Springer Series on Cultural Computing

For further volumes:
http://www.springer.com/series/10481

Vladimir Geroimenko

Editor

Augmented Reality Art

From an Emerging Technology to a Novel
Creative Medium

Springer

Editor
Vladimir Geroimenko
School of Art and Media
Plymouth University
Plymouth, Devon, UK

Printed on acid-free paper

This pioneering book is dedicated to the future generations of augmented reality artists

Preface

The book you are holding in your hands in a paper, or more likely digital, format is a unique one. This is the first ever monograph on augmented reality art. It is written by a team of world-leading artists and researchers, pioneers in the use of augmented reality as a novel artistic medium, and is being dedicated to the future generations of augmented reality artists.

The book explores a wide range of major aspects of augmented reality art and its enabling technology. It is intended to be a starting point and essential reading not only for artists, researchers and technology developers, but also for students and everyone who is interested in emerging augmented reality technology and its current and future applications in art.

It was very difficult to make this book happen, because augmented reality art is still in its infancy at present, and there are therefore relatively few research materials available. We owe a debt to our contributors who have managed to produce this monograph in the face of these difficulties. The team includes 25 artists and researchers from 6 countries (USA, Australia, Italy, UK, Romania and Germany). The majority of the authors are either members of the Manifest.AR group (www.manifestar.info), or contributors to the only substantial collection of articles on augmented reality art available so far (*Not Here, Not There* double issue of *Leonardo Electronic Almanac,* 2013, Vol. 19, No. 1 & 2).

Manifest.AR is the first artist collective that started using augmented reality (AR) to create art and activist works. The group was formed when AR creation first became possible on smartphones. Manifest.AR explores what makes AR unique as a medium, separating it from other forms of new media such as virtual reality, web art, video and physical computing.

The collective found its roots in the groundbreaking 2010 We AR in MoMA intervention. Mark Skwarek and Sander Veenhof realized they could challenge the Museum of Modern Art's extreme exclusivity by placing art works inside and around the museum, and invited selected artists to participate. Finding talented and accomplished AR artists for the show was very difficult – at the time of the MoMA intervention, very few people even knew what AR was. The group of invited participants included most of those who became core founders of Manifest.AR:

Sander Veenhof, Mark Skwarek, Tamiko Thiel, Will Pappenheimer, Christopher Manzione and John Craig Freeman.

After the We AR in MoMA intervention it was time to put down in words the thoughts, goals and future visions of the first artists working with this new technology. Tamiko Thiel proposed choosing a group name to give an identity to future collaborations. Sander Veenhof suggested the name Manifest.AR, and that the group should write a manifesto to document this historic moment, the birth of mobile AR as an art form. Mark Skwarek brought together what became the original founder's group (the above artists, plus Geoffrey Alan Rhodes) and was the driving force behind getting the group to write and publish the "AR Art Manifesto," Manifest.AR's debut as a group entity, on January 25, 2011.

Here is the manifesto in full:

"All that is Visible must grow beyond itself and extend into the Realm of the Invisible" (Tron, 1982).

Augmented Reality (AR) creates Coexistent Spacial Realities, in which Anything is possible – Anywhere!

The AR Future is without boundaries between the Real and the Virtual. In the AR Future we become the Media. Freeing the Virtual from a Stagnant Screen we transform Data into physical, Real-Time Space.

The Safety Glass of the Display is shattered and the Physical and Virtual are united in a new In-Between Space. In this Space is where we choose to Create.

We are breaking down the mysterious Doors of the Impossible! Time and Space died yesterday. We already live in the Absolute, because we have created eternal, omnipresent Geolocative Presence.

In the 21st Century, Screens are no longer Borders. Cameras are no longer Memories. With AR the Virtual augments and enhances the Real, setting the Material World in a dialogue with Space and Time.

In the Age of the Instantaneous Virtual Collective, AR Activists aggravate and relieve the Surface Tension and Osmotic Pressure between the so-called Networked Virtual and the so-called Physical Real.

Now hordes of Networked AR Creatives deploy Viral Virtual Media to overlay, then overwhelm closed Social Systems lodged in Physical Hierarchies. They create subliminal, aesthetic and political AR Provocations, triggering Techno-Disturbances in a substratosphere of Online and Offline Experience.

Standing firmly in the Real, we expand the influence of the Virtual, integrating and mapping it onto the World around us. Objects, banal By-Products, Ghost Imagery and Radical Events will co-exist in our Private Homes and in our Public Spaces.

With AR we install, revise, permeate, simulate, expose, decorate, crack, infest and unmask Public Institutions, Identities and Objects previously held by Elite Purveyors of Public and Artistic Policy in the so-called Physical Real.

The mobile phone and future Visualization Devices are material witness to these Ephemeral Dimensional Objects, Post-Sculptural Events and Inventive Architectures. We invade Reality with our Viral Virtual Spirit.

AR is not an Avant-Garde Martial Plan of Displacement, it is an Additive Access Movement that Layers and Relates and Merges. It embraces all Modalities. Against the Spectacle, the Realized Augmented Culture introduces Total Participation.

Augmented Reality is a new Form of Art, but it is Anti-Art. It is Primitive, which amplifies its Viral Potency. It is Bad Painting challenging the definition of Good Painting. It shows up in the Wrong Places. It Takes the Stage without permission. It is Relational Conceptual Art that Self-Actualizes.

AR Art is Anti-Gravity, it is Hidden and must be Found. It is Unstable and Inconstant. It is Being and Becoming, Real and Immaterial. It is There and can be Found – if you Seek It.

The content of the book is arranged as follows. You can read chapters in sequence or randomly.

Chapter 1 "Augmented Reality Activism" narrates the exciting story of the first generation of activists that began working with augmented reality to further their causes. These activists pioneered the development of mobile AR in search of what made it unique from other mediums and what traits could be used to further activists agendas. Many of these works are the first explorations of their type with this new technology and act as a road map for future activists working with AR. What dangers do those working with this technology face? Does AR have the ability to empower the masses? Can it create real social change and can it unite society by turning virtual experiences into physical ones? The activists in this chapter set out to find these answers.

Chapter 2 "Critical Interventions into Canonical Spaces" describes augmented reality interventions led by the author in 2011 with the artist group Manifest.AR at the Venice Biennale, and in collaboration with the design office PATTU at the Istanbul Biennale. The interventions used the emerging technology of mobile augmented reality to geolocate virtual artworks inside the normally curatorially closed spaces of the exhibitions via GPS coordinates. Unlike physical art interventions, the artworks cannot be removed or blocked by the curators or other authorities, and will remain at those locations as long as the artist desires. The artworks exploit the site-specificity as an integral part of the artwork while simultaneously questioning the value of location to canonize works of art, and the power of the curator as gatekeeper to control access to the spaces that consecrate works of art as part of the high art canon.

Chapter 3 "Beyond the Virtual Public Square: Ubiquitous Computing and the New Politics of Well-Being" first explores augmented reality and ubiquitous computing in general and then describes examples of place-based augmented reality artworks within the framework of electracy (the digital apparatus). Apparatus theory correlates technological innovations with the corresponding inventions in institutional practices, including individual and collective identity behaviours. The authors, working with an electrate consultancy (the EmerAgency), test an augmented deliberative design rhetoric intended to overcome individual alienation from collective agency. It is an electrate equivalent of the ancient Theoria. Theoria, augmented by literacy, became journalism – the fourth estate of a democratic

society. The konsult practice described in this chapter updates Theoria for a fifth estate with a new function supporting collective well-being, in the global experience of a potentially ubiquitous public square.

Chapter 4 "Augmented Interventions: Re-defining Urban Interventions with AR and Open Data" proposes that augmented reality art and open data offer the potential for a redefinition of urban interventionist art practices. It examines the possibilities for redefining the activist art practice of urban intervention with data and augmented reality to introduce new hybrid techniques for critical spatial practice. The combination of augmented reality and open data is seen to provide a powerful tool-set for the artist/activist to augment specific sites with a critical, context-specific data layer. Such situated interventions offer powerful new methods for the political activation of sites which enhance and strengthen traditional non-virtual approaches and should be thought of as complementary to physical intervention. The chapter offers a case study of the author's *NAMAland* project, a mobile artwork which used open data and augmented reality to visualise and critique aspects of the Irish financial collapse.

Chapter 5 "The Aesthetics of Liminality: Augmentation as an Art Form" reveals that while one can make arguments that much AR-based art is a convergence between handheld device art and Virtual Reality, there are gestures that are specific to augmented reality that allow for its specificity as a genre. The chapter explores some historical examples of AR and critical issues of the AR-based gesture, such as compounding of the gaze, problematizing of the "retinal", and the representational issues of informatic overlays. This also generates four gestural vectors analogous to those defined in his chapter in the *Oxford Handbook of Virtuality* (2014), which is being examined through case studies. Through these studies, it is hoped that a deeper understanding of an augmented semiotics can be achieved.

Chapter 6 "Augmented Reality in Art: Aesthetics and Material for Expression" starts with an analysis of Cinematic Apparatus theory of the 1970s that set the stage for an investigation of cinematic expression in avant-garde film art through a deconstruction of its materials. The material and production elements repressed in the normal ideological apparatus became the arena for new expression. Cinema accelerated the mechanization and sequence of its era to create the essential medium of that era; augmented reality is a similar acceleration of the electric image that first emerged with electric video installation. Using Jean-Louis Baudry's diagram of the cinematographic apparatus as reference, this chapter excavates and diagrams the electric image apparatus to search out the repressed and revealed in viewers' perception. For augmented reality, the first medium which fully realizes the electric image, a new way forward is proposed, towards an avant-garde AR(t).

Chapter 7 "Digital Borders and the Virtual Gallery" shows that augmented reality art, as a new media subset, distinguishes itself through its peculiar mechanics of exhibition and performative re-contextualization. It allows the artist to translocate the borders and constraints of the experience from physical to virtual, expressing the piece onto spaces independent of physical or locative constraint, yet still tethered to the real world. This practice of anchoring virtual assets to the physical world allows artists to make use of virtual properties such as mutability and replication, while engaging with issues of embodiment, performance, and presence. The ability to customize work's boundaries, to draw one's own curatorial borders and parameters,

is in itself a freedom drawing from augmented reality's strengths, inviting a model of the world as not one in which art happens, but one which is conditionally defined and experienced as an integrative work of art.

Chapter 8 "Immersive Art in Augmented Reality" studies how current AR technology has taken a turn away from the attempt at a sensorial suspension of disbelief in favor of a new social form of immersion. In this new model, space is collapsed not between the real and the virtual, but instead between people in distance and time. In context of the new mobile form of augmented reality that is based on social interactivity, artists are now beginning to examine the cultural potential this new medium can offer. This chapter will explore several components of this new artistic medium and some markers from art history and gaming culture that help to explain the history of how we have arrived at this new social AR medium. Specifically it will look at socially immersive artworks and collaborative locative media as outcomes of this new medium based on social immersion rather than sensorial immersion.

Chapter 9 "Skin to Skin: Performing Augmented Reality" undertakes an examination of the use of augmented reality in recent examples of digital performance and installation investigation at the Deakin Motion.Lab. In particular, the authors discuss the concept of 'digital dualism' as a means of mapping some of the conceptual shifts augmented reality makes possible for dance and performance technology. Digital dualism sees the disjuncture between 'real' and 'virtual' in digital performance, as in life, as an artefact of an earlier technological/cultural moment in which the digital had not yet become embedded within and a conduit for everyday life. The authors argue that digital performance within an augmented reality framework provides a demonstration of the inability of digital dualism to stand up even in relation to what might be considered the most unlikely candidate for digital distribution – the embodied experience of the human body.

Chapter 10 "Augmented Reality Painting and Sculpture: From Experimental Artworks to Art for Sale" focuses on a use of augmented reality that is more closely related to traditional painting and sculpture than to interactive game-like AR installations. Based on an analysis of the author's experimental paintings and sculptures, presented in his solo exhibition *Hidden Realities* and the outdoor installation *The Enterprise Jigsaw*, it deals with a particular type of augmented reality paintings that integrate gallery-quality art prints of digital paintings with augmentation by 2D and 3D objects. This type of painting can provide one easy and reliable solution to the acute problem of the saleability of augmented reality art. Alongside theoretical considerations, the first ever augmented reality painting for sale on Amazon is presented – the author's artwork *The Half Kiss*. Similar possibilities for AR sculptures are also analysed.

Chapter 11 "Augmented Reality Graffiti and Street Art" looks at how the concept of augmented reality graffiti enables us to experience an expanded view of the urban environment. It examines how the intersection between graffiti, street art and AR provides us with a complex socially and technologically encoded interface, which has the potential to combine the first-hand experience of public space with digital media, and creative practices, in a hybrid composition. The chapter begins by looking at the tradition of graffiti and street art; this is followed by a discussion

around the philosophical implications for digitally augmented graffiti. A number of key techniques and technologies are then explored through the use of two practice-based case studies.

Chapter 12 "Why We Might Augment Reality: Art's Role in the Development of Cognition" shows that an important aspect of Behavioral Art is "borrowing intelligence" from a humanly organized source, such as a painting, and applies it to a computer process. This process might easily be mistaken for an objet de (computer) art, but we must look further into the larger dynamic system, one that includes the audience as well. Since the machine itself is incapable of any type of organization, a human must supply the organizational paradigm to the input, and a human must recognize one in the output. However, by sampling from the environment via machine, a process we can now call augmented reality, we might imbue whatever quality triggered an interpretation of "potentially meaningful" in audience members regarding that painting, to our computed output. This chapter addresses how and why humans tends to employ this particular form of nonverbal expression.

Chapter 13 "Augmenting Wilderness: Points of Interest in Pre-Connected Worlds" looks at the way the aesthetics of object-oriented ontology performs in association with augmented reality art made on the borders of Internet connection. The focus of the research is on the notion of 'wilderness onticology' by Levi Bryant, and the ideas of 'hyperobjectivity' by Timothy Morton, while examining artworks by George Ahgupuk, Alvin Lucier, Mark Skwarek, Nathan Shafer, v1b3, and John Craig Freeman. Most of the conclusions of the research point to the praxis of the art historical anti-tradition as a tool for negotiating ontologies of the wilderness, or the unknown, as well as the virtual objects which exist there, for creating socially useful forms of art. Other topics include the usage of the Earth art binary of site/non-site, media ecology and the flaneur.

Chapter 14 "An Emotional Compass: Emotions on Social Networks and a new Experience of Cities" analyses the methodology and technique used to design and develop an Emotional Compass, a device for orientation in urban environments which uses geolocated content harvested from major social networks to create novel forms of urban navigation. This user-generated content is processed in real-time to capture emotional information as well as geolocation data and different types of additional meta-data. This information is then rendered on mobile screens under the form of a Compass interface, which can be used to understand the direction and locations in which specific emotions have been expressed on social networks. This gives rise to achieve novel ways for experiencing the city, including peculiar forms of way-finding techniques which rely on emotions rather then street names and buildings.

Chapter 15 "Augmenting the Archaeological Record with Art: The Time Maps Project" proposes a new method for evoking the complexity of the Past from the archaeological record, based on a transdisciplinary approach linking science, art and technology. Inspired from the fractal-theory, this method employs different levels of augmentations from general context to detail and uses a combination of augmented reality techniques and visual media, with a high artistic quality, to create

a mixed-reality user experience. The chapter presents an experimental augmented reality application on mobile devices, and discusses the efficacy of the method for an educational strategy to help communities recover and transmit their immaterial heritage to future generations. The research was based in Vadastra village, southern Romania, in an archaeological complex of a prehistoric settlement.

Chapter 16 "Spatial Narratives in Art" analyzes the work of artists who use augmentation, information and immersion in specific contexts – public or private spaces. The aim of the analysis is to understand socio-cultural transformations in the fields of art and technology in social space and what new forms of aggregation and participation have developed, providing an opportunity to reflect on new concepts of democracy that are emerging in our global media age. The question underlying the study is how do artists who use augmentation, information and immersion give new meaning to the concept of public space, changing the proprietary boundaries of that space and concept of what it is to perceive reality.

Chapter 17 "Shifting Perceptions – Shifting Realities" is an artistic journey to define perceptual shifts, explore the multiplicity of realities and reveal the many layers of a sense of presence through Immersion. AR art incorporated in small southern Indiana town makes the locals wary of strangers waving computer devices to capture photographs of their sanctuary. The musings and conversations that transpire offer a window into a world beyond AR which opens up an awareness to the historicity of the moment. The AR appears as a balloon shaped heart blazing with a picture of Lenin raising his arm to the sky. The AR is motivated by Skwarek's participation in the Occupy movement and the celebration of May Day and the motivations of these movements are also discussed. AR facilitates an investigation of space and an earnestness of place in the community.

Chapter 18 "Wearable Apocalypses: Enabling Technologies for Aspiring Destroyers of Worlds" examines "Apocalypse" by William S. Burroughs (novelist, essayist, painter 1914–1997), an essay on the possibilities of street art that he wrote as a collaboration with Keith Haring (pop and graffiti artist, social activist 1958–1990). While written in 1988 this essay can serve as a guide for current and future artists who work in augmented reality interventions into public spaces by situating their work within a 2000+ year old cycle of revolution and counter revolution in art, culture, and spirituality. The author's contention is that looking backward to pre-modern mythology in this way provides larger frame of reference that is even more useful to contemporary augmented reality artists than it was to the graffiti artists of the 1980s that this essay was originally discussing, as the technological and artistic affordances of mobile devices have expanded the possibilities of street art to begin to match Burroughs' vision.

Finally, we hope that the reader will not judge us too harshly. We have accepted the challenge of being the first and we have done our best to bring out this pioneering work. Just go ahead and read the book. We hope sincerely that you will enjoy it.

Plymouth, UK   Vladimir Geroimenko
New York, USA   Mark Skwarek

Contents

Contributors

Damon Loren Baker Department of Entertainment Technology, New York City College of Technology (CUNY), Brooklyn, NY, USA

Alison Bennett Deakin Motion.Lab, School of Communication and Creative Arts, Deakin University, Melbourne, Australia

Margaret Dolinsky HR Hope School of Fine Arts, Pervasive Technology Institute, Institute of Digital Arts and Humanities, Indiana University, Bloomington, IN, USA

John Craig Freeman Department of Visual and Media Arts, Emerson College, Boston, MA, USA

Jacob Garbe Center for Games and Playable Media, University of California Santa Cruz, Santa Cruz, CA, USA

Vladimir Geroimenko School of Art and Media, Plymouth University, Plymouth, Devon, UK

Dragoş Gheorghiu Doctoral School, National University of Arts, Bucharest, Romania

Ian Gwilt Department of Design and Visual Communication, Art and Design Research Centre (ADRC), Sheffield Hallam University, Sheffield, UK

Stephanie Hutchison Deakin Motion.Lab, School of Communication and Creative Arts, Deakin University, Melbourne, Australia

Salvatore Iaconesi Department of Digital Design, ISIA School of Design, Florence, Italy

Patrick Lichty University of Wisconsin, Milwaukee, Digital Studio Practice

Simona Lodi Share Festival (Turin), Art Critic and Curator, Turin, Italy

Todd Margolis California Institute of Telecommunications and Information Technology (Calit2), University of California, San Diego, CA, USA

John McCormick Deakin Motion.Lab, School of Communication and Creative Arts, Deakin University, Melbourne, Australia

Conor McGarrigle Emergent Digital Practices, University of Denver, Denver, CO, USA

Oriana Persico Department of Digital Design, ISIA School of Design, Florence, Italy

Geoffrey Alan Rhodes Department of Visual Communication Design, School of the Art Institute of Chicago, Chicago, IL, USA

Nathan Shafer Founder, Institute for Speculative Media, University of Alaska Anchorage, Honors College, Complex Systems, Anchorage School District, Structured Learning, AK, USA

Mark Skwarek NYU Polytechnic School of Engineering, New York, NY, USA

Livia Ştefan Integrated Applications Department, Institute for Computers, Bucharest, Romania

Tamiko Thiel Artist and Manifest.AR co-founder, USA, DE, JP

Gregory L. Ulmer Department of English and Media Studies, University of Florida, Gainesville, FL, USA

Jordan Beth Vincent Deakin Motion.Lab, School of Communication and Creative Arts, Deakin University, Melbourne, Australia

Kim Vincs Deakin Motion.Lab, School of Communication and Creative Arts, Deakin University, Melbourne, Australia

Judson Wright Artist/programmer, Pump Orgin, New York, NY, USA