CURRICULUM VITAE

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RESEARCH INTERESTS

As a researcher in the field of human-computer interaction, I am focused on techniques and tools that increase the creativity and productivity of individuals using systems leveraging three dimensional input and output. My current research focuses on Integrated Development Environments for Augmented Reality that are built around software and protocols already seeing broad use. My research methodology is based on a strong interest in understanding and responding to the cognitive frameworks of actual stakeholders combined with a belief that this dynamic is the most productive way to advance the field of 3D user interfaces. My greatest strength lies in bringing a combination of broad technical knowledge and strong communication skills, both verbal and visual, to bear on my relationship with the users of the tools I develop.

EDUCATION

12/07   *Ph.D. in Computer Science. University of Illinois at Chicago*
         Dissertation: A Unified Framework for the Development of Desktop and Immersive User Interfaces
         Electronic Visualization Laboratory directors Tom DeFanti and Daniel Sandin were recipients of the
         2007 IEEE VGTC Virtual Reality Technical Achievement Award.

5/92   *M.S. in Mechanical Engineering. University of Texas at Austin*
         Thesis: Reduced Order Modeling and First-Order Multivariate Control of a Coal Fired Power Plant
         Cockrell Graduate School of Engineering is consistently ranked in the top 10 (*U.S. News & World Report*).

12/88   *B.S. in Mathematics. Trinity University, San Antonio, Texas*
         Minor: Art History
         Ranked No. 1 in "America's Best Colleges" guide 16 consecutive years (*U.S. News & World Report*).

EMPLOYMENT

08-11   *Postdoctoral Fellow at the Augmented Environments Laboratory, Georgia Institute of Technology*
I was a postdoctoral fellow working with Associate Professor Blair MacIntyre in the Interactive Computing department at the Georgia Institute of Technology. One of the main research goals of the laboratory has been to contribute to the understanding and development of AR entertainment applications for handheld devices. My responsibilities included leading the effort to develop protocols for the client and server infrastructure of an open standards-based augmented reality browser. I also developed and continue to maintain an augmented reality toolkit for the Unity 3D game engine.

5-9/08   *Research Scientist at the Center for Technology and Social Behavior, Northwestern University*
I conducted research on the development of Embodied Conversational Agents in the Articulab, the principle laboratory started by Justine Cassell after she moved from MIT. My focus was on developing a modular architecture for social behavior research using virtual peers. I was responsible for their current effort to develop target controllers for the SmartBody character realizer in collaboration with Reykjavik University and the University of Southern California. My research at the lab also included the development of BML character markup language extensions to model the interaction between virtual characters, objects in their environment and other virtual agents.

01-06   *Adjunct Assistant Professor at the University of Illinois at Chicago*
I was the sole instructor for the advanced section of Computer Art-Design in the School of Art and Design (AD 408). The class is designed to teach computer science topics to Master of Fine Arts students affiliated with the Electronic Visualization Laboratory. Lecture topics include polygon rendering techniques, scene graphs, stereo display, tele-immersion, spatialized sound, tracking and display hardware along with historical and artistic perspectives on virtual reality and gaming. Students can retake the course up to 2 times. I concurrently taught repeating students advanced subjects such as C++, the Performer rendering library and node development for the Ygdrasil VR system. The course also requires a laboratory section that I developed and instructed. In the final semester, I introduced a new graphical IDE to the instruction and revised the labs accordingly. In my role within the School of Art and Design, I also oversaw several students doing independent studies related to their MFA work.

99-05   *Research Assistant at the University of Illinois at Chicago*
The Electronic Visualization Laboratory is a 35-year collaboration between computer scientists and artists best known for developing the CAVE virtual reality system. During my graduate studies at the lab my main responsibility was maintaining and continuing development of the Ygdrasil authoring platform. Ygdrasil is a script-based virtual reality authoring system using dynamic plug-ins and built-in tele-collaboration. I added numerous features including an overhaul of the message passing system, state persistence, state variable access and spatialized sound. I was also responsible for developing an automatic documentation system, maintaining a user forum and creating user tutorials. My responsibilities also included acting as technical director for a large number of virtual reality projects initiated either by faculty or MFA students.

92-98   *Senior Project Engineer with Aspen Technology, Incorporated*
As a member of the Advanced Hydrocarbon Controls department, I worked on a number of projects implementing multi-variable controls at client sites around the world. Over time, I became specialized in developing plant historian databases and eventually moved into in client-server technology and user interfaces. I was contracted by a client in Chicago my last 2 years to build a plant historian and laboratory sample management system using Aspen's SETCIM relational database and the SQL query language.

PROFICIENCIES

Operating Systems   Linux, IRIX, IOS, Android, OSX, UNIX, UNICOS, AIX, DOS/WFC, VAX/VMS

Software Languages   C++, C#, Java, JavaScript, SQL, C Shell, DCL, OpenGL, SmallTalk, Fortran, PHP, HTML, CSS, VRML, KML

Software Tools   Unity 3D, OpenGL, PowerVR, ARToolKit, StbES, QCAR, SGI Performer/Inventor, CAVELib, Maya

PUBLICATIONS

REFEREED CONFERENCES

10/11   Macintyre, B., **Hill, A.**, Rouzati, H., Gandy, M., Davidson, B., The Argon AR Web Browser and Standards-based AR Application Environment, *Proceedings of the IEEE Symposium on Mixed and Augmented Reality,* October 26-29, 2011, Basel, Switzerland, 10 pages.

3/08   **Hill, A.**, Johnson, A., Withindows: A Framework for Transitional Desktop and Immersive User Interfaces, *Proceedings of the IEEE Symposium on 3D User Interfaces,* March 8-9, 2008, Reno, Nevada, Pages 3-10.

3/07   **Hill, A.**, Tsoupikova, D., Development of Rutopia 2 VR Artwork Using New Ygdrasil Features, *Proceedings of the 3rd International Conference on Computer Graphics Theory and Applications*, Springer, March 2007, Barcelona, Spain, Pages 225-228.

REFEREED JOURNALS

3/05   Fischnaller, F., **Hill, A.**: CITYCLUSTER - "From the Renaissance to the Megabyte Networking Age": A Virtual Reality and High-Speed Networking Project, *Presence: Teleoperators & Virtual Environments*, February 1, 2005, Vol. 14, No. 1, Pages 1-19, 18 pages.

CONFERENCES, POSTERS, ARTICLES AND TECHNICAL REPORTS

10/11   **Hill, A.**, Schiefer, J., MacIntyre, B.: Virtual Transparency: Introducing Parallax View into Video See-through AR, *Proceedings of the IEEE Symposium on Mixed and Augmented Reality*, October 26-29, 2011, Basel, Switzerland, Poster, 2 pages.

7/11   **Hill, A.**, MacIntyre, B., Gandy, M., Barba, E., Davidson, B.: Mirror Worlds: Experimenting with Heterogeneous AR, *International Symposium on Ubiquitous Virtual Reality*, July 1-3, 2011, Jeju, South Korea, Invited Paper, 4 pages.

7/11   **Hill, A.**, Bonner, M., MacIntyre, B.: ClearSpace: Mixed-Reality Virtual Teamrooms, *International Conference, HCI International*, July 9-14, 2011, Orlando, Florida, Invited Paper, 4 pages.

10/10   **Hill, A.**, MacIntyre, B., Gandy, M., Davidson, B., Rouzati, H.: KHARMA: An Open KML/HTML Architecture for Mobile Augmented Reality Applications, *IEEE Symposium on Mixed and Augmented Reality*, October 14-16, 2010, Seoul, Korea, Poster, Pages 233-234.

7/09   **Hill, A.**, Macintyre, B.: ClearSpace: Mixed-Reality Presence through Virtual ClearBoards, *IEEE Pervasive Computing*, July-September, 2009, Vol. 8, No. 3, Article, Pages 55-56.

11/08   **Hill, A.**, Standardized Prototyping and Development of Virtual Agents, *Technical Report*: *School of Communication and School of Engineering*, NWU-EECS_10-10, Northwestern University, 2008, 17 pages.

3/07   **Hill, A.**, Johnson, A.: Withindows: A Single-Authoring Framework for Desktop and Immersive Interfaces, *IEEE Symposium on 3D User Interfaces*, March 10-11, 2007, Charlotte, North Carolina, poster.

INVITED TALKS

July 1, 2011:   International Symposium on Ubiquitous Virtual Reality, "KHARMA Tutorial", Jeju, South Korea

April 25, 2011:   CATEA: State of the Science Conference, "Argon Browser", Washington, D.C

September 29, 2010:   CNN Newsroom Live, "Tech: Augmented Reality on Cellphone", Atlanta, Georgia

December 12, 2007:   Software Engineering Research Center, "3D User Interfaces", Ball State University, Indiana

March 29, 2003:   Version 3.0 Festival Panelist, "Tele-immersive Avatars", Museum of Contemporary Art, Chicago

FELLOWSHIPS & GRANTS

01-02   *Graduate Fellows in K-12 Education, University of Illinois at Chicago*

PUBLIC PRESENTATIONS

May 20, 2010: KAMRA iPhone Browser, The Auggies: The Augmented Reality Event, Santa Clara Convention Center, Santa Clara, California

Mar 29-31, 2004: CITYCLUSTER, IEEE VR 2004, Electronic Visualization Laboratory, Chicago, Illinois (tele-collaborative with the School of Art and Design, UIC, Chicago)

November 20-21, 2003: CITYCLUSTER, Virtual Storytelling '03, Modern and Contemporary Art Museum "Les Abattoirs", Toulouse, France

September 6-11, 2003: CITYCLUSTER, Ars Electronica Festival, AEC Museum of the Future, Linz, Austria

February 9-11, 2003: CITYCLUSTER, Museum of Palazzo Medici Riccardi, Florence, Italy
(tele-collaborative with Electronic Visualization Laboratory, Chicago)

October 22-26, 2002: CITYCLUSTER Prototype, X Canarias Mediafest, Elder Museum of Science and Technology, Las Palmas de Gran Canaria, Spain

October 21, 2001: Alive on the Grid, Chicago Artists Month, Electronic Visualization Laboratory, Chicago, Illinois (tele-collaborative with 4 sites including University of Indiana, USA and Umea, Sweden)

September 1-6, 2001: Alive on the Grid, Ars Electronica Festival, AEC Museum of the Future, Linz, Austria (tele-collaborative with 6 sites including EVL, Chicago, Umea Institute, Sweden and C3 Institute, Hungary)

PROFESSIONAL ACTIVITIES

Chair of the W3C Points of Interest Working Group *3/1/11-*

Member of the Program Committee for the International AR Standards Workshop *10/11/10-10/12/10*

Reviewing for Pervasive Computing, Virtual Reality journal, ACM CHI, UbiComp and IEEE ISMAR conferences

Volunteer Assistant, Dr. Alex Schwarzkopf, ENG/IIP Program Director, National Science Foundation *11/07-12/07*

Student Volunteer, SIGGRAPH 2001, New Orleans, Louisiana

MEMBERSHIPS

- Tau Beta Pi Engineering Honor Society
- Phi Kappa Phi National Honor Society
- ACM (Association for Computing Machinery)
- IEEE (Institute of Electrical and Electronics Engineers)

LANGUAGES

- English (native, fluent)
- Spanish (fluent)

SELECTED PROJECT SUMMARIES

RESEARCH PROJECTS

KHARMA Augmented Environments Laboratory, ISMAR 2010
An open standards-based framework for the development of augmented reality applications on mobile devices based on HTML, CSS3, Javascript and an extension to standard KML markup.

Unity AR Toolkit Augmented Environments Laboratory, 2009
A set of Unity 3D plugins for background video, marker tracking and peripherals that allow users to easily develop and deploy augmented reality applications for both the desktop and iPhone.

ClearSpace Augmented Environments Laboratory, Pervasive Computing 2009
A mixed-reality interface for virtual teamrooms that tracks the head and hands of remote users at see-through whiteboards and reflects their actions into a common virtual world.

Image-Plane Selection Electronic Visualization Laboratory, 2008
A user study to evaluate the merits of using image-plane selection on 2D surfaces. A repeated measures ANOVA contrasts image-plane with ray-casting on surfaces placed below the hand and at various distances from the user.

Withindows Electronic Visualization Laboratory, IEEE 3DUI Symposium 2008
A theoretical framework designed to single-author applications that operate on the continuum between the desktop and immersion. The framework is based on using image-plane selection on through-the-lens viewing windows.

Ygdrasil GUI Electronic Visualization Laboratory, 2007
Proof of concept virtual world builder based on the Withindows framework. Uses image-plane selection on viewing windows for search, selection and manipulation in both desktop and immersive Linux/SGI/Windows environments.

CaveSim 2.0 Electronic Visualization Laboratory/VRCO, 2006
A modernization of the CAVElib simulator interface to improve the usability. Mouse-wand mode moves the hand in a spherical coordinate system under the mouse and the mouse-look mode allows de-coupled navigation and viewing.

Avarticulate Electronic Visualization Laboratory, 2005
A reverse kinematics system to articulate user avatars based on simple geometric rules. A component-based system allows users to easily program autonomous arm and leg interactions with simple shapes and complex terrain.

ART AND DESIGN PROJECTS

Nojd Royal Institute of Technology, 2006
A large screen installation based on the mythological Shaman from Northern Sweden. Combines embedded live video feeds, autonomous characters, particle systems and physics into a robust museum grade interface.

W.O.M.B University of Konstanz, 2003
A CAVE application focused on balancing the seven major Chakras that implements a physically intuitive user interface. Proprioception and gesture control navigation while voice, gaze and hands create and organize bubbles.

CITYCLUSTER Electronic Visualization Laboratory, 2003
The novel user interface for this CAVE art piece based on a co-located Chicago and Florence uses a view rendered texture into the scene. The user interface presented opportunities for complex tele-immersive avatar representations.

ExCavation Electronic Visualization Laboratory, 2001
A CAVE art piece, on permanent display at the ARS Museum, allows the user to interactively configure a very large active surface defined terrain. A highly efficient representation scheme allowed the piece to run at full frame rates.

DreamBox Electronic Visualization Laboratory, 2000
A CAVE art project based on psychoanalytic play therapy using a sand tray. Several attributes of each object are affected by relative position to one another. Reflecting different object states motivated the development of morphing, texture translation and dynamic surface modules.