PART I

INTRODUCTION AND BACKGROUND

What is virtual reality (VR)? What does VR consist of and for what situations is it useful? What is different about VR that gets people so excited? How do developers engage users so that they feel present in a virtual environment? This part of the book answers such questions, and provides a basic background that later chapters build upon. This introduction and background serves as a simple high-level toolbox of options to intelligently choose from, such as different forms of virtual and augmented reality (AR), different hardware options, various methods of presenting information to the senses, and ways to induce presence into the minds of users.

Part I consists of five chapters that cover the basics of VR.

Chapter 1, What Is Virtual Reality?, begins by describing what VR is at a high level and what it is suitable/effective for. This includes descriptions of different forms of communication that are at the heart of what VR is—communication between the user and a system created by the VR designer.

Chapter 2, A History of VR, provides a history of VR starting with stereoscopes created in the 1800s. The concept and implementation of VR is not new.

Chapter 3, An Overview of Various Realities, discusses forms of reality ranging from the real world to augmented reality (AR) to VR. Whereas the focus of this book is on fully immersive VR, this chapter provides context of where VR fits into the overall picture of related technologies. The chapter also gives a high-level description of various forms of input and output hardware options that can be used as part of AR and VR systems.
Chapter 4, Immersion, Presence, and Reality Trade-Offs, discusses the often-used terms of immersion and presence. Readers may be surprised to learn that realism is not necessarily the goal of VR and there are trade-offs for attempting to perfectly simulate reality, even if reality could be perfectly simulated.

Chapter 5, The Basics: Design Guidelines, concludes this introductory part of the book and gives a small number of guidelines for those looking to create VR experiences.
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Jason Jerald, PhD, is Co-Founder and Principal Consultant at NextGen Interactions. In addition to primarily focusing on NextGen Interactions and its clients, Jason is Chief Scientist at Digital ArtForms, is Adjunct Visiting Professor at the Waterford Institute of Technology, serves on multiple advisory boards of companies focusing on VR technologies, coordinates the Research Triangle Park VR Meetup, and speaks about VR at various events throughout the world.

Jason has been creating VR systems and applications for approximately 20 years. He has been involved in over 60 VR-related projects across more than 30 organizations including Valve, Oculus, Virtuix, Sixense, NASA, General Motors, Raytheon, Lockheed Martin, three U.S. national laboratories, and five universities. Jason’s work has been featured on ABC’s Shark Tank, on the Discovery Channel, on the UK’s Gadget Show, in the New York Times, and on the cover of the MIT Press journal Presence: Teleoperators and Virtual Environments. He has held various technical and leadership positions including building and leading a team of approximately 300 individuals, and has served on the ACM SIGGRAPH, IEEE Virtual Reality, and IEEE 3D User Interface Committees.

Jason earned a Bachelor of Computer Science degree with an emphasis in Computer Graphics and Minors in Mathematics and Electrical Engineering from Washington State University. He earned a Masters and a Doctorate in Computer Science from the University of North Carolina at Chapel Hill with a focus on perception of motion and latency in VR. His graduate work consisted of building a VR system with under 8 ms of end-to-end latency; the development of a mathematical model relating latency, head motion, scene motion, and perceptual thresholds; and validation of the model through psychophysics experiments. Jason as authored over 20 publications and patents directly related to VR.