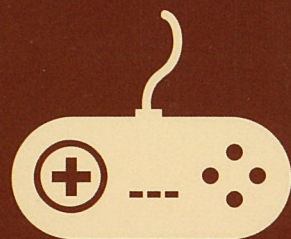
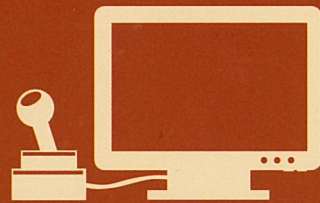


# HTML5 GAME DEVELOPMENT

*from the Ground Up with*  
**CONSTRUCT 2**



**HTML5**  
**GAME DEVELOPMENT**  
*from the Ground Up with*  
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# **HTML5 GAME DEVELOPMENT** *from the Ground Up with* **CONSTRUCT 2**

**Roberto Dillon**



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*To my Students*

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# Contents

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Foreword, xi

Preface, xiii

Acknowledgments, xv

About the Author, xvii

About the Book, xix

CHAPTER 1 ■ HTML5 and Construct 2	1
TAKE AWAY	11
CHAPTER 2 ■ Understanding How Games Work	13
TAKE AWAY	29
EXERCISE	30
CHAPTER 3 ■ About Games and Ideas: Dream vs. Reality	31
TAKE AWAY	40
CHAPTER 4 ■ Game Design Documentation for Indies	41
TAKE AWAY	46
EXERCISE	46
CHAPTER 5 ■ <i>Moon Wolf</i> , a Space Arcade Game	47
5.1 <i>SOLAR FOX</i> : ANALYSIS	47
5.2 <i>MOON WOLF</i> : DESIGN	50
TAKE AWAY	52



CHAPTER 6 ■ <i>Moon Wolf</i> Development	53
6.1 GETTING STARTED	53
6.2 ADDING CELLS AND A SCORING SYSTEM	65
6.3 SPEEDING UP	72
6.4 ADDING ENEMIES AND A BASIC GAME LOOP	82
TAKE AWAY	93
EXERCISE	93
CHAPTER 7 ■ <i>Kitty &amp; Katty, a Platformer</i>	95
7.1 <i>DONKEY KONG</i> : ANALYSIS	95
7.2 <i>KITTY &amp; KATTY</i> : DESIGN	96
TAKE AWAY	99
CHAPTER 8 ■ <i>Kitty &amp; Katty</i> Development	101
8.1 GAME STRUCTURE	101
8.2 BACKGROUND AND PLATFORMS	110
8.3 KITTY, KATTY, AND THE PLAYER	114
8.4 RESCUING OUR PETS AMIDST FALLING BOULDERS	123
8.5 THE HIGH SCORE TABLE	130
TAKE AWAY	134
EXERCISES	134
CHAPTER 9 ■ <i>Turky on the Run, a Puzzle Game</i>	137
9.1 <i>LOCO-MOTION</i> : ANALYSIS	137
9.2 <i>TURKEY ON THE RUN</i> : DESIGN	138
TAKE AWAY	141
CHAPTER 10 ■ <i>Turky on the Run</i> Development	143
10.1 LAYOUT AND SHUFFLING	144
10.2 MOVING TILES	150
10.3 TURKY: PLACEMENT AND MOVEMENT	156
10.4 SLY, FOXY, AND OTTO	168
10.5 TIMER AND BONUS ITEMS	176

TAKE AWAY	186
EXERCISES	186
<b>CHAPTER 11 ■ The Journey Ahead</b>	<b>187</b>
11.1 PATHFINDING	187
11.2 SPRITE FONTS	191
11.3 SHADERS (EFFECTS)	193
11.4 SOURCE CONTROL	195
11.5 PERFORMANCE TIPS	196
<b>CHAPTER 12 ■ Deployment and Monetization</b>	<b>199</b>
12.1 WEB PORTALS	201
12.2 CHROME WEB STORE AND MOZILLA MARKETPLACE	212
12.3 FACEBOOK	214
12.4 WINDOWS 8 METRO	216
12.5 WINDOWS, OSX, AND LINUX	218
12.6 BLACKBERRY 10	222
12.7 TIZEN	227
12.8 IOS AND ANDROID	228
APPENDIX A: RESOURCES FOR INDIES, 233	
APPENDIX B: SELECTED BIBLIOGRAPHY FOR FURTHER STUDY, 237	
INDEX, 239	



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# Foreword

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Scirra started out life several years ago as a loosely organized band of volunteer students working in our spare time around full-time courses. We were fairly casual and a little chaotic in getting the first (and rather flawed) iteration of our software, Construct Classic, off the ground. Sometimes there were periods of neglect when exams and other concerns came up, but we always returned to it. We really loved it solving the technical problems, working with the community, and slowly gaining recognition. Years later, through a complete ground-up rewrite and release of the successor, Construct 2, I find myself sitting in our office in the outskirts of London and making a living from it all! Passion and persistence can get you a long way, even from the most humble of beginnings.

I won't go into Construct 2 itself, since this book by Prof. Dillon will teach you a great deal about that. However, I will add a word about technology in general. I think technology is amazing. You can buy consumer graphics processors that have thousands of cores, using billions of individual transistors. Most of the computers in the world are connected together and can communicate in real time via the Internet. Phones are now computers with apps that you carry everywhere with you, and tablets are a whole new type of device. There are, of course, even more exciting technologies, and there are surely more innovations to come that we cannot even anticipate. When it comes though, as ever, software will be the glue that connects all of it together.

Traditionally software development has been a complicated endeavor requiring expertise to combine exciting technologies in interesting ways. One of our aims with Construct 2 is to help people get involved in this fascinating, fast-paced world. It's designed to considerably lower the barrier of entry, while remaining a productive and useful tool. We hope that even without much experience you can come up with something exciting that combines graphics processors, Internet communication, phones, tablets,

and more—all made possible by a whole stack of technology, right down to the individual transistors.

If you are using Construct 2 and ever experience the delight of seeing something working the way you wanted it, or feel curious to find out how something works and are compelled to learn more, or just awe at how much is working together to make it all possible, then we have succeeded. If you are young, or have never really been involved in technology, and Construct 2 is your first inspiration on a longer path of involvement in technology (just as other technologies fascinated us when we were young), then it truly is a privilege to have provided that for you. Just remember that with your persistence and Construct 2, you can create great games!

**Ashley Gullen**

Director, Scirra Ltd.

London, September 2013

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# Preface

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The exponential growth in sales of smart phones and tablets, together with more widespread and faster Internet connections worldwide, has made playing video games more popular than ever before. Internet-enabled personal computers and mobile device sales worldwide are fast approaching 1 billion units, and research data show that a significant portion of time spent online is dedicated to playing games. It's no wonder then that game development is attracting more and more attention, as a hobby as well as a possible career, where even small teams, relying exclusively on online platforms, can find success.

In an industry that was dominated until recently by big blockbusters sold at retail and developed by teams of 100+ professionals with budgets topping \$100 million or even more, this may look like a dramatic and totally unexpected revolution. In reality, it can also be seen as a resurgence of the original spirit that characterized the early days of the gaming industry: in the 1980s, in fact, the relative simplicity of 8-bit computers allowed for the emergence of the so-called “bedroom coders,” young students and teenagers who, through their passion and commitment, managed to find success in a market that started as a niche but soon expanded in ways that were truly unimaginable.

As the market became more demanding and complex, though, so did the underlying technology. Consequently, more resources, more time, and bigger teams were needed to develop successful titles. Today, instead, we are witnessing a new generation of technology that sidestepped raw power and complexity for convenience and ease of use. The new tools that are now available are so advanced and yet so intuitive that they enable anyone to develop commercially viable products. We can actually say that the time for the “bedroom coders” is back!

This book is written for this new generation of hobbyists and aspiring game developers who realized that exciting things can actually be done

with the right tools and knowledge. Indeed, there's a plethora of new and very good manuals available already covering all possible game engines and middleware, but, still, the book you are currently holding aims at being a little different, and I'm very glad it found a place on your shelf.

Not only will it teach you how to use a modern tool, in this case Construct 2, an HTML5-based game engine that will enable you to develop and release polished two-dimensional games on a multitude of different platforms, but it will also cover a foundational knowledge of game analysis and design based on my personal research on the subject. This more theoretical part will be covered in the exact same way I have been successfully teaching it in specialized classes across different institutions, including DigiPen Institute of Technology and James Cook University.

It is my hope that the first part of this book will help you in understanding what really matters in games and contribute to making you a better game designer from the ground up, able to play any game critically and to express your ideas in a clear and concise format. The practical chapters that follow from Chapter 5 onward are structured through step-by-step tutorials. There, we will build an arcade-style game, a platformer integrating some physics elements, and then a more complex puzzle game, remaking my own game *Turky on the Run*, published on Apple App Store and on BlackBerry World.

Lastly, the book will discuss different ways to deploy and monetize games across several platforms, including Facebook, iOS, Android, web-based marketplaces, and more. A couple of appendices are also included to provide some additional resources you may want to investigate as you progress in your journey as an independent (“indie”) game developer.

Get ready to work hard and play harder!

**Roberto Dillon**  
*Singapore*  
*September 6, 2013*

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I'm grateful to all editorial staff at CRC Press for believing in this project, in particular to Mr. Rick Adams and Ms. Jennifer Ahringer, and to Ms. Carmen Tropeano for her invaluable feedback on the different tutorials. Special thanks also to my family for providing constant support and encouragement. Last but not least, I'm also very grateful to the guys at Scirra for making Construct 2 such a fantastic tool!





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# About the Author

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Roberto Dillon was born in Genoa, Italy, and holds a Master's and a Ph.D. degree in Electrical and Computer Engineering from the University of Genoa.

Over the years he has worked in prestigious academic institutions across Europe and Asia, including the Kungliga Tekniska Högskolan (Royal Institute of Technology, KTH) in Stockholm, Nanyang Technical University (NTU) in Singapore, and the DigiPen Institute of Technology in Singapore.

While at DigiPen, he served as an Assistant Professor and Game Design Department Chair, teaching a variety of subjects like Game Mechanics and Game History, with his students gaining top honors at competitions like the Independent Games Festival (IGF) both in San Francisco and Shanghai.

He is now an Associate Professor at the Singapore campus of James Cook University, where he teaches game design and project management subjects to both undergraduate and graduate students.

As a game developer, Roberto has led high-profile research projects on innovative game mechanics and has designed indie games that were showcased by the international press and at events like Sense of Wonder Night in Tokyo, Electronic Language International Festival (FILE) Games in Rio de Janeiro, and the Indie Showcase at Casual Connect Asia.

Besides *HTML5 Game Development from the Ground Up with Construct 2*, Roberto wrote two other books: *On the Way to Fun* and *The Golden Age of Video Games*, published by A K Peters and CRC Press.



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# About the Book

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This book covers game design and development in a manner suitable for beginners, hobbyists, and aspiring indie developers. No specific programming knowledge is required, although familiarity with very basic concepts (e.g., what is a variable, an array, or a function) is assumed.

The practical chapters are based on Construct 2, an HTML5-based game engine that runs under Windows. Note that Construct 2 is an ever-evolving engine with new versions being released very often. To make the book as “future proof” as possible, the tutorials have been carefully designed around stable and proven features that shouldn’t change significantly in upcoming versions of the software. But remember that these were developed and tested up to the latest stable and beta releases available at the moment of writing, and specific implementations may have to be tweaked and modified in the future. The underlying game design concepts discussed here, though, will not be affected by any change in software and should help you in building a solid foundation in game design and development regardless of the actual tools used later in production.

Sample Construct 2 project files for the games designed in this book can be found on the author’s website, <http://programandplay.com>.