Learn JavaScript with p5.js

Coding for Visual Learners

Engin Arslan

Apress®

Learn JavaScript with p5.js: Coding for Visual Learners

Engin Arslan
Toronto, Ontario, Canada

ISBN-13 (pbk): 978-1-4842-3425-9 ISBN-13 (electronic): 978-1-4842-3426-6
https://doi.org/10.1007/978-1-4842-3426-6

Library of Congress Control Number: 2018935139

Copyright © 2018 by Engin Arslan

This work is subject to copyright. All rights are reserved by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed.

Trademarked names, logos, and images may appear in this book. Rather than use a trademark symbol with every occurrence of a trademarked name, logo, or image we use the names, logos, and images only in an editorial fashion and to the benefit of the trademark owner, with no intention of infringement of the trademark.

The use in this publication of trade names, trademarks, service marks, and similar terms, even if they are not identified as such, is not to be taken as an expression of opinion as to whether or not they are subject to proprietary rights.

While the advice and information in this book are believed to be true and accurate at the date of publication, neither the authors nor the editors nor the publisher can accept any legal responsibility for any errors or omissions that may be made. The publisher makes no warranty, express or implied, with respect to the material contained herein.

Managing Director, Apress Media LLC: Welmoed Spahr
Acquisitions Editor: Natalie Pao
Development Editor: James Markham
Coordinating Editor: Jessica Vakili

Cover designed by eStudioCalamar

Cover image designed by Freepik (www.freepik.com)

Distributed to the book trade worldwide by Springer Science+Business Media New York, 233 Spring Street, 6th Floor, New York, NY 10013. Phone 1-800-SPRINGER, fax (201) 348-4505, e-mail orders-ny@springer-sbm.com, or visit www.springeronline.com. Apress Media, LLC is a California LLC and the sole member (owner) is Springer Science + Business Media Finance Inc (SSBM Finance Inc). SSBM Finance Inc is a **Delaware** corporation.

For information on translations, please e-mail rights@apress.com, or visit http://www.apress.com/rights-permissions.

Apress titles may be purchased in bulk for academic, corporate, or promotional use. eBook versions and licenses are also available for most titles. For more information, reference our Print and eBook Bulk Sales web page at http://www.apress.com/bulk-sales.

Any source code or other supplementary material referenced by the author in this book is available to readers on GitHub via the book's product page, located at www.apress.com/978-1-4842-3425-9. For more detailed information, please visit http://www.apress.com/source-code.

Printed on acid-free paper

Table of Contents

About the Author vii

About This Book ix

Chapter 1: Introduction 1

Why Learn Coding? 1

Coding vs. Programming 2

On HTML and CSS 3

Why Learn JavaScript? 4

Why Do We Have Different Languages? 6

Learning JavaScript with p5.js 8

Chapter 2: Getting Started 13

Installing p5.js 13

Gentle Introduction to JavaScript 16

Getting Started with p5.js 24

More About Functions 26

Coordinates in p5.js 31

Summary 35

Practice 36

Chapter 3: Colors in p5.js 37

Color Functions in p5.js 37

Changing Shape Colors 39

Summary....42
Practice....42

Chapter 4: Operators and Variables....45

Setup....45
Variables....47
Variables Continued....49
Predefined Variables in p5.js....55
Summary....58
Practice....59

Chapter 5: Conditional Statements and Comparison Operators....61

frameCount, frameRate, and frame....61
Conditionals....66
Summary....75
Practice....76

Chapter 6: More p5.js Variables....77

mouseIsPressed....77
mouseX and mouseY....80
Summary....83
Practice....84

Chapter 7: Loops....85

For Loop....85
Random and Noise Functions....92
Summary....99
Practice....100

Chapter 8: Functions 101

Creating Functions 101

Revisiting Setup and Draw Functions 107

Summary 108

Practice 108

Chapter 9: Objects 109

Using Object Initializer 109

Using the Constructor Function 117

Summary 123

Chapter 10: Arrays 125

Using the push Method 125

Using Arrays 133

Using the remainder Operator 136

Summary 141

Practice 141

Chapter 11: Events 143

Using mousePressed 143

Using keyPressed 145

Summary 151

Practice 151

Chapter 12: More on p5.js 153

Rotate and Translate 153

Push and Pop 159

Summary 164

Practice 165

Chapter 13: Final Project 167

Getting Started 168

User Interaction 176

Keeping the User Score 181

Final Code 198

Summary 208

Appendix: Final Words 209

Where to Go Next 210

Additional Resources 212

Index 213

About the Author

Engin Arslan is a Software Developer with a Bachelor of Science in Materials Engineering and a Postgraduate Degree in Visual Effects. Before becoming a Developer, he worked as a Visual Effects Artist / Technical Director on films and TV shows including *Resident Evil*, *Tron*, *Mama*, *Pompeii*, *Vikings,* and *Strai*n. He received an Emmy nomination and won a Canadian Screen Award for his achievements in Visual Effects. During his time in VFX, he fell in love with Python and with programming in general. As a result, he changed careers to be able to immerse himself completely in software development. Engin currently works at a Toronto-based digital services company, where he helps develop solutions in strategic problem spaces using emerging technologies. He also works at Seneca College as a part-time professor and creates online courses for Lynda/LinkedIn and Pluralsight.

About This Book

The emphasis of this book will be primarily on learning programming using JavaScript and p5.js and secondarily in creating visuals. The main focus is to teach you how to program so that you can choose to pursue whatever field that you would like with your newly established skill set. The skills that you will acquire from this book are highly transferrable and can be used with whatever you choose to build: whether web applications, programmable robots, or generative art. This means that I will provide you with enough context so that you can build a strong foundation for programming. But I also won't hinder your momentum with irrelevant technical or theoretical points. The aim is to build a strong but a minimum viable knowledge to get you running with coding. This is the book that I wished I had available when I was learning coding myself.

If you are an artist or a visual designer, this book is perfect for you as you might find the examples we will be building to be directly relevant to your work. If not, this is still a great book for learning programming as the visual nature of the exercises will help you grasp the fundamentals of programming more easily and let you build a strong foundation in a shorter amount of time.

This book will present various JavaScript and p5.js features and concepts in the following chapters. The knowledge will be reinforced by building several useful examples like an animation and a data visualization; and as a final project, we will be building a game that can be deployed online using what we learned in this book!

Here is a rundown of the topics that we will be covering:

Chapter 1 - Introduction: Provides an overview of coding versus programming.

Chapter 2 - Getting Started: We will learn some very basic JavaScript commands and operations to get started with using p5.js.

Chapter 3 - Colors in p5.js: This will be a p5.js-specific chapter where we learn about how colors are defined and used in p5.js. This doesn't pertain to JavaScript but needs to be explored regardless to be able to use p5.js in a comfortable manner.

Chapter 4 - Operations and Variables: We will make use of the JavaScript knowledge we acquired in the second chapter in p5.js context.

Chapter 5 - Conditional Statements and Comparison Operators: This chapter will allow us to write programs that can respond to different conditions by using conditionals and comparison operators.

Chapter 6 - More p5.js Variables: This will be another p5.js-specific chapter where we will learn about several library-specific variables.

Chapter 7 - Loops: Here we will learn about loops, which will allow us to build programs that handle enormous amounts of calculations.

Chapter 8 - Functions: Functions are the building blocks of JavaScript and we will learn more about them in order to build more scalable, modular, and robust programs.

Chapter 9 - Objects and **Chapter 10 - Arrays**: Objects and Arrays are JavaScript data structures that will allow us to organize our code and handle complexity in more intelligent ways.

Chapter 11 - Events: Event handling will allow us to write programs that handles user interaction.

Chapter 12 - More on p5.js: Another p5.js-only chapter where we learn more about library-specific features before diving into our final project.

Chapter 13 - Final Project: We will build a game using everything we have learned up to this chapter!