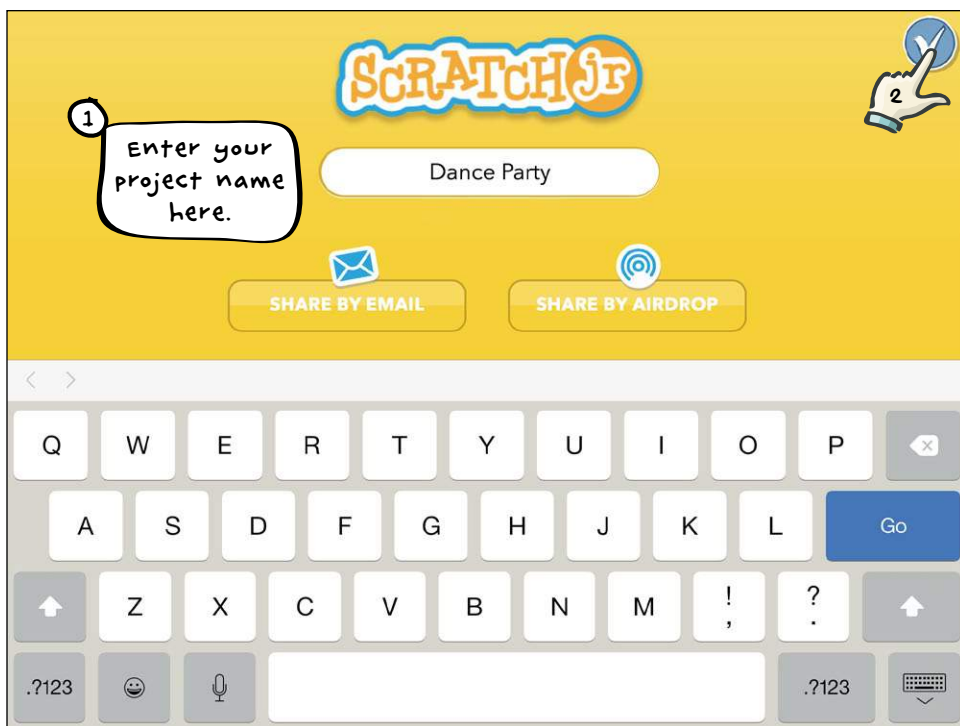re your projects, see the Frequently Asked Questions on the ScratchJr website (*http://www.scratchjr.org/about .html#faq*).

You're almost finished, but you have one important step left!

STEP 10: SAVE YOUR PROJECT

To save your project and go back to the home screen, tap the **Home** button ( ) in the top-left corner. Your project will not be saved until you return to the home screen, so it's a good idea to do this a few times while you are working on your project so that you don't lose anything.

To continue working on your project, just tap the small image of the project on the home screen. This will take you back to the ScratchJr editor for that project.

HINTS

The ScratchJr characters are all either facing forward or facing right when you first add them to your stage. If you want a character to face to the left, drag a Move Left block to the programming area and tap the block.

The character will turn to the left and take a step. You can then delete this block and the character will continue to face left.

TIPS FOR GROWN-UPS

ScratchJr makes different sounds when you perform different actions on the interface. These sounds can be very useful when you first start using ScratchJr. For example, when you have successfully snapped blocks together in a script, you'll hear a "pop." If you want to turn the sounds off, however, you can just turn the volume off on your device.

DON'T BE AFRAID TO EXPLORE!

As you explore the various features of ScratchJr, you should feel free to experiment, try new features, and test out new blocks. You can make your project whatever you want it to be in many ways: you could move your party to the beach, put a boat in the background, add more characters, or do almost anything else you want to do. A good feature of ScratchJr is that if you decide you don't like any of the changes you've made, you can easily get rid of them.

We'll show you some simple ways to do this.

UNDOING AND REDOING

You can undo your most recent actions by tapping the Undo button at the far end of the blocks palette. If you tap the Undo button multiple times, you will undo more and more of your work, one step at a time.

If you've undone several steps, the Redo button will reverse the most recent Undo.

DELETING OBJECTS

To delete something from ScratchJr, press it with your finger and hold it for a few seconds (sometimes called a *long press*) until you see a red X appear on the object. Tap the X to delete the object.

You can use this process to delete a character within a project or even delete an entire project from the home screen.
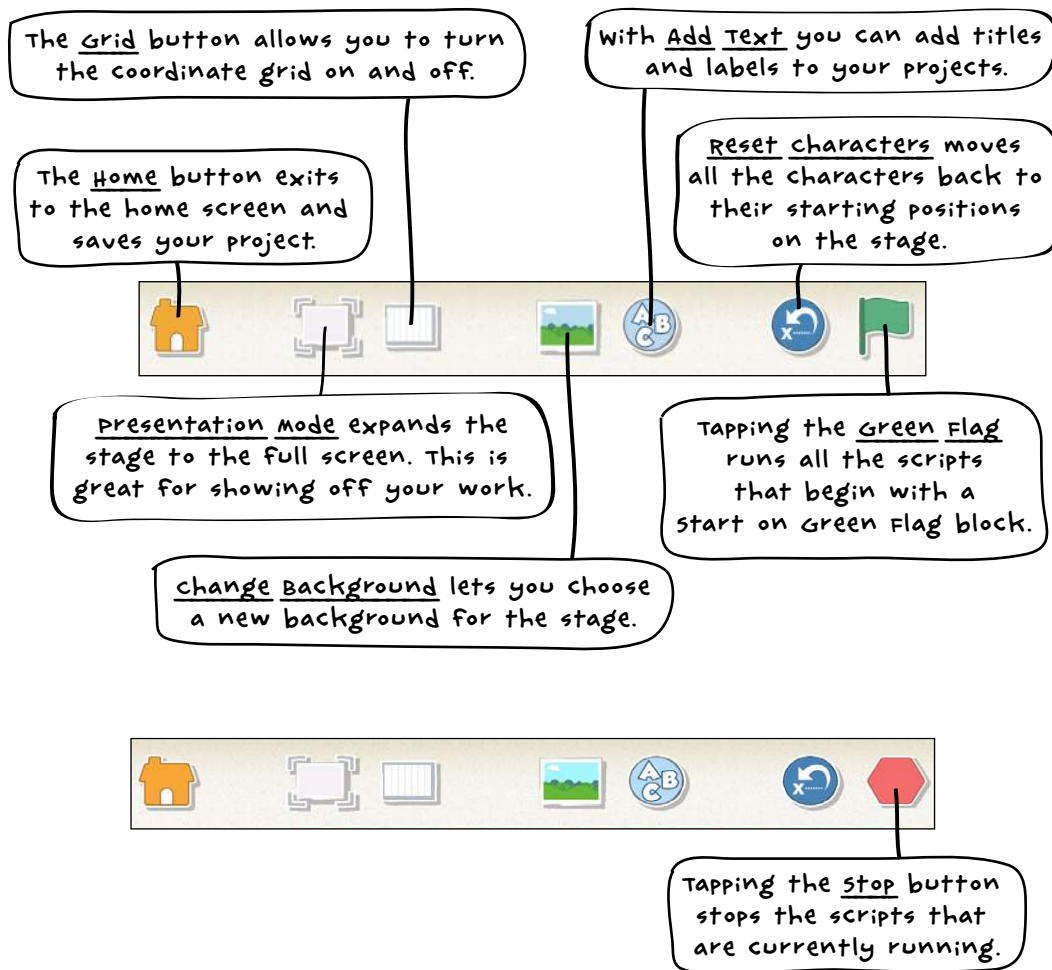
DELETING BLOCKS

To get rid of a block or even a whole script from the programming area, just drag it back up to the blocks palette and let go. You can have any color palette showing to do this; the palette doesn't have to be the same color as the blocks you are deleting.

A GUIDED TOUR OF THE SCRATCHJR INTERFACE

Now that you have a good grasp of the basics, you can take a look at all the buttons and features. Try a few of the ones we skipped earlier. If you feel overwhelmed, don't worry: the rest of the book's projects will show you how to use everything! It's okay to skip ahead and refer back here when you need to.

Let's start with the buttons at the top of the editor.

The Grid button allows you to turn the coordinate grid on and off.

With Add Text you can add titles and labels to your projects.

The Home button exits to the home screen and saves your project.

Reset characters moves all the characters back to their starting positions on the stage.

Presentation mode expands the stage to the full screen. This is great for showing off your work.

Tapping the Green Flag runs all the scripts that begin with a start on Green Flag block.

change Background lets you choose a new background for the stage.

Tapping the stop button stops the scripts that are currently running.

In the character area, you can select among the characters in your project to give them scripts or tap the plus sign to add a new character. Tap the name to rename a character, or tap the paintbrush to edit its image. To delete a character, press and hold it until you see the red X; then tap the X.

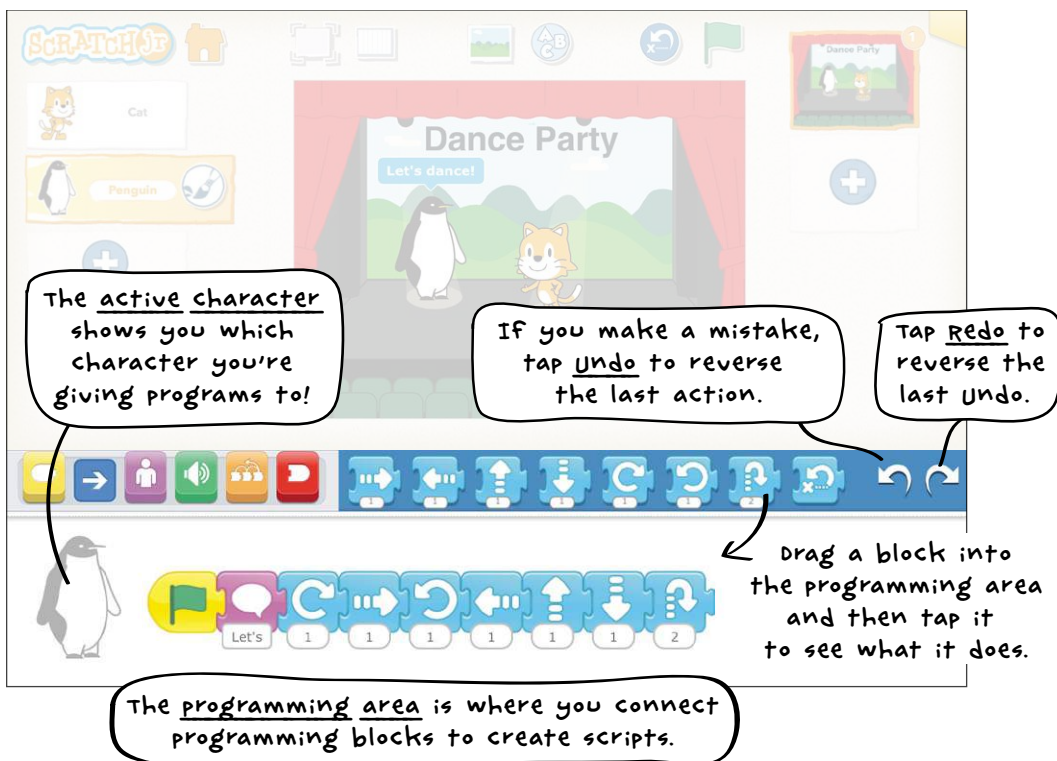Using Project Information, you can change the title of your project and share the project with friends.

The pages area allows you to select among the pages in your project. Check out "Turn the Page!" on page 58 to see how to use the pages area.

The stage is where the action takes place.

The block categories area is where you select a category of programming blocks: triggering, motion, looks, sound, control, or end.

The blocks palette displays blocks you can add to your project.

The **active character** shows you which character you're giving programs to!

If you make a mistake, tap **Undo** to reverse the last action.

Tap **Redo** to reverse the last Undo.

Drag a block into the programming area and then tap it to see what it does.

The **programming area** is where you connect programming blocks to create scripts.

WHAT'S NEXT?

You now have a good working knowledge of the ScratchJr interface. Move on to the next chapter to learn about new programming blocks and to explore new types of projects.