Blair MacIntyre

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Research Interests

Human-Computer Interaction, Augmented Reality, Ubiquitous Computing, and Wearable Computing, Computer Graphics, Colour Science, Distributed Systems and Programming Languages.

Education

Ph.D., Computer Science, Columbia University, New York, New York, USA, summer, 1998 (expected). Dissertation: "Building and Interacting with Distributed, Multi-User Augmented Reality Systems." Advisor: Prof. Steven Feiner

M. Phil., Computer Science, Columbia University, New York, New York, USA, May, 1995.

M. Math, Computer Science, University of Waterloo, Waterloo, Ontario, Canada, October, 1991. Dissertation: "A Constraint-based Approach to Dynamic Colour Management for Windowing Interfaces." Advisor: Prof. William Cowan.

B. Math, Honours Computer Science, University of Waterloo, Waterloo, Ontario, Canada, May, 1989. Minor in Combinatorics and Optimization.

Journal Papers

MacIntyre, Blair and Feiner, Steven. "Future Multimedia User Interfaces." *Multimedia Systems*, 4(5): 250–268, 1996.

Feiner, Steven, Webster, Anthony, Krueger, Theodore, MacIntyre, Blair, and Keller, Edward. "Architectural Anatomy." *Presence: Teleoperators and Virtual Environments*, 4(3): 318–325, Summer 1995. (To be reprinted in B. Tschumi (ed.), *Digital Studios*, 1997.)

Feiner, Steven, MacIntyre, Blair and Seligmann, Doree. "Knowledge-Based Augmented Reality." *Communications of the ACM* 36(7): 53–62, July, 1993.

MacIntyre, Blair and Cowan, William. "A Practical Approach to Calculating Luminance Contrast on a CRT." *ACM Transactions on Graphics* 11(4): 336–347, October, 1992.

Conference Papers

MacIntyre, Blair and Feiner, Steven. "A Distributed 3D Graphics Library." To appear in *Proc. SIGGRAPH '98*, Orlando, Florida, July, 1998. 15% accepted.

Feiner, Steven, MacIntyre, Blair, Höllerer, Tobias, and Webster, Anthony. "A Touring Machine: Prototyping 3D Mobile Augmented Reality Systems for Exploring the Urban Environment." In *Proc. ISWC '97 (Int. Symp. on Wearable Computers)*, pages 74–81, Cambridge, MA, October 13–14, 1997.

MacIntyre, Blair and Feiner, Steven. "Language-level Support for Exploratory Programming of Distributed Virtual Environments." In *Proc. UIST '96 (ACM Symp on User Interface Software and Technology)*, pages 83–94, Seattle, WA, November 6–8, 1996.

Webster, Anthony, Feiner, Steven, MacIntyre, Blair, Massie, William, and Krueger, Theodore. "Augmented Reality in Architectural Construction, Inspection and Renovation." In *Proc. ASCE Third Congress on Computing in Civil Engineering*, pages 913–919, Anaheim, CA, June 17–19, 1996.

Feiner, Steven, MacIntyre, Blair, Haupt, Marcus and Solomon, Eliot. "Windows on The World: 2D Windows for 3D Augmented Reality." In *Proc. UIST '93 (ACM Symp on User Interface Software and Technology)*, pages 145–155, Atlanta, Georgia., November 3–5, 1993.

Feiner, Steven, MacIntyre, Blair and Seligmann, Doree. "Annotating the Real World with Knowledge-Based Graphics on a See-Through Head-Mounted Display." In *Proc. Graphics Interface '92*, pages 78–85. Vancouver, Canada, May 11–15, 1992.

Workshop Presentations and Papers

MacIntyre, Blair and Mynatt, Elizabeth. "Augmenting Intelligent Environments: Augmented Reality as an Interface to Intelligent Environments." At *Intelligent Environments Symposium, AAAI Spring Symposium Series*, Stanford University, March 23–25, 1998.

MacIntyre, Blair. "COTERIE: Columbia Object-oriented Toolkit for Exploratory Research in Interactive Environments." At *IEEE WETICE '97* (Workshops on Enabling Technologies: Infrastructure for Collaborative Enterprises) *Workshop on Distributed Systems Aspects of Sharing a Virtual Reality*, Cambridge, MA, June 18–20, 1997.

MacIntyre, Blair. "Augmented Computing Environments: Augmented Reality and Ubiquitous Computing." At *CHI '97 Workshop on Research Issues in Ubiquitous Computing*, Atlanta, GA, March 22–27, 1997.

MacIntyre, Blair. "A Testbed for Distributed Augmented Reality Systems." At *OOPSLA '95 Workshop on Reliability and Scalability in Distributed Object Systems*, Austin, TX, October, 1995.

MacIntyre, Blair and Feiner, Steven. "New Multimedia User Interfaces: Virtual Environments and Ubiquitous Computing." In *Proc. Schloss Dagstuhl Seminar on Fundamentals and Perspectives on Multimedia Systems*, Seminar No. 9427, Report No. 92, Schloss Dagstuhl, Germany, July 4–8, 1994.

Book Chapters

Webster, Anthony, Feiner, Steven, MacIntyre, Blair, Massie, William, and Krueger, Theodore. "Augmented Reality Applications in Architectural Construction." In D. Bertol (ed.), *Designing Digital Space: An Architect's Guide to Virtual Reality*, pages 193–200, John Wiley and Sons, New York, 1997.

Feiner, Steven and MacIntyre, Blair. "Rapid Prototyping of Distributed Augmented Reality Applications." To appear in Barfield, W., and Caudell, T. (eds.) *Augmented Reality and Wearable Computers*, Lawrence Erlbaum Press, Mahwah, NJ.

Demonstrations

Feiner, Steven, Webster, Anthony, and MacIntyre, Blair. ARC: Augmented Reality for Construction. *ACM '97*, San Jose, CA, March 1–4, 1997.

MacIntyre, Blair and Feiner, Steven. Language-level Support for Exploratory Programming of Distributed Virtual Environments. *UIST '96 (ACM Symp on User Interface Software and Technology)*, Seattle, WA, November 6–8, 1996.

Webster, Anthony, Feiner Steven, and MacIntyre, Blair. Demonstration of augmented reality system for space-frame assembly. *ASCE Third Congress on Computing in Civil Engineering*, Anaheim, CA, June 17–19, 1996.

Feiner, Steven and MacIntyre, Blair. Augmented Reality. *ONR 50th Anniversary Symposium*, National Academy of Sciences, Washington, DC, May 22, 1996.

Awards

Honorable Mention, 1996 American Institute for Architectural Research / Architecture Awards for Architectural Research (with Steven Feiner and Anthony Webster).

Natural Science and Engineering Research Council of Canada (NSERC) Post-Graduate Scholarship during Masters work, 1989–1991.

Teaching Experience

Instructor, *Department of Computer Science, Columbia University*, Spring 1994
W3152 (Software Design Lab). Practical Software Engineering for Computer Science majors. Responsible for all aspects of the course, including lecture content, textbook selection, and assignments and project creation and grading.

Teaching Assistant, *Department of Computer Science, Columbia University*, Fall 1991, Spring and Fall, 1992
Assisted with Computer Graphics, Operating Systems and Advanced Digital Computer System Design courses.

Project Student Supervisor, *Department of Computer Science, Columbia University,* 1991-present
Supervised more than two dozen Masters and Undergraduate Computer Graphics project students.

Teaching Assistant, *Department of Computer Science, University of Waterloo,* Fall 1989, Spring and Fall 1990
TA for a graduate course in User Interface Tools, a first year Introductory CS course for Math and CS majors and an Assembly Language course. In addition to typical TA responsibilities, gave weekly recitations in the Introductory CS course.

Employment History

Graduate Research Assistant, *Department of Computer Science, Columbia University,* Sept 1991–present
Designed and implemented augmented reality prototype systems [1991–1994] (~75K lines of C code) Designed and implemented COTERIE, an object-oriented toolkit for rapid prototyping of multi-user, multi-display, distributed augmented reality systems [1994–present] (~200K lines of Modula-3 code). This toolkit is based on an easy-to-program replicated object system exposed to both compiled and interpreted languages. The toolkit has been used to prototype a variety of augmented reality and wearable computing systems.

Research Intern, *Nynex Science and Technology,* June–Aug 1993
Worked on prototypes of Augmented and Virtual Reality systems aimed at various aspects of Nynex business.

Research Intern, *Xerox Palo Alto Research Center,* June–Aug 1992
Worked on initial prototypes of *Magic Lens* in the domain of 2 1/2D graphical editing. The work was done in Cedar and included modifying the interface of a 2 1/2D editor, creating and modifying graphical libraries and doing performance analysis and tuning.

Unix Consultant, *Math Faculty Computing Facility, University of Waterloo,* Sept 1989–Apr 1991
Responsible for assisting students, faculty and staff with the many Unix systems supported on campus by the MFCF.

Research Assistant, *Computer Graphics Laboratory, University of Waterloo,* May–Aug 1989
Designed tools for use in experiments in cognitive psychology running on real-time, multi-processor workstations. Began work on an experiment to study Fitts Law and its applicability to menu styles. This work was completed as a Masters project by another member of CGL.

Research Programmer, *Centre for the New Oxford English Dictionary, Univ. of Waterloo*, Jan–May, Sept–Dec 1988
Participated in the design and implementation of a distributed, structure-sensitive editor. Responsible for the core editing components of the editor.

Research Programmer, *Computer Systems Group, University of Waterloo,* Sept–Dec 1986, May–Aug 1987
Implemented tools for the CSG C Tools project, including *lint* (a C program verifier), a grammar based *cformat* (a C source code formatter) and *cxref* (a C program cross-reference generator.) Implemented a prototype system for a research project in hybrid-data document editors.

MIS Programmer, *CIBA-Geigy Canada, Ltd.,* May–Aug 1985, Jan–April 1986
Responsible for writing and maintaining tools for creating and updating databases, and generating related reports. Work was done primarily in RPG-II on IBM 3090 and System 38 machines.

Other Practical Skills and Experience

Have significant design and implementation experience with C, C++, Modula-3, Obliq, Cedar/Mesa and WSL (Waterloo Systems Language). Have also used Java, Prolog, NewtonScript, Cobol, RPG I and RPG II.

Co-designed and built a vector-graphics display controller card for a 32 bit VME bus (wire-wrapped, 66 MSI and LSI digital and analog logic and memory chips, ~1000 wires, multiple parallel state machines), and wrote a high level, OpenGL-like graphics library for this card. Have built and/or integrated numerous serial and parallel devices (ranging from button boxes to 3D and 6D tracking systems) and written device drivers to communicate with them.

Have built or worked on both immediate and retained-mode 3D graphics libraries.

Unrefereed Reports and Articles

Nayari, Farshad and MacIntyre, Blair. “Critical Mass JVM: Modula-3 Befriends Java.” In *Threads: The Modula-3 Systems Journal*, Issue 3, Fall 1997. To applear at http://www.cmass.com/threads/.

MacIntyre, Blair, Feiner, Steven and Dickes, Thomas. “The Columbia Object-oriented Tracker Library.” Columbia University, Department of Computer Science Research Report CUCS-028-97 (in preparation).

MacIntyre, Blair, Sha, Xinshi, Feiner, Steven and Dickes, Thomas. “Obliq-VE: Adding Virtual Environment support to Obliq-3D.” Columbia University, Department of Computer Science Research Report CUCS-025-97 (in preparation).

MacIntyre, Blair. “Repo Programmers Guide and Reference Manual.” Columbia University, Department of Computer Science Research Report CUCS-024-97 (in preparation).

Anderson, Ben and MacIntyre, Blair. “Programming Languages: A Play in Three Acts.” In *ACM SIGCHI Bulletin* 28(3): 15–19, July, 1996.

Meyer-Boudnik, Thomas and MacIntyre, Blair. “Session Report: Multimedia Documents and Mailing.” In the post-workshop report of the *Schloss Dagstuhl Seminar on Fundamentals and Perspectives on Multimedia Systems*, Seminar No. 9427, Schloss Dagstuhl, Germany, July 4–8, 1994.

Video Tapes

MacIntyre, Blair and Feiner, Steven. “Language-level Support for Exploratory Programming of Distributed Virtual Environments.” In *Proc. UIST ’96 (ACM Symp on User Interface Software and Technology) Videotape*, Seattle, WA, November 6–8, 1996.

Invited Talks

Rapid Prototyping of Augmented Reality Systems. At Eikoh Software Symposium, Japan, May 10-16, 1998.

Augmented Reality in Modula-3. At *OOPSLA’95 Modula-3 Users Group Meeting*, October, 1995.

Grants

Arranged for a donation of software and books, and continuing support, from Microsoft [1996–present].

Arranged for a donation of Newton Message Pads from Apple Research [1997].

Affiliations

ACM, SIGGRAPH and SIGCHI.

Services and Activities

Conference Committee, Demo Program Committee Chair, *ACM UIST ’98* .

Conference Committee, Student Volunteer Chair, *ACM UIST ’96* and *ACM UIST ’97*.

Demo Program Committee, *ACM Multimedia ’95*.

Conference Reviewer. Multiple years for each of *ACM SIGGRAPH*, *ACM SIGCHI*, *ACM UIST*, and *IEEE VRAIS*. Also *ACM Multimedia ’95*.

Journal Reviewer for *Presence: Teleoperators and Virtual Environments*.

Co-editor, Students Column, ACM SIGCHI Bulletin, 1995–1996.

Student Volunteer, *ACM SIGGRAPH ’89* and *’90*, *ACM UIST ’95* .

Department of Computer Science Ph.D. Student Representative, 1992–1993.

Various activities within the Department of Computer Science, including co-organizing and running the Ph.D. Student Lunchtime Informal Talks [1995–1997], co-organizing and running the Computer Science Happy Hour [1995–present], attending meetings of the Academic and Facilities committees and acting as a temporary Computer Science Representative to the Columbia University Graduate Student Council.

Citizenship

Canadian

References

Steven Feiner, Associate Professor of Computer Science
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William B. Cowan, Associate Professor
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Anthony Coates Webster, Director of Building Technologies, Adjunct Associate Professor of Architecture
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