Appendix A

A Brief History of Handheld Devices

Interestingly, the history of handheld electronic gaming devices is almost as long as that of their arcade and home counterparts. After a first experiment by Waco in 1972 with a tic-tac-toe game, it was Mattel in 1977 that seriously pushed into the market by releasing its first dedicated handheld game, Auto Race. This, followed by Football and other sports-based titles, was met with great success by the general public and proved that electronic and video games could be a viable product "on the go" and not only in homes or at the arcades.

Coleco, Milton Bradley, and others soon followed Mattel and the handheld market started becoming a lively and growing segment in the gaming industry alongside the home sector. Milton Bradley, in particular, was responsible for the first cartridge-based handheld: the Microvision, released in 1979. Unfortunately, the Microvision was an extremely fragile device and both the system and games were prone to break very easily, seriously stifling its chances of success.

Mattel's Auto Race was the first fully electronic handheld game ever released and ran through a very simple LED display system and 512 bytes of memory.
The Microvision—the first cartridge-based system having a display of only $16 \times 16$ pixels. It was released in October 1979, and then discontinued in less than two years due to its poor success.

To find the next successful series of products, let’s shift to Japan where, from 1980 onwards, Nintendo decided to follow up its early successes with a set of simple electronic games based on LCD screens—the *Game & Watch* series was born. Designed by Gunpei Yokoi, *Game & Watch* was a clear breakthrough for Nintendo and helped to define many elements that became commonplace in later systems, both handheld and home based, like the D-Pad. Different series were produced till 1991 and are now coveted collector’s items.

Also in Japan, in 1984 Epoch tried to develop another cartridge-based handheld, named Game Pocket Computer. This time, the screen had a resolution of $76 \times 64$ pixels but the technology of the time was not yet mature enough to deliver complex experiences on the go.

*Donkey Kong* in its *Game & Watch* incarnation dating back to 1982. Note the D-Pad and the dual screen, which were later adopted in the NES and the Nintendo DS, respectively.
The Game Boy retailed for $89.99 and was an instant success. The display size was 160 x 144 pixels and it featured an 8-bit LR35902 CPU by Sharp that merged the best of the Intel 8080 and Zilog Z-80 processors, delivering enough power for the development of fun and addictive games.

It was only in 1989, and again thanks to Nintendo and Gunpei Yokoi, that handheld gaming was finally able to move to its next generation as a result of the popularity of the Game Boy. The Game Boy was an instant success, thanks also to its being bundled with Tetris. Across its multiple iterations and restylings like the Game Boy Pocket and Game Boy Color, it sold more than 118 million units worldwide.

Such instant and staggering success excited many other companies and the handheld market started getting crowded very fast. The first challenger was Atari, which, in 1989, released the Lynx by implementing a previous prototype developed by Epyx in 1987.

Designed by Alexey Pajitnov, Tetris found a perfect platform in the Game Boy. Thanks to this very simple yet addictive action/puzzle game, the Game Boy was successful in attracting not only youngsters but also a more adult crowd.
The Atari Lynx was the first handheld with a backlit and color screen. Built around a MOS 6502 CPU, it was released in 1989 at $189.99 and needed six AA batteries for just a few hours of playing time. Overall, it sold less than five million units.

Despite its technical qualities, the Lynx had all the same issues that would soon plague other upcoming devices like the NEC Turbo Express (1990, a portable TurboGrafx-16), the Sega Game Gear (1990), Nomad (1995), and others, preventing them from being able to compete seriously against Nintendo. In particular, poor battery life, big clunky size, and a much higher price tag all contributed to diminishing their appeal to a crowd for which all of these characteristics were more important than raw power for a device to be used while not at home. At the same time, Nintendo, thanks to its dominant position in the market and the doubtful strategies implemented by its competitors, was able to maintain its leadership comfortably by gradually releasing new iterations of its device that featured small, but meaningful, technical improvements together with more ergonomic designs.

The strategy of pleasing its audience thanks to small incremental improvements while delaying a more robust next generation until the underlying technology would be more affordable—and thereby maintaining high profit margins—proved successful and the Game Boy Advance was not released until 2001. Following this, though, Nintendo, decided to release its next console, the Nintendo DS, in 2004, probably in anticipation of the release of Sony's PlayStation Portable (PSP) in 2005. The DS was a staggering success, especially after the release of the "Lite" version in 2006, selling more than 135 million units worldwide. However, Sony was still able to seize a respectable share of the market with its PSP by selling more than 60 million units.

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30 The Game Gear was actually the most successful among the Game Boy competitors and sold around 11 million units worldwide.

31 The Game Boy Color, the first Nintendo handheld with a color display, wasn’t released until 1998.

32 The Game Boy Advance sold more than 81 million units overall.

33 As of September 2010.
The original Nintendo DS as released in 2004. As with its predecessors, several iterations offering small but meaningful improvements followed within a few years, turning this device into the most successful handheld gaming system ever released.

Though an analysis of past results shows that, at any given time, only very few players are able to take a meaningful role in this industry, many small and big companies alike keep trying to carve a niche audience for themselves by providing new ideas and systems. For example, despite the marketplace becoming even riskier and more competitive after the sudden and powerful rise of Apple's iPhone/iPad platforms, companies such as South Korean Game Park Holdings succeeded in building a small but significant following by producing devices open to hobbyists to freely develop games. And tech giants like Panasonic recently announced the upcoming release of a new handheld focused on online gaming (the Jungle, planned for 2011).

At the same time, Nintendo is ready to release its new device, the 3DS, which will be able to deliver actual 3D images on the go without the need for special glasses, thereby pushing the industry and its competitiveness to new heights once again.
Collecting Classic Games Today

An interesting phenomenon that has grown in popularity during the last few years is the collecting of old and classic games. Many people all around the world, whether adults looking to remember their younger days or new gamers eager to know more about the history of their favorite hobby, are seeking to experience old games once again and enjoy their legacy.

Online forums and websites are very active, and meetings and conferences on the subject are regularly organized around the world. Through a variety of means, the dedication of so many enthusiasts has successfully turned forgotten pieces of plastic and electronics into valuable collectibles that can fetch very high prices on popular auction sites.

On April 10, 2010, an extremely rare game for the Atari 2600, Air Raid, sold for $31,600 on the popular auction site eBay.

An Interview with Mike Kennedy

To understand more about classic games collecting, we interviewed Mike Kennedy. Mike is the founder and CEO of GameGavel.com, the cohost of the RetroGamingRoundup, a monthly podcast on retro games, and, obviously, an avid game collector and expert on this subject.
Roberto Dillon: Hello Mike, can you tell us something about yourself and how games came to play a significant role in your life?

Mike Kennedy: I grew up in the 70s and 80s. So, obviously, video and arcade gaming played a big part in my childhood. Unlike for many of my friends, gaming has continued to play a big role in my life—so much so that I have started a business centered on this lifestyle (yes, lifestyle) that I love so much. I started gaming, like many of us, in the arcades and on the Atari 2600 at home. Soon I moved onto computers, owning first a Timex Sinclair 1000 and moving quickly onto the Commodore 64 and ultimately to an Apple IIe when I was in high school. So, I had a good mix of arcade, console, and computer gaming while growing up. Fast forward to today. With the advent of the Internet as well as the weekly swap meets year round here in Southern California, I have been able to go back and experience all the games and gaming systems I didn’t have as a child. I currently own pretty much all the classic gaming systems from the Atari 2600, Intellivision, ColecoVision, Odyssey 2, NES, SNES, Sega Master System, Genesis and Dreamcast, Vectrex, and TurboGrafx right through the current generation systems, the Nintendo Wii and the PS3. I love mobile gaming as well on my Nintendo DS, GBA, GP2X, iPod/iPad, etc. In addition to console gaming, I also spend lots of time in our home arcade playing some of the arcade and pinball games that I dropped so many quarters into back in the day.

RD: How and why did you get the idea of starting GameGavel? How many users does it currently have?

Mike: I had been a pretty regular eBay member since 1997 so I had a good understanding of online auctions. Towards the end of 2007, I could tell that eBay was changing its vision and would be making changes that were really going to turn me off. I was trying to find other places to buy and sell video games and realized that the options were pretty limited. So, I decided to deal eBay the ultimate blow and start an auction site dedicated only to video gaming, and GameGavel (originally named Chase/TheChuckwagon.com) was born on March 24, 2008. To give back to the community and to the hobby that I love, I wanted to make an auction site that was similar enough to eBay in its appearance but featured a less expensive environment to sell on. So, I made the decision to do away with listing fees and then cut the eBay selling/final value fees and commissions in half. The bottom line is that, for sellers, it is a much cheaper place to sell their items. Since launching the auction site, I have added other community features such as gaming forums, industry blogs, a retrogaming-themed streaming radio station (http://www.retroarcaderadio.com) and we have also spun off a monthly retrogaming podcast (http://www.retrogamingroundup.com). Overall, GameGavel is more than a video game auction site, but rather a unique, all-inclusive gaming destination where gamers can buy and sell, and also mingle and catch up on
the latest industry news and opinions. There is really nothing else like it anywhere. Currently, after about two and a half years, GameGavel has nearly 5,000 members and is visited monthly by over 50,000 unique visitors. It has hosted over 300,000 gaming auctions and sold nearly $200,000 in merchandise.

**RD:** Is vintage game collecting a hobby that has spread mostly in North America or do you think it is also getting more popular worldwide?

**Mike:** Again, with the dawn of the Internet, I think vintage gaming is a worldwide interest. I think it appears to be predominantly a North American hobby, maybe because a lot of the earliest forms of gaming were invented here in the United States, at least until after the crash of 1983 when Japanese companies Nintendo and Sega established themselves as the new leaders of the industry. But for the most part, gamers want to experience lots of things they missed out on during the first go-around. And now it is easier than ever to collect a variety of vintage gaming systems from all around the world.

**RD:** What do you think makes it so attractive? Why do so many people see game carts from previous console generations as not just old pieces of plastic?

**Mike:** A lot of the gamers who grew up in the advent of gaming are obviously much older now and have some discretionary income. What better things to buy than video games? It is a relatively inexpensive hobby that has the ability to transport people back to their younger days with the flip of a switch and the twitch of a joystick. There is no shortage of gaming systems and memorabilia to collect. And you can take your collecting as far as you want to. Do you want to go after the expensive rare games or prototypes? Or just try to complete a collection of the more common less expensive games? It is your choice and there is a level for about any collector’s budget out there. There is just so much you can collect, from the systems themselves to the games, and the loads of gaming toys and memorabilia that has come out over the years.

**RD:** What suggestions would you give to someone who wants to start a new collection?

**Mike:** First, you have to decide how much money you want to spend and if you are going to be a hardcore collector who has to have every game made for a system, or a more passive collector who is happy just picking and choosing games to their liking. If you fall into the hardcore, gotta-have-it-all category, to begin I would recommend starting a collection with a system that is easy to collect—perhaps a system like the Atari 5200 or the Odyssey 2. Both systems have a smaller game catalog as compared
to some of the other systems like the Atari 2600 or Nintendo NES. If you are passive, like me, then you simply pick up the games you remember or had as a child. Or games that you would have liked to have owned back in the day, but missed out on. Personally, I like to spread my collecting around a variety of systems, not just a single system.

**RD:** Which games and platforms are particularly sought after nowadays?

**Mike:** Right now, it really depends on the various generations of gamers. I believe that the dawn of collecting the first generation systems has reached its peak and is on the decline. Most collectors of this earliest era have been collecting for the past 10 years or so and have what they want, or are chasing rare or more out-of-reach games. Today, I think the second generation of gamers is leading the way, collecting for the Nintendo and Sega systems from the mid to late 80s to mid-90s. It is cyclical and soon the third generation collectors will be trying to find the sought-after Sony PlayStation, Nintendo 64, and Sega Dreamcast games they grew up with.

**RD:** There have been items that fetched very high prices in online auctions. Do you think this trend will continue or have these been one-hit wonders that will likely not be repeated in the future?

**Mike:** I think that is anyone's guess. But I believe now is a peak time for collectors of the earliest first generation systems. It is a key time where most of us are in our early 40s and our collecting goals and income is at an all-time high. So I think for now, rare games and systems from the first generation will continue to hit their highest prices, but as each year goes by I think prices will decline. Now the second generation of system collectors is maturing and rarities for the Nintendo NES through the SNES, Genesis, and N64 will rise in value, and then fall. And so on. It is important for gamers to continue collecting as they age, and to introduce these classic systems to their children and to their children's friends. Keep classic gaming alive from the first generation of systems right through to the present day, some way, somehow. If someone is getting out of collecting, sell or give your collection to someone else. Don't throw it away. We must preserve all that we can.
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Index

Symbols

3dfx 156–157
3D Imager 39
3D Monster Maze 55
3DO Company 128, 129, 144
   3DO Interactive Multiplayer 128–129

A

Acorn Computers 86
Activision xvi, 32, 33, 34, 36, 66, 72, 74, 78, 82, 108.
Adam 37, 79, 80
Addictive Games 100–101
Advanced Dungeons & Dragons 146
Adventure 31, 32
Alcorn, Allan xv, 14, 19, 21, 27, 29
Altered Beast 123
America Online 146
Amiga CD32 152
   Amiga Corporation 93, 94
Amstrad CPC xviii, 87, 107, 108, 137
   Amstrad GX4000 87
   Amstrad Mega PC 132
Anco 140
Andy Capps 15
Another World 144

Apple Computer 47, 77
   Apple II xvi, 48, 49, 57, 60, 64, 65,
      76, 77, 89, 90, 102, 103, 106,
      108, 113, 66, 139, 103, 108
   Apple IIgs 117
   Apple iPhone 166
   Apple Macintosh 144, 152
Aquarius 79
Arakawa, Minoru 95
Argonaut Games 126
Arnold Palmer's Golf 124
Artwick, Bruce 64
Asteroids 29, 39, 58–59
Atari xv, xvi, xvii, xviii, xix, xx, 14, 16, 17,
   18, 19, 20, 21, 23, 24, 25, 27, 28, 29,
   30, 31, 32, 33, 36, 37, 38, 40, 41, 46, 47,
   49, 51, 52, 56, 57, 58, 60, 61, 65, 70, 72,
   73, 74, 77, 80, 81, 92, 93, 94, 95, 98,
   101, 102, 103, 116, 118, 140, 150, 151,
   152, 164
   Atari 8-bit Computers 104
   Atari 400 74
   Atari 800XL 81
   Atari 2600 30, 60, 74, 101, 168, 170
   Atari 2600 Jr. xvi, 30, 116, 150
   Atari 5200 xvii, xviii, 30, 60, 74–75,
      92, 101
   Atari 7800 xviii, 30, 46, 92, 93, 98,
      102, 105, 116
Atari Consumer Division 92, 93
Atari Falcon  117, 150
Atari Games  92
Atari Jaguar  xx, 117, 151
Atari Lynx  xix, xx, 150, 164–165
Atari ST  xviii, 116, 117, 118, 132,
136, 137, 142, 144, 150, 152
Atari VCS  28, 38, 66, 93, 102

Atic Atac  101–102
ATI Technologies  133
Atlantis  33

B

Baer, Ralph  xv, 11
Bally  14, 16
Barle, Richard  61
BBC Micro  86–87, 101
B.C. Kid  122
Bell, Ian  86
Beyond Software  107
Blender  118
Bluth, Don  103
Bomberman  89
Bonk  122
Boxing  33
Braben, Dave  86
Breakout  56–57
Broderbund  139, 148
Brookhaven National Laboratories  4
Brown Box  11, 12
Bryant, Larry  8, 14
Buchon, Didier  138
Bug-Byte  84
Bullfrog  141–142
Bunten, Dan  104, 108
Burokku kusuishi  23
Bushnell, Nolan  xiv, xv, 8–11, 14, 16–20,
25, 27–30, 56

C

California Pacific Computer Company  65–66
Capcom  126, 145
Captain Blood  137–138
Carmack, Adrian  133
Carmack, John  133, 148
Castlevania II: Simon’s Quest  120–121
Caswell, Dennis  105
Catacomb 3D  134
Ceripede  29
Championship Soccer. See Pele’s Soccer
Channel F  xv, 25–27
Checkers  33
Chuck E. Cheese’s Pizza Time Theatre  29
Cinematronics  xvi, xviii, 63, 103
Cinemaware  82
Civilization  143–144
Coleco  xv, xvii, 22, 23, 27, 37, 38, 44, 70,
75, 77, 79, 80, 162
ColecoVision xvii, 22, 33, 37, 38, 44, 70,
79, 102
Colossal Cave Adventure  61
Combat  27, 28
Commander Keen  134
Commodore  xi, xii, xvii, xviii, xix, xx,
77, 48, 49, 50, 51, 52, 53, 55, 60, 118,
76, 77, 78, 82, 83, 84, 90, 92, 93, 116,
117, 133
Commodore 16  93
Commodore 64 xviii, xx, 53, 65, 66,
Index

76, 77, 80, 81, 82, 83, 84, 88, 93, 101, 102, 104, 105, 106, 107, 108, 113
Commodore Amiga xviii, xix, 93, 94, 117, 118, 119, 122, 132, 137, 138, 140, 142, 143, 144, 150, 151, 152
Commodore Plus/4 93
Cosmos 29, 51
Crane, David 32, 66, 108
Crawford, Chris xix
Creative Technologies 133
Crowther, William 61
Curry, Chris 86
Custer's Revenge 74
Cynex xvii, 29

D
Dabney, Ted xiv, xv, 8–9, 11, 14, 16, 17
Daglow, Don 61, 67, 146
Death Race 71
Defender 64
Delphine 144
Destruction Derby 154
Dicker, Sam 64
Digital Vector Generator 58
Dini, Dino 140
DMA Design 144–145
Donkey Kong 38, 42–44, 96, 99, 104, 163
Donkey Kong Country 97
Doom 147–148
Douglas, Alexander xiv, 3
Dragon's Lair xviii, 103
Dragster 33
Dr. Pong 18

Duck Hunt 96
DuMont Laboratories 2
Dungeon 61
Dungeon Master 117

E
Easter Egg xvi, 32
Electronic Arts 82, 102, 104, 107, 124, 128, 148, 154
Electronic Delay Storage Automatic Calculator (EDSAC) 3, 4
Elite 86, 87
Epoch 44, 163
Epyx 82, 96, 105–106, 164
ERE Informatique 137–138
E.T. the Extraterrestrial 73
Evans, Malcolm 55
Exidy 71

F
Fairchild Semiconductors 25
Famicom xviii, xix, xx, 45, 46, 95, 98
Final Fantasy xix, 111–112
Fishing Derby 33
Flight Simulator 64–65
Football Manager 100–101
FTL Games 117
F-Zero 125

G
Galaxian 59–60
Game Mate II 29
Game Pocket Computer 163
Index

Game & Watch 163
Garriott, Richard 65
Gates, Bill 51
Gilbert, Ron 113
GoldenEye 007 97, 156
Goldsmith, Dr. Thomas Jr. 3
Gonzo 18
Gould, Irving 50, 93, 151
Grand Theft Auto IV 160
Gran Turismo 18, 19, 20
Graphical Environment Operating System (GEOS) 83
Greenberg, Maurice 22
Greenstein, Jane 125
Gun Fight 40, 41

H
Hall, Tom 133
Hammond, Eric 102
Harling, Ian 142
Hasbro Interactive 151
Hauser, Hermann 86
Hawkins, Trip 107, 128
Heavyweight Champ 106
Higinbotham, William 4
Hi-Toro 93
Hooersnake 3D 134

I
id s 90–91, 113, 132, 150, 152
ICO 158
ID Software xxi, 134, 147–148

Imagic 32, 33, 34, 36, 74
Imagine 84
Impossible Mission 96, 105–106
Infocom 61–63, 82
Infogrames 138, 140–141, 151
Intellivision xvi, xviii, 33–37, 52, 67, 70, 75, 101
Intellivision II 75, 76
International Karate 106
International Soccer 83
INTV Corp. xviii, 77
Iwatani, Toru 42

J
Jarre, Jean Michel 138
Jarvis, Eugene 64
Jelly Monsters 52
Jet Set Willy 85
Jobs, Steve 47, 56
Joe Montana’s Football 124
Jones, David 144
JTS Corporation 151
Jumpman 43–44, 104

K
Kamiya, Hideki 158
Kaplan, Larry 32
Karate Champ 106, 145
Karateka 89
Kassar, Ray 27, 28, 29, 30, 31, 33, 46, 51, 73, 74
Kee Games 19, 20, 27
Keenan, Joe 19, 27
Kennedy, Mike 167–170
Khor, Martin 72
Kick Off 102, 140
King of Fighters, The 128
Knight Lore 85
Kodama, Rieko 99
Kohler, Chris 111
Kojima, Hideo 138
Konami xix, 138–139, 145, 154
Kotick, Robert 78
Kotok, Alan 7
Kutaragi, Ken 125, 130, 131

L
Lamb, Ronnie 71
Legend of Zelda, The 109–110, 120
Lemmings 144–145, 154
LightWave 3D 118
Little Computer People 108–109
Lode Runner 148
Logg, Ed 58
Lords of Midnight 107
Lost Patrol 142–143
LucasArts 61
LucasFilm 81, 112–113
Lunar Lander 58

M
Magic Desk 82–83
Magnavox xv, xvi, 12, 13, 17, 18, 23, 33, 34
Man, Earle Ray 3

Maniac Mansion 112–113
Marcos, President of the Philippines xvii, 72
Mario Bros. 104
Matrox 133
Mattel Electronics xvi, xviii, 27, 34, 35, 36, 37, 67, 75, 77, 79, 102, 162
Mattel’s Auto Race 162
Mattel’s Football 162
Mauer, Rick 31
Maxis 140–141
Mechner, Jordan 89, 139
Mediagenic 78
Meier, Sid 136, 143
Melbourne House 106
Metal Gear 89
Metal Slug 128
Metroid 110–111
Michael Jackson’s Moonwalker 124
MicroProse 136–137, 143–144
Microsoft 51, 65, 82, 88, 159, 160, 161
Microsoft Xbox 159, 160, 161
Microsoft Xbox 360 160
Microvision 162
Midway xv, 40
Mikro-Gen 84
Miller, Alan 32
Milton Bradley 162
 Mindscape 138
Missile Command 29
Massachusetts Institute of Technology (MIT) xiv, 5, 61, 63
Mitchell, Billy xxiii, 42
Miyamoto, Shigeru 23, 42, 43, 96, 104, 109
Molyneux, Peter 141
Mortal Kombat II 127
Index

MS-DOS 81, 132, 141, 142, 144, 146
MSX xix, 60, 82, 88, 129
MUD 61, 146
M.U.L.E. 104–105
Mystique 74

N
------------------
Naka, Yuji 99, 124
Namco xv, xvi, 23, 42, 52, 59, 154
NEC xix, xx, 54, 121, 122
NEC Turbo Express 165
Nelson, Sam 108
Neo-Geo 127–128
Neubauer, Doug 60
Neverwinter Nights 146–147
Night Driver 57–58
Nintendo xii, xvi, xviii, xix, xx, 22, 23, 24, 38, 43, 44, 45, 46, 75, 95, 96, 97, 98, 104, 109, 110, 120, 121, 123, 124, 125, 126, 127, 130, 131, 133, 150, 153, 154, 155, 156, 159, 160, 161, 163, 164, 165, 166, 168, 169, 170
Nintendo 3DS 166
Nintendo 64 97, 131, 155, 170
Nintendo DS 163, 165, 168
Nintendo Entertainment System (NES) xviii, 75, 95, 96, 97, 98, 99, 104, 105, 106, 109, 110, 111, 113, 120, 121, 122, 123, 125, 144, 163, 168
Nintendo GameBoy 144, 150, 164, 165
Nintendo GameCube 159
Nintendo Power xix, 120
Nintendo Wii 160, 161, 168
Nishikado, Tomohiro 41
Noughts and Crosses 3
Nutting Associates xiv, xv, 9, 40
Nvidia 133, 157

O
-------------------
Ocean 84, 142–143
Odyssey xv, 12, 13, 14, 17, 18, 22, 23, 26, 34
Odyssey² xvi, 34
Okami 158
One on One 102–103, 124
On-Line Software 61
Origin Systems 61
Oshima, Naoto 124
Out of this World. See Another World

P
-------------------
Pac-Man xvi, 42, 43, 52, 73
Pajitnov, Alexey 164
Pat Riley’s Basketball 124
PC Engine. See TurboGrafx-16
PDP-1 5, 6, 7, 10
Pete’s Soccer 102
Phantasy Star ’99
Philips xvi, xx, 22, 33, 88, 130, 131
Pinball Construction Set 148
Pin Pong 18
Pitfall! 66–67
PlayCable 35
PlayStation 2 (PS2). See Sony PlayStation 2
PlayStation 3 (PS3). See Sony PlayStation 3
Plimpton, George 37
Pole Position 101
INDEX

Pong xv, 14, 15, 16, 17, 18, 21, 22, 23, 24, 25, 27, 41, 57
Populous 141–142
Prince of Persia 89, 139
Provenzo, Eugene F. 120
Psygnosis 119, 144–145, 154
Puyo Puyo 89

Q

QuadraPong 18, 19
Quicksilva 84

R

Radar Rat Race 52
RadioShack xvi, 47, 48, 78
Rally-X 52
Rare 85, 97, 156
Reflections Interactive 119
Rescue on Fractalus! 81
ROB 95–96
Robinett, Warren 31
Rock Star Games 160
Romero, John 133, 148
Rosa, Piermarco 146
Rosenthal, Larry 63
Ross, Steve 27, 73
Russell, Stephen xiv, 6

S

S3 133
Safran, Scott 59
Salaguchi, Hironobu 111

Samurai Showdown 128
Samurai Showdown V Special 128
Sanders Associates 11
Sanders, Bob 7
Satellaview 126
Sears Roebuck & Co. 21
Sega xviii, xix, xx, xxi, 44, 66, 98, 99, 123, 124, 125, 127, 132, 138, 150, 151, 154, 155, 156, 157, 158, 159, 168
Sega 32X 155
Sega CD 138
Sega Dreamcast 157, 158, 160, 168, 170
Sega Game Gear 165
Sega Genesis, Sega Mega Drive
Sega Master System xviii, 98, 99, 105, 123, 124, 142, 144, 168
Sega Mega-CD 125
Sega Mega Drive 123, 125, 132, 142, 154
Sega Nomad 165
Sega Saturn 155
Sega TeraDrive 132

Seven Cities of Gold 107–108
SG-1000 xviii, 44, 45, 66
Shadow Development 142
Shadow of the Beast 119, 154
Shadow of the Colossus 158
Shannon, Claude 3
Shatner, William 52

Shenmue 157
Sid Meier’s Pirates 136–137
SimCity 140–141
Sinclair, Clive 53, 84
Singleton, Mike 107
Smith, Jay 39
Smith, Matthew 85
Snatcher 138–139
Super Nintendo Entertainment System (SNES) xx, 97, 117, 125, 126, 127, 130, 131, 141, 142, 144, 145, 146, 151, 152, 168, 170

Software Projects 85

Sonic Adventure 157
Sonic the Hedgehog (character) 99, 124

Sonic the Hedgehog 124

Sony xi, xix, xx, 88, 125, 130, 131, 151, 153, 154, 155, 156, 157, 160, 161, 165

Sony Computer Entertainment 153
Sony PlayStation xx, 131, 151, 153, 154, 155, 156, 158, 165

Sony PlayStation 2 158, 159

Sony PlayStation 3 160

Soul Calibur 157

Space Invaders xvi, 31, 41, 52, 60

Spacewar! xiv, 6–7, 8–10, 61

Spielberg, Steven 73

Square 111–112

SSI 146

Stamper, Chris 85, 97, 101

Stamper, Tim 85, 97, 101

Star Fox xx, 126

Star Raiders 60–61

Star Wars: X-Wing 61

Stormfront Studios 146

Street Fighter II 145–146

Studio II 25–26

SubLogic 64–65

Sugar, Alan 87

Super Famicom. See SNES

Super Mario Bros. xviii, 95, 96, 99, 124, 155, 156

Super Mario World 125, 126

T

Tail Gunner xvi, 63

Taito xv, xvi, 40, 41, 57

Take Two Interactive 160

Tandy xvi, 48, 50, 51, 64, 77, 78

Teasdale, Gary 17

Teenage Mutant Ninja Turtles 120

Telstar xv, 22, 23

Tempest 29, 39

Tennis for Two xiv, 4, 5, 9

Tetris xix, 164

Texas Instruments 47, 49, 50, 76, 78

Tezuka, Takashi 109

TI99/4A 78, 80, 101

Timex 55

Tomczyk, Michael 51

Toms, Kevin 100

Tramiel, Jack xviii, 49, 50, 51, 53, 76, 93, 116, 118, 150, 151

Tramiel, Sam 93, 117, 150, 151

TRS-80 xvi, 47, 48, 64, 100

Trubshaw, Roy 61, 146

Trubshaw, Roy. See Tramiel, Jack

TurboGrafx-16 121, 142, 165

U

Ueda, Fumito 158

Uemura, Masayuki 45, 125

Ulrich, Philippe 138

Ultima 65–66

Ultimate 85, 97, 101–102

Universal City Studios 44

U.S. Gold 144
Uston, Ken 42

Utopia 67

uWink 29

Wolfenstein 3D 134, 148

Woods, Don 61

Wozniak, Steve 47, 56

Wright, Will 140

V

Valentine, Don 21

Vectorbeam xvi, 63

Vectrex 38, 39, 101, 168

VIC-20 xvii, 51, 52, 53, 60, 76, 80, 101

Vic-Avengers 52

Videopac G7000 xvi, 34

Villanueva, Cynthia 14, 30

Waco 162

Warner Communications xv, 27, 73

Warshaw, Howard Scott 74

Way of the Exploding Fist, The 106

Williams Electronics 64, 154

Williams, Ken 61

Williams, Roberta 61

Wing Commander 61

Winnick, Gary 113

WipeOut 154

Yamauchi, Fusajiro 23

Yamauchi, Hiroshi 95

Yie Ar Kung Fu 145

Yokoi, Gunpei 95, 104, 110, 163, 164

W

Wakaru 67

X

XBAND 127

Y

Yale 88

Z

Zanussi 22

Zaxxon 38

Zork 31, 61–63

ZX-80 xvii, 53, 54

ZX-81 xvii, 54, 55, 100

ZX Spectrum xviii, 60, 82, 84, 86, 88, 97, 100, 101, 107, 108
About the Author

Roberto Dillon was born in Genoa, Italy, in 1973. In 1981, he had his first encounter with a home computer, a Texas Instruments 99/4A, and then with an Intellivision gaming console. In 1983, he received a Commodore 64 that hooked him into technology, computer science, and games ever since.

He holds a Master and a Ph.D. degree in Electrical and Computer Engineering from the University of Genoa and, after having worked both in the software/multimedia development industry and in prestigious academic institutions across Europe and Asia, he joined the Singapore campus of the DigiPen Institute of Technology where he is currently an Assistant Professor lecturing on a variety of game design subjects including Game Mechanics and Game History.

Roberto has led high profile research projects on innovative game mechanics and designed serious, educational, and experimental games that were showcased internationally in newspapers like USA Today and at events like the Sense of Wonder Night within the Tokyo Game Show.