Geb W. Thomas

Professor – University of Iowa
Department of Mechanical & Industrial Engineering
3100 Seamans Center, Iowa City, IA 52242-1527
Email: geb-thomas@uiowa.edu; Ph. (319) 335-5936

I. Academic and Research Positions

2014 – pres. Professor, Department of Mechanical and Industrial Engineering, The University of Iowa College of Engineering

2014 – pres. Associate Professor, Department of Orthopaedics & Rehabilitation, The University of Iowa

2005 – 2014 Associate Professor, Department of Mechanical and Industrial Engineering, The University of Iowa College of Engineering

1997 – 2005 Assistant Professor, Department of Mechanical and Industrial Engineering, The University of Iowa College of Engineering

1996 National Research Council Research Associate, Applied Robotics Group, NASA Ames Research Center

II. Education

May 1996: Ph.D., Industrial Engineering, The Pennsylvania State University, University Park, PA.

May 1995: M.S., Industrial Engineering, The Pennsylvania State University, University Park, PA.

May 1989: B.S., Physics, State University of New York, Stony Brook, NY.

III. Current Funding

Contract or Grant Title	Sponsor	Duration	Budget	% Credit
A Low-Cost Aerosol Sensing Estimator for Assessing Aerosol Exposure (PI S. Sousan)	University of Iowa Center for Health Effects of Environmental Contamination (CHEEC)	07/15 – 06/16	$30,000	33%
An Inexpensive Monitoring Network to Assess Workplace Exposures (PIs K. Koehler, T. Peters, & G. Thomas)	US DHHS/ CDC/ NIOSH	09/14 – 08/18	$536,857	20%
Improving Patient Safety in Orthopaedic Trauma Surgical Training (PI D. Anderson)	AHRQ/NIH	07/14 – 06/17	$747,954	38%
Development of a Personal Aerosol Collector and Spectrometer for Detecting Airborne Nanomaterials in an Operational Environment: Phase I & II (PI T. Peters)	US Department of Defense, Air Force through Spectral Energies	07/14 – 07/16	$132,675	5%

II-EN: Shared Virtual Environments for Studying Social Influences on Risky Cycling and Pedestrian Behavior (PI J. Kearney)	The National Science Foundation (NSF)	11/13 – 10/16	$356,337	25%
NIAMS: CORT Innovations to Assess and Forestall Post-Traumatic Osteoarthritis (J. Buckwalter, PI)	NIH/Centers for Research Translation	09/12 – 06/17	$7,500,000	5%

IV. Honors, Prizes, and Awards

2015 Recognition for excellence in teaching and dedication to student success from the Industrial Engineering Graduating Class of May 2015

2012 Faculty Excellence for Service, College of Engineering, University of Iowa

2011 Recognition for excellence in teaching and dedication to student success from the Industrial Engineering Graduating Class of December 2011

2003 Best Paper in Engineering Division at Iowa Academy of Science Annual Meeting (With Greg Gerling, Alicia Weissman and Edwin Dove)

2003 5th Annual Student Interdisciplinary Health Research Poster Session Award Winner (With Greg Gerling, Alicia Weissman and Edwin Dove)

2003 Seyit Tigrek, a Graduate Student in the GROK Lab, won the Best Poster Award,

2002 Greg Gerling, 2nd place in Physical, Mathematical, and Engineering Sciences, Graduate Student Forum, University of Iowa

2002 President's Award for Technology Innovation, University of Iowa (With Greg Gerling, Alicia Weissman and Edwin Dove)

2002 Special Recognition, Graduate College Outstanding Mentor Award: Mathematical and Physical Sciences and Engineering

1999 Nominated for the Collegiate Teaching Award

1998 Nominated for the Smithsonian/Computer Graphics World Innovate Award

1996 National Research Council Research Fellowship

1993 Louis and Sara Michael Graduate Fellowship, College of Engineering, The Pennsylvania State University

1993 Life Sciences NASA Space Grant Fellowship Supplement

1992 Honorable Mention, National Defense Science and Engineering Graduate Fellowship Program

V. Teaching

Main Courses Taught: Design for Manufacturing, Design of Virtual Environments, Engineering II, Engineering Problem Solving II, Human-Computer Interaction, Human Factors, IE Freshman Seminar, IE Graduate Seminar, IE Sophomore Seminar, Information System Design, Principles of Design II, Professional Seminar

VI. Publications

A. Peer-Reviewed Journal Articles

Submitted/In preparation

1. Sousan, S., Koehler, K., **Thomas, G.W.**, Park, J.H., Hillman, M., Halterman, A., Peters, T.M. (2015). Inter-comparison of low-cost sensors for measuring the mass concentration of occupational aerosols. Under review at *Aerosol Science & Technology*.
2. **Thomas, G.W.**, Rojas-Murillo, S., Hanley, J., Kreiter, C., Karam, M.D., Anderson, D.D. (2015). Skill assessment in the interpretation of 3D fracture patterns from radiographs. Under review at *Iowa Orthopaedic Journal.*

Accepted

1. Anderson, D.D., Long, S.A., **Thomas, G.W.**, Putnam, M.D., Bechtold, J.E., Karam, M.D. (2015). Objective Structured Assessments of Technical Skills (OSATS) Does Not Assess the Quality of the Surgical Result Effectively. In press at *Clinical Orthopaedics & Related Research*.
2. Kho, J., Johns, B., **Thomas, G.**, Karam, M., Marsh, J.L., Anderson, D.D. (2015). A hybrid reality radiation-free hip fracture simulator for training wire navigation skills. In press at *The Journal of Orthopaedic Trauma*.
3. Karam, M.D., **Thomas, G.W.**, Koehler, D.M., Westerlind, B.O., Lafferty, P.M., Ohrt, G.T., Marsh, J.L., Van Heest, A., Anderson, D.D. (2015). Surgical coaching from head-mounted video in the training of fluoroscopically guided articular fracture surgery. *The Journal of Bone and Joint Surgery*, *97*(12), 1031-1039.
4. **Thomas, G.W.**, Pennathur, P., Falk, D., Myers, J., Ayres, B., Polgreen, P.M. (2015). How lapse and slip errors influence head-of-bed angle compliance rates as measured by a portable, wireless data collection system. *IIE Transactions on Healthcare Systems Engineering, 5*(1), 1-13. [Featured Article].
5. **Thomas, G.**, Johns, B., Kho, J. and Anderson, D. (2015). The validity and reliability of a hybrid reality simulator for wire navigation in orthopaedic surgery. *IEEE Transactions on Human-Machine Systems*, *45*(1), 119-125.
6. Anadioti, E., Aquillino, S., Gratton, D., Halloway, J., Denry, I., **Thomas, G.** and Quian, F. (2014). 3D and 2D marginal fit of pressed and CAD/CAM lithium disilicate crowns made from digital and conventional impressions. *The Journal of Prothodontics*, *23*(8), 610-617.
7. Monsalve M.N., Pemmaraju S.V., **Thomas G.W.**, Herman T., Segre A.M., Polgreen P.M. (2014). Do peer effects improve hand hygiene adherence among healthcare workers? *Clinical Infectious Diseases*, *35*(10), 1277-1285.
8. **Thomas, G.W.**, Johns, B.D., Marsh, J.L., Anderson, D.D. (2014). A review of the role of simulation in developing and assessing orthopaedic surgical skills. *Iowa Orthopaedic Journal*, 34:181-189.
9. Iacovelli, J.N., Yang, J., **Thomas, G.**, Wu, H., Schiltz, T., Foster D. (2013). The effect of field condition and shoe type on lower extremity injuries in American football. *The British Journal of Sports Medicine*, 47:789-793.
10. Schall, M.C., Rusch, M.L., Lee, J.D., Dawson, J.D., **Thomas, G.**, Aksan, N., & Rizzo, M. (2013). Augmented reality cues and elderly driver hazard perception. *Human Factors: The Journal of the Human Factors and Ergonomics Society*, *55*(3), 643-658.
11. Hornbeck, T., Naylor, D., Segre, A.M., **Thomas, G.**, Herman, T., & Polgreen, P.M. (2012). Using sensor networks to study the effect of peripatetic healthcare workers on the spread of hospital-associated infections. *Journal of Infectious Diseases*, *206*(10), 1549-1557.
12. Sharma, D., **Thomas, G.W.**, Foster, E.D., Iacovelli, J., Lea, K.M., Streit, J.A., & Polgreen, P.M. (2012). The precision of human-generated hand-hygiene observations: A comparison of human observation with an automated monitoring system. *Infection Control and Hospital Epidemiology*, *33*(12), 1259-1261.
13. Fries, J., Segre, A.M., **Thomas, G.**, Herman, T., Ellingson, K., & Polgreen, P.M. (2012). Monitoring hand hygiene via human observers: How should we be sampling? *Infection Control and Hospital Epidemiology*, *33*(7), 689-695.

14. Karam, M.D., Kho, J.Y., Yehyawi, T.M., Ohrt, G.T., **Thomas, G.W.**, Jonard, B., Anderson, D.D., Marsh, J.L. (2012). Application of surgical skill simulation training and assessment in orthopaedic trauma. *Iowa Orthopeadic Journal*, 32:76-82.

15. Ellingson, K., Polgreen, P.M., Schneider, A., Shinkunas, L., Kaldjian, L.C., Wright, D., **Thomas, G.W.** Segre, A.M., Herman, T., McDonald, L.C., & Sinkowitz-Cochran, R. (2011). Healthcare personnel perceptions of hand hygiene monitoring technology. *Infection Control and Hospital Epidemiology*, *32*(11), 1091-1096.

16. Thornburg, K.M., & **Thomas, G.W.** (2009). Robotic exploration utility for urban search and rescue tasks. *Journal of Computers*, *4*(10), 975-980.

17. Xiang, Z., **Thomas, G.W.**, Thornburg, K.M., Cabrol, N., Grin, E., & Anderson, R.C. (2009). Slope perception from monoscopic field images: Applications to mobile robot navigation. *Journal of Intelligent and Robotic Systems*, *54*(4), 595-612.

18. Gerling, G.J., & **Thomas, G.W.** (2008). Fingerprint lines may not directly affect SA-I mechanoreceptor response. *Somatosensory & Motor Research*, *25*(1), 61-76.

19. Glasgow, J.M., **Thomas, G.**, Pudenz, E., Cabrol, N., Wettergreen, D., & Coppin, P. (2008). Optimizing information value: Improving rover sensor data collection. *IEEE Transactions on Systems, Man and Cybernetics, Part A: Systems and Humans*, *38*(3), 593-604.

20. Weinstein, S., Pane, D., Ernst, L. A., Warren-Rhodes, K., Dohm, J.M., Hock, A.N., Piatek, J.L., Emani, S., Lanni, F., Wagner, M., Fisher, G.W., Minkley, E., Dansey, L.E., Smith, T., Grin, E.A., Stubbs, K., **Thomas, G.W.** Cockell, C.S., Mariangeli, L., Ori, G.G., Heys, S., Teza, J.P., Moersch, J.E., Coppin, P., Chong Diaz, G., Wettergreen, D.S., Cabrol, N.A. & Waggoner, A.S. (2008). Application of pulsed-excitation fluorescence imager for daylight detection of sparse life in tests in the Atacama Desert. *Journal of Geophysical Research: Biogeosciences*, *113*(G01S90).

21. Hock, A. N., Cabrol, N. A., Dohm, J. M., Piatek, J., Warren-Rhodes, K., Weinstein, S., Wettergreen, D.S., Grin, E.A., Moersch, J., Cockell, C.S., Coppin, P., Ernst, L., Fisher, G., Hardgrove, C., Marinangeli, L., Minkley, E., Ori, G.G., Waggoner, A., Wyatt, M., Smith, T., Thompson, D., Wagner, M., Jonak, D., Stubbs, K., **Thomas, G.W.**, Pudenz, E., & Glasgow, J. (2007). Life in the Atacama: A scoring system for habitability and the robotic exploration for life. *Journal of Geophysical Research: Biogeosciences, 112*(G04S08).

22. Warren-Rhodes, K., Weinstein, S., Piatek, J. L., Dohm, J., Hock, A., Minkley, E., Pane, D., Ernst, L.A., Fisher, G., Emani, S., Waggoner, A.S., Cabrol, N.A., Wettergreen, D.S., Grin, E., Coppin, P., Chong Diaz, G., Moersch, J., Oril, G.G., Smith, T., Stubbs, K., **Thomas, G.W.**, Wagner, M., Wyatt, M., & Boyle, L. N. (2007). Robotic ecological mapping: Habitats and the search for life in the Atacama Desert. *Journal of Geophysical Research: Biogeosciences 112*(G04S06).

23. **Thomas, G.W.**, Peate, I.U., Nakamoto, J., Pudenz, E., Glasgow, J., Bretthauer, J., Cabrol, N., Wettergreen, D., Grin, E., Coppin, P., Dohm, J.M., Piatek, J.L., Warren-Rhodes, K., Hock, A.N., Weinstein, S., Fisher, G., Chong Diaz, G., Cockell, C., Mariangeli, L., Minkley, N., Moersch, J., Ori, G.G., Smith, T., Stubb, K., Wagner, M., Waggoner, A.S. (2007). Comparing different methods for assessing ground truth of rover data analysis for the 2005 season of the Life in the Atacama Project. *Journal of Geophysical Research: Biogeosciences*, *112*(G04S09).

24. Warren Rhodes, K., Weinstein, S., Dohm, J., Piatek, J., Minkley, E., Hock, A., Cockell, C., Pane, D., Ernst, L.A., Fisher, G., Emani, S., Waggoner, A.S., Cabrol, N.A., Wettergreen, D.S., Apostolopoulos, D., Coppin, P., Grin, E., Chong Diaz, G., Moersch, J., Oril, G.G., Smith, T., Stubbs, K., **Thomas, G.W.**, Wagner, M., & Wyatt, M. (2007). Searching for microbial life remotely: Satellite to rover habitat mapping in the Atacama Desert, Chile. *Journal of Geophysical Research: Biogeosciences*, *112*(G04S05).

25. Piatek, J.L., Hardgrove, C., Moersch, J.E., Drake, D.M., Wyatt, M.B., Rampey, M., Crlisle, O., Warren-Rhodes, K., Dohm, J.M., Hock, A.N., Cabrol, N.A., Wettergreen, D.S., Grin, E.A., Chong Diaz, G., Copping, P., Weinstein, S., Cockell, C.S., Marinangeli, L., Ori, G.G., Smith, T., Jonak, D., Wagner, M., Stubbs, K., **Thomas, G.**, Pudenz, E., & Glasgow, J. (2007). Surface and subsurface composition of the Life in the Atacama field sites from rover data and orbital image analysis. *Journal of Geophysical Research: Biogeosciences*, *112*(G04S04).

26. Cabrol, N.A., Wettergreen, D., Warren-Rhodes, K., Grin, E.A., Moersch, J., Chong Diaz, G., Cockell, C.S., Coppin, P., Demergasso, C., Dohm, J.M., Ernst, L., Fisher, G., Glasgow, J., Hardgrove, C., Hock, A.N., Jonak, D., Marinangeli, L., Minkley, E., Ori, G.G., Piatek, J., Pudenz, E., Smith, T., Stubbs, K., **Thomas, G.W.** Thompson, D., Waggoner, A., Wagner, M. Weinstein, S., & Wyatt, M. (2007). Life in the Atacama: Searching for life with rovers (science overview). *Journal of Geophysical Research: Biogeosciences*, *112*(G04S05).

27. Johnson, J.S., Liu, L., **Thomas, G.**, and Spencer, J.P. (2007). Calibration algorithm for eye tracking with unrestricted head movement. *Behavior Research Methods*, *39*(1), 123-132.

28. Kanduri, A.K., **Thomas, G.**, Cabrol, N., Grin, E., & Anderson, R.C. (2005). The (in)accuracy of novice rover operators' perception of obstacle height from monoscopic images. *IEEE Transactions on Systems, Man and Cybernetics, Part A: Systems and Humans*, *35*(4), 505-512.

29. Gerling, G.J., & **Thomas, G.W.** (2005). Augmented, pulsating tactile feedback facilitates simulator training of clinical breast examinations. *Human Factors: The Journal of the Human Factors and Ergonomics Society*, *47*(3), 670-681.

30. Wagner, J., **Thomas, G.**, & Stanford, C. (2003). Forces exerted by a conventional dental explorer during clinical examination. *Caries Research*, *37*(5), 365-368.

31. Gerling, G.J., Weissman, A.M., **Thomas, G.W.**, & Dove, E.L. (2003). Effectiveness of a dynamic breast examination training model to improve clinical breast examination (CBE) skills. *Cancer Detection and Prevention*, *27*(6), 451-456.

32. **Thomas, G.** (2003). Real-time panospheric image dewarping and presentation for remote mobile robot control. *Advanced Robotics*, *17*(4), 359-368.

33. **Thomas, G.**, Goldberg, J.H., Cannon, D.J., & Hillis, S.L. (2002). Surface textures improve the robustness of stereoscopic depth cues. *Human Factors: The Journal of the Human Factors and Ergonomics Society*, *44*(1), 157-170.

34. **Thomas, G.**, Reagan, M., Bettis, E.A., Cabrol, N., & Rathe, A. (2001). Analysis of science team activities during the 1999 Marsokhod rover field experiment: Implications for automated planetary surface exploration. *Journal of Geophysical Research: Planets*, *106*(E4), 7775-7783.

35. Stoker, C.R., Cabrol, N.A., Roush, T.R., Moersch, J., Aubele, J., Barlow, N., Bettis, E.A., Bishop, J., Chapman, M., Clifford, S., Cockell, C., Crumpler, L., Craddock, R., De Hon, R., Foster, T., Gulick, V., Grin, E., Horton, K., Hovde, G., Johnson, J.R., Lee, P.C., Lemmon, M.T., Marshall, J., Newsom, H.E., Ori, G.G., Reagan, M., Rice, J.W., Ruff, S.W., Schriner, J., Sims, M., Smith, P.H., Tanaka, K., Thomas, H.J., **Thomas, G.** & Yingst, R.A. (2001). The 1999 Marsokhod rover mission simulation at Silver Lake, California: Mission overview, data sets, and summary of results. *Journal of Geophysical Research: Planets*, *106*(E4), 7639-7664.

36. Cabrol, N.A., Bettis, E.A., Glenister, B., Chong, G., Herrera, C., Jensen, A., Pereira, M., Stocker, C.R., Grin, E.A., Landheim, R., **Thomas, G.**, Golden, J., Saville, K., Ludvigson, G. & Witzke, B. (2001). Nomad Rover Field Experiment, Atacama Desert, Chile: 2. Identification of paleolife evidence using a robotic vehicle: Lessons and recommendations for a Mars sample return mission. *Journal of Geophysical Research: Planets*, *106*(E4), 7807-7815.

37. Cabrol, N.A., Chong Diaz, G., Stoker, C.R., Gulick, V.C., Landheim, R., Lee, P., Roush, T.L., Zent, A.P., Herrera Lameli, C., Jensen Iglesia, A., Pereira Arrerondo, M., Dohm, J.M., Keaten, R., Wettergreen, D., Sims, M.H., Schwher, K., Bualat, M.G., Thomas, H.J. Zbinden, E., Christian, D., Pedersen, L, Bettis, A., **Thomas, G.** & Witzke, B. (2001). Nomad Rover Field Experiment, Atacama Desert, Chile: 1. Science results overview. *Journal of Geophysical Research: Planets*, *106*(E4), 7785-7806.

38. Wu, J., Chan, W.K., & **Thomas, G.** (2001). Rapid and accurate inter-robot position determination in robot teams. *IEEE Transactions on Instrumentation and Measurement, 50*(1), 163-168.

39. **Thomas, G.**, Johnson, L., Dow, S., & Stanford, C. (2001). The design and testing of a force feedback dental simulator. *Computer Methods and Programs in Biomedicine*, *64*(1), 53-64.

40. Johnson, L., **Thomas, G.**, Dow, S., & Stanford, C. (2000). An initial evaluation of the Iowa dental surgical simulator. *Journal of Dental Education*, *64*(12), 847-854.

41. Wagner, J.L., **Thomas, G.W.**, Radtke, A.M., Stanford, C.M., Goel, V.K., & Wilder, D.G. (2000). The Iowa dental probe: A transducer to measure forces applied by dentists in a clinical setting. *Journal of Clinical Engineering*, *25*(3), 164-168.
42. Stanford, C.M., Welsch, F., Kastner, N., **Thomas, G.**, Zaharias, R., Holtman, K., & Brand, R.A. (2000). Primary human bone cultures from older patients do not respond at continuum levels of in vivo strain magnitudes. *Journal of Biomechanics*, *33*(1), 63-71.
43. Wettergreen, D., Bapna, D., Maimone, M., & **Thomas, G.** (1999). Developing Nomad for robotic exploration of the Atacama Desert. *Robotics and Autonomous Systems*, *26*(2), 127-148.
44. Yun, M.H., Cannon, D., Freivalds, A., & **Thomas, G.** (1997). An instrumented glove for grasp specification in virtual-reality-based point-and-direct telerobotics. *IEEE Transactions on Systems, Man, and Cybernetics, Part B: Cybernetics, 27*(5), 835-846.
45. Cannon, D.J., & **Thomas, G.** (1997). Virtual tools for supervisory and collaborative control of robots. *Presence: Teleoperators and Virtual Environments*, *6*(1), 1-28.
46. **Thomas, G.**, Barton, R., & Cannon, D. (1995). Inferred advantage: Using Kogan's symmetric action principle to empirically assess alternatives in complex system development. *Research in Engineering Design*, *7*(4), 241-252.
47. Cannon, D.J., **Thomas, G.**, Wang, C., & Kesavadas, T. (1994). A virtual reality based point-and-direct robotic system with instrumented glove. *International Journal of Industrial Engineering*, *1*(2), 139-148.
48. Medeiros, D.J., **Thomas, G.**, Ratkus, A.B., & Cannon, D. (1994). Off-line programming of coordinate measuring machines using a hand-held stylus. *Journal of Manufacturing Systems*, *13*(6), 401-411.

B. Peer-Reviewed Conference Proceedings, Abstracts and Poster Presentations

1. Long, S.A., **Thomas, G.W.**, Anderson, D.D. (2016, April). Developing an affordable wire navigation surgical simulator. Technical brief to be presented at the *2016 Design of Medical Devices Conference*, Minneapolis, MN.
2. Long, S.A., Taylor, L., Rink, C., Anderson, D.D., **Thomas, G.W.** (2016, January). Developing a hybrid reality simulator to train orthopaedic residents in wire navigation. To be presented at *The 2016 International Meeting for Simulation in Healthcare*, San Diego, CA.
3. Anderson, D.D., Long, S.A., **Thomas, G.W.**, Karam, M.D. (2016, January). A role for objective performance assessment in orthopaedic training. To be presented at *The 2016 International Meeting for Simulation in Healthcare*, San Diego, CA.
4. **Thomas, G.W.**, Taylor, L., Karam, M.D., Long, S., Rink, C., Kreiter, C., Anderson, D.D. (2016, January). Measuring surgical skill in the operating room for orthopaedic simulator validation. Abstract submitted to *The 2016 International Meeting for Simulation in Healthcare*, San Diego, CA.
5. Anthony, C.A., **Thomas, G.W.**, Liu, X., Karam, M.D. (2016, March). A novel technology platform for surgical video coaching in orthopaedic resident training. Submitted to the *2016 American Academy of Orthopaedic Surgeons Annual Meeting*, Orlando, FL.
6. Kern, A., Long, S.A., **Thomas, G.W.**, Anderson, D.D. (2015, August). Intra-operative fragment tracking for articular fracture reduction. Presented at *The American Society of Biomechanics*, Columbus, OH.
7. Long, S.A., **Thomas, G.W.**, Taylor, L., Rink, C., Anderson, D.D. (2015, August). A vision-based, hybrid-reality, wire navigation simulator. Presented at *The American Society of Biomechanics*, Columbus, OH.
8. Taylor, L., Rink, C., Long, S., **Thomas, G.W.**, Karam, M.D., Anderson, D.D. (2015, August). Assessing wire navigation performance in treating hip fractures. Presented at *The American Society of Biomechanics*, Columbus, OH.
9. Koehler, D.M., Thomas, G.W., Karam, M.D., Lafferty, P.M., Ohrt, G., Marsh, J.L., Van Heest, A., Anderson, D.D. (2015, June). Surgical coaching from head-camera video for fluoroscopically guided articular fracture surgery. Poster presented at *The 2015 American Orthopaedic Association Annual Meeting*, Providence, RI.

10. Anthony, C.A., Liu, X., **Thomas, G.W.**, Karam, M.D. (2015, May). Orthopaedic resident education: A novel technology platform for surgeon training. Poster presented at the *University of Iowa Hospitals & Clinics 2015 GME Leadership Symposium*. Iowa City, IA.

11. Koehler, D.M., Karam, M.D., Westerlind, B.O., Lafferty, P.M., **Thomas, G.W.**, Anderson, D.D. (2014, October). A simulation trainer for fluoroscopically guided articular fracture surgery – experience at a second center. Abstract presented at *The 2014 Annual Meeting of the Orthopaedic Trauma Association*, Tampa, FL.

12. Falk, D., **Thomas, G.W.**, Myers, J., Doerschug, K., Polgreen, P. (2014, May). Real-time, wireless, networked feedback for bed tilt compliance. Abstract and poster presented at *The American Thoracic Society*, San Diego, CA.

13. **Thomas, G.W.**, Anderson, D.D., Karam, M.D., Johns, B., Murillo, S.R., Lawrence Marsh J. (2013, September). A flexible orthopaedic trauma surgery box skills trainer. Abstract and poster presented at the *37th Annual Meeting of the American Society of Biomechanics*, Omaha, NE.

14. Johns, B., **Thomas, G.W.**, Kho, J.Y., Karam, M.D., Marsh, J.L., Anderson, D.D. (2013, September). A novel augmented reality simulator for teaching wire navigation skills in treating intertrochanteric hip fractures. Poster presented at the *37th Annual Meeting of the American Society of Biomechanics*, Omaha, NE.

15. Ohrt, G.T., **Thomas, G.W.**, Karam, M.D., Yehyawi, T.M., Westerlind, B.O., Marsh, J.L., Anderson, D.D. (2013, September). Simulation to improve surgical articular fracture reduction skills. Abstract and poster presented at the *37th Annual Meeting of the American Society of Biomechanics*, Omaha, NE.

16. Marsh, J.L., Kho, J.Y., Johns, B., **Thomas, G.W.**, Karam, M.D., Anderson, D.D. (2013, June). A novel approach to teaching visual-spatial skills in wire navigated orthopaedic procedures. Paper presented at the *126th Annual Meeting of the American Orthopaedic Association*, Denver, CO.

17. Johns, B., **Thomas, G.W.**, Kho, J.Y., Karam, M.D., Marsh, J.L., Anderson, D.D. (2013, May). The advantage of instantaneous versus delayed feedback in orthopaedic simulation. Paper presented at the *2013 Industrial and Systems Engineering Research Conference*, San Juan, Puerto Rico.

18. Marsh, J.L., Kho, J.Y., Karam, M.D., Ohrt, G.T., **Thomas, G.W.**, Yehyawi, T.M., Brown, T.D., Anderson, D.D. (2013, March). A surgical skills simulation training program in an articular fracture model for orthopaedic junior residents. Abstract and poster presented at the *AAOS Annual Meeting*, Chicago, IL.

19. Hollopeter, N., Brown, T., & **Thomas, G.** (2012, September). Differences in novice and experienced driver response to lane departure warnings that provide active intervention. In *Proceedings of the Human Factors and Ergonomics Society 56th Annual Meeting*, (Vol. 56, No. 1, pp. 2216-2220). SAGE Publications.

20. Herman, T., Monsalve, M., Pemmaraju, S., Polgreen, P., Segre, A. M., Sharma, D., & **Thomas, G.** (2012, September). Inferring realistic intra-hospital contact networks using link prediction and computer logins. In the *2012 ASE/IEEE International Conference on Social Computing and 2012 ASE/IEEE International Conference on Privacy, Security, Risk and Trust*, (pp. 572-578). IEEE.

21. Ohrt, G., Karam, M.D., **Thomas, G.W.**, Kho, J., Yehyawi, T., Marsh, J.L., Anderson D.D. (2012, August). Surgical simulation: Validating methods to improve orthopaedic resident skills competency. Abstract and poster presented at the *36th Annual Meeting of the American Society of Biomechanics*, Gainesville, FL.

22. Kho, J.Y., Yehyawi, T.M., Marsh, J.L., Karam, M.D., **Thomas, G.W.**, Ohrt, G.T., Anderson, D.D., Brown, T.D. (2012, May). Articular fracture reduction simulation training program for orthopaedic residents. Paper presented at *UIHC Graduate Medical Education Leadership Symposium*, Iowa City, IA.

23. Anadioti, E., Aquilino, S., Gratton, D., Holloway, J., Denry, I., **Thomas, G.W.**, Qian, F. (2012, February). Marginal fit of two ceramic crowns made from two impressions. Poster presented at *61st Annual Scientific Session for the American Academy of Fixed Prosthodontics*, Chicago, IL.

24. Hornbeck, T., Naylor, D., Segre, A.M., **Thomas, G.**, Herman, T., Polgreen, P.M. (2011, November). On hand hygiene compliance and diminishing marginal returns: An empirically-driven agent-based simulation study. Paper presented at *The Computational Social Science Society of the Americas Annual Conference*.

25. Schall, M.C., Rusch, M.L., **Thomas, G.**, & Lee, J.D. (2011, September). An investigation of learning style and discipline in a human factors course. In *Proceedings of the Human Factors and Ergonomics Society 55th Annual Meeting*, (Vol. 55, No. 1, pp. 555-559). SAGE Publications.

26. **Thomas, G.**, Polgreen, P., Herman, T., Scranton, G., Sharma, D., Johns, B., Chen, H., Scranton, G., Naylor, D., Ireland, M., McCarty, T., Decker, T. & Segre, A. (2011, September). Improving patient safety with hand hygiene compliance monitoring. In *Proceedings of the Human Factors and Ergonomics Society 55th Annual Meeting*, (Vol. 55, No. 1, pp. 823-827). SAGE Publications.

27. Fries, J., Tolentino, S.L., **Thomas, G.**, Herman, T., Segre, A., Polgreen, P. (2011, April). Monitoring hand hygiene via human observers: How should we be sampling? Paper presented at the *21st Annual Scientific Meeting of the Society for Healthcare Epidemiology of America*, Dallas, TX.

28. Hornbeck, T., Curtis, D. E., Herman, T., Segre, A., **Thomas, G.**, Naylor, D., Polgreen, P. (2011, April). Contact patterns for HCWs: Not everyone is the "average." Poster presented at the *21st Annual Scientific Meeting of the Society for Healthcare Epidemiology of America*, Dallas, TX.

29. Petrie, M. and **Thomas, G.** (2007, October). Mechanical properties of the haptic signals indicative of a breast cancer tumor. In the *2007 IEEE International Conference on Systems, Man and Cybernetics* (pp. 2233-2238). IEEE.

30. Thornburg, K. & **Thomas, G.** (2007, October). The scoring procedure for a competitive research competition influences the usefulness of the results in real-world applications. In the *2007 IEEE International Conference on Systems, Man and Cybernetics,* (pp. 902-907). IEEE.

31. Steele, F. & **Thomas, G.** (2007, March). Directed stigmergy-based control for multi-robot systems. In *Proceedings of the 2nd ACM/IEEE International Conference on Human-Robot Interaction,* (pp. 223-230). ACM.

32. Glasgow, J., **Thomas, G.**, Pudenz, E., Cabrol, N., Wettergreen, D., Coppin, P. (2006, October). Panoramic image information utility for mobile robot exploration. In *2006 IEEE International Conference on Systems, Man and Cybernetics*, (Vol. 4, pp. 3216-3221). IEEE.

33. Thornburg, K., **Thomas, G.**, & Draper, S. (2006, October). Categorizing adverse medical device and medication event frequency. In *Proceedings of the Human Factors and Ergonomics Society 50th Annual Meeting*, (Vol. 50, No. 10, pp. 1009-1013). SAGE Publications.

34. Pudenz, E., Glasgow, J., **Thomas, G.**, Coppin, P., Wettergreen, D., Cabrol, N. (2006, March). Searching for a quantitative proxy for rover science effectiveness. In *Proceedings of the 1st ACM SIGCHI/SIGART Conference on Human-Robot Interaction,* (pp. 18-25). ACM.

35. **Thomas, G.** & Liu, L. (2005, September). Displaying small surface features with a force feedback device in a dental training simulator. In *Proceedings of the Human Factors and Ergonomics Society 49th Annual Meeting*, (Vol. 49, No. 26, pp. 2235-2239). SAGE Publications.

36. Gerling, G. and **Thomas, G.** (2005, September). Two dimensional finite element modeling to identify physiological bases for tactile gap discrimination. In *Proceedings of the Human Factors and Ergonomics Society 49th Annual Meeting,* (Vol. 49, No. 10, pp. 891-895). SAGE Publications.

37. Glasgow, J., Pudenz, E., **Thomas, G.**, Cabrol, N., Coppin P., & Wettergreen, D. (2005, August). Observations of a science team during an advanced planetary rover prototype field test. In the *2005 IEEE International Workshop on Robot and Human Interactive Communication,* (pp. 137-142). IEEE.

38. **Thomas, G.**, Coppin, P., Cabrol, N., Wettergreen, D., Pudenz, E., Glasgow, J. (2005, July). Collaborative virtual environments for control of planetary exploration rovers. Presented at the *2005 Special Session on Human Robot Interaction, Human Computer Interaction / Virtual Reality Conference*, Las Vegas, NV.

39. Warren-Rhodes, K., Weinstein, S., Pane, D., Cockell, C., Dohm, J., Piatek, J., ... & **Thomas, G.** (2005, April). Mars analog habitat survey and the search for microbial life remotely with an autonomous astrobiology rover. Abstract presented at the *NAI Biennial Meeting, Cent. for Astrobiology*, University of Colorado at Boulder.

40. Gerling, G. and **Thomas, G.** (2005, March). The effect of fingertip microstructures on tactile edge perception. Paper presented at the *First Joint Eurohaptics Conference and Symposium on Haptic Interfaces for Virtual Environment and Teleoperator Systems*, Pisa, Italy.

41. Piatek, J. L., Moersch, J. E., Wyatt, M., Rampe, M., Cabrol, N. A., Wettergreen, D. S., Whittaker, R.; Grin, E. A., Chong Diaz, G., Cockell, C., Coppin, P., Dohm, J. M., Fisher, G., Hock, A. N., Marinangeli, L., Minkley, N., Ori, G. G.,Waggoner, A., Warren-Rhodes, K., Weinstein, S., Apostolopoulos, D., Smith, T., Wagner, M., Stubb, K., **Thomas, G.**, & Glasgow, J. (2005, March). Spectroscopic results from the Life in the Atacama (LITA) project 2004 field season. Abstract presented at the *36th Lunar and Planetary Science Conference*, Houston, TX.

42. Dohm, J. M.; Cabrol, N. A.; Grin, E. A.; Moersch, J.; Chong Diaz, G.; Cockell, C.; Coppin, P.; Fisher, G.; Hock, A. N.;Marinangeli, L.; Minkley, N.; Ori, G. G.; Piatek, J. L.; Warren-Rhodes, K.; Weinstein, S.; Wyatt, M.; Smith, T.;Wagner, M.; Stubb, K.; **Thomas, G.** and Glasgow, J. (2005, March). Life in the Atacama — Year 2: Geologic reconnaissance through long-range roving and implications on the search for life. Abstract presented at the *36th Lunar and Planetary Science Conference*, Houston, TX.

43. Cabrol, N. A., Wettergreen, D. S., Whittaker, R., Grin, E. A., Moersch, J. E., Chong Diaz, G., Cockell, C., Coppin, P., Dohm, J. M., Fisher, G., Hock, A. N., Marinangeli, L., Minkley, N., Ori, G. G., Piatek, J. L., Waggoner, A., Warren-Rhodes, K., Weinstein, S., Wyatt, M., Calderon, F., Heys, S., Jonak, D., Luders, A., Pane, T., Smith, T., Stubbs, K., Teza, J., Thompkins, P., Villa, D., Willams, C., Wagner, M., **Thomas, G.**, & Glasgow, J. (2005, March). Searching for life with rovers: Exploration methods and science results from the 2004 field campaign of the "Life in the Atacama" project and applications to future Mars missions. Abstract presented at the *36th Lunar and Planetary Science Conference*, Houston, TX.

44. **Thomas, G.**, Wagner, J., Xiang, Z., Kanduri, A., Glasgow, J. (2004). Analytical Rover Operations Development. Paper presented at the *IEEE Systems, Man, and Cybernetics Conference*, The Hague, Netherlands.

45. Anderson, R. C., **Thomas, G.**, Wagner, J., & Glasgow, J. (2004, September). Error-associated behaviors and error rates for robotic geology. Presented at the *Annual Conference of the Human Factors & Ergonomics Society*. Pasadena, CA: Jet Propulsion Laboratory, National Aeronautics and Space Administration.

46. Liu, L., **Thomas, G.**, Stanford, C., & Johnson, L. (2004, September). The identification of the critical haptic stimulus features in a clinical dental task. In *Proceedings of the Human Factors and Ergonomics Society 48th Annual Meeting* (Vol. 48, No. 18, pp. 2137-2141). SAGE Publications.

47. Wagner, J., **Thomas, G.**, Glasgow, J., Anderson, R. C., Cabrol, N., & Grin, E. (2004, September). Error-associated behaviors and error rates for robotic geology. In *Proceedings of the Human Factors and Ergonomics Society 48th Annual Meeting,* (Vol. 48, No. 3, pp. 444-447). SAGE Publications.

48. **Thomas, G.** (2004, March). Engineering robotic geology for Mars exploration. Paper presented at *2004 IIE Annual Conference*, Houston, TX.

49. Johnson, L., Stanford, C., Tigrek, S., & **Thomas, G.** (2004, March). The effect of haptic sampling resolution in a surgical simulator. Abstract presented at the *IADR/AADR/CADR 82nd General Session*, Honolulu, HI.

50. Wagner, J., Anderson, R. C., **Thomas, G.**, Cabrol, N., Grin, E., & Glasgow, J. (2003, December). Assessing geologic image interpretations errors occurring in extraterrestrial robotic exploration. In *AGU Fall Meeting Abstracts*, (Vol. 1, p. 0406).

51. Gerling, G. & **Thomas, G.** (2003. October). Effect of augmented visual performance feedback on the effectiveness of clinical breast examination training with a dynamically configurable breast model. In *IEEE International Conference on Systems, Man and Cybernetics*, (Vol. 3, pp. 2095-2100). IEEE.

52. Wagner, J., **Thomas, G.**, & Glasgow, J. (2003, October). Assessing geologic image interpretations errors occurring in extraterrestrial robotic exploration. In *IEEE International Conference on Systems, Man and Cybernetics*, (Vol. 3, pp. 2089-2094). IEEE.

53. Gerling, G. J., **Thomas, G. W.**, Weissman, A. M., & Dove, E. L. (2003, April). A novel breast cancer simulator to improve training of physicians' tactile sensitivity and discrimination skills in clinical breast examination. Paper presented at *Iowa Academy of Science Annual Meeting,* Des Moines, IA. Won best presentation award.

54. **Thomas, G.** (2002, August). Guest Editor's Introduction - Virtual environments and mobile robots: Control, simulation and robot pilot training. *Presence, Teleoperators and Virtual Environments*, (Vol. 11, No. 4, pp. iv-v).

55. **Thomas, G.** & Debbins, P. (2002, November). The engineering science preparation and introductory training (ESPRIT) Program. In *32nd Annual Frontiers in Education (FIE) Conference*, (Vol. 3, pp. S4C-23). IEEE.

56. Severson, J., Cremer, J., Lee, K., Allison, D., Gelo, S., Edwards, J., Vanderleest, R., Heston, S., Kearney, J. & **Thomas, G.** (2002, September). Exploring virtual history at the National Museum of American History. In *Proceedings of the 8th International Conference on Virtual Systems and Multimedia (VSMM2002)*, (pp. 61-70).

57. Gerling, G., **Thomas, G.**, Weissman, A. & Dove, E. (2002, September). Dynamic simulator for training clinical breast examination. In *Proceedings of the Human Factors and Ergonomics Society 46th Annual Meeting* (Vol. 46, No. 16, pp. 1472-1476). SAGE Publications.

58. Gerling, G., **Thomas, G.**, Weissman, A. & Dove, E. (2002, June). Effectiveness of a dynamic breast examination training model to improve clinical breast examination (CBE) skills. Paper presented at the *World Breast Cancer Conference*, Victoria, Canada.

59. **Thomas, G.**, Fienup, M., Gray, P., Changnon, N., Debbins, P., Dixon, R., Ferris, T., Hirshy, L., Jongedyk, H., Locke, A., Perry, D., Symonds, M. & Tahir, R. (2001, December). Human control of cooperative robots working on Mars. Paper presented at the *11th annual Iowa Space Grant Consortium Conference*, Marshalltown, IA.

60. Harris, P., Stanford, C., Wagner, J. & **Thomas G.** (2001, March). Use of a force transducer during clinical caries detection. In *Journal of Dental Research, Special Issue (AADR Abstracts)*, (Vol. 80, pp. 118). American Association of Dental Research.

61. Wagner, J. L., Stanford, C. M. & **Thomas, G. W.** (2001, March). Dentist-specific patterns of forces are used in clinical procedures. In *Journal of Dental Research, Special Issue (AADR Abstracts)*, (Vol. 80, pp. 207). American Association of Dental Research.

62. **Thomas, G.**, Steele, F. & Gerling G. (2000, December). Stigmergy and bandwidth optimization: Two new approaches to human interactions with planetary robotics. Presentation made at the *10h Annual Iowa Space Grant Consortium Conference*, Marshalltown, IA.

63. Reagan, M., **Thomas, G.**, Bauerly, M., Gerling, G. & Petrie, C. (2000, December). VVROM: Volcanic visual and thermographic onsite, real time monitoring. Paper presented at the *10th Annual Iowa Space Grant Conference*, Marshalltown, IA.

64. Steele, F., Pollack, E., **Thomas, G.**, Lee, J. (2000, April/May). Leveraging popular game designs to understand multi-agent system interfaces. In M. E. Benedict (Ed.), *5th International Conference on Human Interaction with Complex Systems,* (pp. 99-107). Urbana, IL: University of Illinois at Urbana Champaign.

65. Johnson, L. A., **Thomas, G.**, Dow, S., & Stanford C. (2000, January). An evaluation of a force feedback surgical simulator. In *Journal of Dental Research*, (Vol. 79, pp. 463). American Association of Dental Research.

66. **Thomas, G.**, Petrie, C., Loeppke, N., Bauerly, M., Mills, R., Rick, M., Wyatt, B., Reagan, M., Cabrol, N., Dow, S., Fischer, S., McClarigan, S., Steele, F., Wagner, J. (1999, November). Project MARVIN: Mars Advanced Robotic Visualization Initiative. Paper presented at the *9th Annual Iowa Space Grant Consortium Conference*, Cedar Falls, IA.

67. Stanford, C. M., Welsch, F., Kastner, N., **Thomas, G.**, Zaharias, R., Holtman, K., & Brand, R. (1999, October). Primary human bone cells from older patients do not respond in culture at continuum level *in vivo* strain magnitudes. In *23rd Annual Meeting, American Society of Biomechanics Abstract Book*, (pp. 162-163).

68. Dow, S., **Thomas, G.**, & Johnson, L. (1999, September). Signal detection performance with a haptic device. In *Proceedings of the Human Factors and Ergonomics Society 43rd Annual Meeting* (Vol. 43, No. 22, pp. 1233-1237). SAGE Publications.

69. Tawil, A. Z., **Thomas, G.**, Lee, J. D., & McLennan, G. (1999, September). What's so hard about bronchoscopic surgery? In *Proceedings of the Human Factors and Ergonomics Society 43rd Annual Meeting* (Vol. 43, No. 15, pp. 845-849). SAGE Publications.

70. Coppin, P., Morrissey, A., Wagner, M. D., Vincent, M., & **Thomas, G.** (1999, May). Big Signal: Information interaction for public telerobotic exploration. In *Proceedings of the Workshop on Current Challenges in Internet Robotics, IEEE International Conference on Robotics and Automation*. IEEE.

71. Steele, F., **Thomas, G.**, Blackmon, T. (1999, March). An operator interface for a robot-mounted, 3D camera system: Project Pioneer. In *Proceedings of the IEEE Virtual Reality International Symposium*, (pp. 126-132). IEEE.

72. Blackmon, T. T., Ngyuen, L., Neveu, C. F., Rasmussen, D., Zbinden, E., Maimone, M., Matthies, L.H., Thayer, S., Broz, V., Teza, J., Osborn, J., Hebert, M. Carnegie Mellon Univ.; **Thomas, G.**, Steele, J. (1999, May). Virtual reality mapping system for Chernobyl accident site assessment. In *Proceedings of the SPIE Conference on Human Vision and Electronic Imaging IV*, (Vol. 3644, pp. 338-345). SPIE.

73. Corby, K., Wu, J., Chan, W., **Thomas, G.** (1998, October). Sensing and positioning technologies for planetary nanorobot teams. In the *8th Annual Iowa Space Grant Conference Proceedings*, (pp. 1-9).

74. **Thomas, G.**, Robinson, W. D., & Dow, S. (1997, November). Improving the visual experience for mobile robotics. In the *7th Annual Iowa Space Grant Proceedings* (pp. 10-20).

75. **Thomas, G.**, Blackmon, T., Sims, M., and Rasmussen, D. (1997, May). Video engraving for virtual environments. In *Proceedings Electronic Imaging: Science and Technology '97,* (Vol. 3012, pp. 462-471). SPIE.

76. Cannon, D., Graves, C., and **Thomas, G.** (1996, April). Virtual tools and robotics. In *Video Proceedings of the 1996 IEEE International Conference on Robotics and Automation*.

77. **Thomas, G.**, Cannon, D., & Goldberg, J. (1995, October). Video texture cues enhance stereoscopic depth perception in a virtual reality-based, telerobotic interface. In *IEEE International Conference on Systems, Man and Cybernetics: Intelligent Systems for the 21st Century*, (Vol. 5, pp. 4650-4655). IEEE.

78. Cannon, D. & **Thomas, G.** (1994). Point-and-direct virtual tools for robotic control in single shell tank (SST) remediation. *Sandia Robotics Forum*.

79. Cannon, D., and **Thomas, G.** (1993). Virtual reality based point-and-direct (VR-PAD) strategic control of telerobotics in an interwoven live/graphic environment. *Sandia Robotics Forum*.