



C o m m u n i t y   E x p e r i e n c e   D i s t i l l e d

# Learning AngularJS Animations

Enhance user experience with awesome animations in AngularJS using CSS and JavaScript

**Richard Keller**

**[PACKT]** open source\*  
PUBLISHING community experience distilled

# Learning AngularJS Animations

Enhance user experience with awesome animations in AngularJS using CSS and JavaScript

**Richard Keller**



BIRMINGHAM - MUMBAI

# Learning AngularJS Animations

Copyright © 2014 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: October 2014

Production reference: 1251014

Published by Packt Publishing Ltd.  
Livery Place  
35 Livery Street  
Birmingham B3 2PB, UK.

ISBN 978-1-78398-442-8

[www.packtpub.com](http://www.packtpub.com)

# Credits

**Author**

Richard Keller

**Project Coordinator**

Mary Alex

**Reviewers**

Douglas Duteil

Amit Gharat

Daniel Mackay

Sathish VJ

**Proofreaders**

Simran Bhogal

Ameesha Green

Paul Hindle

Clyde Jenkins

**Commissioning Editor**

Pramila Balan

**Indexer**

Rekha Nair

**Acquisition Editor**

Greg Wild

**Production Coordinator**

Arvindkumar Gupta

**Content Development Editor**

Rohit Kumar Singh

**Cover Work**

Arvindkumar Gupta

**Technical Editors**

Mrunmayee Patil

Shruti Rawool

**Copy Editors**

Deepa Nambiar

Stuti Srivastava

# About the Author

**Richard Keller** obtained his BSc in Computer Science from State University of Campinas (UNICAMP), Brazil. He is currently a software engineer at Spring Mobile Solutions in the Latin America headquarters located in São Paulo. His work there includes analysis and implementation of systems used by customer's headquarters and development of internal tools to enhance the company's productivity. He works with the AngularJS framework on a daily basis and with a variety of other technologies including TypeScript, C#, and SQL Server.

He previously worked for an online marketplace for handmade items, a mobile payment company, and an open source e-learning project in an institute at UNICAMP.

---

I would like to thank my parents and family for all their support for my education and personal growth. In addition, I would like to thank the open source community of AngularJS and the AngularJS core team for developing and improving this great framework every day. Finally, I am thankful to my girlfriend for supporting me while writing this book.

---

# About the Reviewers

**Douglas Duteil** is a young open source contributor and a part of the Directory team of the Angular UI organization since 2012. He's passionate about web user interfaces, web user experience, and web components.

While pursuing his Master's degree in Computer Science at University of Paris 8, Douglas had the opportunity to work on digital literature with a group of artists such as Kalamar-e Kidz and the New Fire Tree Press.

He's now working with SFEIR, Paris, a software development company, and participates in the ngParis meetup.

**Amit Gharat** is a full stack engineer, open source contributor, and co-author for *AngularJS UI Development*, Packt Publishing. He has built and made some of his personal projects open source, such as Directives, SPAs, and Chrome Extensions written in AngularJS. He has an urge to share his programming experiences in an easy-to-understand language through his personal blog (<http://amitgharat.wordpress.com>) in order to inspire and help others. When not programming, Amit enjoys reading and watching YouTube and comedy shows with his family.

---

I would like to thank my family who has encouraged me to do so.

---

**Daniel Mackay** has 9 years of commercial experience, primarily in the Microsoft stack, and is currently a lead developer at a software consultancy in Sydney, Australia.

He is passionate about all things in web and particularly enjoys working with ASP.NET MVC, Web API, and Entity Framework. He considers himself a very well-rounded developer and is not afraid to get thrown into the deep end of frontend development. Over the past few years, he has been concentrating on full-stack web development, including technologies such as HTML5, JavaScript, and CSS3. He has built a large commercial single-page application with AngularJS, which is used by a major telecommunications company in Australia. He is a big believer of process and is always searching for the most productive tool for the job.

He is very passionate about technology and is continually improving himself whenever possible through conferences, blogs, books, and personal projects.

When not coding, you'll probably find him halfway up a cliff in the Blue Mountains, or catching a wave at one of Sydney's many beautiful beaches.

**Sathish VJ** is a technologist who is passionate about software specifically – where he is most prolific – and all science, engineering, and technology in general. He regularly attends hackathons, quickly prototyping new ideas on various emerging technologies. He has always been particularly interested in AngularJS, conducting many workshops and training events for the community and has created almost all his recent apps in AngularJS.



# www.PacktPub.com

## Support files, eBooks, discount offers, and more

You might want to visit [www.PacktPub.com](http://www.PacktPub.com) for support files and downloads related to your book.

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](http://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](mailto:service@packtpub.com) for more details.

At [www.PacktPub.com](http://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.



<http://PacktLib.PacktPub.com>

Do you need instant solutions to your IT questions? PacktLib is Packt's online digital book library. Here, you can access, read and search across Packt's entire library of books.

## Why subscribe?

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

## Free access for Packt account holders

If you have an account with Packt at [www.PacktPub.com](http://www.PacktPub.com), you can use this to access PacktLib today and view nine entirely free books. Simply use your login credentials for immediate access.





# Table of Contents

<b>Preface</b>	<b>1</b>
<b>Chapter 1: Getting Started</b>	<b>7</b>
The definition of animation and the web context	8
The need for AngularJS animation	9
Choosing when to use JavaScript for animations	10
AngularJS – combining JavaScript and CSS3	16
Do it yourself exercises	17
Summary	17
<b>Chapter 2: Understanding CSS3 Transitions and Animations</b>	<b>19</b>
<b>CSS3 transitions</b>	<b>19</b>
The transition-timing-function property	24
The transition-delay property	28
Animatable properties	28
<b>CSS3 keyframe animations</b>	<b>32</b>
Defining an animation using keyframes	32
Separating timing functions for each keyframe interval	35
Other CSS keyframe animations' properties	36
<b>CSS3 transforms</b>	<b>37</b>
The scale function	41
The translate function	42
The skew function	44
<b>Exercise</b>	<b>45</b>
<b>Summary</b>	<b>45</b>
<b>Chapter 3: Creating Our First Animation in AngularJS</b>	<b>47</b>
The ngAnimate module setup and usage	47
<b>AngularJS directives with native support for animations</b>	<b>49</b>
Fade animations using AngularJS	49
The AngularJS animations convention	51

<b>AngularJS animation with CSS transitions</b>	<b>52</b>
The ng-enter class	54
The ng-leave class	56
<b>AngularJS animation with CSS keyframe animations</b>	<b>58</b>
<b>The CSS naming convention</b>	<b>62</b>
The ngClass directive animation sample	62
The ngHide and ngShow animation sample	66
The ngModel directive and form animations	69
<b>The ngMessage and ngMessages directive animations</b>	<b>70</b>
<b>The ngView directive animation</b>	<b>74</b>
The ngSwitch directive animation	77
The ngInclude directive sample	79
<b>Do it yourself exercises</b>	<b>81</b>
<b>Summary</b>	<b>81</b>
<b>Chapter 4: JavaScript Animations in AngularJS</b>	<b>83</b>
<b>Creating AngularJS animation without CSS3</b>	<b>83</b>
The ngHide JavaScript animation	90
The ngIf JavaScript animation	92
The ngRepeat JavaScript animation	95
<b>JavaScript animations as a fallback for CSS animations</b>	<b>97</b>
<b>Do it yourself exercises</b>	<b>100</b>
<b>Summary</b>	<b>101</b>
<b>Chapter 5: Custom Directives and the \$animate Service</b>	<b>103</b>
<b>Triggering animations on custom directives</b>	<b>103</b>
<b>Animating the enter and leave events</b>	<b>107</b>
Using the \$animate.move method	111
<b>Creating a custom directive animated with JavaScript</b>	<b>113</b>
<b>Exercises</b>	<b>116</b>
<b>Summary</b>	<b>117</b>
<b>Chapter 6: Animations for Mobile Devices</b>	<b>119</b>
<b>Enhance UX on mobile devices with animations</b>	<b>119</b>
<b>Transition between views</b>	<b>120</b>
<b>Mobile AngularJS frameworks</b>	<b>129</b>
<b>Summary</b>	<b>129</b>
<b>Chapter 7: Staggering Animations</b>	<b>131</b>
<b>Creating staggering animations</b>	<b>131</b>
Staggering animations with a CSS transition	132
Staggering animations with a CSS keyframes animation	136

<b>Creating staggering animations for other native directives</b>	<b>138</b>
<b>Create staggering animations for custom directives</b>	<b>140</b>
<b>Summary</b>	<b>143</b>
<b>Chapter 8: Animations' Performance Optimization</b>	<b>145</b>
<b>The display and the frame rate</b>	<b>145</b>
<b>Finding performance bottlenecks using Chrome DevTools</b>	<b>148</b>
Checking FPS using Show fps meter	150
<b>Measuring browser layers and Jank on Chrome</b>	<b>152</b>
<b>CSS styles in animations you should avoid</b>	<b>161</b>
<b>Summary</b>	<b>162</b>
<b>Index</b>	<b>163</b>

---



# Preface

The AngularJS framework is a turning point in the evolution of web development. It really helps developers to produce professional web apps by writing less JavaScript code.

The ngAnimate module, developed by the core team of AngularJS and the open source community, integrated AngularJS features with animation web standards, providing all the benefits from standardization with AngularJS development patterns.

Before animations were introduced to AngularJS, integrating animations was a bit tricky, as in AngularJS, changes to the model affect the view implicitly (it's part of the two-way data binding concept). In other words, the DOM life cycle management is often controlled by the AngularJS core and animations should be triggered in between those manipulations. To solve this problem, the ngAnimate module was written and redesigned to be completely based on CSS classes. This means that animations should be applied based on element classes. Classes are appended or removed from elements on specific events, so we are able to apply animations as the entry of an element on DOM and the imminent exit of an element from DOM.

This book will help you learn from the beginning how to add animations to AngularJS web apps, focusing on the ngAnimate module. It's an optional module in AngularJS because the framework is going in a direction that will allow you to choose which modules to use so that the module can fit your needs and be as light as you desire.

## What this book covers

*Chapter 1, Getting Started*, will introduce you to the history of animations in web development and explain why the AngularJS animation module is so important. Then, you will get started on the modern web standards of animation, introducing you to when to use each of them.

*Chapter 2, Understanding CSS3 Transitions and Animations*, will teach you how to create animations using CSS transitions, CSS animations, and how to animate using the CSS transform, giving us a good base to start using animations with the AngularJS framework in the next chapter.

*Chapter 3, Creating Our First Animation in AngularJS*, will walk you through setting up an AngularJS application using the ngAnimate module. Then, we will create basic animations using CSS transitions and an animation keyframe integrated with AngularJS native directives. This chapter will introduce the AngularJS directives that support animation events.

*Chapter 4, JavaScript Animations in AngularJS*, will tell you how to create animations using JavaScript and create animations with jQuery integrated with AngularJS native directives. You will learn how to create animations using CSS and JavaScript as a fallback when the browser does not support CSS animations.

*Chapter 5, Custom Directives and the \$animate Service*, will teach you how to use CSS animations together with custom directives by giving you an overview of what happens in the life cycle of an AngularJS animation inside the \$animate service. Then, it will teach you how to create animations in custom directives using only JavaScript.

*Chapter 6, Animations for Mobile Devices*, will help you apply animations to enhance usability on smartphones and small devices and introduces the Google material design, a guideline for mobile development.

*Chapter 7, Staggering Animations*, will teach you how to create animations that appear in a consistent sequence, which are usually difficult to create without the ngAnimate module, and can improve user experience. This chapter will teach you the rules to be followed and how to apply these animations in native and custom directives.

*Chapter 8, Animations Performance Optimization*, will provide you with an introduction to animation performance diagnostics and solutions by teaching you how to find performance bottlenecks using Chrome DevTools. Then, it will teach you about rendering layers and animations that you should avoid or are that replaced by others.

## What you need for this book

In order to run the example code in this book, you will need a modern web browser such as Google Chrome, IE10 or newer, Safari, or Firefox, as support for CSS animations and CSS transitions is mandatory.



A basic text editor is mandatory to test samples and answer exercises.

Source files of AngularJS and angular animate are needed too, although we will use a CDN for all samples.

## Who this book is for

This book is intended for those who are familiar with the AngularJS framework, as we will focus on the animations module. You need to know the basics of HTML and CSS. Some previous knowledge about the most essential AngularJS directives (such as `ngRepeat`, `ngView`, `ngIf`, and `ngSwitch`) is expected, but no previous knowledge of JavaScript animations, CSS3 animations, or any animations library is required.

By reading this book, you will be prepared to create animations and integrate them with AngularJS web apps.

## Conventions

In this book, you will find a number of styles of text that distinguish between different kinds of information. Here are some examples of these styles and an explanation of their meaning.

Code words in text, database table names, folder names, filenames, file extensions, pathnames, dummy URLs, user input, and Twitter handles are shown as follows: "First we created an animation with JavaScript without `requestAnimationFrame`."


A block of code is set as follows:


```
var app = angular.module('myApp', ['ngAnimate'])
    .animation('.firstJsAnimation', firstJsAnimation);
```

When we wish to draw your attention to a particular part of a code block, the relevant lines or items are set in bold:

```
<body>
  <script src="//ajax.googleapis.com/ajax/libs/angularjs/
    1.3.0/angular.min.js"></script>
  <script src="//ajax.googleapis.com/ajax/libs/angularjs/
    1.3.0/angular-animate.min.js"></script>
  <script>
    var app = angular.module('myApp', ['ngAnimate']);
  </script>
</body>
```

**New terms** and **important words** are shown in bold. Words that you see on the screen, in menus or dialog boxes for example, appear in the text like this: "For this sample, we have a **Toggle fade** button that changes the `ngShow` model value, so we can see what happens when the element fades in and fades out from the DOM."

 Warnings or important notes appear in a box like this.

 Tips and tricks appear like this.

## Reader feedback

Feedback from our readers is always welcome. Let us know what you think about this book – what you liked or may have disliked. Reader feedback is important for us to develop titles that you really get the most out of.

To send us general feedback, simply send an e-mail to [feedback@packtpub.com](mailto:feedback@packtpub.com), and mention the book title via the subject of your message.

If there is a topic that you have expertise in and you are interested in either writing or contributing to a book, see our author guide on [www.packtpub.com/authors](http://www.packtpub.com/authors).

## Customer support

Now that you are the proud owner of a Packt book, we have a number of things to help you to get the most from your purchase.

## Downloading the example code

You can download the example code files for all Packt books you have purchased from your account at <http://www.packtpub.com>. If you purchased this book elsewhere, you can visit <http://www.packtpub.com/support> and register to have the files e-mailed directly to you.

## Downloading the color images of this book

We also provide you a PDF file that has color images of the screenshots/diagrams used in this book. The color images will help you better understand the changes in the output. You can download this file from: [https://www.packtpub.com/sites/default/files/downloads/44280S\\_ColoredImages.pdf](https://www.packtpub.com/sites/default/files/downloads/44280S_ColoredImages.pdf).

## Errata

Although we have taken every care to ensure the accuracy of our content, mistakes do happen. If you find a mistake in one of our books—maybe a mistake in the text or the code—we would be grateful if you would report this to us. By doing so, you can save other readers from frustration and help us improve subsequent versions of this book. If you find any errata, please report them by visiting <http://www.packtpub.com/submit-errata>, selecting your book, clicking on the **errata submission form** link, and entering the details of your errata. Once your errata are verified, your submission will be accepted and the errata will be uploaded on our website, or added to any list of existing errata, under the Errata section of that title. Any existing errata can be viewed by selecting your title from <http://www.packtpub.com/support>.

## Piracy

Piracy of copyright material on the Internet is an ongoing problem across all media. At Packt, we take the protection of our copyright and licenses very seriously. If you come across any illegal copies of our works, in any form, on the Internet, please provide us with the location address or website name immediately so that we can pursue a remedy.

Please contact us at [copyright@packtpub.com](mailto:copyright@packtpub.com) with a link to the suspected pirated material.

We appreciate your help in protecting our authors, and our ability to bring you valuable content.

## Questions

You can contact us at [questions@packtpub.com](mailto:questions@packtpub.com) if you are having a problem with any aspect of the book, and we will do our best to address it.

