MARY LOU MAHER

Professor and Chair, Software and Information Systems
University of North Carolina Charlotte
Honorary Professor of Design Computing
Faculty of Architecture, Design and Planning, University of Sydney
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SUMMARY

I am interested in the design and evaluation of innovative digital/physical environments and new media that enhance information systems, creativity and design. My research draws on and contributes to human-computer interaction, intelligent systems, computer-supported collaborative work, design science, and computational creativity. The research methods in my research draw on HCI engineering and design, research through design, cognitive studies through protocol analysis, and experimental studies of the performance of computational models. My current research has a focus on developing social-computational models and new technology as we scale up from human-computer interaction, through collaborative systems, to large-scale collective intelligence. Some highlights of my recent research are models of surprise as a basis for innovation analytics, gesture and tangible interaction design, crowdsourcing design process models, and strategies for flipped classrooms in CS education.

While at NSF, I started a funding program on Creativity and IT with a $23M budget and co-chaired the Cyber-Enabled Discovery and Innovation Working Group to oversee a $70M program. In 2008 I became a member of Senior Executive Services was appointed as Deputy Director of the Division of Information and Intelligent Systems.

While Professor of Design Computing and Co-Director of the Key Centre of Design Computing and Cognition at the University of Sydney, I developed and implemented an innovative Bachelor's degree in design computing. I was Chair of the Department of Architectural and Design Science. I participated in the development of a research program for the Collaborative Research Centre for Construction Innovation (CRC CI) and in the start up of the Humans Understanding Machines group at National ICT Australia (NICTA).

EMPLOYMENT

I have held faculty positions in Engineering, Architecture, and Computer Science Faculties. I have been involved in several multi-disciplinary centers: the Center for Education Innovation at UNC Charlotte, the Design Research Center at Carnegie Mellon University, the Key Centre of Design Computing and Cognition at the University of Sydney, the Collaborative Research Centre for Construction Innovation in Australia, and National ICT Australia.

PROFESSOR AND CHAIR, SOFTWARE AND INFORMATION SYSTEMS

University of North Carolina Charlotte: 2012-present. The Software and Information Systems Department is a pioneer in Information Technology research and education emphasizing on designing and deploying integrated, secure, reliable, and human-centered IT solutions. I have started the Center for Education Innovation, the InDe Lab, and lead a research team on computational creativity, tangible computing, and crowdsourcing design.

SENIOR RESEARCH SCIENTIST, COLLEGE OF INFORMATION STUDIES

University Of Maryland, 2010-2012: Senior Research Scientist at the University of Maryland doing research in the Human Computer Interaction Lab. This is a multidisciplinary group of faculty from Computer Science, Information Studies, Engineering, and Humanities disciplines. I have been collaborating on research proposals and teaching in the Masters of Information Management.

PROGRAM DIRECTOR, COMPUTER & INFORMATION SCIENCE & ENGINEERING

National Science Foundation, 2006-2010: I established a program called CreativeIT by organising workshops, funding exploratory research and developing a Solicitation for funding in 2008-2010. I was part of the Human Centered Computing cluster focussing on research in HCI techniques, social computing, computer-supported collaborative work, virtual worlds, and multi-agent systems. I was co-chair of the Cyber-Enabled Discovery and Innovation Program in 2009, participated in the development of the Social Computational Systems solicitation, participated in the Science of Design program and its evolution into the Rethinking Software program area, assisted in the development of the Virtual Organizations as Socio-technical Systems solicitation, served as a technical coordinator for the Spatial Information Science of Learning Center, and participated in the development of an action plan for Broadening Participation in CISE. As a member of the Senior Executive Service in 2009 I was the Deputy Director of the Division of Information and Intelligent Systems and served on the SWAT Team for improving the hiring processes in the Federal Government to make the government an employer of choice.

PROFESSOR OF DESIGN COMPUTING, jointly in ARCHITECTURE and COMPUTER SCIENCE

University of Sydney, 1990-2011, currently Honorary Professor: promoted to a personal chair as Professor of Design Computing in 1997. Highlights are: Developed a new interdisciplinary undergraduate degree Bachelor of Design Computing and served as Program Coordinator for 5 years; Program coordinator for Graduate Program in Design Computing for 10 years; Chair of Department of Architectural and Design Science for 2 years while Faculty was restructuring, Joint appointment with School of Information Technologies for 3 years; Research provider for Collaborative Research Centre for Construction Innovation and for National ICT Australia, Co-Director of the Key Centre of Design Computing for 15 years.

VISITING PROFESSOR IN DESIGN AND COMPUTATION

Massachusetts Institute of Technology, 2002: teaching and research in the Design and Computation Group in the School of Architecture on designing virtual worlds; collaborating with Active Worlds Inc. to develop agent models using their platform.

ADJUNCT PROFESSOR IN SOCIAL POLICY

Columbia University, 2002: teaching in School of International and Public Affairs on computer-mediated communication in virtual worlds.

ASSOCIATE PROFESSOR, ASSISTANT PROFESSOR IN CIVIL ENGINEERING

Carnegie Mellon University, 1984-1989: teaching and research in computer-aided engineering in Civil Engineering.

EDUCATION

PhD Carnegie Mellon University, Civil Engineering Department, 1984. PhD thesis on artificial intelligence in design focussing on the synthesis of alternative design concepts for high rise buildings.

MS Carnegie Mellon University, Civil Engineering Department, 1981. Masters thesis on an intelligent tutoring system for teaching principles of structural design.

BS Columbia University, Civil Engineering Department, 1979.

TEACHING

My teaching has ranged from lecture based teaching in engineering, to teaching computing subjects in a studio environment for design computing, engineering and computer science students. In my teaching I use open-ended project-based learning to encourage students to be creative and to develop their knowledge and skills through the pursuit of a unique solution. My teaching encourages independent thinking and collaboration. Listed here are descriptions of the most recent subjects I have taught at the University of North Carolina Charlotte, the University of Maryland and the University of Sydney and a list of other subjects taught in the past 10 years. My current approach to teaching is influenced by flipped classroom methods and project-based learning.

ITIS6400/8400 Human Computer Interaction, UNCC
This course is a foundational course in design methods and techniques for human-computer interaction. A major focus of the course is the processes of needfinding, early prototyping of interface designs, evaluating and improving a design. Students gain practical design and evaluation skills through a semester long project and in-class group activities that apply various needfinding, design, and evaluation methods to specific interaction design contexts. Students learn about current research topics in HCI, human ethics in HCI research, and experiment design in HCI research. This course was redeveloped using the flipped classroom method in Fall 2014.

ITIS2300 Web-Based Application Development, UNCC
This course covers basic concepts for developing interactive web based applications; including HTML, client side scripting, server side scripting, user interface design considerations, and system integration considerations. Students will learn html, css, javascript, jquery, and be introduced to php. Students will gain experience in designing and implementing working prototypes of web pages, web sites, and interactive dynamic web-based applications. This course was redeveloped using the flipped classroom method in Spring 2013.

ITIS4010/6010/8010 Interaction Design Studio, UNCC
Tangible computing incorporates gesture, grasping, and the use of physical objects as integral parts of interaction design. Comparing graphic user interfaces with tangible user interfaces shows that this change in perception and action changes cognition – providing opportunities for designing digital environments that have a dramatically different impact on how we think and interact. Students engage in collaborative design projects that provide experience in designing and implementing a specific interaction design application.

INFM737 Solving Problems in Information Management, Fall 2011, Spring 2012, UMD
This is a graduate capstone project-based learning course where problems are drawn from real world information management challenges faced by an organization. A specific problem related to the topics studied in the MIM program is selected by each individual based on the student's interests and expertise.

INFM736 Information Management Team Experience, Fall 2011, Spring 2012, UMD
This problem-based team experience is required for all Masters of Information Management students with the objective to learn how to work in teams on problems that require multiple areas of knowledge in information management. Students work on teams within an organization with an assigned Project Director who serves as the organizational overseer, liaison, and coach. The team will be presented with and/or identify issues facing real-world

organizations, and members will participate in creating solutions. Students gain experience in using design thinking methods and applying theories and practices learned in the classroom to organizational problems and challenges drawn from government, business, and not-for-profit sectors.

DECO1100 Digital Design Studio. USYD
The objective of this course is to develop knowledge of digital design processes through a series of design exercises and two design projects. This subject is taught as a studio during which students explore the concepts and design considerations of raster vs vector graphics, colour, layers, layout and composition, and frame-based animation. Various sources of images from photographs, sketches, 3D models, or drawing software are used. Software for creating, editing, managing and printing digital images is introduced.

DECO2010 Collaborative Virtual Environments. USYD
The objectives of this course are to introduce concepts and techniques for synchronous and asynchronous communication; to develop an understanding of communication and representation of design models in a computer-mediated collaborative design project; and to develop skills in using collaborative technologies. The outcomes are an understanding of the similarities and differences of computer-mediated and face-to-face communication; skills in the use and extension of collaborative tools such as email, shared whiteboards, blogs, virtual worlds, web-based project management, and version control development environments; and experience in developing a collaborative design product using the tools above to support the collaborative process.

INFO4990 Research Methods in Information Technology. USYD
The objective of this course is to understand the research methods that are used in IT and to place the students' individual research in the broader field. Students learn to find and evaluate research on their own topic and to present their own research plan or results for evaluation by others.

DECO1001 Digital Image Design and Representation, USYD
DECO1002 Web Design Information Systems, USYD
DECO1021 Design Computing Studio 1B, USYD
DECO2005 Computer Supported Collaborative Design, USYD
DECO2603 Agents in Design: Agent-Based Virtual Worlds, USYD
DECO3001 Life-Cycle Integrated Design Computing Studio, USYD
DESC9097 Digital Communication in Design, USYD
DESC9123 Designing Virtual Worlds, USYD
DESC9158 Intranet Design Studios, USYD

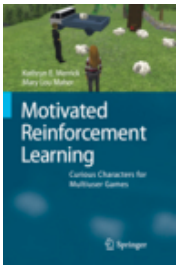
RESEARCH

My research develops interactive and computational systems that improve our understanding of creativity and design, and more recently, relates computational models and techniques to cognitive models of designers. The following research areas reflect my current research by providing a description of my research focus, relevant recent publications, and recent grants. A complete list of over 150 publications including books, journal articles, and refereed conference papers, is provided at the end of this CV and available on http://www.maryloumaher.net

COLLABORATIVE DESIGN AND COLLECTIVE INTELLIGENCE

My research on collaborative design and collective intelligence has lead to the development of

new collaborative technology solutions to supporting synchronous and asynchronous designing by enabling multi-user access to shared representations and facilitating communication. Various studies of computer-supported collaborative design show how this process can benefit from studying how designers communicate while using different collaborative technologies. Crowdsourcing design describes a relatively new phenomenon where the key to success lies in large numbers of individuals providing input at many stages of the process. Research in this area considers not only shared representations and communication, but also what motivates people to participate in design challenges.



Paulini, M., Maher, M.L. and Murty, P. (2014) Motivating participation in online innovation communities, accepted for publication in International Journal of Web-Based Communities, 10(1).

Paulini, M., Murty, P. and Maher, M.L. (2013). Design processes in collective innovation communities: a study of communication, in CoDesign: International Journal of CoCreation in Design and the Arts, 9(1):90-212.

Paulini, M., Maher, M.L., and Murty, P. (2011). The Role of Collective Intelligence in Design: A protocol study of online design communication, in C. M. Herr, N. Gu, S. Roudavsky, M. A. Schnabel (eds.), Circuit Bending, Breaking and Mending: Proceedings of the 16th International Conference on Computer-Aided Architectural Design Research in Asia CAADRIA 2011, pp 687-696.

Fisher, D.H. and Maher, M.L. (2011). Free Play in Contemplative Ambient Intelligence, International Joint Conference on Ambient Intelligence, Springer.(pdf)

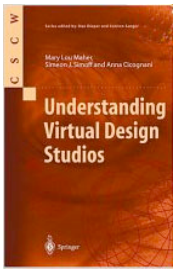
Maher, M.L. (2010) What People Talk About in Virtual Worlds, in William Sims Bainbridge (ed) Online Worlds: Convergence of the Real and the Virtual, Series: Human-Computer Interaction Series, Springer-Verlag ISBN: 978-1-84882-824-7

Maher, M.L. (2010). Designers and Collaborative Virtual Environments, In Xinagyu Wang and Jerry Tsai (Eds) Collaborative Design in Virtual Environments, Springer.

Maher, M.L., Paulini, M. and Murty, P. (2010). Scaling up: From individual design to collaborative design to collective design, In John S Gero (Ed) Design Computing and Cognition DCC10, Springer, pp. 581-600.

Recent Grant: NatureNet Design: Increasing participation in citizen science by crowdsourcing the design of embedded technology for nature parks, National Science Foundation, $400,000, 2012-2014.

TANGIBLE USER INTERFACES



My research in tangible user interfaces relates new HCI techniques to the needs of creative designers. The emphasis is on the development of tabletop systems, augmented reality systems, and mobile computing systems to support a designer while creating and developing 3D designs that respond to an open ended design specification. This research has resulted in prototype systems that are being evaluated using protocol analysis to determine the impact of tangible interfaces on spatial reasoning and design cognition.

Kim, M. J. and Maher, M.L. (2008). The Impact of Tangible User Interfaces on Spatial Cognition During Collaborative Design, *Design Studies*, **29**(3):222-253.

Kim, M.J. and Maher, M.L. (2007). Collaborative Design in a Tabletop System Employing Tangible User Interfaces, in *Proceedings of the 11th International Conference on Computer Supported Cooperative Work in Design,* W. Shen (Ed.), IEEE.

Maher, M.L. and Kim, M.J. (2006). Studying Designers Using A Tabletop System For 3D Design With A Focus On The Impact On Spatial Cognition, in M. Fjeld and M. Takatsuka (eds) *First IEEE International Workshop on Horizontal Interactive Human-Computer Systems, Tabletop 2006*, Adelaide, Victoria, Australia, IEEE, pp 105-112.

Kim, M. J. and Maher, M.L. (2008). The Impact of Tangible User Interfaces on Designers' Spatial

Cognition, *Human-Computer Interaction* A Journal of Theoretical, Empirical, and Methodological Issues of User Science and of System Design, **23**(2):101-137. http://dx.doi.org/10.1080/07370020802016415

Recent Grant: Designing Tangible Computing for Creativity, National Science Foundation, $500,000, 2012-2015.

COMPUTATIONAL CREATIVTY

My research in this area develops models of creativity and curiosity, as an aid to human creativity and as an extension to machine learning techniques. These models have been applied to complex, dynamic environments such as multi-user game environments and combined physical/virtual environments. This research has resulted in a model for motivated reinforcement learning that can demonstrate cyclic emergent behavior for non-player characters in open-ended multi-user virtual worlds. This research has also been the basis for developing a curious information display as a starting point for understanding how the physical environment can respond to human activity.

Maher, M.L., Brady, K. and Fisher, D. (2013). Computational Models of Surprise in Evaluating Creative Design In *Proceedings of The Fourth International Conference on Computational Creativity*, University of Sydney, pp 147-151.

Lee, J.H., Kim, M.J., and Maher, M.L. (2013). Designing for Interactive and Collective Mobile Creativity In Proceedings of Creativity and Cognition, Sydney Australia.

Maher, M.L. (2012). Computational and Collective Creativity: Who's Being Creative?, In *Proceedings of The Third International Conference on Computational Creativity*, University College Dublin, pp 67-71.

Maher, M.L. and Fisher, D.H. (2012). Using AI to Evaluate Creative Designs, In *Proceedings of International Conference on Creative Design, pp 45-54*.

Maher, M.L. (2010). Evaluating Creativity in Humans, Computers, and Collectively Intelligent Systems, *DESIRE'10: Creativity and Innovation in Design*, Aurhus, Denmark.

Merrick, K. and Maher, M.L. (2009). *Motivated Reinforcement Learning: Curious Characters for Multiuser Games*, Springer-Verlag:Berlin/Heidelberg.

Merrick, K., Maher, M.L.: (2009) Motivated Learning from Interesting Events: Adaptive, Multitask Learning Agents for Complex Environments, Adaptive Behaviour, SAGE Publications, Peter M. Todd (Ed.), Vol 17(1):7-27.

Gu, N and Maher, ML (2007). Designing Curious Places: Digital and Computing Technologies in the Workplace, in Calder J (ed), *Public #3 - Worklife*, Melbourne: WoodsBagot Research Press, 101-115.

Recent Grant: Curious Places: Agent-Mediated Self-Aware Worlds, Australian Research Council Discovery Grant, $255,000 (doesn't include overheads or PI salaries), 2006-2008.

DESIGNING AND LEARNING IN VIRTUAL WORLDS

My research in this area started with the availability of MUDS and MOOS and now involves extensions and applications for 3D virtual worlds such as Active Worlds and SecondLife. This research has resulted in principles for designing virtual places that take the perspective of architectural design and the extension of virtual worlds to include agent models for design, curious, and emergent interactive behaviors.

Maher, M.L., Simoff, S., and Cicognani, A. (2000). *Understanding Virtual Design Studios*, Springer-Verlag, London. 235p.

Maher, M.L.: (2009) What People Talk About in Virtual Worlds, in W. Bainbridge, editor, *The Scientific Research Potential of Virtual Worlds*, Springer-Verlag London Ltd.

Maher, M.L. and Fruchter, R. (2007). Support for design teams. *Artificial Intelligence for Engineering*

Design, Analysis and Manufacturing, **21**(3):201-202.

Maher, M.L., Rosenman, M. and Merrick, K. (2007). Agents For Multidisciplinary Design In Virtual Worlds, *Artificial Intelligence for Engineering Design, Analysis and Manufacturing,* **21**(3):267-277.

Gu N., Gul L. F., Maher M. L. (2007). Designing and Learning Within the Design: A Case Study of Principles for Designing and Teaching 3D Virtual Worlds, in *CAADRIA 2007: Proceedings of the 12th International Conference on Computer-Aided Architectural Design Research in Asia*, Nanjing, China, pp. 127-132.

Rosenman, M., Merrick, K., Maher, M.L. and Marchant, D. (2006). DESIGNWORLD: A Multidisciplinary Collaborative Design Environment Using Agents in a Virtual World, in JS Gero (ed), *Design Computing and Cognition'06*, Springer, Dordrecht, The Netherlands, pp 695-710.

Recent Grants:

Team Collaboration in High Bandwidth Virtual Environments, CRC for Construction Innovation, $790,000 (doesn't include overheads or PI salaries), 2003-2006.

3D Electronic Institutions, Australian Research Council Discovery Grant, $40,000 (doesn't include overheads or PI salaries), 2004-2006.

Intelligent Virtual Architecture, Australian Research Council Large Grant, $120,000 (doesn't include overheads or PI salaries), 2001-2003.

Understanding Virtual Design Studios, Australian Research Council Large Grant, $144,000 (doesn't include overheads or PI salaries), 1996-1998.

COMPUTATIONAL AND COGNITIVE MODELS OF DESIGN

My research in this area started with my PhD thesis in artificial intelligence in design. It has evolved over the years to consider a broad range of computational models that have the potential to model the processes associated with creative design. This research has resulted in several computational models that have been demonstrated to show their potential as "designers", models for understanding human designers through design cognition studies and large-scale collective intelligence in design.

Gero, JS and Maher ML (eds) (2005). *Computational and Cognitive Models of Creative Design VI*, University of Sydney, 377p.

Maher, M. L. and Pu, P. (eds) (1997). *Issues and Applications of Case-Based Reasoning to Design,* Lawrence Erlbaum Associates, New Jersey, 345p.

Maher, M.L., Balachandran, B., Zhang, D.M. (1995). *Case-Based Reasoning in Design*, Lawrence Erlbaum Associates, New Jersey, 246p.

Gero, J. S. and Maher, M. L. (eds) (1993*). Modeling Creativity and Knowledge-Based Creative Design*, Lawrence Erlbaum Associates, New Jersey, 354p.

Maher, M.L. (2007). The Synergies Between Design Computing and Design Cognition, in *Computing in Civil Engineering*, L. Soibelman and B. Akinci (Eds), American Society of Civil Engineers.

Recent Grants:

Case-Based Reasoning in Construction Processes, CRC for Construction Innovation, $65,000 (doesn't include overheads or PI salaries), 2003-2005.

Knowledge Discovery from Multimedia Design Libraries, Australian Research Council Large Grant, $200,000 (doesn't include overheads or PI salaries), 1998-2000.

Co-evolutionary Models of Design, Australian Research Council Large Grant, $185,000 (doesn't include overheads or PI salaries), 1997-1999.

PhD Students

Lina Lee, current, Gesture-Based Interaction Design, UNC Charlotte

Sarah Abdelahi, current, Collective Intelligence in Design, UNC Charlotte

Mohammad Mahzoon, current, Computational and Cognitive Models of Creativity, UNC Charlotte.

Mercedes Paulini, 2013, Collective Intelligence in Online Innovation Communities, University of Sydney.

Kathryn Merrick, 2007, Modelling Motivation for Experience-Based Attention Focus in Reinforcement Learning, now Lecturer at the University of New South Wales Australian Defence Force Academy in Australia.

Leman Figen Gul, 2007, Understanding Collaborative Design In Different Environments: Comparing Face-To-Face Sketching To Remote Sketching And 3D Virtual Worlds, now Associate Professor at International University of Sarajevo in Bosnia and Herzegovina.

Mi Jeong Kim, 2006, The Effects of Tangible User Interfaces on Designers' Spatial Cognition, now a Lecturer at Kyung Hee University in Korea.

Ning Gu, 2006, Dynamic Designs of Virtual Worlds Using Generative Design Agents, now a Lecturer at University of Newcastle in Australia.

Steven Clark, 2006, The Role of Place in a Virtual Learning Environment, now an Academic Fellow in the College of Fine Arts at the University of New South Wales in Australia.

Catherine Bridge, 2005, Case-Based Redesign For People with Ability Impairment, now Associate Professor at the University of Sydney.

Andres Gomez de Silva Garza, 2000, An Evolutionary Approach to Design Case Adaptation, now a Professor at Instituto Tecnologico Autonomo de Mexico.

Gerard Gabriel, 2000, Computer-Mediated Collaborative Design in Architecture, now the Facilities Information Manager for University of Sydney.

Anna Cicognani, 1998, Design Speech Acts: "How To Do Things With Words" In Virtual Communities, now the Director of Operational Capability in Telstra Bigpond in Australia.

Josiah Poon, 1997, Design Exploration as Co-evolutionary Models, now a Senior Lecturer at University of Sydney.

Milad Saad, 1994, Shared Understanding in Synchronous Collaborative Design, now a Consultant for Computer Supported Facilities Management in Australia.

Dong Mei Zhang, 1994, A Hybrid Design Process Model Using Case-Based Reasoning, now a Researcher at CSIRO in Australia.

Heng Li, 1994, Learning Design Concepts to Assist Preliminary Design, now a Professor at Polytechnic University in Hong Kong.

Fang Zhao, 1991, A Knowledge-Based Representation for Creative Design, now a Professor at Florida International University.

Weiguang Zhang, 1990, Chunking Structural Design Knowledge as Design Prototypes, now a software developer for CAD companies.

AWARDS and INVITATIONS

Tee Sasada Award, Presented at CAADRIA 2014.

Best Paper Award, 2014 International Conference Design Computing and Cognition:
Grace, K., Maher, M. L., Fisher, D. & Brady, K. (2014). Modelling expectation for evaluating surprise in design creativity. In Gero, J.S. and Hanna, S (eds) Proceedings of Design Computing and Cognition 2014, University College London.

Keynote Speaker at European Conference of Technology Enhanced Learning (EC-TEL 2012), September 2012, www.ec-tel.eu

Invited Speaker at the Distinguished Lecture Series, Computer Engineering Department at ITAM, April 2012, http://ingcomputacion.itam.mx/

Keynote Speaker at 6th International ASCAAD Conference February 2012:
http://www.ascaad.org/conference/2012/index.htm

Invited Speaker at ISPE Concurrent Engineering 2011: http://www.ce2011.org/

Invited Panelist at the International Conference on Design Creativity: http://www.org.kobe-u.ac.jp/icdc2010/

Invited Speaker in 2010 at the 1st International Conference on Computational Creativity:
http://creative-systems.dei.uc.pt/icccx/

Keynote Speaker at Collaborative Technologies 2009: http://www.collabtech.org/

Keynote Speaker at the 2009 College of Information Science and Technology Graduate Symposium at Penn State University
http://gradsymp.ist.psu.edu/2009/speakers

Keynote Speaker at the 2nd International Workshop on Social Computing, Behavior Modeling, and Prediction 2009
http://www.public.asu.edu/%7Ehuanliu/sbp09/index.html

9th International Conference on Construction Applications of Virtual Reality 2009
http://www.convr2009.com/

Director's Award in 2008 at the National Science Foundation for novel approaches to panel review of potential transformative research

Senior Executive Service in 2008 at the National Science Foundation

Keynote Speaker Design Computing and Cognition 2008
http://mason.gmu.edu/~jgero/conferences/dcc08/

Keynote Speaker at International Visual Literacy Association 2008
www.ivla.org/pdf_files/IVLA_Final_Program_really.pdf

Keynote Speaker at Australian and New Zealand Architectural Science Association 2008
http://www.newcastle.edu.au/conference/anzasca2008/keynote_speakers.html

SERVICE

I have served on review panels for the National Science Foundation and the European Commission, reviewed grant proposals for the Australian Research Council and the Research Council for Natural Sciences and Engineering of the Academy of Finland. I reviewed proposals and made recommendations for funding as a member of the Research Committee for the Collaborative Research Centre for Construction Innovation n Australia. While in the US I was an active member of the Society of Women Engineers and since moving back to the US I have participated in a workshop for high school girls as part of the Women in Technology program. I was on the Committee for broadening participation of under-represented groups in CISE at NSF.

On the Editorial Board and/or review papers for the following journals:
Automation in Construction
AI EDAM
Computers in Industry
CoDesign
Design Studies
International Journal of Design Creativity and Innovation
International Journal of Human Computer Studies
International Journal of Architectural Computing
Journal of Computer Information and Science in Engineering
Journal of Engineering Design
Knowledge Based Systems
Research in Engineering Design

Program Committee for the following conference series:
ICCC (Int'l Conference on Computational Creativity) 2012 and 2013, Program Chair
AmI (Ambient Intelligence) 2011: Program Co-Chair (with David Keyson)
ACADIA: Association for Computer Aided Design in Architecture
CAADRIA: Computer Aided Architectural Design and Research in Asia Computer Supported
CAADFutures
Computer supported Collaborative Work
Collaborative Design, Visualization and Engineering
Computer Supported Collaborative Design
Computer Aided Innovation
Creativity and Cognition
Design Computing and Cognition
SIGCHI: ACM Special Interest Group on Computer Human Interaction
International Conference on Intelligent Environments
International Conference on Computational Creativity
International Conference on Design Creativity
International Conference on Engineering Design
International Conference on Creativity and Cognition
IVA, International Conference on Intelligent Virtual Agents
SIGraDi: Iberoamerican Society of Digital Graphics

GRANTS

This is a list of my research grants while in Australia and the United States. In Australia the research grants do not include overhead or the salaries for the principal investigators. The

overheads and salaries are provided by the University and are not charged to a government funding body. This means that the amounts for the grants in Australia would be increased by up to 60% and approximately $25-40,000 per year to reflect the equivalent amount for a grant in the United States. For example, the $790,000 grant is the equivalent of $1.4M including PI salaries and overhead.

Subject	Agency	Year(s)	Amount
The Connected Learner	NSF RED	2015-2020	$2M
Community-Driven Projects that Include Adaptable Technology for Environmental Learning in Nature Preserves	NSF AISL	2015-2019	$2.4M
Pathways for Women	NCWIT	2014	$8,000
HCC: Small: Designing Tangible Computing for Creativity	National Science Foundation	2012-2015	$499,982
VOSS: Crowdsourcing interaction design for citizen science virtual organizations	National Science Foundation	2012-2014	$399,872
Curious Places: Agent-Mediated Self-Aware Worlds	ARC Discovery Grants	2006-2009	$255,000
3D Electronic Institutions	ARC Discovery Grants	2004-2006	$40,000
Pervasive and Mobile Computing in Design and Construction	CRC CI	2005-2007	$65,000
Modelling Design Knowledge using Swarm Intelligence	University of Sydney	2004	$18,000
Team Collaboration in High Bandwidth Virtual Environments	CRC CI	2003-2006	$790,000
Information Flows in Virtual Environments	CRC CI	2001-2003	$120,000
Case-Based Reasoning in Construction Processes	CRC CI	2003-2005	$72,000
Intelligent Virtual Architecture	ARC Large Grant	2001-2003	$120,000
Object Design in Virtual Architecture	University o f Sydney	2001	$25,000
Virtual Architecture	ARC Small Grants	1999-00	$40,000
Knowledge Discovery from Multimedia Design Libraries	ARC Large Grants Scheme	1998-00	$200,000
Coevolutionary Models of Design	ARC Large Grants Scheme	1997-9	$185,000
Understanding Virtual Design Studios	ARC Large Grants Scheme	1996-8	$144,000
Multimedia Case-Based Design Tool for Teaching Architectural Science	Commonwealth Advancement of University Teaching (CAUT)	1996	$42,508
Computer-supported Collaborative Design	ARC Large Grants Scheme	1993-5	$116, 000
Representation of Design Knowledge Based on Decomposition and Analogy	ARC Large Grants Scheme	1992-4	$119, 000
Indexing and Retrieving Multimedia Desgin Documents	University Research Grants Scheme	1994	$12,000
Evolving Design Knowledge-bases Using Machine Learning	ARC Large Grants Scheme	1991-3	$104, 000
Interdisciplinary Computer-based Design Teaching Centre	NSW Education and Training Foundation	1991	$125,000
Incremental Learning Techniques for Design	University Research Grants Scheme	1990	$7,000
Synthesis of Preliminary Designs	CMU Engineering Design Research Center	1986-1990	$120,000
Development of a Shell for Engineering Design	Digital Equipment	1989	$37,000

Knowledge Representation for Preliminary Structural Design	NSF Presidential Young Investigator Award	1997-1991	$100,000
Knowledge Representation for Preliminary Structural Design	Industry Matching for NSF PYI	1989	$37,000
Robotic Applications for Coal Mines	US Bureau of Mines	1986-1988	$500,000

EQUPMENT GRANTS

Subject	Agency	Year(s)	Amount
Design Computing Laboratory	University of Sydney	2001	$65,000
Establishing Virtual Design Studios	University of Sydney Large Equipment Grant	1996	$75,000
Computer Aided Design Teaching	University of Sydney Major Equipment Grant	1994-5	$225,000
Collaborative and Multimedia Design Facility	University of Sydney Large Equipment Grant,	1993-4	$180,000
Computer-based Design Research and Teaching	University of Sydney, Large Equipment Grant	1991	$150, 000
Computer-based Design Research and Teaching	IBM Australia	1991	$450, 000

Complete List of Publications

I have an h-index of 44 using the results from Google Scholar. My most highly cited book is Case-Based Reasoning in Design, published in 1997, my most highly cited magazine article is Process Models for Design Synthesis in AI Magazine in 1990, my most highly cited journal article is Modeling Design Exploration as Co-evolution in 1996.

My most recent books are Motivated Reinforcement Learning: Curious Characters for Multiuser Games published in 2009 and Design Grammars for Designing Adaptive Virtual Worlds to be published in 2014.

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