

CURRICULUM VITAE

TIMOTHY BICKMORE

OFFICE

College of Computer and Information Science
Northeastern University
202 West Village H
360 Huntington Avenue
Boston, Massachusetts 02115
(617) 373-5477

INTERNET

bickmore@ccs.neu.edu
<http://www.ccs.neu.edu/home/bickmore/>

Research lab:
<http://www.ccs.neu.edu/research/rag/>

EDUCATION

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

Cambridge, MA

Ph.D. in Media Arts & Sciences, February 2003

Thesis: *Relational Agents: Effecting Change Through Human-Computer Relationships*. Presents a theory, computational model, and evaluation of how animated conversational agents can build relationships with users, and the effects these relationships can have on task outcomes in sales, tutoring and health behavior change applications. **Coursework includes:** Affective Computing, Discourse and Dialogue for Interactive Systems, Social Visualization, Society of Mind, Systems and Self, Social Psychology, Interaction Techniques for Virtual Environments, Technology and Competitive Strategy (co-taught by MIT and Harvard Business School), and Social Relationships (at Harvard).

ARIZONA STATE UNIVERSITY

Tempe, AZ

Master of Science in Computer Science, June 1986

Bachelor of Science and Engineering in Computer Systems Engineering, June 1985

Summa Cum Laude

RESEARCH EXPERIENCE

NORTHEASTERN UNIVERSITY (2005-Present)

Boston, MA

Assistant Professor, College of Computer and Information Science: Investigates the development and evaluation of Relational Agents—computer artifacts designed to establish and maintain long-term, social-emotional relationships with users, and their use within health education and behavior change.

BOSTON UNIVERSITY SCHOOL OF MEDICINE (2003-2005)

Boston, MA

Assistant Professor of Medicine: Investigates the development and impact of new technologies for health behavior change and chronic disease management, focusing on the use of automated systems that simulate face-to-face conversation with patients. Develops algorithms to support natural language dialogue that encompasses both therapeutic and social conversation. Conducts studies of interpersonal communication between health providers and patients—with particular emphasis on the relational and social aspects—to inform the development of these technologies, as well as studies to evaluate the use of these technologies in addressing a wide range of health problems in diverse populations.

MIT MEDIA LABORATORY (1998-2003)

Cambridge, MA

Research Assistant, Affective Computing Group: Advisor: Rosalind Picard. Designed and developed an animated conversational exercise advisor agent designed to build long-term relationships with users in order to boost compliance in an exercise behavior change program. Conducted a one-month longitudinal study involving 100 participants who interacted with the agent daily.

Research Assistant, Gesture & Narrative Language Group: Advisor: Justine Cassell. Designed and conducted several studies illuminating the role of nonverbal behavior in face-to-face conversation between humans and between humans and conversational computer agents, including user nonverbal behavior in PDA-based interactions, and posture shifts as markers of topic changes. Designed and conducted two studies on the role of social dialogue in building trust between a user and a conversational agent. Project lead on REA, a four-year effort to develop an embodied conversational agent in the form of a life-sized, animated real-estate agent, who interacts with users using speech, gesture, gaze, intonation and other nonverbal modalities. Co-developed the BEAT text-to-embodied-speech system. Technical lead on the initial build of SAM, an embodied conversational storyteller for children.

**RESEARCH
EXPERIENCE
Continued**

FUJI-XEROX PALO ALTO RESEARCH LAB (1995-1998) **Palo Alto, CA**
Consulting Scientist: Project lead on the Office Avatars project, investigating the use of conversational agents as personal representatives and document annotations. Project lead on the Digestor project, investigating techniques for dynamically re-formatting web content for handheld devices.

INTELLIGENT SOFTWARE ASSOCIATES (1994-1998) **Sacramento, CA**
Principal: Independent contractor on several NASA and commercial advanced software development projects. Principal Investigator on two NASA Phase I SBIR contracts. Worked with customers through project definition, proposal writing, system design and development, evaluation and documentation. Customers included Lockheed Missiles & Space, Aerojet Industrial Products, Affordable Health Care, NASA LeRC, NASA MSFC, NASA Stennis, and Boeing Rocketdyne.

AEROJET PROPULSION SYSTEMS (1990-1994) **Sacramento, CA**
Project Engineer: Developed intelligent monitoring and diagnostic systems for liquid fuel rocket engines. Worked closely with NASA customers through entire development process from proposal writing to system design, implementation and evaluation.

LOCKHEED ARTIFICIAL INTELLIGENCE CENTER (1986-1990) **Menlo Park, CA**
Research Scientist: Conducted software R&D for government and internal customers. Managed five-person knowledge-based software technology group. Conducted training seminars in AI software technology, including LISP, ART, KEE, CLIPS and knowledge engineering.

**TEACHING
EXPERIENCE**

NORTHEASTERN UNIVERSITY **Boston, MA**
Instructor, Human-Computer Interaction (CSG170)(Fall'05-08)
Graduate computer science course in HCI, covering both practice and contemporary research in HCI design and evaluation. The course has recently focused on the development of health education and health behavior change applications for geriatrics patients. Responsible for all aspects of course.
Instructor, Empirical Research Methods in Information Science (ISU580)(Spring'06-09)
Undergraduate information science course on the theory and practice of empirical research in computer and information science, covering qualitative and quantitative research study design and analysis. Responsible for all aspects of course.
Instructor, Empirical Research Methods (CSG228)(Spring '08)
Graduate course in empirical research methods, part of the PhD concentration in Human-Computer Interaction, covering all material in ISU580 plus critical review of HCI studies from the research literature, and the full design and execution of a publishable study, including IRB approval. Responsible for all aspects of course.

BOSTON UNIVERSITY SCHOOL OF MEDICINE **Boston, MA**
Instructor, Introduction to Computer Applications in Healthcare and Biomedicine: Spring 2004.
Graduate level survey course in medical informatics. Responsible for course design, homework and lab assignments, developing and giving over half of the lectures, and grading.

MIT MEDIA LABORATORY **Cambridge, MA**
Guest Lecturer, Human-Robot Interaction: Fall 2002. Instructor: Cynthia Breazeal. Gave lecture on applying theories from social psychology, linguistics and sociology to building relationships between people and computational artifacts.
Teaching Assistant, Theory and Practice of Discourse and Dialogue for Interactive Systems: Fall 2000. Instructor: Justine Cassell. Gave two lectures (Discourse Theory and Social Dialogue) and taught parts of other classes. Prepared reading materials, lab assignments, and demonstrations and reviewed lab solutions. Graded all student materials.

**TEACHING
EXPERIENCE
Continued**
SACRAMENTO STATE UNIVERSITY**Sacramento, CA**

Instructor, Extended Learning Program: 1995-1997. Taught semester-long courses on C++ and Java programming. Responsible for design of courses and materials, gave all lectures, supervised and graded lab work.

NASA MSFC, NASA LeRC, LOCKHEED R&D, AEROJET, GTE LABS, KAISER HMO

Instructor: 1988-1998. Taught 20 week-long professional seminars on Expert System Development, and Advanced LISP and Java programming. Responsible for design of courses and materials, gave all lectures, supervised and graded lab work.

PUBLICATIONS

Most recent publications available online at:

<http://www.ccs.neu.edu/home/bickmore/publications.html>

Dissertation

Bickmore, T. (2003) *Relational Agents: Effecting Change Through Human-Computer Relationships*, Ph.D. Thesis, MIT Media Arts & Sciences.

Journal Articles

Bickmore, T., Pfeifer, L., and Paasche-Orlow, M. (to appear) "Using Computer Agents to Explain Medical Documents to Patients with Low Health Literacy", *Patient Education and Counseling*

Bickmore, T., Mauer, D., and Brown, T. (2009) "Context Awareness in a Handheld Exercise Agent", *Pervasive and Mobile Computing*, 5, 226-235.

Bickmore, T., Pfeifer, L. and Yin, L. (2008) "The Role of Gesture in Document Explanation by Embodied Conversational Agents", *International Journal of Semantic Computing*, 2, 1.

Jack, B, Atrash, H., Bickmore, T., and Johnson, K. (2008) "The Future of Preconception Care: A Clinical Perspective", *Women's Health Issues*. 18S, S19-S25

Bickmore, T. (2007) "Long-Term Interactions with Pedagogical Agents" *Educational Technology*, 47, 1, 47-50.

Bickmore T, Giorgino T, Green N, Picard R. (2006) "Guest Editorial: Special Issue on Dialog Systems for Health Communication" *J Biomedical Informatics* 39(5):465-467.

Bickmore T, Giorgino T. (2006) "Methodological Review: Health Dialog Systems for Patients and Consumers" *J Biomedical Informatics* 39(5): 556-571.

Bickmore T. (2006) "Wearable Relational Agents for Health" *Ann Behav Med* 31 (Suppl):S185 (abstract).

Bickmore, T., Caruso, L., Clough-Gorr, K., and Heeren, T. (2005) "It's just like you talk to a friend' – Relational Agents for Older Adults" *Interacting with Computers* 17(6): 711-735.

Bickmore, T., Gruber, A., and Picard R. (2005) "Establishing the Computer-Patient Working Alliance in Automated Health Behavior Change Interventions" *Patient Education and Counseling* 59(1): 21-30.

Bickmore, T. and Picard, R. (2005) "Establishing and Maintaining Long-Term Human-Computer Relationships" *ACM Transactions on Computer Human Interaction (ToCHI)* 12(2): 293 – 327.

Bickmore, T. (2004) "Unspoken Rules of Spoken Interaction" *Communications of the ACM* 47(4): 38-44.

PUBLICATIONS
Journal Articles
Continued

Cassell, J., Bickmore, T. (2002) "Negotiated Collusion: Modeling Social Language and its Relationship Effects in Intelligent Agents" *User Modeling and User Adaptive Interaction* 13(1): 89-132.

Cassell, J. and Bickmore, T. (2001) "External Manifestations of Trustworthiness in the Interface", *Communications of the ACM* 43(12): 50-56.

Cassell, J., Bickmore, T., Vilhjalmsson, H., Yan, H. (2001) "More Than Just a Pretty Face: Conversational Protocols and the Affordances of Embodiment." *Knowledge-Based Systems* 14: 55-64.

Bickmore, T. and Girgensohn, A. (1999) "Web Page Filtering and Re-Authoring for Mobile Users", *Computer Journal special issue on Mobile Computing* 42(6): 534-546.

Bickmore, T. and Schilit, B. (1997) "Digester: Device-Independent Access to the World Wide Web", *Computer Networks And ISDN Systems*, 29(8-13): 1075-1082, September.

Bickmore, T. and Filman, R. (1997) "MultiLex, A Pipelined Lexical Analyzer." *Software Practice and Experience* 27(1): 25-32.

Findler, N. and Bickmore, T. (1996) "On the concept of causality and a causal modeling system for scientific and engineering domains, CAMUS." *Applied Artificial Intelligence*, vol. 10, no. 5, pp. 455-487.

Findler, N., Bickmore, T., Ihrig, L. and Tsang, W. (1991) "A note on the comparison of five heuristic optimization techniques of a certain class of decision trees." *Information Sciences*, vol. 53, no. 1-2, pp. 89-100.

Vere, S. and Bickmore, T. (1990) "A Basic Agent." *Computational Intelligence* 6:41-60.

Cook, L. and Bickmore, T. (1989) "Instructional Strategies for Teaching Knowledge Engineering." *Heuristics*, Vol. 2, No. 3, Fall, pp. 24-28.

Findler, N., Crompt, R. and Bickmore, T. (1985) "A General-Purpose Man-Machine Environment with Special Reference to Air Traffic Control." *International Journal of Man-Machine Studies*, 23, pp.587-603.

Long Peer-
Reviewed
Conference Papers

Bickmore, T. and Fernando, R. (2009) "Engagement vs. Deceit: Virtual Humans with Human Autobiographies", Proceedings of *Intelligent Virtual Agents*, Amsterdam.

Bickmore, T. and Schulman, D. (2009) "A Virtual Laboratory for Studying Long-term Relationships between Humans and Virtual Agents", Proceedings of *Autonomous Agents and Multi-Agent Systems (AAMAS)*, Budapest, Hungary.

Schulman, D. and Bickmore, T. (2009) "Persuading Users through Counseling Dialogue with a Conversational Agent", *Persuasive Technology*, Claremont, CA.

Bickmore, T, Pfeifer, L, Jack, B, (2009) "Taking the Time to Care: Empowering Low Health Literacy Hospital Patients with Virtual Nurse Agents", *Proceedings of the ACM SIGCHI Conference on Human Factors in Computing Systems (CHI)*.

-
- PUBLICATIONS**
- Long Peer-Reviewed Conference Papers Continued**
- Schulman, D., Sharma, M., and Bickmore, T. (2008) The Identification of Users by Relational Agents *Autonomous Agents and Multi-Agent Systems (AAMAS) '08*.
- Bickmore, T., Pfeifer, L., and Paasche-Orlow, M. (2007) "Health Document Explanation by Virtual Agents" *Intelligent Virtual Agents '07*, Paris.
- Bickmore, T., Mauer, D., Crespo, F., and Brown, T. (2007) "Persuasion, Task Interruption and Health Regimen Adherence" *Persuasive Technology '07*, Stanford, CA.
- Bickmore, T., Caruso, L., and Clough-Gorr, K. (2005) "Acceptance and Usability of a Relational Agent Interface by Urban Older Adults" *Proceedings of the ACM SIGCHI Conference on Human Factors in Computing Systems (CHI)*, Portland, OR.
- Bickmore, T. and Picard, R. (2004) "Towards Caring Machines" *Proceedings of the ACM SIGCHI Conference on Human Factors in Computing Systems (CHI)*, Vienna.
- Bickmore, T. and Picard, R. (2003). "Subtle Expressivity by Relational Agents." *Proceedings of the CHI 2003 Workshop on Subtle Expressivity for Characters and Robots*. April 7th, Fort Lauderdale, FL.
- Bickmore, T. and Cassell, J. (2002) "Phone vs. Face-to-Face with Virtual Persons." *Proceedings of the International CLASS Workshop on Natural, Intelligent and Effective Interaction in Multimodal Dialogue Systems*. June 28-29, Copenhagen, Denmark.
- Bickmore, T. (2002) "Social Dialogue is Serious Business." *Proceedings of the CHI 2002 Workshop on Socially Adept Technologies*, April 21, Minneapolis, MN.
- Cassell, J., Nakano, Y., Bickmore, T., Sidner, C., Rich, C. (2001). "Non-Verbal Cues for Discourse Structure." *Proceedings of the 41st Annual Meeting of the Association for Computational Linguistics*, pp. 106-115. July 17-19, Toulouse, France
- Cassell, J., Vilhjálmsón, H., Bickmore, T. (2001) "BEAT: the Behavior Expression Animation Toolkit." *Proceedings of SIGGRAPH '01*, pp. 477-486. August 12-17, Los Angeles, CA.
- Bickmore, T. and Cassell, J. (2001) "Relational Agents: A Model and Implementation of Building User Trust". *Proceedings of the ACM SIGCHI Conference on Human Factors in Computing Systems (CHI)*, pp. 396-403. March 31-April 5, Seattle, Washington
- Cassell, J., Bickmore, T., Vilhjálmsón, H., and Yan, H. (2000) "More Than Just a Pretty Face: Affordances of Embodiment" in *Proceedings of the Conference on Intelligent User Interfaces*, pp. 52-59. January 4-9, New Orleans, LA.
- Bickmore, T. and Cassell, J. (2000) "How about this weather? Social Dialogue with Embodied Conversational Agents." in *Proceedings of the AAI Fall Symposium on Socially Intelligent Agents*. pp. 4-8. November 3-5, Cape Cod, MA.
- Cassell, J., Bickmore, T., Billinghurst, M., Campbell, L., Chang, K., Vilhjálmsón, H. and Yan, H. (1999). "Embodiment in Conversational Interfaces: Rea." *Proceedings of the ACM SIGCHI Conference on Human Factors in Computing Systems (CHI)*, pp. 520-527. Pittsburgh, PA.
- Bickmore, T. and Cassell, J. (1999) "Small Talk and Conversational Storytelling In Embodied Interface Agents," *Proceedings of the AAI Fall Symposium on Narrative Intelligence*.

PUBLICATIONS
Long Peer-
Reviewed
Conference Papers
Continued

Bickmore, T., Cook, L., Churchill, E., and Sullivan, J. (1998) "Animated Autonomous Personal Representatives." *Proceedings of the Second International Conference on **Autonomous Agents***.

Cassell, J., Bickmore, T., Billingham, M., Campbell, L., Chang, K., Vilhjálmsson, H., Yan, H. (1998) "An Architecture for Embodied Conversational Characters." *Proceedings of the First **Workshop on Embodied Conversational Characters***, pp. 21-30, Tahoe City, CA.

Churchill, E., Prevost, S., Bickmore, T., Hodgson, P. and Cook, L. (1998) "Design Issues for Embodied Conversational Characters", *Proceedings of the First **Workshop on Embodied Conversational Characters***, pp. 149-158, Tahoe City, CA.

Prevost, S., Bickmore, T. and Cassell, J. (1998) "Interactional Competency for Conversational Characters." *Proceedings of the **AAAI Workshop on Representations for Multi-Modal Human-Computer Interaction***.

Bickmore, T. and Schilit, W. (1997) "Digester: Device-Independent Access to the World-Wide Web." *Proceedings Sixth International **World Wide Web Conference***, Santa Clara, California, April.

Bickford, R., Bickmore, T., Meyer, C. and Zakrasjek, J. (1996) "Real-Time Flight Data Validation for Rocket Engines." *Proceedings 32nd **Joint Conference on Propulsion***, Orlando, Florida, July, 1996.

Gray, R., Bickmore, T. and Williams, S. (1995) "Reengineering COBOL Systems to Ada." *Proceedings 1995 **Software Technology Conference***, Salt Lake City, Utah, April, 1995.

Bickmore, T. "Sensor Validation." (1994) *Proceedings 1994 Conference on **Advanced Earth-to-Orbit Propulsion Technology***, George C. Marshall Space Flight Center, Alabama.

Pollack, W., Nelson, L., and Bickmore, T. (1995) "Converting Hierarchical Database Systems to Relational." *Proceedings 1995 **Software Technology Conference***, Salt Lake City, Utah, April, 1995.

Jansa, E., Bickmore, T., Makel, D., Powers, W. (1993) "Automated Hydrogen Propellant Leak Detection." *Proceedings Fifth Annual **Space System Health Management Technology Conference***, Cincinnati, Ohio, April, 1993.

Bickmore, T. and Maul, W. (1993) "A Qualitative Approach to Systemic Diagnosis of the SSME." ***AIAA Aerospace Sciences Conference and Exhibition***, Reno, Nevada.

Bickmore, T. and Bickford, T. (1992) "Aerojet's Titan Health Assessment Expert System." *28th **Joint Conference on Propulsion***, Nashville, Tennessee.

Bickmore, T. (1992) "A Probabilistic Approach to Sensor Data Validation." *28th **Joint Conference on Propulsion***, Nashville, Tennessee.

Cook, L., Hinkle, D., and Bickmore, T. (1990) "Planning for the manufacturing domain: long-term and reactive scheduling." *First International Conference on **Expert Planning Systems***, pp. 6-10.

Cook, L. and Bickmore, T. (1990) "Towards Better Expert Systems Curricula: Lessons Learned from Industry." *Proceedings of the **California State University Conference on Artificial Intelligence***.

PUBLICATIONS
Long Peer-
Reviewed
Conference Papers
Continued

Cook, L. and Bickmore, T. (1989) "An Automatable Model of Knowledge Acquisition." *Proceedings of the Workshop on Knowledge Acquisition, International Joint Conference on Artificial Intelligence*, Detroit, Michigan.

Bickmore, T. (1989) "An Object-Oriented Approach to Tactical Text Generation ." *Proceedings of the SPIE Conference on Applications of Artificial Intelligence VII*, Orlando, Florida.

Bickmore, T. and Yoshimoto, G. (1987) "An Evidential Approach to Model-Based Satellite Diagnosis." *Proceedings of the SPIE Conference on Space Station Automation III*, Cambridge, Massachusetts.

Findler, N., Bickmore, T., and Belofsky, M. (1983) "On Some Issues Concerning Optimization and Decision Trees." *Proceedings of the International Conference on Mathematical Modeling*, Zurich, Switzerland.

Conference
Peer-Reviewed
Short Papers
And Abstracts

Bickmore, T., Schulman, D. and Shaw, G. (2009) "DTask & LiteBody: Open Source, Standards-based Tools for Building Web-deployed Embodied Conversational Agents", Proceedings of *Intelligent Virtual Agents*, Amsterdam.

Pfeifer, L. and Bickmore, T. (2009) "Should Agents Speak Like, um, Humans? The Use of Conversational Fillers by Virtual Agents", Proceedings of *Intelligent Virtual Agents*, Amsterdam.

Bickmore, T., Fernando, R., (2009) "Towards Empathic Touch by Relational Agents", *AAMAS Workshop on Empathic Agents*, Budapest.

Bickmore, T. (2009) "A Responsive Virtual Human Museum Guide at the Boston Museum of Science", *Museums & the Web conference*, Indianapolis.

Velicer, W., Bickmore, T., Blissmer, B., Reading, C., Johnson, J., Meier, K. (2009) "Relational Agent Interventions for Multiple Risk Factors: Demonstration and Initial Results", *23rd Annual Conference of the European Health Psychology Society*.

Bickmore, T. "Addressing Low Health Literacy with Animated Computer Agents" (2008), *NIH Summit on "The Science of Eliminating Health Disparities"*

Bickmore, T., Schulman, D., Sidner, C. "Issues in Designing Agents for Long Term Behavior Change" (2009) *CHI'09 Engagement by Design workshop*.

Bickmore, T. Pfeifer, L., Schulman D., Perera, S., Senanayake, C., and Nazmi, I. (2008) "Public Displays of Affect: Deploying Relational Agents in Public Spaces", *CHI'08*

Bickmore, T., Pfeifer, L. (2008) "Relational Agents for Antipsychotic Medication Adherence" *CHI'08 Workshop on Technology for Mental health*.

Bickmore, T. (2008) "Movie Magic in the Clinic: Computer-Generated Characters for Automated Health Counseling", *American Medical Informatics Association Annual Symposium (AMIA)*, DC.

Bickmore, T., Gruber, A., Intille, S. (2008) Just-in-Time Automated Counseling for Physical Activity Promotion, *American Medical Informatics Association Annual Symposium (AMIA)*, DC.

PUBLICATIONS
Conference
Short Papers
And Abstracts
Continued

Bickmore, T., Mauer, D., and Brown, T. (2007) "Context Awareness in Mobile Relational Agents" *Intelligent Virtual Agents '07*, Paris.

Bickmore, T. (2007) "What Would Jiminy Cricket Do? Lessons From the First Social Wearable" *HCI International '07*, Beijing, China.

Bickmore, T. and Schulman, D. (2007) "Practical Approaches to Comforting Users with Relational Agents" *ACM SIGCHI Conference on Human Factors in Computing Systems (CHI)*, San Jose, CA.

Bickmore, T. and Sidner, C. L. (2006) "Towards Plan-based Health Behavior Change Counseling Systems" *AAAI Spring Symposium on Argumentation for Consumers of Healthcare*, Stanford, CA.

Bickmore T, Mauer D. (2006) "Modalities for Building Relationships with Handheld Computer Agents" *ACM SIGCHI Conference on Human Factors in Computing Systems (CHI)*, Montreal.

Bickmore T, Schulman D. (2006) "The Comforting Presence of Relational Agents" *ACM SIGCHI Conference on Human Factors in Computing Systems (CHI)*, Montreal.

Schlenk E, Puskar K, Sereika S, Bickmore, T (2006) "Forging partnerships to develop and test relational agent technology to improve medication adherence in schizophrenia" *Eastern Nursing Research Society Annual Scientific Sessions*, Cherry Hill, NJ.

Bickmore, T. (2005) "Ethical Issues in Using Relational Agents for Older Adults" *AAAI Fall Symposium on Caring Machines: AI in Eldercare*, Washington, DC.

Bickmore, T. (2005) "Affecting Health Behavior through Parasocial Involvement with Interactive Computer Characters" IARR Mini-Conference on *Exploring Relationship in Health or Health of Relationships*, Indianapolis, IN.

Bickmore, T. (to appear) "Relational Agents for Patient Education and Counseling" 2005 *International Conference on Communication in Healthcare*, Chicago, IL.

Bickmore, T. (2005) "Behavioral Informatics: a Perspective from Informatics" *Society for Behavioral Medicine* 2005 Annual Meeting, Boston, MA.

Bickmore, T. (2005) "Conversational Health Assessment" CHI'05 *Workshop on HCI Challenges in Health Assessment*, Portland, OR.

Bickmore, T. (2004) "Connecting Elders to Home-based Care-giving Agents" *CHI '04 Workshop on Home Technologies to Keep Elders Connected*, Vienna.

Bickmore, T. (2004) "Relational Agents for Home-based Elder Care" *CHI '04 Workshop on HCI and Homecare: Connecting Families and Clinicians*, Vienna.

Bickmore, T. (2004) "What do you Expect? Towards a Model of Human-Computer Relationships," *Vienna Workshop on Dimensions of Sociality: Shaping Relationships with Machines*, November 19-20, Vienna.

Bickmore T. and Giorgino, T. (2004) "Some Novel Aspects of Health Communication from a Dialogue Systems Perspective," Proceedings of the *AAAI Fall Symposium on Dialogue Systems for Health Communication*, October, 2004, Washington, DC.

PUBLICATIONS
Conference
Short Papers
And Abstracts
Continued

Bickmore, T. (2002). "When Etiquette Really Matters: Relational Agents and Behavior Change." *Proceedings of the AAAI Fall Symposium on Etiquette for Human-Computer Work*, November 15-17, Falmouth, MA.

Bickmore, T. (2002). "Towards the Design of Multimodal Interfaces for Handheld Conversational Characters." *Proceedings of the ACM SIGCHI Conference on Human Factors in Computing Systems (CHI)*, pp. 788-789. April 20-25, Minneapolis, MN.

Cassell, J., Stocky, T., Bickmore, T., Gao, Y., Nakano, Y., Ryokai, K., Tversky, D., Vaucelle, C., Vilhjálmsón, H. (2002). "MACK: Media lab Autonomous Conversational Kiosk." *Proceedings of Imagina02*. February 12-15, Monte Carlo.

Cassell, J., Ananny, M., Basu, A., Bickmore, T., Chong, P., Mellis, D., Ryokai, K., Smith, J., Vilhjálmsón, H., Yan, H. (2000) "Shared Reality: Physical Collaboration with a Virtual Peer." *Proceedings of the ACM SIGCHI Conference on Human Factors in Computing Systems (CHI)*, pp. 259-260. April 4-9, Amsterdam, NL.

Bly, S., Cook, L., Bickmore, T., Churchill, E. and Sullivan, J. (1998) "The Rise of Personal Web Pages at Work." *Proceedings of the ACM SIGCHI Conference on Human Factors in Computing Systems (CHI)*, ACM Press, pp. 313-314.

Book Chapters

Bickmore, T. (to appear) "Etiquette in Motivational Agents: It's not always about being nice." in "*Human Computer Etiquette*", Chris Miller and Caroline Hayes, eds. Taylor and Francis.

Bickmore, T. (to appear) "Relational Agents for Chronic Disease Self Management" in "*The Informatics of Diabetes*" Edited by Barbara M. Hayes and William Aspray, MIT Press.

Bickmore, T. (2008) "Lasers" in S. Turkle (ed.) *Falling for Science: Objects in Mind*, MIT Press.

Bickmore, T. and Picard, R. (2006) "Future of Caring Machines" in R. Bushko (ed.) *Future of Intelligent and Extelligent Health Environment*, IOS Press, Amsterdam. pp. 132-145.

Tim Bickmore, Justine Cassell (in press) "Social Dialogue with Embodied Conversational Agents" In J. van Kuppevelt, L. Dybkjaer, and N. Bernsen (eds.), *Natural, Intelligent and Effective Interaction with Multimodal Dialogue Systems*. New York: Kluwer Academic.

Cook, L., Bickmore, T., Bly, S., Churchill, E. and Prevost, S. (1999) "Autonomous Synthetic Computer Characters as Personal Representatives" in *Human Cognition and Social Agent Technology*, K. Dautenhahn (Guest-editor). John Benjamins Publishing Company (In the Advances in Consciousness Research series).

Cassell, J., Bickmore, T., Campbell, L., Vilhjálmsón, H. and Yan, H. (1999) "Conversation as a System Framework: Designing Embodied Conversational Agents." In *Embodied Conversational Agents*, J. Cassell, S. Prevost, E. Churchill, and J. Sullivan (editors). MIT Press.

Cassell, J., Vilhjálmsón, H., Chang, K., Bickmore, T., Campbell, L. and Yan, H. (1999) "Requirements for an Architecture for Embodied Conversational Characters." *Computer Animation and Simulation '99* (Eurographics Series). Vienna, Austria: Springer Verlag.

PATENTS

Cook, L., Bickmore, T., Sullivan, J., Churchill, E., Prevost, S. (2006) *System for designing and rendering personalities for autonomous synthetic characters*, Fuji Xerox Co. Xerox Corp. US Patent 7,061,493 granted June 13, 2006.

Bickmore, T., Sullivan, J., Churchill, E., Bly, S. and Cook, L. (2006, 2002) *Method and Apparatus for Creating Personal Autonomous Avatars*. Xerox Corporation. US Patents 6,466,213 and 7,006,098 granted October 15, 2002 and February 28, 2006.

Bickmore, T., Schilit, W., Girgensohn, A., and Sullivan, J. (2005) *Document re-authoring systems and methods for providing device-independent access to the world wide web*, Fuji Xerox Co & Xerox Corp. US Patent 6,857,102 granted February 15, 2005.

Prevost, S., Bickmore, T., Sullivan, J. Churchill, E., and Girgensohn, A. (2003) *Method and apparatus for embodied conversational characters with multimodal input/output in an interface device*, Fuji Xerox Co & Xerox Corp. US Patent 6,570,555 granted May 27, 2003.

Wilcox, L., Schilit, W., Sawhney, N., Sullivan, J. and Bickmore, T. (1998) *System for capturing and retrieving audio data and corresponding hand-written notes*. Xerox Corporation and Fuji Xerox Company, Ltd. U.S. Patent 5,970,455, Granted Oct. 19, 1999. International Patent granted in June 1998.

Makel, D., Jansa, E., Cahill, D. and Bickmore, T. (1996) *Remotely controllable LNG field station management system and method*. U.S. Patent 5,586,050, Granted December 17th, 1996.

RESEARCH GRANTS

Technology lead on \$14.5 million in research grants, with \$3.8 million direct funding.

NIH/National Library of Medicine, "Just in Time Information for Exercise Adoption" (Bickmore PI) \$317,702. August 2005-July 2007.

NIH/National Library of Medicine, "Computational Models of Health Behavior Change Dialog", (Bickmore PI) \$405,285, September 1, 2007-August 31, 2009.

NSF CAREER, "A Virtual Laboratory for Studying Long-Term, Human-Computer Relationships" (Bickmore PI) \$497,607. May 2006-April 2011.

Boston University Department of Medicine Pilot Project Grant, "Impact of Relational Agent Technology on Exercise Adoption in an Older Adult Population." (Bickmore PI) \$14,000. July 2003-December 2004.

Agency for Health Research and Quality (subcontract to BMC, Bickmore subcontract PI), "Using Innovative Communication Technology to Improve the Health of Young African American Women", Grant total \$400,000, NU subcontract \$187,443, July 1, 2009 - Dec 31, 2010.

NIH/National Institute on Aging (subcontract to Boston Medical Center, Bickmore subcontract PI), "Computer Agents to Promote Walking in Older Adults with Low Health Literacy". Grant total \$3.2M, NU subcontract \$654,854, September 1, 2007-August 31.

NIH/National Cancer Institute (subcontract to University of Rhode Island, Bickmore subcontract PI) "Online Tailored Interventions & Relational Agents for Exercise and Sun Protection". Grant total \$4M, NU subcontract \$752,517, August 1, 2007-July 31, 2012.

**RESEARCH
GRANTS
Continued**

DHHS/Agency for Health Research and Quality (subcontract to Boston Medical Center, Bickmore subcontract PI), “Virtual Patient Advocate to Reduce Adverse Drug Events”. NU subcontract \$356,802, September 1, 2007-August 31, 2010.

NIH/National Cancer Institute (subcontract to Stanford University, Bickmore subcontract PI), “Computer-Based Physical Activity Advice for Ethnic Minority Aging Adults”. Grant total \$440K, NU subcontract \$163,939, September 1, 2007-August 31, 2009.

Partners Healthcare, Center for Connected Health (Bickmore subcontract PI), “The role of a virtual coach in improving adherence to an activity program for overweight adults”, \$26,000. June 2006-May 2007.

Eli Lilly Pharmaceuticals (subcontract to University of Pittsburgh School of Nursing, Bickmore subcontract PI), “Medication Adherence for Young Adults with Schizophrenia.” NU subcontract \$21,980. April 2006-December 2006.

NIH/National Heart Lung and Blood Institute (subcontract to Boston Medical Center, Bickmore subcontract PI), “A RCT to Reduce Cardiopulmonary Re-hospitalizations.” Grant total \$4M, NU subcontract \$416,833. January 2006-September 2010.

DHHS/Agency for Health Research and Quality (subcontract to Boston Medical Center, Bickmore subcontract PI), “Using Innovative Communication Technology to Improve the Health of Young African American Women”, \$400,000, NU subcontract \$188,000, September 2009-August 2011.

**PROFESSIONAL
ACTIVITIES**

Member American Association for Artificial Intelligence
Member Association for Computing Machinery
Member American Medical Informatics Association
Member American Academy on Physician and Patient
Member International Association for Relationship Research

Chair, 2009 CHI Workshop on Engagement by Design
Co-Chair, 2006 AAAI Spring Symposium on Argumentation for Consumers of Healthcare
Chair, 2005 AAAI Fall Symposium on Caring Machines: AI in Eldercare
Chair, 2004 AAAI Fall Symposium on Dialogue Systems for Health Communication.

Member Organizing Committee 2002 AAAI Fall Symposium on Etiquette for Human-Computer Work.
Member of the Program Committee for the 2002 International CLASS Workshop on Natural, Intelligent and Effective Interaction in Multimodal Dialogue Systems.
Guest editor for special issue of the Journal of Biomedical Informatics on Dialogue Systems for Health Communication.

**PROFESSIONAL
ACTIVITIES**
Continued

Grant reviewer for the following agencies:

- NIH National Library of Medicine EUREKA review panel, Jan 23, 2009, Washington DC.
- NSF review panel, Feb 4-5, 2009, Washington DC.
- NSF review panel, June 19-20 2008, Washington DC.
- NSF review panel, Jan 31-Feb 1 2007, Washington DC.
- NSF review panel, Mar 14-15 2006, Washington DC.
- NIH National Library of Medicine review panel for R21 grant applications, Feb 16 2006, Washington DC.
- NIH National Library of Medicine review panel for R21/R03 grant applications, Nov 29 2005, Washington DC.
- NIH Musculoskeletal Tissue Engineering Study Section review panel for Bioengineering Research Partnership grant applications, Nov 1 2005, Washington DC.

Reviewer for the following journals:

- ACM Transactions on Computer-Human Interaction
- AI Magazine
- Artificial Intelligence in Medicine
- Communications of the ACM
- Computer Graphics Forum
- Discourse Processes
- IEEE Internet Computing Magazine
- IEEE Transactions on Information Technology in BioMedicine
- IEEE Transactions on Knowledge and Data Engineering
- Interacting with Computers
- International Journal of Human-Computer Studies
- International Journal of Artificial Intelligence in Medicine
- International Journal on Universal Access in the Information Society
- Journal of Artificial Intelligence Research
- Journal of Biomedical Informatics (Guest Editor)
- Journal of Medical Internet Research
- Patient Education & Counseling

Reviewer for the following conferences:

- American Medical Informatics Association annual symposium (2007, 2008, 2009)
- Autonomous Agents and Multi-Agent Systems (2003, 2004, 2005, 2009)
- ACM SIGCHI Conference on Human Factors in Computing Systems (CHI)(2005, 2006, 2007, 2008, 2009)
- ACM Computer Supported Collaborative Work (CSCW) (2006)
- Human-Robot Interaction (HRI) (2008, 2009)
- Human Language Technology - North American chapter of the Association for Computational Linguistics (HLT-NAACL)(2006)
- Intelligent User Interfaces (IUI) (2009)
- Intelligent Virtual Agents (IVA) (2008,2009)
- International Conference of Multimodal Interfaces (2004, 2008)
- SIGGRAPH (2004)

**PROFESSIONAL
ACTIVITIES
Continued**

Reviewer for the following workshops:

- AAMAS Workshop on Creating Bonds with Humanoids (2005)
- AAMAS Workshop on Empathic Agents (2009)
- AISB Symposium on Mind-Minding Agents (2005)
- AISB Symposium on Conversational Informatics for Supporting Social Intelligence & Interaction (2005)
- Portuguese Conference on AI Workshop on Affective Computing: towards Emotional Intelligent Systems (2005)
- PRICAI Workshop on Lifelike Animated Agents (2002)
- Workshop on Social and Emotional Intelligence in Learning Environments (2004)

AWARDS

Finalist, MIT \$50K entrepreneurship competition, “ThinWear” team (2003).

James Chen Annual Award for Best UMUI Paper for “Negotiated Collusion” (2002).

Winning entry in the British Airways Concorde design competition held at the MIT Media Lab, entitled "Airborne Social Networking." The entry described ways in which technology could promote social networking among airline passengers (2000).

**INVITED TALKS
& LECTURES**

“Taking the Time to Care: Empowering Low Health Literacy Hospital Patients with Virtual Nurse Agents”, *Innovation Learning Network* webinar, 7/24/09.

“Relational Agents: Adding the Human Touch to Telemedicine”, at *Patient-Centered Computing and eHealth: Transforming Healthcare Quality*, sponsored by Partners Healthcare and Harvard Medical School, 5/2/09.

“Dialogue Systems for Longitudinal Health Counseling”, *Worcester Polytechnic Institute Computer Science Colloquium*, 1/30/09.

“Improving Patient Safety: Implementing Re-Engineered Hospital Discharges Web Conference”, webcast to 1,469 remote attendees, Sponsored by DHHS *Agency for Health Research and Quality*, 3/31/09.

“New Health IT System to Assist Patient Transitions and for Preconception Care”, *Centers for Disease Control*, Atlanta, 9/19/08.

“Relational Agents for Health Communication”, *Future of Health Technology Institute Summit*, 9/23/08, MIT.

“Relational Agents: Social and Communicative Competencies for Maintaining Engagement with Users Over Multiple Interactions”, *USC Computer Science Colloquium*, 10/1/08.

“Long-Term Human-Computer Relationships”, Workshop on Intelligent Lifelong Learning Companions, *USC Institute for Creative Technologies*, 10/2/08.

“Movie Magic in the Clinic: Computer-Generated Characters for Automated Health Counseling”, demonstration, *American Medical Informatics Annual Symposium*, DC, 11/10.

“Addressing Low Health Literacy with Animated Computer Agents”, 12/17/08, *NIH Summit on The Science of Eliminating Health Disparities*, Washington DC.

**INVITED TALKS
& LECTURES**
Continued

“Relational Agents for Automated Health Communication”, 12/19/08, *Beth Israel Deaconess Medical Center Medical Informatics Group Seminar*, Boston.

“Relational Agents for Health Behavior Change”, *Summit on Behavioral Telehealth: Technology for Behavior Change & Disease Management*, Harvard Medical School, 6/3/08

“Relational Agents for Clinical Care”, *Gaming, Simulation & Social Media in Behavioral Health & Disease Management*, Summit on Behavioral Telehealth post-conference workshop, Harvard Medical School, 6/3/08

Demonstration to *Admiral Gary Roughneck, Chief of Naval Operations*, as part of an annual briefing on future technologies for the naval operations. Organized by the Strategic Studies Group. The Pentagon, Washington, DC. 7/16/08.

“Empathic Computer Characters for Health Behavior Change” *Electronic Media and Behavior Change interest group*, New England Research Institute, 4/18/07, Watertown, MA.

“What Would Jiminy Cricket Do? Lessons from the first Social Wearable” *Northeastern University Science, Technology and Society Seminars*, 4/19/07.

“What Would Jiminy Cricket Do? Lessons from the first Social Wearable” – presented at *MIT Media Lab, Affective Computing Group*, 4/23

“Relational Agents for Comforting and Pain Management” *Johnson & Johnson workshop on technologies for chronic pain management*, 3/29/07, MIT, Cambridge, MA.

Panel discussion on “Entrepreneurship in Health and Technology” as part of *Northeastern University’s “Entrepreneurship Week”*, 3/1/07.

“Relational Agents for Health Behavior Change” Symposium on “Applying Biomedical Informatics to Cancer Screening: The Future is Now”, *Society of Behavioral Medicine annual conference*, 3/24/07, Washington, DC.

“Relational Agents: Virtual Nurse and Portable Exercise Advisor”, *Future of Health Technology Symposium*, Centers for Disease Control, Atlanta, 2/22

“Automated Tailoring in Health Dialogue Systems”, *Conference on Targeting & Tailoring for Health Interventions*, October 13th, 2006, Univ. of Connecticut, Storrs, CT.

“Relational Agents Group Demonstrations: Portable Exercise Coach and Virtual Nurse”, *Future of Health Technology Summit*, September 25th, 2006, MIT, Cambridge, MA.

“Machines that Care: Building Empathy into Assistive Devices” invited talk given at the *State of the Science Conference on Exercise and Recreational Technologies for People with Disabilities*, May 31st, 2006, Denver, CO.

“Future of Caring Machines” invited talk given at the *Future of Health Technology Summit*, Sept 26th, 2005, Cambridge, MA.

“Long-Term Human-Computer Relationships” invited talk given at biannual meeting of the *National Academy of Sciences Committee on Human Factors*, August 17th, 2005, Woods Hole, MA.

PRESS

- 4/29/09 – Web - “Virtual Patient Advocate Could Enhance Health Literacy”, Health Leaders Media.
- 2/1/09 – Magazine - “Discharge Protocol Cuts Readmissions”, Family Practice News, Vol 39, No 3.
- 12/08 – Web - CARING Monthly Health News, “Medical simulation takes new leaps with patient “avatars” virtually visiting medical students and nurse avatars providing discharge planning to hospital patients” <http://www.caringonline.org/mc/page.do?sitePageId=79673>
- 6/8/07 – Web - NurseZone.com – “Virtual Health Coach Encourages Physical Activity, Health Awareness” <http://www.nursezone.com/Job/DevicesandTechnology.asp?articleID=16529>
- 5/22/07 – Radio - Interview on Boston WBZ news radio by Jon MacLean.
- 5/21/07 – Newspaper - “Laura' makes digital health coaching personal”, Boston Globe Health & Science section, report by Catherine Elton.
http://www.boston.com/news/globe/health_science/articles/2007/05/21/laura_makes_digital_health_coaching_personal/
- 4/6/07 – TV - “Virtual weight loss coach”, New England Cable News, report by Ryan McBride.
- 4/6/07 – Web - “Piloting a virtual health care helper: Partners Healthcare System to run trials of weight-loss coach 'Laura'”, Mass High Tech, Ryan McBride.
<http://masshightech.bizjournals.com/masshightech/stories/2007/04/09/story10.html>
- 3/26/07 – Newspaper - “Digital ‘counselor’ minds your meds”, Boston Globe, Personal Tech column, Mark Baard.
- 3/5/07 – Radio - Interview on WBUR (Boston NPR) by Allan Coukell, piece on telemedicine.
http://www.wbur.org/news/2007/64996_20070305.asp
- 12/18/06 - Newspaper – Christian Science Monitor. “What if your laptop knew how you felt?”
<http://www.csmonitor.com/2006/1218/p12s01-stct.html>
- 9/25/06 – TV –Boston channel 4 news brief on the Future of Health Technology Symposium.
- 9/13/06 - TV – guest appearance on “Taking Care” TV show (Boston Network).
- 8/21/06 - Newspaper – Boston Globe article on my research – “Health coach gets seniors moving” – Mark Baard.
http://www.boston.com/business/personaltech/articles/2006/08/21/health_coach_gets_seniors_moving/
- 7/11/06 – Newspaper - Newhouse News – “Certain Seniors Embrace High-Tech Gear” (quote)
- 12/3/05 – Magazine - New Scientist article on Affective Computing “Virtual fitness trainer gets pulses racing”
- 9/5/05 – Newspaper - Daily Herald – Palatine/Reuter’s - “Robotic Dog keeps tabs on what you eat – if you exercise” (quote)
- 12/03 – Cartoon – OK/Cancel - “Deep in the lab of Tim Bickmore...”
<http://www.ok-cancel.com/comic/13.html>

PRESS
Continued

12/03 – Magazine – Wired – feature article “The Love Machine”
<http://www.wired.com/wired/archive/11.12/love.html>
