

Nikhil Malankar

Learning Android Game Development

Android Game development simplified!



Packt>

Learning Android Game Development

Creating games can be the most fun-filled way to learn a coding language or a platform. This book will take you on a fun-filled ride where you'll not only learn about the latest Android N SDK, but also how you can create highly interactive and interesting games with android.

Focused on 2D game development, this book is an entry-level look at how to make interesting games on the Android N platform.

In this book, we'll start with installing Android studio and its components, and setting it up ready for Android N. We will teach you how to take inputs from users, create images and interact with them, and work with sprites to create animations. You'll then explore the various collision detection methods and use sprites to create an explosion. Moving on, you'll go through the process of UI creation and see how to create buttons as well as display the score and other parameters on screen.

By the end of the book, you will have a working example and an understanding of a 2D platform game like Super Mario and know how to convert your 2D games to 3D games.

Things you will learn:

- Understand the nuts and bolts of developing highly interactive and interesting games for Android N
- Link the interface to the code used in games through simple methods
- Interact with the images on the screen and also learn to animate them
- Set and save the game state and save high scores, hit points, and so on for your games
- Get a grasp of various collision techniques and implement the bounding box technique
- Convert your 2D games to 3D games using Android N
- Get an understanding of the process of UI creation using Android Studio

Packt
www.packtpub.com

\$ 34.99 US
£ 28.99 UK

Prices do not include local sales
Tax or VAT where applicable



Learning Android Game Development

Nikhil Malankar



Learning Android Game Development

Android Game development simplified!

Nikhil Malankar

Packt>

BIRMINGHAM - MUMBAI

Learning Android Game Development

Copyright © 2017 Packt Publishing

All rights reserved. No part of this book may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, without the prior written permission of the publisher, except in the case of brief quotations embedded in critical articles or reviews.

Every effort has been made in the preparation of this book to ensure the accuracy of the information presented. However, the information contained in this book is sold without warranty, either express or implied. Neither the author, nor Packt Publishing, and its dealers and distributors will be held liable for any damages caused or alleged to be caused directly or indirectly by this book.

Packt Publishing has endeavored to provide trademark information about all of the companies and products mentioned in this book by the appropriate use of capitals. However, Packt Publishing cannot guarantee the accuracy of this information.

First published: May 2017

Production reference: 1240517

Published by Packt Publishing Ltd.

Livery Place

35 Livery Street

Birmingham

B3 2PB, UK.

ISBN 978-1-78588-095-7

www.packtpub.com

Credits

Author

Nikhil Malankar

Copy Editor

Dhanya Baburaj

Reviewer

Nischal Dubey

Project Coordinator

Ritika Manoj

Commissioning Editor

Amarabha Banerjee

Proofreader

Safis Editing

Acquisition Editor

Shweta Pant

Indexer

Rekha Nair

Content Development Editor

Aditi Gour

Graphics

Jason Monteiro

Technical Editor

Rashil Shah

Production Coordinator

Nilesh Mohite

About the Author

Nikhil Malankar started his journey into game development in 2011 by founding his company, GameEon, as the CEO, at the age of 17. GameEon has developed over 70+ games, of which 10 are available for download on Play Store and others are distributed worldwide via multiple distribution channels. Currently, he is running his new company--Next Move Digital--as the founder and CEO. Next Move Digital deals in digital media and game development.

He has a total experience of 5 years in the field of game development and has worked on technologies such as Pygame (a subset of Python) to create GameEon's first game, Kite - Kite Flying Game, which has over 300,000 downloads on Google Play. He is also familiar with the Unity Game engine and has developed most of the games at GameEon in the same. He has also worked with Unreal Engine 4 to develop Special Ops, a first person shooter game for Android and iOS.

He has also developed non-gaming apps and websites for clients. At GameEon, he also worked with multiple clients to develop games for them, and one of the most famous brands he has worked with is m-Indicator. He is also a social media influencer with a big following of his own on Facebook and is extremely passionate about playing games. With Next Move Digital, he aims to work on content creation, distribution, and licensing. He also operates a content website--Tell Me Nothing--under Next Move Digital, which focuses on lighthearted satirical content. His future endeavors with the company include making good-quality games for PC and console platforms.

Currently, he is running Next Move Digital, as the Founder and CEO, that focuses on creating digital media content.

I would like to thank Shweta Pant for introducing me to Packt and giving me the opportunity to work on this book. Also, I would like to thank Aditi Gour, who has been extremely supportive and friendly throughout the entire process of writing the book. I would like to thank Rashil Shah, the technical editor on the book, and I would also like to thank Raimon Rafols and Nischal Dubey, the technical reviewers of this book, for ensuring that the information presented by me was technically accurate.

Of course, I would also thank my mom, dad, and sister for supporting me throughout the entire process of writing this book, and also my close friends, without whom this book wouldn't have been possible.

About the Reviewer

Nischal Dubey is a full stack application developer who specializes in Java development. He has more than 3 years of experience in android development and has made applications having features ranging from basic utility apps to complex social networking applications. Over the years, he has tried to master in and out of Android development. Currently, he is working as Java and Angular JS developer in TCS.

www.PacktPub.com

For support files and downloads related to your book, please visit www.PacktPub.com.

Did you know that Packt offers eBook versions of every book published, with PDF and ePub files available? You can upgrade to the eBook version at www.PacktPub.com and as a print book customer, you are entitled to a discount on the eBook copy. Get in touch with us at service@packtpub.com for more details.

At www.PacktPub.com, you can also read a collection of free technical articles, sign up for a range of free newsletters and receive exclusive discounts and offers on Packt books and eBooks.



<https://www.packtpub.com/mapt>

Get the most in-demand software skills with Mapt. Mapt gives you full access to all Packt books and video courses, as well as industry-leading tools to help you plan your personal development and advance your career.

Why subscribe?

- Fully searchable across every book published by Packt
- Copy and paste, print, and bookmark content
- On demand and accessible via a web browser

Customer Feedback

Thanks for purchasing this Packt book. At Packt, quality is at the heart of our editorial process. To help us improve, please leave us an honest review on this book's Amazon page at <https://www.amazon.com/dp/1785880950>.

If you'd like to join our team of regular reviewers, you can e-mail us at customerreviews@packtpub.com. We award our regular reviewers with free eBooks and videos in exchange for their valuable feedback. Help us be relentless in improving our products!

Table of Contents

Preface	1
Chapter 1: Introduction to Android N and Installation of Android SDK	7
Introduction to Android N	8
Software requirements	9
The nuts and bolts of Android	23
Package names	24
Layouts	24
Android Manifest file	24
Summary	25
Chapter 2: Getting Familiar with Android Studio	27
Understanding the Android project structure	27
Creating your first Android Studio project	28
Project Structure of an Android Project	34
Creating our Hello World! program	36
Setting up the emulator	38
Summary	47
Chapter 3: Managing Inputs	49
Resource folder in detail	49
Taking user inputs	53
Button input	54
Hardware button input	60
Touch input	62
The Accelerometer input	69
Building and deploying through USB	73
Building an apk and installing on device	78
Summary	82
Chapter 4: Creating Sprites and Interactive Objects	83
Game Theory	83
Illusions	84
Game loop	86
Game Design Document	87
Prototyping	87
Surface and Canvas	87

Working with colors and images	87
Creating colors	89
Creating images	91
Summary	107
Chapter 5: Adding Animation to Your Game	109
Adding animations to make your game more awesome	110
Making our player character	112
Summary	124
Chapter 6: Collision Detection and Basic Artificial Intelligence	125
Collision detection	126
Algorithms for collision detection techniques	127
Bounding Box Collision	127
Circle Collision	127
Detecting collisions in our game	128
Making our player jump	128
Dodging incoming rocks	132
Defining our variables	139
Tackling the infinite loop situation	140
Initializing our variables	140
Collision behavior	141
Collision function	142
Drawing our objects on the screen	142
Artificial Intelligence	149
History of Artificial Intelligence	149
Artificial Intelligence Algorithms	151
Breadth-First Search	151
Depth-First Search	151
Bidirectional search	151
Uniform cost search	152
Iterative deepening Depth-First Search	152
Comparison of preceding algorithms complexities	152
A * search	152
Creating your own Artificial Intelligence	153
Summary	153
Chapter 7: Adding Boundaries and Using Sprites to Create Explosions	155
Adding boundaries	155
Creating the classes for our boundaries	156
Creating boundaries in our game	158
Creating the variables required	158
Referencing our boundaries	159
Updating our boundaries	159
Drawing our boundaries on the screen	162

Detecting a collision between the ground and player	162
Maximum and minimum boundary heights	163
Creating a new game	163
Creating explosions	170
Summary	173
Chapter 8: Adding an Explosion and Creating a UI	175
<hr/>	
Adding an explosion to our game	176
Creating variables	177
Some optimizations and improvements	177
Spawning our explosion	179
Drawing the explosion on the screen	180
Creating the UI for our game	183
Summary	190
Chapter 9: Converting Your Game from 2D to 3D	191
<hr/>	
Introduction to OpenGL ES	192
Learning about the 3D coordinate system	192
Creating a 3D scene with OpenGL ES	194
Creating our project folder	194
Creating a render class and defining a main activity	199
Defining shapes	204
Summary	207
Chapter 10: Working Further on 3D Game	209
<hr/>	
Rendering our object on screen	210
Adding colors to our object	212
Rotating our object	213
Creating a pyramid 3D object	215
Defining the shape	216
Rendering our 3D object	219
Summary	221
Index	223
<hr/>	

Preface

This book will take our readers to a fun-filled ride where they will not just learn about the latest Android N SDK, but also about the other APIs and how they can create highly interactive and interesting games with them. The book will show readers how to create a complete game from scratch, designed for the Android platform. It will start by setting up the Android N SDK and other repositories, and then it will show readers how to customize the development environment. After this, it will show readers how to create game elements, objects, game layouts, game architecture, and game loops. It will create reusable Java code scripts, which will help you in your other game projects. An integral part of game development is to integrate images and graphics seamlessly. As we move ahead, we will show how to efficiently work with moving images, creating sprite animations, particle explosions, in-game entities, Bitmap fonts, and so on. Prototyping can decrease development time significantly; readers will implement prototyping techniques using the libgdx library. Toward the end of the book, readers will get a clear idea of improving game physics and the collision system, to give their game that real-life look.

What this book covers

Chapter 1, *Introduction to Android N and Installation of Android SDK*, guides the reader through the installation of the necessary software with a step-by-step guide.

Chapter 2, *Getting Familiar with Android Studio*, works toward making the reader comfortable with the project layout and components needed to get started with developing games with Android Studio.

Chapter 3, *Managing Inputs*, guides the reader through how to take inputs from the user.

Chapter 4, *Creating Sprites and Interactive Objects*, teaches how to display images on screen and turn them into interactive objects.

Chapter 5, *Adding Animation to Your Game*, takes you through how to create animations using sprite sheets.

Chapter 6, *Collision Detection and Basic Artificial Intelligence*, explores various collision detection methods. It is recommended that the user has a little mathematical understanding of some basic concepts of the coordinates system.

Chapter 7, *Adding Boundaries and Using Sprites to Create Explosions*, goes through creating boundaries for the game, and then moves on to create an explosion class to create an explosion effect.

Chapter 8, *Adding an Explosion and Creating a UI*, shows how we will spawn our explosion on screen after creating the explosion class, and then covers on how to create a UI that will display instructions and score the on screen.

Chapter 9, *Converting Your Game from 2D to 3D*, discusses how to move from making 2D games into 3D games.

Chapter 10, *Working Further on 3D Game*, introduces the player to further work with 3D objects in the game.

What you need for this book

This book is aimed at those who want to get started with native development with Android. It also gives a ready introduction to the latest version of Android, Android N, and guides the reader through the process of going from developing a simple app to a complex 3D game in a matter of 10 simple chapters.

Who this book is for

This book is for anyone who has a basic knowledge of Java and is interested in making games for Android. No prior knowledge of Android or game development is needed; however, this would be a plus.