CURRICULUM VITAE

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RESEARCH INTERESTS

My research mission has been to discover new knowledge and to develop better technologies and management processes for infrastructure construction, maintenance and management. Research interests include: (1) ***Sensing and Information Technology for State Estimation*** through development of object locating algorithms and a family of 3D and 4D algorithms that contribute to the foundation for continuous and automated 3D process control, progress tracking, and as-built modeling, (2) ***Construction Robotics*** including human motion sensing and earlier career research culminating in the deployment of several full-scale field robotic systems in the field, (3) ***Capital Projects Process Management*** including automated construction process management systems, formalized collaboration processes, database and document management systems, and cloud based computing networks to support fundamental capital project practices such as front end planning, workflow and document status detection, and interface management, (4) ***Construction Productivity*** such as multiskilling implementation methods, studies of the impact of technology, activity analysis to improve direct work rate and reduce waste, rework reduction, and best productivity-practices implementation, and (5) ***Infrastructure Sustainability*** including system dynamics models used for self-financing, strategic planning, and “cradle to grave” life cycle analysis of water and waste water networks; as well as models for re-use, recycling and repurposing of construction materials such as steel.

ACADEMIC, ADMINISTRATIVE AND PROFESSIONAL POSITIONS

* **University of Waterloo**
  + Professor, 2005 to present
  + Tier I Canada Research Chair, 2005 to present
  + Interim Chair of Civil and Environmental Engineering Department, 9/1/17-4/30/18 and 5/1/16-12/31/16
  + Over two dozen committee assignments at all university levels since 2005
  + Director of Center for Paving and Transportation Technologies, 2005 to 2010
* Ecole Centrale de Lille – invited for brief stays as a visiting professor in the summers of 2005, 2008, 2010, and 2012
* **University of Texas at Austin**
  + Assistant Professor (1991-1996), Associate Professor and Liedtke Centennial Fellow (1996-2002), and Full Professor with Clyde E. Lee Endowed Fellow in Transportation Engineering (2002-2005)
  + Over two dozen committee assignments from 1991 to 2005
  + Director of Center for Construction Industry Studies (2004-2005)
  + Construction Engineering and Project Management Area Coordinator (2002-2004)
* Arizona State University – invited as Visiting Eminent Scholar in July 2002
* Computing Devices Corporation as Defense Systems Engineer from 1986-1987

GRANTS AND CONTRACTS

Since 1991, I have held well over 80 significant grants and contracts from many granting agencies and companies. Significant highlights follow:

* Approximately **$26,000,000 of cash funding (in inflation adjusted dollars) jointly awarded since 1991**, excluding industry in-kind contributions, the annual Canada Research Chair contribution which goes entirely to support my salary, and scholarships of graduate students
* Approximately **$13,000,000 of that funding was my share since 1991** – it is not adjusted for inflation or exchange value with US dollars, since those fluctuate constantly

EDUCATION

* University of Waterloo, Systems Design Engineering, BS, 1985
* Carnegie Mellon University, Civil Engineering, MASc, 1986
* Carnegie Mellon University, Civil Engineering, PhD, 1990

MAJOR AWARDS AND RECOGNITIONS

* **The University of Waterloo Award of Excellence in Graduate Supervision for 2016 –** the highest level graduate supervision award from all of the faculties
* **ASCE (American Society of Civil Engineers) Peurifoy Construction Research Award, 2015** – the premier international award in construction research, given annually for outstanding contributions to the advancement of construction engineering through research and development of new technology, principles or practices
* **CII (Construction Industry Institute) Outstanding Researcher of the Year Award, 2014** – given annually amongst the two dozen or so active funded researchers in North America for contributions to CII research of the highest quality and impact in the preceding few years
* **CSCE (Canadian Society of Civil Engineers) Walter Shanly Award, 2014** – for outstanding contributions to the development and practice of construction engineering in Canada
* **Fellow of the US NAC (National Academy of Construction), inducted in 2013** – with formal ties to the US National Academy of Engineering, the NAC elects less than one out of ten nominated fellows from all sectors of construction including industry leaders and academics (less than 15%)
* **Tishman Distinguished Lecturer, November 20, 2013** – one leading construction engineer or researcher is invited annually to the University of Michigan in Ann Arbor, MI to give this talk
* **Fellow of the ASCE (American Society of Civil Engineers), inducted in 2010** – election to fellow is based on an outstanding track record of accomplishments in the community including service such as journal and conference leadership as well as research
* **Co-Chair of 30th International Symposium on Automation and Robotics in Construction (ISARC), August 11-14, 2013** – with 395 registered participants, this conference held in Montreal, Quebec was a major success within the construction automation research community
* **CII (Construction Industry Institute) Annual Conference Best Poster Award, 2009** – given to graduate students under my supervision and direction (Duncan Young, Saiedeh Razavi, Hassan Nasir) and selected from approximately forty submitted and ten displayed during the conference
* **Fellow of the Canadian Academy of Engineering (CAE), inducted in 2009** – election to fellow is based on contributions to practice and to the profession over the course of a career
* **IAARC (International Association for Automation and Robotics in Construction) Tucker-Hasegawa Award, 2009** – IAARC has held conferences annually since the first one at Carnegie Mellon University in 1983, and it sponsors the Elsevier Journal of Automation in Construction; the award is given for cumulative contributions to the body of knowledge and to IAARC
* **CII (Construction Industry Institute) Outstanding Researcher of the Year Award, 2002** – given annually amongst the two dozen or so active funded researchers in North America for contributions to CII research of the highest quality and impact in the preceding few years
* **Outstanding Graduate Teaching Award, University of Texas at Austin, 2001** – this award is given annually to two or three professors out of over 2,000 across the campus who have demonstrated outstanding success in teaching and mentoring graduate students at UT Austin
* **Engineering Foundation Award, College of Engineering, University of Texas at Austin, 2000** – this award is given annually to a few professors out of over 300 in the college who have demonstrated outstanding success in research in the preceding year
* **National Research Council’s TRB (Transportation Research Board) D. Grant Mickle Award, 1998** – well over 10,000 people attend their annual meeting at which close to two thousand papers are presented annually and of which a few receive best paper awards; this was given for “A Life Cycle Cost-Benefit Model for Road Weather Information Systems,” published in 1999 in the Transportation Research Record
* **ASCE (American Society of Civil Engineers) Thomas Fitch Rowland Prize, 1995** – awarded to the best paper annually from the previous year’s journal articles in the ASCE Journal of Construction Engineering and Management, and in this case for "Computer Aided Planning of Heavy Lifts," published in 1993
* **Natural Sciences and Engineering Research Council of Canada, Scholarship (1988, '89, '90)**
* **Roads and Transportation Association of Canada (RTAC) Scholarship (1988, '89)**
* **3rd Place Award at Ontario Engineering Design Competition (1985)** – awarded for a machine vision based automated pavement crack detection and classification system produced as a fourth year design project that predated many dozens of articles and commercial developments in this area

SIGNIFICANT INVITATIONS TO SPEAK

In addition to over 180 conference presentations given since 1984, not including the many dozens given by my co-authors which I have attended, there have been some significant invitations to speak. Travel was supported in most cases by the host organizations. A conference presentation list is available on request. Significant invitations to speak follow:

• Plenary presentation, entitled, “Construction Productivity – Are We Flat-lining or Breaking Through?” Industry Innovations Forum, CSCE Annual Conference and Construction Specialty Conference, Vancouver, BC, June 2, 2017.

• Invited to speak to the US National Academies’ Committee for Study of Future Interstate Highway System on the subject of highway construction productivity, December 19, 2016, Washington, D.C.

* Keynote Address, entitled, “Construction Academic Life Cycle Management,” at CSCE Construction Specialty Conference (related to the receipt of the Peurifoy Award), Vancouver, British Columbia, June 9, 2015.

• Invited seminar at University of Alberta, entitled, “Improving Construction Productivity,” July 15, Edmonton, Alberta, Canada, 2013.

• Invited seminar at University of Michigan, entitled, “Improving Construction Project Performance,” October 11, Ann Arbor, MI, USA, 2012.

• Invited plenary presentation, entitled, “Construction Productivity Research in North America,” for Engineering Construction Industry Association (ECIA) Conference at the Supreme Court in Westminster, London, the UK, 27th of October, 2011.

• Invited seminar at McMaster University, entitled, “Automated Earned Value Tracking,” October 3, Hamilton, Ontario, 2011.

• Invited seminar at Carnegie-Mellon University, entitled, “Improving Construction Project Performance,” September 30, Pittsburgh, PA, USA, 2011.

• Invited plenary presentation, “Benchmarking and Metrics for Improving Construction Productivity,” Construction Productivity Symposium, Engineering Society of Detroit Headquarters, September 13, 2011.

• Invited seminar at Concordia University, entitled, “Benchmarking and Metrics Research in Construction,” May 16, Montreal, Quebec, Canada, 2011.

• Invited seminar at Queen’s University, entitled, “Infrastructure State Estimation,” March 15, Kingston, Ontario, Canada, 2011.

• Kick-off plenary presentation for the 27th Annual ISARC (International Symposium on Automation and Robotics in Construction) entitled, “An International Perspective on Technology & Productivity in Construction,” Bratislava, Slovakia, June 25, 2010.

• Invited Seminar at Georgia Tech, entitled, “Infrastructure State Estimation,” March 4-5, Atlanta, Georgia, 2010.

• Plenary Panel participant and presenter on June 27th for the joint 26th Annual International Symposium for Automation and Robotics in Construction (ISARC) and the ASCE Computing in Civil Engineering Conference in Austin Texas, June 24-27, 2009.

• Plenary Speaker for ExxonMobil Refining & Supply Worldwide Planning and Project Execution Leadership Team Meeting; talk entitled, “Improving Construction Productivity: What Role Does Technology Play?,” Washington, DC, February 5, 2009.

• Plenary Speaker for the US National Research Council Workshop on Advancing the Competitiveness and Productivity of the US Construction Industry; talk entitled, “An International Perspective on Construction Productivity and Competitiveness,” Washington, D.C., November 19, 2008.

• Plenary Speaker for 25th International Symposium on Automation and Robotics in Construction (ISARC), presentation entitled, “IAARC Impact on Knowledge and Practice in Construction,” Vilnius, Lithuania, June 27, 2008.

• Plenary Speaker for 21st International Symposium on Automation and Robotics in Construction (ISARC), presentation entitled “The Future of Construction Automation and Robotics,” Jeju, Korea, September 21-25, 2004.

• CERF Corporate Advisory Board Annual Meeting, plenary presentation entitled, simply, “Construction Productivity,” Washington, D.C., May 1, 2003.

• AIChE’s 34th Annual Engineering and Construction Contracting Conference, plenary presentation entitled, “Addressing the Skilled Workforce Shortage,” San Francisco, CA, Oct. 2002.

• Dupont’s Annual Internal International Construction and Engineering Meeting, plenary presentation entitled, “Alternative Workforce Management Strategies,” Wilmington DE, Fall 2000.

• Gas Research Institute's Robotics Workshop, presentation entitled, “Automated Clinker Clearing System,” Tarrytown NY, Nov. 4, 1997.

• Waseda University Construction Robot Research International Workshop, presentation entitled, “Construction robotics Advances in North America,” Tokyo, June 10, 1996.

COURSES TAUGHT IN CIVIL ENGINEERING

* Machine Vision and Sensing in Civil Engineering
* Construction Automation and Robotics
* Modeling and Simulating Uncertainty in Construction
* Civil Engineering Systems
* Engineering Economics and Construction Project Management
* Heavy Construction Methods, Equipment, Modeling, and Simulation
* Design of Automated Construction Systems
* Graduate Seminar in Teaching and Research Skills

SHORT COURSES TAUGHT TO INDUSTRY

* Prefabrication, Preassembly, Modularization, and Offsite Fabrication (Indianapolis, July 21, 2014)
* Sensing and Detection for Building Security (UT Austin, Feb. 19, 2005)
* Prefabrication, Preassembly, Modularization, and Offsite Fabrication (Houston, Oct. 29, 2004)
* Innovative Construction Workforce Management Strategies (DTU in Denmark, October 19-21, 2004)
* Construction Safety: Zero Accidents (1996-2005 biannually)
* Project Schedule Optimization (1997-2001 biannually)
* Modularization and Preassembly (c. 1994-8 biannually)
* Project Time Management (c. 1994-7 biannually)

SUPERVISION OF HIGH QUALITY PERSONNEL

Our greatest accomplishments may be related to the people who we have mentored and helped to advance in their careers so that they can contribute to the welfare of society, the body of knowledge, and the engineering profession. While detailed lists of names, thesis titles, and last known employment positions are available on request, a summary of supervisory accomplishments, excluding those currently under supervision, is presented as follows:

* **42 PhD students directly supervised** (12 co-advised) to completion at UT Austin and UW – of those, 25 accepted tenure track faculty positions with 8 progressing through the ranks to full professor and 2 with chairs; 3 are in PDF positions; 14 moved directly into government organizations or private industry and have progressed to positions such as VP of Linbeck Construction – a detailed list of their most recent known positions is available on request
* **77 PhD additional committees**, including acting as an external for:
  + University of New South Wales in Australia (3)
  + University of Aukland
  + University of Illinois – Urbana Champlain
  + Carlton University in Canada
  + Concordia University in Canada (4)
  + University of Alberta in Canada (3 )
  + IIT Madras in India
  + Yonsei University in Korea
  + Carnegie Mellon University in the USA
  + University of Waterloo when at UT Austin
* **71 MASc students directly supervised**, all but 17 at UT Austin, and numerous masters committees as second or third reader
* **Post-Doctoral Fellows (PDF’s), research scientists, and research engineers** supported and supervised over the years include ten at University of Waterloo and at least a dozen at UT Austin – since these positions ranged from four months to several years in duration, a numerical summary is meaningless – most transitioned successfully into subsequent tenure track faculty positions
* **Over 60 undergraduate research assistants have been employed and supervised in the last ten years** alone at the University of Waterloo in capacities ranging from summer interns under various international exchange programs to co-op students employed full time on research

EDITORIAL ROLES

* **Editor**, Construction Innovation special issue on Innovations in Health, Safety and Environment, 2016
* **Co-Editor**, Advanced Engineering Informatics special issue on Infrastructure Computer Vision, 2015
* **Co-Editor**, Automation in Construction special issue on 30th Annual International Symposium on Automation and Robotics in Construction, 2014
* **Senior Specialty Editor** of ASCE Journal of Construction Engineering and Management - 2003 to 2012 – this was an executive committee position and required a significant time commitment including several face-to-face meetings per year
* **Associate Editor** of ASCE Journal of Infrastructure Systems - 1994 to 1999
* **Member** of:
  + Editorial Board for Korea Institute of Construction Engineering and Management’s (KICEM) Journal of Construction Engineering and Project Management (JCEPM)- 2010 to present
  + Editorial Panel for Construction Management and Economics, 2011 to present
  + Editorial Panel for Engineering Construction and Architectural Management, 2006 to present
  + Editorial Board of Automation in Construction – August 2007 to present
* **Chairman**, National Research Council's Transportation Research Board Committee on Applications of Emerging Technologies - A2F09 - 1996 to 2002 – this required annual management of review of articles for the US National Academies’ Transportation Research Record
* **Reviewer for many journals, including for example:**
  + The Canadian Journal of Civil Engineering
  + ASCE Journal of Construction Engineering and Management
  + ASCE Journal of Infrastructure Systems
  + ASCE Journal of Transportation Engineering
  + ASCE Journal of Computing in Civil Engineering
  + ASCE Journal of Management in Engineering
  + National Research Council’s Transportation Research Record
  + Transportation Research Part C
  + Automation in Construction
  + Construction Management and Economics
  + Journal of Field Robotics
  + Engineering, Construction, and Architectural Management
  + Advanced Engineering Informatics
  + Journal of Civil Engineering and Management
  + Waste Management
  + Construction Innovation

CONSULTING

Research has been my primary focus throughout most of my career, however consulting serves a vital role in transfer of knowledge and implementation of research findings. I have acted as a paid consultant for the following organizations:

* Building Trades Council of Ontario
* KLA Tencor
* GSE&C
* OPG
* GS Engineering & Construction Corp.
* National Academies’ National Research Council (USA)
* Software Innovation Inc.
* TU Denmark
* FIATECH
* Korean Institute of Construction Technology
* Construction Industry Institute
* Larry Laden Law Firm
* Dupont
* Rose Law Firm
* Malcolm Pirnie, Inc.
* Morrison & Foerster LLP Attorneys at Law
* Hilti Corporation
* National Taiwan Institute of Technology

REVIEW PANELS

Serving on peer review panels is a duty. I have conducted research proposal reviews and served on many research proposal review panels over the years for the following organizations:

* US National Science Foundation
* National Research Foundation of Korea
* Singapore National Science Agency
* South African National Science Agency
* Lebanese National Science Agency
* Natural Sciences and Engineering Research Council of Canada’s programs
* Alfred P. Sloan Foundation
* Canada Foundation for Innovation (CFI)
* Mitacs
* Ontario Centers of Excellence

SIGNIFICANT PROFESSIONAL COMMITTEES

Contributions have been made through service on many dozens of professional and governmental committees since 1990. A complete list is available on request. Those not listed below include well over two dozen conference organizing teams, many awards committees, and many invited workshops. The remaining significant contributions are listed below:

* **Member** **and Academic Advisor** of Construction Industry Institute (CII) Funded Studies Committee – 2014 to present – this committee develops the multi-million dollar annual research projects slate for CII and selects research teams who are awarded research projects from the slate – it represents a commitment of at least two person-weeks per year and three in-person meetings in US locations
* **Member** of American Society of Civil Engineers (ASCE) Construction Institute’s Awards Committee – 2011 to present – many nomination packages are reviewed annually for the various awards in this Institute, and final recommendations are made by this committee of five people
* **President** **since 2016** **and Member since 1995** of the Board of Directors of the International Association for Automation and Robotics in Construction (IAARC) – 1995 to present – IAARC has held conferences (ISARC’s) annually since the first one at Carnegie Mellon University in 1983, and it sponsors the Elsevier Journal of Automation in Construction – its web site hosts over thirty years of freely accessible proceedings from past ISARC’s, and while it is not incorporated, it has made a substantial contribution to the body of knowledge since its inception
* **Member** of Construction Industry Institute (CII) Breakthrough Committee – 1997 to 2014 – this committee develops and nurtures breakthroughs in technology, processes and perceptions that could improve substantially the performance of the construction industry – it typically meets several times per year in North American locations
* **Co-Chair** for the 30th Annual International Symposium for Automation and Robotics (ISARC) held in Montreal in August, 2013 – co-chairing such a conference is a major time contribution distributed over two years prior to the conference and entailing many post-conference obligations - with over 400 participants, this conference was a major success, and that was partly a result of the extremely hard work of the organizing committee and hosts
* **Co-Chair** of Construction Industry Institute (CII) Academic Committee – 2010 to 2012 – this committee manages the collaboration of the many dozens of academic research institutions and researchers who contribute to CII research teams, processes, strategic planning, and value system
* **Co-Chair** of the 1st Canadian Graduate Student Colloquium on Computer-assisted Construction Technologies, London, Ontario, Canada, June 18-19, 2009 – since this first symposium, there have been three more associated with the bi-annual CSCE Construction Research Congresses
* **Member** NSERC Civil Engineering Discovery Grant Selection Committee (GSC 1061) – July 2007 to June 2010 – former members of this committee are well aware that it requires a commitment of about four person weeks per year and is a significant responsibility
* **Member**, National Research Council's Transportation Research Board’s (TRB) Group 2 Council on Design and Construction of Transportation Facilities – 2003 to 2006 – this council oversaw the activities of over fifty TRB committees, which each have 30-100 participants – a term on this council is the culmination of a career progression through committee membership, committee chair, section membership and chair, and council membership – TRB’s Annual Conference has for 95 years occurred every January in in Washington DC, results in many annual TRR journal issue publications, and attracts over 12,000 participants annually

MEDIA MENTIONS

Service to society and professional practice may sometimes include popular media contributions that expedite implementation in practice, improve awareness and reflect positively on the role of the host academic institution. Since 2003, such contributions have fallen into two general categories:

* **Research contributions featured in the popular media** – over one dozen articles, including Globe and Mail, and ENR which has a circulation in the hundreds of thousands weekly, have described research to which I have contributed directly – a detailed citation list is available on request
* **Research contributions featured on YouTube**  – five videos have been posted with about 7,400 views between them as of September 2017
* Editor and contributor to World Economic Forum’s Future of Construction web site

PATENTS

* Haas, C., Sreenivasan, S.V., Traver, A.E., Saidi, K.S., Seo, J., and Greer, R.L., “Pole Inserting Robotic Mechanism for Accessing the Interior of a Harsh Enclosure,” Patent Number 5,979,340, Nov. 9, 1999.

PUBLICATIONS ORGANIZATION

Publications are organized by category, subcategory, date, and then by archival journal articles, book chapters, conference papers, and technical reports. Graduate students are most often the first authors. Total publications exceed 350, including over 160 journal articles. Google Scholar H factor is 42+, and total citations exceed 6,400 with a current rate of about 800/year. The publications ontology follows:

* **Sensing and state estimation**
  + **3D modeling and analysis for capital facilities life cycle management**
  + **Automated location and state estimation of onsite craft workers**
  + **Object location estimation and tracking for capital projects construction**
    - Archival journal articles (most recent listed first)
    - Conference papers (most recent listed first)
    - Technical reports (most recent listed first)
  + **Data fusion for state estimation**
  + **Construction supply chain visibility**
  + **Automated sensing and state estimation for infrastructure systems and materials**
  + **Automated incident detection for traffic systems**
* **Construction robotics**
  + **Fabricated and structural systems re-alignment**
  + **Site robotics** **control systems and design methodology**
  + **Trenchless technologies**
* **Capital projects processes**
  + **Workflow automation, verification, and diagnostics**
  + **Interface management for mega-projects**
  + **Supply chain management**
  + **Risk management**
* **Construction productivity improvement and economics**
  + **Management of innovation**
  + **Modularization and prefabrication**
  + **Practices and processes**
  + **Benchmarking and metrics**
  + **Diagnostics**
  + **Automation**
* **Construction crafts training**
  + **Health and safety**
  + **Return on investment in training**
  + **Organization of training systems**
* **Sustainable infrastructure management**
  + **Water and waste water**
  + **Pavements**
  + **Capital projects**
* **Engineering research and practice issues**

PUBLICATIONS LIST

* **Sensing and state estimation**
  + **3D modeling and analysis for capital facilities life cycle management** 
    - Sharif, M., Nahangi, M., Haas, C., and West, J., “Automated Known Object Finding in Cluttered Construction Point Clouds,” accepted by ADVEI in July, 2017.
    - Czerniawski, T., Nahangi, M., Haas, C., and Walbridge, S., “Pipe spool recognition in cluttered point clouds using a curvature-based shape descriptor,” Automation in Construction, 2016.
    - Nahangi, M., and Haas, C., “Skeleton-based discrepancy feedback for automated realignment of industrial assemblies,” Automation in Construction, 2016.
    - Nahangi, M., Yeung, J., Haas, C., Walbridge, S., and West, J., “Automated Assembly Discrepancy Feedback Using 3D Imaging and Forward Kinematics,” Automation in Construction 56, 36-46, 2015.
    - Ghahremani, Safa, Yeung, Walbridge, and Haas, “Quality Assurance for Ultrasonic Impact Treatment of Welds using Handheld 3D Laser Scanning Technology,” Welding in the World, Volume 59, Issue 3 (2015), Page 391-400.
    - Patrauscean, V., Armeni, I., Nahangi, M., Yeung, J., Brilakis, I., and Haas, C., “State of Research in Automatic As-built Modeling,” Advanced Engineering Informatics special issue on Infrastructure Computer Vision, February, 2015.
    - Nahangi, M., and Haas, C., “Automated 3D compliance checking in pipe spool fabrication,” Advanced Engineering Informatics, in press, August, 2014.
    - Bosché, F., Ahmed, M., Turkan, Y., Haas, C., and Haas, R, “The value of integrating Scan-to-BIM and Scan-vs-BIM techniques for construction monitoring using laser scanning and BIM: The case of cylindrical MEP components,” Automation in Construction, in press, August, 2014.
    - Bosche, F., Guillamet, A., Turkan, Y., Haas, R., and Haas, C., “Tracking the built status of MEP works: Assessing the value of a Scan-vs-BIM system,” ASCE journal of Computing in Civil Engineering, 28 (4), 05014004, 2014.
    - Ahmed, M., Haas, R., and Haas, C., “Automatic Detection of Cylindrical Objects in Built Facilities,” Computing in Civil Engineering, 28 (3), 04014009, 2014.
    - Turkan, Y., Bosché, F., Haas, C., and Haas, R., "Tracking of secondary and temporary objects in structural concrete work", Construction Innovation: Information, Process, Management, Vol. 14 Iss: 2, pp.145 – 167, 2014.
    - Turkan, Y., Bosche, F., Haas, R., and Haas, C., “Towards Automated Earned Value Tracking Using 3D Imaging Tools,” ASCE Journal of Construction Engineering and Management 139 (4), pp. 423-433, 2013.
    - Cho, Y., Wang, M., Tang, P., and Haas, C., “Target-focused Local Workspace Modeling for Construction Automation Applications,” ASCE Journal of Computing in Civil Engineering, 26 (5), pp. 661-670, 2012.
    - Ahmed, M., Haas, C., Shahi, A., Aryan, A., West, J., and Haas, R., “Using Digital Photogrammetry for Pipe-Works Progress Tracking,” Canadian Journal of Civil Engineering 39 (9), pp. 1062-1071, 2012.
    - Turkan, Y., Bosche, F., Haas, R., and Haas, C., “Automated Progress Tracking Using 4D Schedule and 3D Sensing Technologies,” Automation in Construction 22 , pp. 414-421, 2012.
    - Bosche, F., Haas, C., and Akinci, B., “Automated recognition of 3D CAD objects in site laser scans for project 3D status visualization and performance control,” ASCE Journal of Computing in Civil Engineering, 23 (6), pp. 311-318, 2009.
    - Bosche, F., and Haas, C., “Rapid Automated Three-dimensional CAD Model Object Retrieval and Quality Control,” ITCon, March, 2008.
    - Bosche, F., Haas, C.T., "Automated Retrieval of 3D CAD Model Objects in Construction 3D Images", Journal of Automation in Construction, Elsevier, New-York, USA, Volume 17, Issue 4, pp 499-512, 2008.
    - Teizer, J., Kim, C., Haas, C.T., Liapi, K.A., and Caldas, C.H. (2005), “A Framework for Real-time 3D Modeling of Infrastructure,” National Research Council’s Transportation Research Board’s Transportation Research Record, No. 1913, Washington D.C., 2005, pp. 177-186.
    - Kim, C., Haas, C., and Liapi, K., “Rapid, On-Site Spatial Information Acquisition and its Use for Infrastructure Operation and Maintenance,” Automation in Construction, Vol 14/5, Oct. 2005, pp.666-684.
    - Bosche, F., Haas, C., and Caldas, C., “3D CAD Drawing as A Priori Knowledge for Machine Vision in Construction,” proc.s of 1st Annual Inter-university Symposium on Infrastructure Management, Waterloo, Ontario, Canada, August 6, 2005.
    - Teizer, J., Caldas, C.H., Haas, C.T., “Real-Time 3D Modeling of Infrastructure Using Emerging Technology,” Graduate Research and Industry Networking Conference, The University of Texas at Austin, Austin, Texas, April 28, 2005.
    - Kwon, Bosche, Kim, Haas, and Liapi, “Fitting Range Data to Primitives for Rapid Local 3D Modeling Using Sparse Range Point Clouds,” Automation in Construction 13, January 2004, pp. 67-81.
    - Cho, Y.K., and Haas C.T., “Rapid Geometric Modeling for Unstructured Construction Workspaces,” Computer-Aided Civil and Infrastructure Engineering, pp. 242-253, no. 18, 2003.
    - Kim, Y.S., and Haas, C., “A Model for Automation of Infrastructure Maintenance using Representational Forms,” Vol. 10/1, Automation in Construction, pp. 57-68, Sept. 2000.
    - Lin, K., and Haas, C., “Multiple Heavy Lifts Optimization,” ASCE Journal of Construction Engineering and Management, Vol. 122, No. 4, pp. 354-362, Dec. 1996.
    - Lin, K., and Haas, C., “An Interactive Planning Environment for Critical Operations,” ASCE Journal of Construction Engineering and Management, Vol. 122, No. 3, pp. 212-222, Sept. 1996.
    - Tucker, R., O'Connor, J., Gatton, T., Gibson, G., Haas, C., and Hudson, D., “The Impact of Computer Technology on Construction's Future,” Microcomputers in Civil Engineering, 9(1), pp. 3-11, Feb. 1994.
    - Hornaday, W., Haas, C., O'Connor, J., and Wen, J., “Computer Aided Planning for Heavy Lifts,” ASCE Journal of Construction Engineering and Management, 119(3), pp. 498-515, Sept. 1993.
    - *Sharif, Jeanclos, Kwiatek, Nahangi, Haas, West, “Optimal Nearest Neighbour Calculation for Automated Retrieval of Construction Elements from Cluttered Point Clouds,” CSCE Annual Conference and Construction Specialty Conference, Vancouver, BC, May 31 to June 3, 2017.*
    - *Nahangi, Rausch, Haas and West, “Dimensional variability analysis of construction assemblies using kinematics chains and building information models,” 34th International Symposium on Automation and Robotics in Construction (ISARC 2017), Taipei, Taiwan, June 28th to July 1st, 2017.*
    - *Sharif, M., Nahangi, M., Haas, C., West, J., Ibrahim, M. (2016). “A preliminary investigation of the applicability of portable sensors for fabrication and installation control of construction assemblies”. Canadian Society of Civil Engineering (CSCE) Annual Conference, June 2016, London, ON, Canada.*
    - *Czerniawski, T., Nahangi, M., Walbridge, S., Haas, C. (2016). “Automated removal of planar clutter from 3D point clouds for improving industrial object recognition”. 33rd International Symposium on Automation and Robotics in Construction (ISARC), July 2016, Auburn AL, USA.*
    - *Nahangi, M., Czerniawski, T., Rausch, C., Haas, C. (2016). “Automated 3D object extraction from cluttered laser scans using local features”. 33rd International Symposium on Automation and Robotics in Construction (ISARC), July 2016, Auburn AL, USA.*
    - *Nahangi, M., Yeung, J., Chaudhary, L., Haas, C., and Walbridge, S., “Skeleton-Based Registration of 3D Laser Scans for Automated Quality Assurance of Industrial Facilities,” proc.s, ASCE 2015 International Workshop on Computing in Civil Engineering, Austin, TX, June 21-23, 2015.*
    - *Nahangi, M., Czerniawski, T., and Haas, C., “Automated 3D Shape Detection and Outlier Removal in Cluttered Laser Scans of Industrial Assemblies,” proc.s, International Conference on Innovations in Construction, May 11-12, Cachan, France, 2015.*
    - *Nahangi, M., Czerniawski, T., Yeung, J., Haas, C., Walbridge, S., and West, J., “An Image-based Framework for Automated Discrepancy Quantification and Realignment of Industrial Assemblies,” Proc.cs, The CSCE International Construction Specialty Conference 2015, June 8 - 10, 2015, University of British Columbia, Vancouver, Canada.*
    - *Czerniawski, T., Nahangi, M., Walbridge, S., and Haas, C., “Automated dimensional compliance assessment with incomplete point cloud,” Proc.cs, The CSCE International Construction Specialty Conference 2015, June 8 - 10, 2015, University of British Columbia, Vancouver, Canada.*
    - *Yeung, J. Nahangi, M. Walbridge S. and Haas C.T., “A Preliminary Investigation into Automated Identification of Structural Steel without A-Priori Knowledge,” proc.s of the 31st International Symposium on Automation and Robotics in Construction and Mining (ISARC 2014) Sydney, Australia, July 9-11, 2014.*
    - *Nahangi, M., Safa, M., Shahi, A., and Haas, C., “Automated Registration of 3D Point Clouds with 3D CAD Models for Remote Assessment of Staged Fabrication,” proc.s of the ASCE Construction Research Congress, Atlanta, GA, USA, May 19-21, 2014.*
    - *Yeung, J., Nahangi, M., Shahtaheri, Y., Haas, C., Walbridge, S., and West, J., “Comparison of Methods Used for Detecting Unknown Structural Elements in Three Dimensional Point Clouds,” proc.s of the ASCE Construction Research Congress, Atlanta, GA, USA, May 19-21, 2014.*
    - *Nahangi, M., Yeung, J., Amaral, J., Freitas, F.N., Walbridge, S., and Haas C.T., “Automated Deviation Analysis for As-Built Status Assessment of Steel Assemblies and Pipe Spools,” proc.s of the 15th International Conference on Computing in Civil and Building Engineering, Orlando, FL, June 23-25, 2014.*
    - *Ahmed, M., Haas, C., and Haas, R., ``Autonomous Modeling of Pipes Within Point Clouds,``proc.s (searchable database) of 30th Annual International Symposium on Automation and Robotics in Construction (ISARC), Montreal, Quebec, July 11-14, 2013.*
    - *Safa, M., Nahangi, M., Shahi, A., and Haas C. T., ``An Integrated Quality Management System For Piping Fabrication Using 3d Laser Scanning And Photogrammetry,`` proc.s (searchable database) of 30th Annual International Symposium on Automation and Robotics in Construction (ISARC), Montreal, Quebec, July 11-14, 2013.*
    - *Bosché, F., Turkan, Y., Haas, C.T., Chiamone, T., Vassena, G., and Ciribini, A., ``Tracking MEP Installation Works,`` proc.s (searchable database) of 30th Annual International Symposium on Automation and Robotics in Construction (ISARC), Montreal, Quebec, July 11-14, 2013.*
    - *Turkan, Y., Bosche, F., Haas, C., and Haas, R., ``Tracking Secondary and Temporary Concrete Construction Objects Using 3D Imaging Technologies,`` 2013 ASCE International Workshop on Computing in Civil Engineering (IWCCE), University of Southern California , Los Angeles, CA, USA, June 23-25, 2013.*
    - *Y. Turkan, F. Bosché, C.T. Haas, R. Haas, “Automated earned-value tracking,” Gerontechnology, Vol 11, no. 2, p.242, 2012.*
    - *Ahmed, M., Guillemet, A., Shahi, A., Haas, C., West, J., and Haas, R., “Dialectic on Point-Cloud Acquisition from Laser-Scanning and Photogrammetry Based on Field Experimentation,” CSCE 3rd International/9th Construction Specialty Conference, Ottawa, Ontario, June 14-17, 2011.*
    - *Turkan, Y., Bosche, F., Haas, C., and Haas, R., “Automated Progress Tracking of Erection of Concrete Structures,” CSCE 3rd International/9th Construction Specialty Conference, Ottawa, Ontario, June 14-17, 2011.*
    - *Ahmed, M., Haas, C., Shahi, A., Aryan, A., West, J., and Haas, R., “Rapid Tracking of Pipe-Works Progress using Digital Photogrammetry,” CSCE 3rd International/9th Construction Specialty Conference, Ottawa, Ontario, June 14-17, 2011.*
    - *Turkan, Y., Bosche, F., Haas, C., and Haas, R., “TOWARDS AUTOMATED PROGRESS TRACKING OF ERECTION OF CONCRETE STRUCTURES," proc.s, AEC Innovation Conference, State College, PA June 9-11, 2010.*
    - *Ahmed, M., and Haas, C., “The Potential of Low Cost Close Range Photogrammetry towards Unified Automatic Pavement Distress Surveying,” proceedings of the Transportation Research Board Meeting, January 2010.*
    - *Bosche, F., and Haas, C., “Towards Automated Retrieval of 3D Designed Data in 3D Sensed Data,” Proc.s of the 2007 ASCE Computing in Civil Engineering Conference, Pittsburgh, PA, ed. Soibelman, L., July 25-28, 2007*
    - *Bosche, F., and Haas, C., “Metric for Automated Detection and Identification of 3D CAD Elements in 3D Scanned Data,” Proc.s of the 2007 Construction Research Congress, Grand Bahama Island, Bahamas, ed.s Garvin, Edum-Fotwe, Chinowsky, May 6-8, 2007.*
    - *Bosche, F., and Haas, C., “Integrating 3D CAD and Sensed Data,” CSCE 1st International Construction Specialty Conference, Calgary, Canada, May 23-26, 2006.*
    - *Teizer, J., Haas, C.T., Caldas, C.H.., Liapi, K.A. (2004), “Collaborative LADAR Object Recognition and Tracking Research,” Final Report to the National Institute of Technology and Standardization, College of Engineering, University of Texas, February 2004.*
    - *Kwon, S., Liapi, K., Haas, C., and Bosche, F., “Algorithms for fitting Cylindrical Objects to sparse range point clouds for rapid workspace modeling,” Proc.s of the 20th Annual International Symposium for Automation and Robotics in Construction (ISARC), Eindhoven, The Netherlands, pp. 173-178, September 21-23, 2003.*
    - *Bosche, F., Kim, C., Kwon, S., Haas, C., and Liapi, K., “Primitives Merging for Rapid 3D Modeling,” Proc.s of the 20th Annual International Symposium for Automation and Robotics in Construction (ISARC), Eindhoven, The Netherlands, pp. 389-392, September 21-23, 2003.*
    - *Kwon, S., Liapi, K., Haas, C., Sreenivasan, S.V., and McLaughlin, J., “Human-Assisted Object Fitting to Sparse Range Point Clouds for Rapid Workspace Modeling in Construction Automation,” 19th Annual ISARC, Gaithersburg, MD, Sept. 23-25, 2002.*
    - *Haas, C., and Lin, K., “An Interactive Database System with Graphical Linkage for Computer Aided Critical Lift Planning,” Automation and Robotics in Construction XII, Proc. of the 12th Int. Symposium on Automation and Robotics in Construction (ISARC) Warsaw, Poland, eds. Budny, E., McCrea, A., and Szymanski, K., pp. 313-324, IMGiGS, Warsaw, Poland, May 30 - June 1, 1995.*
  + **Automated location and state estimation of onsite craft workers**
    - Teizer, J., Caldas, C.H., and Haas, C.T., “Real-time three-dimensional occupancy grid modeling for the detection and tracking of construction resources,” Journal of Construction Engineering and Management 133 (11), pp. 880-888, 2007.
    - *A. Alwasel, K. Elrayes, E. Abdel-Rahman, and C. Haas, A Human Body Posture Sensor For Monitoring And Diagnosing MSD Risk Factors,`` proc.s (searchable database) of 30th Annual International Symposium on Automation and Robotics in Construction (ISARC), Montreal, Quebec, July 11-14, 2013.*
    - *A. Alwasel, K.Elrayes, E. Abdel-Rahman, C.Haas, “Reducing shoulder injuries among construction workers,” Gerontechnology, Vol 11, no. 2, p.333, 2012.*
    - *Alwasel, A., Elrayes, K., Abdel-Rahman, E., and Haas, C.., “Sensing Construction Work-related Musculoskeletal Disorders (WMSDs),” 28th Annual International Symposium on Automation and Robotics in Construction, Seoul, Korea, June 29 to July 1, 2011.*
    - *Teizer, J., Kim, C., Bosche, F., Caldas, C. H., and Haas, C.T. “Real-Time 3D Modeling for a Accelerated and Safer Construction Using Emerging Technology” Proceedings of 1st International Conference on Construction Engineering and Management, Seoul, Korea, Oct. 2005, pp. 539-543*
    - *Kim, C., Haas, C., and Liapi, K., “Rapid 3D Modeling of Construction Sites,” Proc.s of the 21st Annual International Symposium for Automation and Robotics in Construction (ISARC), Jeju, Korea, September 21-25, 2004.*
    - *Kim, C., Haas, C., Caldas, C., and Liapi, K., “Spatial Data Acquisition, Integration, and Modeling for Real-Time Project Life-Cycle Applications,” proc.s of the 10th International Conf. on Computing in Civil and Building Engineering, Weimar, Germany, June 2-4, 2004.*
  + **Object location estimation and tracking for capital projects construction**
    - Shahi, A., West, J., and Haas, C., “Onsite 3D Marking for Construction Activity Tracking,” Automation in Construction 30 (2013) 136–143, 2013.
    - Shahi, A., Aryan, A., West, J., Haas, C., and Haas, R., “Deterioration of UWB positioning during construction,” Automation in Construction 24, pp. 72-80, 2012.
    - Razavi, S., Haas, C., Duflos, E., and Vanheeghe, P., “Dislocation detection in field environments : A belief functions contribution.” Expert Systems with Applications, on-line, doi:10.1016/j.eswa.2011.12.014, 2012.
    - Razavi, S., Haas, C., “Using Reference RFID Tags for Calibrating the Estimated Locations of Construction Materials,” Automation in Construction 20 (6), pp. 677-685, 2011.
    - Song, J., Haas, C., and Caldas, C., “A Proximity-based Method for Locating RFID Tagged Objects,” Journal of Advanced Engineering Informatics, (21), October, 2007, pp. 367-376.
    - Caron, F., Duflos, E., Haas, C., and Vanheeghe, P., “Application du TBM pour la localization de noeuds de communication a partir de measures de proximite - Application of the TBM to the communication nodes localization using proximity measurements,” Revue Traitement du Signal, Vol. 24, pp. 153-164, 2007.
    - Song, J., Haas, C., and Caldas, C., “Tracking the Location of Materials on Construction Job Sites,” Journal of Construction Engineering and Management, Volume 132, Number 9 (September 2006), pp. 911-918.
    - Caron, F., Razavi, S., Song, J., Vanheeghe, P., Duflos, E., Caldas, C., and Haas, C., “Locating Sensor Nodes on Construction Projects,” Autonomous Robots, 10.1007/s10514-006-9720-1, September, 2006.
    - Grau, D., Caldas, C., and Haas, C., “Using Global Positioning System to Improve Materials-Locating Processes on Industrial Projects,” ASCE J. of Construction Engineering and Management Volume 132, Issue 7, July 2006, pp. 741-749.
    - *Aryan, A., Shahi, A., West, J., Haas, C., and Haas, R., “EVALUATION OF ULTRA-WIDEBAND TECHNOLOGY FOR POSITION LOCATION AND PROGRESS TRACKING IN INDOOR CONSTRUCTION ENVIRONMENTS,” CSCE 3rd International/9th Construction Specialty Conference, Ottawa, Ontario, June 14-17, 2011.*
    - *Duflos, E., Vanheeghe, P., Razavi, S., and Haas, C., “Belief Function Based Algorithm for Material Detection and Tracking in Construction,” proc.s, Workshop on the Theory of Belief Functions, Brest, France, April 1-2, 2010.*
    - *Young, D., Nasir, H., Razavi, S., Haas, C., Goodrum, P., and Caldas, C., “Automated Materials Tracking and Locating: Impact Modeling and Estimation,” Construction Research Congress, Banff, Alberta, May 8-11, 2010.*
    - *Razavi, S.N., Young, D., Nasir, H., Haas, C., Caldas, C., and Goodrum, P., “Field Trial of Automated Material Tracking in Construction,” proc.s, CSCE Annual Conference, Quebec, QC, June 10-13, 2008.*
    - *Caron, Razavi, Song, Haas, Vanheeghe, Duflos, Caldas, “Models For Locating RFID Nodes,” for ICCCBEXI, Montreal, Canada, June 14-16, 2006.*
    - *Teizer, J., Haas, C., Caldas, C., and Bosche, F., “Real-Time Three-Dimensional Object Detection and Tracking in Transportation,” proc.s, 9th International Conference on Applications of Advanced Technology in Transportation, Chicago, Illinois, August 13-16, 2006.*
    - *Teizer, J., Bosche, F., Caldas, C.H., and Haas, C.T., “Real-time Three-Dimensional Modeling of Construction Environment to Sustain Resource Detection and Tracking,” for ICCCBEXI, Montreal, Canada, June 14-16, 2006.*
    - *Teizer, J., Caldas, C.H., and Haas, C.T. (2005), “Services to develop efficient algorithms for processing Flash LADAR data obtained from a moving platform to detect stationary & moving objects within field of view”, Final Report to the National Institute of Technology and Standardization, College of Engineering, University of Texas, October 2005.*
    - *Teizer, J., Bosche, F., Haas, C., Caldas, C., and Liapi, K., “Real-Time, 3D Object Detection and Modeling in Construction,” proc.s of the 22nd International Symposium on Automation and Robotics in Construction, Ferrara, Italy, September 11-14, 2005.*
    - *Grau, D., Caldas, C., and Haas, C., “GPS Technology for Locating Fabricated Pipes on Industrial Projects,” proc.s of the ASCE 2005 International Conference on Computing in Civil Engineering, Cancun, Mexico, July 2005.*
    - *Song, J., Haas, C., Caldas, C., and Liapi, K., “Locating Materials on Construction Sites Using Proximity Techniques,” ASCE Construction Research Congress, San Diego, CA, April 2005.*
    - *Teizer, J., Liapi, K., Caldas, C., and Haas, C., “Experiments in Real-Time Spatial Data Acquisition for Obstacle Detection,” ASCE Construction Research Congress, San Diego, CA, April 2005.*
    - *Grau, D., Caldas, C., and Haas, C., “Use of GPS for Materials Management,” Proc.s of the 21st Annual International Symposium for Automation and Robotics in Construction (ISARC), Jeju, Korea, September 21-25, 2004.*
    - *Song, J., Haas, C., Caldas, C., Ergen, E., Akinci, B., Wood, C., and Wadepuhl, J., “Field Trials of RFID Technology for Tracking Fabricated Pipe – Phase II,” FIATECH, College of Engineering, University of Texas, June 2004.*
    - *Caldas, C., Haas, C., Grau, D., Wood, C., and Porter, R., “Field Trials of GPS Technology for Locating Fabricated Pipe in Laydown Yards,” FIATECH, College of Engineering, University of Texas, October 2004.*
    - *Akinci, B., Ergen, E., Haas, C., Caldas, C., Song, J., Wood, C., and Wadephul, J., “Field Trials of RFID Technology for Tracking Fabricated Pipe,” FIATECH report, University of Texas at Austin, February 2004.*
  + **Data fusion for state estimation**
    - Shahi, A., Safa, M., Haas, C., West, J., “Workflow Based Data Fusion for Construction Progress Estimating,” ASCE Computing in Civil Engineering, September, 2014.
    - Razavi, S., Haas, C., “A Reliability Based Hybrid Data Fusion Method for Adaptive Location Estimation in Construction,” Journal of Computing in Civil Engineering 26 (1), pp. 1-10, 2012.
    - Shahandashti, S., Razavi, S., Soibelman, L., Berges, M., Caldas, C., Brilakis, I., Teizer, J., Haas, C., Garrett, J., Akinci, B., and Zhu, Z., “Data Fusion Approaches and Applications for Construction Engineering,” ASCE Journal of Construction Engineering and Management, 137(10), pp. 863-869, 2011.
    - Pradhan, A., Akinci, B., and Haas, C., “Formalisms for query capture and data source identification to support data fusion for construction productivity monitoring,” Automation in Construction 20 (4), pp. 389-398, 2011.
    - Razavi, S., Haas, C., “Multi-sensor Data Fusion for On-Site Materials Tracking in Construction,” Automation in Construction 19 (8), pp. 1037-1046, 2010.
    - Haas, C., “A Model for Data Fusion in Civil Engineering,” Intelligent Computing in Engineering and Architecture, Volume 4200/2006, ISBN 978-3-540-46246-0, 2006, pp. 315-319. (note: this is described as a chapter in a book, but it is really more a short journal article and was refereed in that fashion.)
    - Kim, C., Haas, C., Caldas, C., and Liapi, K.,“Erfassung raumlicher Daten, Integration und Modellierung fur Echtzeit-Projektlebenszyklus Anwendungen“, Thesis, Wissenschaftliche Zeitschrift der Bauhaus-Universitat Weimar, 1. Heft 2004 50. Jahrgang, pp. 30-37.
    - Haas, C., and Hendrickson, C., “Integration of Diverse Technologies for Pavement Sensing,” the National Research Council's Transportation Research Record, No. 1311, pp. 92-102, 1991.
    - Haas, C., McNeil, S., Hendrickson, C., and Haas, R., “A Pavement Surface Model for Integrating Automated Management Data,” Pavement Management Implementation, ASTM STP 1121, Frank B. Holt, Wade L. Gramling, Editors, American Society for Testing and Materials, Philadelphia, pp. 394-410, 1991.
    - Haas, C., and Hendrickson, C., “A Computer-Based Model of Pavement Surfaces,” the National Research Council's Transportation Research Record, No. 1260, pp. 91-98, 1990.
    - *A.Shahi, C.T. Haas, J.S.West, “Automated construction activity assessment using workflow-based data fusion,” Gerontechnology, Vol 11, no. 2, p.198, 2012.*
    - *Shahi, A, Cardona, J., Haas, C., West, J., and Caldwell, G., “Activity-based Data Fusion for Automated Progress Tracking of Construction Projects,” proc.s, Construction Research Congress, Purdue, IN, 2012.*
    - *Bosche, F., Turkan, Y., Haas, C., and Haas, R., “Fusing Laser Scanning and 4D Modeling for Automated Construction Progress Control, ARCOM Conf. proc.s, Leeds, UK, Sept. 6-8, 2010.*
    - *Razavi, S., Haas, C., “A Data Fusion Model for Location Estimation in Construction,” proc.s 26th Annual International Symposium on Automation and Robotics in Construction (ISARC), Austin, Texas, June 24-26, 2009.*
    - *Razavi, S., Haas, C., Vanheeghe, P., and Duflos, E., “Real world implementation of belief function theory to detect dislocation of materials in construction,” IEEE Fusion, Seattle, WA, July 6-9, 2009. It should be noted that papers in these conferences with very high rejection rates are roughly equivalent to a journal article in many other engineering journals.*
    - *Bosche, F. and Haas, C. T., “Automated Project Progress Tracking with 3D Data Fusion,” proc.s, CSCE Annual Conference, Quebec, QC, June 10-13, 2008.*
    - *Bosche, F. and Haas, C. T., “3D Data Fusion Approach for Lifecycle 3D Project Management,” proc.s, 25th Annual International Symposium on Automation and Robotics in Construction (ISARC), Vilnius, Lithuania, June 27-29, 2008.*
    - *Bosche, Haas, Caldas, “Integrating 3D Sensed and 3D CAD Data for Real-Time 3D Environment Modeling,” for ICCCBEXI, Montreal, Canada, June 14-16, 2006.*
    - *Haas, C., Hendrickson, C. and Rehak, D., “Large Volume Planar Data Management,” Proceedings, ASCE Computing Conference, Washington DC, May 1991.*
    - *Haas, C., Hendrickson, C., and McNeil, S., “A Design for Automated Pavement Crack Sealing,” Proceedings, Construction Congress 1991, Boston, MA, pp. 222-227, Apr. 1991.*
    - *Haas, C., “A Model of Pavement Surfaces,” unpublished PhD dissertation, Carnegie Mellon University Department of Civil Engineering, Sept. 1990.*
    - *Walker, M., and Haas, C., “A Digital Terrain and Tactical Information System,” Proceedings, AFCEA Canada '88, Ottawa, Canada, Apr. 1988.*
  + **Construction supply chain visibility** 
    - Young, D., Haas, C., Caldas, C., and Goodrum, P., “Modeling the Impact of Automated Materials Locating and Tracking Technology on the Construction Supply Network,” ASCE Journal of Construction Engineering and Management, 137(11), pp. 976-984, 2011.
    - Nasir, H., Haas, C.T., Young, D.A., Razavi, S.N., Caldas, C. and Goodrum, P. (2010). “An Implementation Model for Automated Construction Materials Tracking and Locating.” Canadian Journal of Civil Engineering, Vol. 37(4), pp. 588-599
    - Song, J., Haas, C., Caldas, C., Ergen, E., and Akinci, B., “Automating The Task of Tracking the Delivery and Receipt of Fabricated Pipe Spools in Industrial Projects,” Automation in Construction, Vol. 15/2, March 2006, pp 166-177.
    - *Song, J., Caldas, C., Ergen, E., Haas, C., and Akinci, B., “Field Trials of RFID Technology for Tracking Pre-Fabricated Pipe Spools,” Proc.s of the 21st Annual International Symposium for Automation and Robotics in Construction (ISARC), Jeju, Korea, September 21-25, 2004.*
  + **Automated sensing and state estimation for infrastructure systems and materials**
    - Safa, M., Sabet , A., Ghahremani, K., Haas, C., and Walbridge, S., “Rail corrosion forensics using 3D imaging and finite element analysis,” published online by International Journal of Rail Transportation, June, 2015.
    - Vaziri, S.H., Haas, C.T., Rothenburg, L., Haas, R.C., “Investigation of the effect of weight factor on performance of piezoelectric weigh-in-motion sensors,” Journal of Transportation Engineering, 139 (9), pp. 913-922, 2013
    - Vaziri, S., Jiang, X., Haas, C., Haas, R., and Rothenburg, L., “Investigation of the Effects of Air Temperature and Speed on Performance of Piezoelectric Weigh-In-Motion Systems,” CSCE Civil Engineering Journal, 40 (10), pp. 935-944, 2013.
    - Ahmed, M., Haas, R., and Haas, C., “Toward Low-Cost 3D Automatic Pavement Distress Surveying: The Close Range Photogrammetry Approach,” Canadian Journal of Civil Engineering, 38(12), pp. 1301-1313, 2011.
    - Baiz, S., Tighe, S.L., Haas, C., Mills, B., and Perchanok, M., “Development of Frost and Thaw Depth Predictors for Decision Making About Variable Load Restrictions,” National Research Council’s Transportation Research Record, TRR 2053, pp.1-8, 2008.
    - White, R., Song, J., and Haas, C., “An Evaluation of Quartz Piezo Electric Weigh-in-Motion Sensors,” National Research Council’s Transportation Research Record, no. 1945, pp. 109-117, November, 2006.
    - Kim, H., Rauch, A.F., and Haas, C., “Automated Quality Assessment of Stone Aggregates Based on Laser Imaging and a Neural Network,” ASCE Journal of Computing in Civil Engineering, vol. 18, issue 1, January 2004, pp. 58-64.
    - Browne, C., Rauch, A. F., Haas, C. T., and Kim, H. (2003). “Performance evaluation of automated machines for measuring gradation of aggregates.” Geotechnical Testing J., ASTM, Vol. 26, No. 4, December, pp. 373-381.
    - Kim, H., Haas C.T., Rauch, A., and Browne, C., “3D Image Segmentation of Aggregates from Laser Profiling,” Computer-Aided Civil and Infrastructure Engineering, pp. 254-263, Vol. 18, No. 4, July 2003.
    - Kim, H., Haas, C.T., Rauch, A.F., and Browne, C., “Wavelet-based 3D Descriptors of Aggregate Particles,” National Research Council’s Transportation Research Board’s Transportation Research Record 1787, pp. 109-116, 2002.
    - Kim, H., Haas, C., Rauch, A., and Browne, C., “Dimensional Ratios for Stone Aggregates from Three-Dimensional Laser Scans,” ASCE Journal of Computing in Civil Engineering, Vol. 16, no. 3, pp. 175-183, July 2002.
    - Weissmann, J., Chun, H.T., and Haas, C., “Pilot Installation of a Bridge Scour Monitoring Site,” the National Research Council’s Transportation Research Board’s Transportation Research Record, No. 1749, pp. 68-72, 2001.
    - McKeever, B., Haas, C., Weissmann, J., and Greer, R., “Life Cycle Cost-Benefit Model for Road Weather Information Systems,” National Research Council's Transportation Research Record, No. 1627, pp.41-48, 1998.
    - Phelan, R.S., Radjy, F., Haas, C., and Hendrickson, C., “Computer Aided Concrete Placement Optimization,” ASCE Journal of Construction Engineering and Management, 116(1), pp. 172-186, Mar. 1990.
    - Haas, C., and McNeil, S., “Criteria for Evaluating Pavement Imaging Systems,” the National Research Council's Transportation Research Record, No. 1260, pp. 64-73, 1990.
    - *Vaziri, S., Haas, C., Rothenburg, L., and Haas, R., “Investigation of Piezoelectric Weigh-in-Motion Sensors’ Performance in Asphalt Concrete Pavements in Cold Temperatures of Southern Ontario,” Proceedings, Transportation Research Board 91st Annual Meeting, to be held January 22-26, 2012, in Washington, D.C.*
    - *Shahram Hashemi Vaziri, Carl Haas, Ralph Haas, Leo Rothenburg, “Validation of Default Values Used in Ontario for Estimating Truck Axle Load Spectra,” Pavements and Foundations Section, Materials Engineering and Research Office, Ontario Ministry of Transportation, Downsview, ON, HIIFP-126, August 2013.*
    - *Xiaohua, J., Vaziri, S., Haas, C., Rothenburg, L., Kennepohl, G., and Haas, R., “Improvements in Piezoelectric Sensors and WIM Data Collection Technology,” proc.s TAC Conference, Vancouver BC, Oct. 18-21, 2009.*
    - *Zhang, L., Haas, C., and Tighe, S., “Evaluation of the Economic Feasibility of Weigh-in-Motion in Canada,” poster presentation at Annual Conference and Exhibition of the Transportation Association of Canada, Toronto, Ontario, Sept., 23, 2008.*
    - *Baiz, S., Tighe, S., Mills, B., Perchanok, M., and Haas, C., “Using Road Weather Information Systems (RWIS) to optimize the scheduling of load restrictions on Northern Ontario’s low-volume roads,” Annual Conf. of Transp. Assoc. of Canada, Saskatoon, Saskatchewan, Oct. 14-17, 2007.*
    - *Baiz, S., Tighe, S., Mills, B., Haas, C., and Huen, K., “Using Road Weather Information Systems (RWIS) to Control Load Restrictions on Gravel and Surface Treated Highways,” Ontario Ministry of Transportation Engineering Standards Branch Report, November, 2007.*
    - *Zhang, A., Tighe, S., and Haas, C., “Evaluating Weigh-in Motion Sensing Technology for Traffic Data Collection,” Annual Conf. of Transp. Assoc. of Canada, Saskatoon, Saskatchewan, Oct. 14-17, 2007.*
    - *Chiu, Y., and Haas, C., “Making ITS Communication Technology Acquisition Decisions under Uncertainty,” Proc.s of the 7th IEEE International Conference on Intelligent Transportation Systems, Washington, D.C., Oct. 3-6, 2004.*
    - *Kim, H., Haas, C., and Rauch, A., “Image Texture Based Control of Aggregate Production,” ICAR (International Center for Aggregates Research) 11th Annual Symposium, Austin, TX, April 30, 2003.*
    - *Kim, H., Rauch, A. F., and Haas, C.T., “The Laser Based Aggregate Scanning System: Current Capabilities and Potential Developments,” Proceedings, 10th Annual Symposium, International Center for Aggregates Research, Baltimore, Maryland, Apr. 14-17, 2002.*
    - *Rauch, A., Haas, C., Browne, C., and Kim, H., “Rapid Test to Establish Grading of Unbound Aggregate Products: An Evaluation of Automated Devices to Replace and Augment Manual Sieve Analysis in Determining Aggregate Gradation,” International Center for Aggregates Research report ICAR 503-2, University of Texas, Austin TX, 2002.*
    - *Kim, H., Haas, C.T. Rauch, A. F., and Browne, C., “A Prototype Laser Scanner for Characterizing Size and Shape Parameters in Aggregates,” Proceedings, 9th Annual Symposium, International Center for Aggregates Research, Austin, Texas, Apr. 22-25, 2001.*
    - *Browne, C., Rauch, A. F., Haas, C.T., and Kim, H., “Comparison Tests of Automated Equipment for Analyzing Aggregate Gradation” Proceedings, 9th Annual Symposium, International Center for Aggregates Research, Austin, Texas, Apr. 22-25, 2001.*
    - *Kim, H., Browne, C., Rauch, A. F., and Haas, C.T. “Technical Aspects of Implementing Rapid Aggregate Gradation,” Proceedings, 8th Annual Symposium, International Center for Aggregates Research, Denver, Colorado, 20 pages, Apr. 2000.*
    - *Kim, H., Haas, C., Rauch, A., and Browne, C., “Development of a Laser Based System for Construction Aggregate Testing,” 18th Annual ISARC, Cracow, Poland, Sept. 10-12, 2001.*
    - *Groll, T., Haas, C., and Weissmann, J., “Bridge Scour Prioritization Model,” Proceedings of the National Research Council’s Transportation Research Board’s 80th Annual Meeting (compact disk), paper no. 01-2143, Washington, DC, Jan. 7-11, 2001.*
    - *Weissmann, J., Chun, H., and Haas, C., “Pilot Installation of a Bridge Scour Monitoring System at FM 1157 Mustang Creek,” TxDOT Research Report 3970-S, Center for Transportation Research, Univ. of Texas at Austin, Dec. 2001.*
    - *Rauch, A., Haas, C., Kim, H., and Browne, C., “Rapid Test to Establish Grading of Unbound Aggregate Products,” International Center for Aggregates Research, Report No. Interim Report ICAR 503-1, University of Texas, Austin, Feb. 2000.*
    - *Kim, H., Haas, C.T., Rauch, A., and Browne, C., “Innovation Testing System for Scanning Construction Aggregate Using Laser Profiling,” Proceedings of the 17th International Symposium on Automation and Robotics in Construction, Taipei, Taiwan, Sept. 2000.*
    - *Rauch, A., Haas, C.T., and Kim, H., “State of the Art in Aggregate Classification: Review of Aggregate Gradation Technologies,” 7th Annual Symposium Proceedings, International Center for Aggregates Research, University of Texas at Austin, Austin, TX, Apr. 19-21, 1999.*
    - *Haas, C., Weissmann, J., and Groll, T., “Remote Bridge Scour Monitoring: A Prioritization and Implementation Guideline,” TxDOT Research Report 7-3970-1, Center for Transportation Research, University of Texas at Austin, Aug. 1999.*
    - *Haas, C., Weissman, J., McKeever, B., and Greer, R., “TxDOT Research Report 1380-2F: Implementation Guidelines for Road Weather Information Systems,” Center for Transportation Research, University of Texas at Austin, Nov. 1997.*
    - *Haas, C., Weissman, J., McKeever, B., and Greer, R., “TxDOT Research Report 1380-3F: Road Weather Information Systems Decision Support Tool,” Center for Transportation Research, University of Texas at Austin, Nov. 1997.*
    - *Weissman, J., Haas, C., Greer, R., and McKeever, B., “TxDOT Research Report 1380-1F: Review of Remote Weather Information System and Low Water Crossing Technologies,” Center for Transportation Research, University of Texas at Austin, 1996.*
    - *Gharpuray, D., and Haas, C., “Comparison of Multi-sensing Methods for the Detection of Cracks in Pavement Surfaces,” Proceedings of the ASCE Pacific Rim TransTech Conference, Seattle, Washington, pp. 425-429, July 1993.*
    - *Hajek, J., and Haas, C., “Applications of Artificial Intelligence in Highway Pavement Maintenance,” Proceedings, Third International Conference on Applications of Artificial Intelligence in Engineering, Stanford, CA, Aug. 1988.*
    - *Haas, C., and Shen, H., “PRESERVER: A Knowledge Based Pavement Maintenance Consulting Program,” Proceedings, 2nd North American Pavement Management Conference, Toronto, Vol. 2, pp. 2.327-2.338, Nov. 1987.*
    - *Haas, C., “Algorithms to Map Subsurface Ferrous Conductors,” MS Thesis, Carnegie Mellon University Department of Civil Engineering, Aug. 1986.*
    - *Haas, R., Karan, M.A., and Haas, C., “Strategies and Methodology of Pavement Surface Condition Evaluation,” Proceedings, RTAC Annual Conference, Toronto, Sept. 1986.*
    - *Haas, C., Shen, H., and Haas, R., “ADDA SYSTEM I (Automated Pavement Distress Data Acquisition and Evaluation System) Report with User Manual,” Prepared for Ontario Ministry of Transportation and Communications, Research Program Project 21156, Phase III, Aug. 1985.*
    - *Haas, C., Shen, H., Phang, W.A., and Haas, R., “An Expert System for Automation of Pavement Condition Inventory Data,” Proceedings, North American Pavement Management Conference, Toronto, pp. 4.46-4.57, Mar. 1985.*
    - *Haas, C., Shen, H., Phang, W.A., and Haas, R., “Application of Image Analysis Technology to Automation of Pavement Condition Surveys,” Proceedings, International Transport Congress, Montreal, Vol. 5, pp. C55-C74, Sept. 1984.*
  + **Automated incident detection for traffic systems** 
    - Khoury, J., Haas, C., Mahmassani, H., Logman,H., and Rioux, T., “Performance Comparison of Automated Vehicle Identification and Inductive Loop Traffic Detectors for Incident Detection,” ASCE Journal of Transportation Engineering, Vol. 129, no. 6, pp. 600-607, Nov/Dec 2003.
    - Tavana H., H.S. Mahmassani, and C. Haas, “Effectiveness of Wireless Phones in Incident Detection, Probabilistic Analysis,” National Research Council's Transportation Research Record, No. 1683, Washington DC, pp. 31-37, Nov. 1999.
    - *Middleton, D., White, R., Crawford, J., Parker, R., Song, J., and Haas, C., “Investigation for Traffic Monitoring Equipment Evaluation Facility,” report no. FHWA/TX-06/0-4664-3, Texas Transportation Institute, http://tti.tamu.edu/documents/0-4664-3.pdf , Jan., 2007.*
    - *Middleton, D., Crawford, J., White, R., Song, J., and Haas, C., “Planning for Traffic Monitoring Equipment Evaluation Facility,” presented at the 2004 NATMEC, San Diego, California.*
    - *Mahmassani, H.S., Haas, C., Logman, H., Shin, H., and Rioux, T., “Integration of Point-Based and Link-Based Data for Incident Detection and Traffic Estimation,” Center for Transportation Research, Bureau of Engineering Research, University of Texas at Austin, research report no. 0-4156-1, March, 2004.*
    - *Yi-Chang Chiu, and Haas, C., “Cost Effective Strategies for Communicating with Remote Surveillance Stations,” Center for Transportation Research, Bureau of Engineering Research, University of Texas at Austin, research report no. 0-4449-1, submitted October, 2003.*
    - *Haas, C., Mahmassani, H., Khoury, J., Haynes, M., Rioux, T., and Logman, H., “Evaluation of Automatic Vehicle Identification for San Antonio’s Transguide for Incident Detection and Advanced Traveler Information Systems,” Center for Transportation Research, Bureau of Engineering Research, University of Texas at Austin, research report no. 4957-1, February, 2001.*
    - *Mahmassani, H., Haas, C., Peterman, J., and Zhou S., “Evaluation of Incident Detection Methodologies,” Center for Transportation Research, Univ. of Texas, Report No. 1795-2, Austin TX, Oct. 1999.*
    - *Mahmassani, H.S., Haas, C., Zhou, S., and Peterman, J., “TxDOT Research Report 1795-1: Evaluation of Incident Detection Methodologies,” Center for Transportation Research, University of Texas at Austin, Oct. 1998.*
* **Construction robotics**
  + **Fabricated and structural systems re-alignment**
    - Rausch, C., Nahangi, M., and Haas, C., and West, J., “Kinematics chain based dimensional variation analysis of construction assemblies using building information models and 3D point clouds,” Automation in Construction, 75, 33-44, 2017.
    - Rausch, C., Nahangi, M., Perreault, M., Haas, C., and West, J., “Optimum Assembly Planning for Modular Construction Components,” ASCE Journal of Computing in Civil Engineering, 2016.
    - Nahangi, M., Czerniawski, T., Haas, C., Walbridge, S., and West, J., “Parallel Systems and Structural Frames Realignment Planning and Actuation Strategy,” Journal of Computing in Civil Engineering, Automation in Construction 61, 147-161, 2016.
    - Nahangi, M., Haas, C., West, J., and Walbridge, “Automatic realignment of defective assemblies using an inverse kinematics analogy,” Computing in Civil Engineering, January, 2015.
    - *Nahangi, M., Yeung, J., Haas, C., Walbridge, S., and West, J., “Robotic Kinematics Analogy for Realignment of Defective Construction Assemblies,” proc.s, 32nd Annual International Symposium on Automation and Robotics in Construction and Mining, June 15-18, Oulu, Finland.*
  + **Site robotics control systems and design methodology**
    - Seo J.W. , Haas C., and Saidi K., “Graphical modeling and simulation for design and control of a tele-operated clinker clearing robot,” Automation in Construction, Volume: 16, Issue: 1, January, 2007, pp. 96-106.
    - Kim, C., Haas, C., Liapi, K., and Caldas, C., “Human-Assisted Obstacle Avoidance System Using 3D Workspace Modeling for Construction Equipment Operation,” ASCE J. Comp. in Civ. Engrg., Volume 20, Issue 3, (May/June 2006), pp. 177-186.
    - Cho, Y., Haas, C., Sreenivasan, S., and Liapi, K., “Position Error Modeling for Automated Construction Manipulators,” ASCE Journal of Construction Engineering and Management, vol. 130, no. 1, Jan/Feb 2004, pp. 50-58.
    - McLaughlin, J, Sreenivasan, S.V., Haas, C., and Liapi, K., “Rapid Human-Assisted Creation of Bounding Models for Obstacle Avoidance in Construction,” Journal of Computer-Aided Civil and Infrastructure Engineering, vol. 19, pp. 3-15, 2004.
    - Haas, C., and Kim, Y., “Automation in Infrastructure Construction,” Construction Innovation, Vol. 2, Issue 3, pp. 191-210, 2002.
    - Cho, Y., Haas, C., Liapi, K., and Sreenivasan, S., “A framework for rapid local area modeling for construction automation.” Journal of Automation in Construction, 11(6), pp. 629-641, 2002.
    - Kim, Y.S., Haas, C., “A man-machine balanced rapid object model for automation of pavement crack sealing and maintenance,” Canadian Journal of Civil Engineering, 29: pp. 1-16, 2002.
    - Seo, J., Haas, C., Saidi, K., and Sreenivasan, S.V., “Graphical Control Interface for Construction and Maintenance Equipment,” ASCE Journal of Construction Engineering and Management, Vol. 126, No. 3, pp. 210-218, May/June 2000.
    - Saidi, K.S., Seo, J., Sreenivasan, S.V., Haas, C.T., and Traver, A.E., “Design of a Tele-Operated Robot for the Maintenance of Boiler Hoppers in Electric Power Plants,” ASME Journal of Mechanical Design, Vol. 121, pp. 647-649, Dec. 1999.
    - LeBlond, D., Owen, F., Gibson, G., Haas, C., and Traver, A., “Control Improvement for Advanced Construction Equipment,” ASCE Journal of Construction Engineering and Management, Vol. 124, No. 4, pp. 289-296, Jul./Aug. 1998.
    - Kim, Y., Haas, C., and Greer, R., “Path Planning for a Machine Vision Assisted, Teleoperated Pavement Crack Sealer,” ASCE Journal of Transportation Engineering, Vol. 124, No. 2, pp. 137-143, Mar./Apr. 1998.
    - Greer, R., Haas, C., Gibson, G., Traver, A., and Tucker, R., “Advances in Control Systems for Construction Manipulators,” Automation in Construction, Vol. 6, No. 3, pp. 193-204, 1997.
    - Haas, C., “Evolution of an Automated Crack Sealer: A Study in Construction Technology Development,” Automation in Construction 4, pp. 293-305, 1996.
    - Osmani, A., Haas, C., and Hudson, W., “Evaluation of Road Maintenance Automation,” ASCE Journal of Transportation Engineering, Vol. 122, No. 1, Jan./Feb. 1996.
    - Haas, C., Skibniewski, M., and Budny, E., “Robotics in Civil Engineering,” Microcomputers in Civil Engineering, No. 10, pp. 371-381, 1995.
    - Hsieh, T., and Haas, C., “Determining Functional Requirements for Large Scale Manipulators,” Automation in Construction, 3, pp. 55-64, 1994.
    - Hsieh, T., and Haas, C., “Costs and Benefits of Automated Road Maintenance,” the National Research Council's Transportation Research Record, No. 1406, pp. 10-19, 1994.
    - *Kim, C., Haas, C., Liapi, K., McLaughlin, J., Teizer, J., and Bosche, F., “Rapid Human-Assisted, Obstacle Avoidance System using Sparse Range Point Clouds,” Proc.s of the ASCE 9th International Conference – Earth & Space, Houston, TX, March 7-10, 2004.*
    - *Cho, Y., Haas, C., Sreenivasan, S.V., and Liapi, K., “Error Modeling for Automated Construction Equipment,” 19th Annual ISARC, Gaithersburg, MD, Sept. 23-25, 2002.*
    - *McLaughlin, J., Haas, C., Liapi, K., Sreenivasan, S.V., and Kwon, S., “Rapid Human-Assisted Creation of Bounding Models for Obstacle Avoidance in Construction,” 19th Annual ISARC, Gaithersburg, MD, Sept. 23-25, 2002.*
    - *Kim, H., Haas, C., and Rauch, A., “Artificial Intelligence Based Quality Control of Aggregate Production,” 19th Annual ISARC, Gaithersburg, MD, Sept. 23-25, 2002.*
    - *Cho, Y., Haas, C., Saidi, K., Liapi, K., and Sreenivasan, S.V., “Rapid Local Area Modeling for Construction Automation,” 18th Annual ISARC, Cracow, Poland, Sept. 10-12, 2001.*
    - *Cho, Y., Haas, C., Liapi, K., and Sreenivasan, S.V., “Rapid Visualization of Geometric Information in a Construction Environment,” Proceedings of the IEEE Information Visualization 2001 Conf., London, U.K., July 25-27, 2001.*
    - *Haas, C., Saidi, K., Cho, Y., Fagerlund, W., and Kim, H., “Implementation of an Automated Road Maintenance Machine,” Proceedings of the National Research Council’s Transportation Research Board’s 80th Annual Meeting (compact disk), paper no. 1-2265, Washington, DC, Jan. 7-11, 2001.*
    - *Kim, Y., Haas, C., Peyret, F., and Cho, Y., “Automation in Transportation System Construction and Maintenance,” National Research Council’s Transportation Research Circular E-C017, Apr. 2000.*
    - *Griffin, R., Navon, R., Brecher, A., Livingston D., Haas, C., and Bullock, D., “Emerging Technologies for Transportation Construction,” Transportation in the New Millennium, the National Academy of Engineering's Transportation Research Board, CD and national-academies.org/trb, Jan. 2000.*
    - *Seo, J., Saidi, K.S., Haas, C.T., Sreenivasan, S.V., and Traver, A.E., “A Tele-Robotic System with Dynamic Graphical Interfacing for Electrical Power Plant Maintenance,” Proceedings Field Service and Robotics Conference, Carnegie Mellon University, Pittsburgh, PA, Aug. 29-31, 1999.*
    - *Haas, C., Saidi, K., Cho, Y., Fagerlund, W., Kim, H., and Kim, Y., “Automated Pavement Crack Sealing Technology Transfer: Implementation of an Automated Road Maintenance Machine (ARMM),” Center for Transportation Research, Univ. of Texas, Report No. 1515-1, Austin TX, Aug. 1999.*
    - *Kim, Y.S., Haas, C. T., Boehme, K., and Cho, Y.K., “Implementing an Automated Road Maintenance Machine (ARMM): Lessons from the Field,” for the 16th International Symposium on Automation and Robotics in Construction (ISARC), pp. 459464, Madrid Spain, Sept. 22-24, 1999.*
    - *Kim, Y.S., Haas, C., and Greer, R., “Man-Machine Balanced Crack Sealing Process for UT Automated Road Maintenance Machine,” Proceedings of the ASCE 5th International Conference on Applications of Advanced Technologies in Transportation Engineering, pp. 114-123, Newport Beach, CA, Apr. 26-29, 1998.*
    - *Greer, R., Kim, Y., and Haas, C., “Teleoperation for Construction Equipment,” Proceedings of the ASCE Construction Congress V in Minneapolis MN, pp. 1012-1019, Oct. 5-7, 1997.*
    - *Owen, F., Park, G., Haas, C., Gibson, G., and Traver, A., “Performance Testing of a Large Scale Manipulator to Determine Relative Utility of Several Operator Interfaces,” Proceedings of the 14th International Symposium on Automation and Robotics in Construction, The Robotics Institute, Carnegie Mellon University, Pittsburgh PA, June 8-11, 1997.*
    - *Kim, Y., Husbands, J., Haas, C., Greer, R., and Reagan, A., “A Productivity Model for Performance Evaluation of the UT Automated Road Maintenance Machine,” Proceedings of the 14th International Symposium on Automation and Robotics in Construction, The Robotics Institute, Carnegie Mellon University, Pittsburgh PA, June 8-11, 1997.*
    - *Seo, J., Haas, C., Traver, A., Sreenivasan, S., Stone, R., Greer, R., and Wunz, C., “Graphical Simulation for Design of a Tele-operated Clinker Clearing Robot,” Proceedings of the 14th International Symposium on Automation and Robotics in Construction, The Robotics Institute, Carnegie Mellon University, Pittsburgh PA, June 8-11, 1997.*
    - *Haas, C., Kim, Y., and Greer, R., “A Model for Imaging Assisted Automation of Infrastructure Maintenance,” Proceedings Imaging Technologies: Techniques and Civil Engineering Applications, Davos Switzerland, May 25-30, 1997.*
    - *Haas, C., Traver, A., Kim, Y., and Greer, R., “TxDOT Research Report 1508-1F: Performance Evaluation of the UT Automated Road Maintenance Machine,” Center for Transportation Research, University of Texas at Austin, Oct. 1997.*
    - *Greer, R., Haas, C., Gibson, G., Traver, A., and Tucker, R., “Advances in Control Systems for Construction Manipulators,” Proceedings of the 13th International Symposium on Automation and Robotics in Construction, pp. 615-624, Japan Robot Association, Tokyo, 1996.*
    - *Haas, C., Traver, A., Easter, G., Greer, R., Kim, Y., and Reagan, A., “TxDOT Research Report 2926-1F: Implementation of an Automated Crack Sealer,” Nov. 1996.*
    - *Griffith, A., Haas, C., and Tucker, R., “Feasibility Analysis of Automated Material Handling for Hazardous Waste Remediation,” Proceedings of the ASCE Conference on Robotics for Challenging Environments, Albuquerque, NM, pp. 338-346, Mar. 1994.*
    - *Osmani, A., Hudson, W., and Haas, C., “A Model for Evaluating Automation in Road Maintenance,” report No. SWUTC/94/60035-2, Center for Transportation Research, University of Texas at Austin, Aug. 1994.*
    - *Hsieh, T., Haas, C., and Hudson, W., “Automated Maintenance Technology to Reduce Fuel Consumption by Minimizing Lane Closure Time,” report No. SWUTC/93/60035-1, Center for Transportation Research, University of Texas at Austin, July 1993.*
    - *Haas, C., and Hsieh, T., “Large Scale Manipulators in Construction,” Proceedings of the EPRI Third International Conference on Fossil Plant Construction, Palm Beach, Florida, pages not numbered, Oct. 1993.*
    - *Hsieh, T., and Haas, C., “Applications of Large-Scale Manipulators in the Construction Environment,” Automation and Robotics in Construction, Proceedings of the 10th International Symposium on Automation and Robotics in Construction, Houston, eds. Watson, G.H., Tucker, R.L., and Walters, J.K., pp. 55-62, Elsevier, New York NY, May 24-26, 1993.*
    - *Hsieh, T., and Haas, C., “Performance Evaluation Model for Construction Manipulators,” Automation and Robotics in Construction Proceedings of the 10th International Symposium on Automation and Robotics in Construction, Houston, eds. Watson, G.H., Tucker, R.L., and Walters, J.K., pp. 301-308, Elsevier, New York, NY, May 24-26, 1993.*
    - *Hsieh, T., Fulton, C., Gibson, G., and Haas, C., “An Evaluation of the Pipe Manipulator Performance in a Material Handling Yard,” Automation and Robotics in Construction Proceedings of the 10th International Symposium on Automation and Robotics in Construction, Houston, eds. Watson, G.H., Tucker, R.L., and Walters, J.K., pp. 293-300, Elsevier, New York, NY, May 24-26, 1993.*
    - *Dailey, C., Traver, A., Wesley, G., Haas, C., and O'Connor, J., “Field Testing of an Automated Surface Finishing System for Large Diameter Storage Tanks,” Automation and Robotics in Construction Proceedings of the 10th International Symposium on Automation and Robotics in Construction, Houston, eds. Watson, G.H., Tucker, R.L., and Walters, J.K., pp. 431-438, Elsevier, New York, NY, May 24-26, 1993.*
    - *Hsieh, T., and Haas, C., “Large Scale Manipulators for Construction,” Proceedings of the 37th Annual Meeting of AACE International, Dearborn, Michigan, July 1993.*
    - *Haas, C., Hendrickson, C., McNeil, S., and Bullock D., “A Field Prototype of a Robotic Pavement Crack Sealing System,” Proceedings of the 9th International Symposium on Automation and Robotics in Construction, Tokyo, pp. 313-322, June 1992.*
    - *Haas, C., Hajek, J., and Haas, R., “Opportunities for Automation in Pavement Maintenance,” Proceedings, Transportation Association of Canada Annual Conference, Vol. I, pp. 873-891, Winnipeg, Canada, Sept. 1991.*
    - *Hendrickson, C., McNeil, S., Bullock, D., Haas, C. Peters, D., Grove, D., Kenneally, K., and Wichman, S., “Perception and Control for Automated Pavement Crack Sealing,” Proceedings, Second International Conference on Applications of Advanced Technologies in Transportation Engineering, Minneapolis, pp. 66-70, Aug. 1991.*
  + **Trenchless technologies** 
    - Bauhan, T.L., Fowler, D.W., and Haas, C.T., “Wastewater Line Spot Repair: Two Trenchless Alternatives,” Journal of Protective Coatings and Linings, Vol. 17, No. 3, pp. 49-65, Mar. 2000.
    - Ueki, M., Haas, C., and Seo, J., “Decision Tool for Microtunneling Method Selection,” ASCE Journal of Construction Engineering and Management, Vol. 125, No. 2, pp. 123-130, Mar./Apr. 1999.
    - Bauhan, T., Fowler, D.W., and Haas, C., “Performance Testing of Trenchless Wastewater Line Spot Repairs,” ASCE Journal of Infrastructure Systems, Vol. 3, No. 1, pp. 40-48, Mar. 1997.
    - Haas, C., Fowler, D., Conegliano, B., Wright, C., and Bauhan, T., “Evaluation of New Underground Infrastructure Maintenance Technologies,” ASCE Journal of Infrastructure Systems, Vol. 1, No. 4, Dec. 1995.
    - *Bauhan, T.L., Fowler, D.W., and Haas, C.T., “Wastewater Line Spot Repair: Two Trenchless Alternatives,” Proceedings of SSPC 99 (Society for Protective Coatings) International Conference and Exposition, Houston, TX, Nov. 15, 1999.*
    - *Haas, C., “NSF Sponsored Trenchless Technology Tour of Germany (September 16-24, 1995),” Trip Report, Civil Engineering, University of Texas at Austin, Austin TX, Sept. 30, 1995.*
    - *Wright, C.E., Haas, C., and Fowler, D., “Independent Evaluation of Sewer Repair Techniques in the City of Austin, Volume 1 - Cost Assessment,” report prepared for the City of Austin, TX, Contract No. SA-199-94 (IL), Civil Engineering, University of Texas at Austin, Oct. 1994.*
    - *Bauhan, T., Fowler, D., and Haas, C., “Independent Evaluation of Sewer Repair Techniques in the City of Austin, Volume 2 - Materials Assessment,” report prepared for the City of Austin TX, Contract No. SA-199-94 (IL), Civil Engineering, University of Texas at Austin, Oct. 1994.*
* **Capital projects processes**
  + **Workflow automation, verification, and diagnostics**
    - Golzarpoor, B., Haas, C., and Rayside, D., “Improving Process Conformance with Industry Foundation Processes (IFP),” Advanced Engineering Informatics, 30(2), pp. 143-156, 2016.
    - Karimidorabati, S., Haas, C., and Gray, J., “Evaluation of Automation Levels for Construction Change Management,” Engineering, Construction and Architectural Management, 2016.
    - Chettupuzha, A., Gray, J., and Haas, C., “An Algorithm for Determining the Criticality of Documents within a Construction Information System,” J of Computing in Civil Engineering 04015039 July, 2015.
    - *Golzarpoor, Haas, Grey, Rayside and Kang, “Industry Foundation Processes – A novel approach to improve conformance and interoperability”, CSCE Annual Conference and Construction Specialty Conference, Vancouver, BC, May 31 to June 3, 2017.*
    - *Kang, Haas, Golzarpoor, “Framework for Measuring Process Interoperability in Construction Management,” CSCE Annual Conference and Construction Specialty Conference, Vancouver, BC, May 31 to June 3, 2017.*
    - *Eray; Haas, Rayside, Golzarpoor, “An overview on integrating Interface Management and Building Information Management Systems,” CSCE Annual Conference and Construction Specialty Conference, Vancouver, BC, May 31 to June 3, 2017.*
    - *Golzarpoor, B., Haas, C., “Implementation of Construction Industry Best Practices into Workflow Management Systems,” Proc.cs, The CSCE International Construction Specialty Conference 2015, June 8 - 10, 2015, University of British Columbia, Vancouver, Canada.*
    - *A. J. Antony Chettupuzha, Dr Carl T. Haas, Joel Gray, A Conceptual Approach To Discovering Knowledge From Construction Workflows,`` proc.s (searchable database) of 30th Annual International Symposium on Automation and Robotics in Construction (ISARC), Montreal, Quebec, July 11-14, 2013.*
    - *Karimidorabati, S., Haas, C., and Gray, J., ``A Model for Implementing & Continuously Improving the Automated Change Management Process for Construction Mega Projects,`` proc.s (searchable database) of 30th Annual International Symposium on Automation and Robotics in Construction (ISARC), Montreal, Quebec, July 11-14, 2013.*
    - *Chettupuzha, A. J., Haas, C., Gray, J., and Simonson, R., ``Determining Critical Construction Documents Through Knowledge Discovery,`` proc.s (searchable database) of 30th Annual International Symposium on Automation and Robotics in Construction (ISARC), Montreal, Quebec, July 11-14, 2013.*
    - *Shokri, S., Safa, M., Haas, C., and Haas, R., A Conceptual Framework to Improve Information and Process Management in the Execution of Capital Projects,” CSCE 3rd International/9th Construction Specialty Conference, Ottawa, Ontario, June 14-17, 2011.*
    - *Shahi, A., Safa, M., Nasir, H., Chettupuzha, A.J., and Haas, C., “Discrete Modelling and Simulation for Optimization and Planning,” CSCE 3rd International/9th Construction Specialty Conference, Ottawa, Ontario, June 14-17, 2011.*
    - *Shokri, Safa, Chettupuzha, Karimidorabati, Simonson, MacGillivray, Fiander, Haas, and Haas, “Electronic Product and Process Management System: A Tool to Improve the Execution of Capital Projects,” Proceedings of the CIB W78-W102 2011: International Conference –Sophia Antipolis, France, 26-28 October, 2011.*
  + **Interface management for mega-projects**
    - Ahn, S., Shokri, S., Lee, S., Haas, C., and Haas, R., “Exploratory Study on the Effectiveness of Interface-Management Practices in Dealing with Project Complexity in Large-Scale Engineering and Construction Projects,” ASCE Journal of Management in Engineering, 2016.
    - Shokri, S., Ahn, S., Lee, S., Haas, C., and Haas, R., “Current Status of Interface Management in Construction: Drivers and Effects of Systematic Interface Management,” published online in Journal of Construction Engineering and Management, October 2015.
    - Shokri, S., Haas, C., Haas, R., and Lee, S., “An Interface Management Process for Managing Risks in Complex Capital Projects,” published online in Journal of Construction Engineering and Management, October 2015.
    - *Ahn, S., Shokri, S., Lee, S., Haas, C., and Haas, R., “Motivation for Interface Management in Construction: A Project Complexity Perspective,” Proc.cs, The CSCE International Construction Specialty Conference 2015, June 8 - 10, 2015, University of British Columbia, Vancouver, Canada.*
    - *Shokri, S., Ahn, S., Haas, C., Lee, S., and Czerniawski, T., “Current State of Interface Management in Mega Construction Projects,” proc.s of the ASCE Construction Research Congress, Atlanta, GA, USA, May 19-21, 2014.*
    - *Shokri, Haas, Lee, and Ahn, “Interface Management,” CII Final Research Report 302-3, November, 2014.*
    - *Shokri, Haas, Lee, LaBar, Wheatcraft, Burrows, Goodman, Reibold, Van Der Merwe, Wilson, and Ahn, et al, “ Interface Management Implementation Guide,” CII Implementation Resource 302-2, October, 2014*
    - *Shokri, Haas, Lee, LaBar, Wheatcraft, and Ahn, et al, “Interface Management,” CII Research Summary 302-1, October, 2014*
    - *S. Shokri, C.T. Haas, and R C.G. Haas, ``How To Identify The Critical Stakeholders In An Interface Management System,`` proc.s (searchable database) of 30th Annual International Symposium on Automation and Robotics in Construction (ISARC), Montreal, Quebec, July 11-14, 2013.*
    - *Simonson, R., Maloney, K., Haas, C., and Shokri S., ``Identifying When An Interface Management Program Is Essential And Planning For The Project Controls,`` proc.s (searchable database) of 30th Annual International Symposium on Automation and Robotics in Construction (ISARC), Montreal, Quebec, July 11-14, 2013.*
    - *S. Shokri, K. Maloney, S. MacGillivray, C.T. Haas, R.C.G. Haas, “Integrated interface management system and project schedule,” Gerontechnology, Vol 11, no. 2, p.335, 2012.*
    - *Shokri, S., Safa, M., Haas, C., Haas, R., Maloney, K., and MacGillivray, S., “Interface Management Model for Mega Capital Projects,” proc.s, Construction Research Congress, Purdue, IN, 2012.*
  + **Supply chain management** 
    - Safa, Shahi, Haas, and Hipel, “Construction Contract Management Using Value Packaging Systems,” International Journal of Construction Management, 17 (1), 50-64, 2017.
    - Safa, M., Reinsma, S., Haas, C., Goodrum, P., and Caldas, C., “A Decision Making Method for Choosing Concrete Forming Systems,” International Journal of Construction Management (IJCM), 1-12, IJCM-140955, 2016.
    - Safa, M, Yee, M., Rayside, D., and Haas, C., “Optimizing Contractor Selection for Construction Packages in Capital Projects,” ASCE journal of Computing in Civil Engineering, January, 2016.
    - Safa, M., Shahi, A., Haas, C., and Hipel, K., “Supplier Selection Process in an Integrated Construction Materials Management Model,” Automation in Construction 48, 64-73, 2014.
    - Safa, M., Haas, C., Gray, J., and Hipel, K., “Electronic Process Management System based Front End Planning Tool (FEPT),” Journal of Construction Engineering and Project Management., Vol. 3, issue 2, pp. 1-12, 2013.
    - *Safa, M., Gray, J., and Haas, C., ``Electronic Process Management System based Front End Planning Tool (FEPT),`` proc.s, Canadian Society for Civil Engineering (CSCE) Annual Conference, Montreal, Quebec, May 29 to June 1, 2013.*
  + **Risk Management**
    - Shahtaheri, M., and Haas, C., “Applying VLSI Reliability Theory for Understanding the Impact of Type II Risks on Megaprojects,” accepted by ASCE Journal of Management in Engineering, August, 2016.
    - Shahtaheri, M., Haas, C., and Salimi, T., “A Multi-dimensional Joint Confidence Limit Approach to Mixed Mode Planning for Round-the-Clock Projects,” Engineering, Construction and Architectural Management, October, accepted in March, 2016.
    - Fiolet, J.C., Haas, C., and Hipel, K., “Risk-Chasing Behaviour in On-Site Construction Decisions,” Construction Management and Economics, August, 2016.
    - *Shahtaheri, M., Hanna, M. and Haas, C., “Corporate-level risk analysis for industrial projects,” CSCE Annual Conference and Construction Specialty Conference, Vancouver, BC, May 31 to June 3, 2017.*
    - *Ahmed, Haas, Hegazy, “Intelligent Supply Chain Visibility for Risk Management in Pipe Spool Manufacturing,” CSCE Annual Conference and Construction Specialty Conference, Vancouver, BC, May 31 to June 3, 2017*
    - *Shahtaheri, M., Haas, C., Salimi, T.,“A Stochastic Simulation Approach for the Integration of Risk and Uncertainty into Megaproject Cost and Schedule Estimates,” proc.s, Construction Research Congress, San Juan, Puerto Rico, May 31 - June 2, 2016.*
* **Construction productivity improvement and economics**
  + **Management of innovation**
    - Safa, M., Shahi, A., Haas, C., Fiander-McCann, D., Safa, M., Hipel, K., and MacGillivray, S., “Competitive intelligence (CI) for evaluation of construction contractors," accepted by Automation in Construction, February and available online in March, 2015.
    - Goodrum, P., Haas, C., Caldas, C., Zhai, D., Yeiser, J., and Homm, D., “Model to predict the impact of a technology on construction productivity,” ASCE Journal of Construction Engineering and Management 137 (9), pp. 678-688, 2011.
    - Advancing the Competitiveness and Efficiency of the U.S. Construction Industry, Kennedy, T., et al, The National Academies Press, Washington, D.C., ISBN – 13:978-0-309-14191-8, “Appendix C: An International Perspective on Construction Competitiveness and Productivity”, by C. Haas, pp. 55-75, 2009.
    - *Dadi. G., Safa, M., Goodrum, P., Haas, C., Caldas, C., and MacNeel, D., “Improving Concrete Trade Labor Productivity through the Use of Innovations,” proc.s, Construction Research Congress, Purdue, IN, 2012.*
    - *Safa, M., Gouett, M., Haas, C., Goodrum, P., and Caldas, C., “Implementation of Weld-less Innovations on Construction Projects,” CSCE 3rd International/9th Construction Specialty Conference, Ottawa, Ontario, June 14-17, 2011.*
    - *Safa, M., Gouett, M., Haas, C., Goodrum, P., and Caldas, C.,"A FUZZY-LOGIC DECISION MAKING APPROACH FOR USING INNOVATIONS IN THE CONSTRUCTION INDUSTRY," proc.s, AEC Innovation Conference, State College, PA June 9-11, 2010.*
    - *Tiantian, S., Teizer, J., Changwan, K., Goodrum, P., and Haas, C.T. (2005), “Content Analyses: CII Members’ Annual Reports and Mission & Vision Statements,” Report to the Construction Industry Institute, College of Engineering, University of Texas, July 2005.*
    - *Saidi, K., Haas, C., and Balli, N., “The Value of Handheld Computers in Construction,” 19th Annual ISARC, Gaithersburg, MD, Sept. 23-25, 2002.*
    - *Haas, C.T., Alemany, C., and Kim, H., “Study of Foreman-level Task Automation in the US Construction Industry,” proceedings of the 17th International Symposium on Automation and Robotics in Construction, Taipei, Taiwan, Sept. 2000.*
    - *Goodrum, P., and Haas, C., “Variables Affecting Innovations in the U.S. Construction Industry,” ASCE Construction Congress VI Proceedings, pp.525-533, Orlando FL, Feb. 20-22, 2000.*
    - *Stein, D.F., Haas, C.T., et al, “Summary Report of the Workshop on Enabling Transportation Research,” National Research Council’s Transportation Research Board Committee to Conduct a Workshop on Enabling Transportation Research, Washington, DC, Sept. 9-10, 1998.*
    - *Haas, R., Abdelhalim, A., and Haas, C., “Highway Pavement Research: Issues, Opportunities, and Innovations in Construction and Maintenance,” Proceedings, Colloquium on Transportation, Technical Center of the Hilti Corporation, Schaan, Principality of Liechtenstein, pp. 1-17, Sept. 16, 1994.*
  + **Modularization and prefabrication**
    - Shahtaheri, Y., Rausch, C., West, J., Haas, C., and Nahangi, M., “Managing Risk in Modular Construction Using Dimensional Tolerance Strategies,” Automation in Construction in November, 2017.
    - Shan, Y., Kim, Y., Caldas, C., Goodrum, P., and Haas, C., “Impact of Steel Quick Connection System on Steel Erection Labor Productivity: Case Studies and Simulation Based Analyses,” Canadian Journal of Civil Engineering, October, 2014.
    - Song, J., Fagerlund, W., Haas, C., Vanegas, J., and Tatum, C., “Considering Prework on Industrial Projects,” ASCE Journal of Construction Engineering and Management, Vol. 131, no. 6, June 2005, pp. 723-733.
    - *Rausch, C., Zhang, L., Haas, C., and West, J., “Analyzing the Critical Sources of Dimensional Variability during the Lifecycle of a Steel Framed Modular Construction Project,” MOC, Edmonton, October, (2016).*
    - *Rausch, C., Nahangi, M., Haas, C., West, J. (2016). “Deviation analysis for evaluating the as-built quality and alignment of modular components”. Canadian Society of Civil Engineering (CSCE) Annual Conference, June 2016, London, ON, Canada. One of two Honourary Mentions for the “Best Paper Award” by the technical panel.*
    - *Rausch, C., Nahangi, M., Perreault, M., Haas, C., West, J. (2016). “Applying selective assembly in modular construction using terrestrial laser scanners”. 33rd International Symposium on Automation and Robotics in Construction (ISARC), July 2016, Auburn AL, USA.*
    - *Shahtaheri, Rausch, West, Haas, Nahangi, “Risk Mitigation through Tolerance Strategies for Design in Modularization,” proc.s, The Modular and Off-site Construction (MOC) Summit, May 8-9 in Edmonton, Alberta, Canada 2014.*
    - *Safa, M., Reinsma, S., Haas, C., Goodrum, P., and Caldas, C., ``A Method for Choosing Concrete Forming Systems,`` proc.s, Canadian Society for Civil Engineering (CSCE) Annual Conference, Montreal, Quebec, May 29 to June 1, 2013.*
    - *Shan, Y.; Goodrum, P.; Haas. C.; and Caldas, C, “Assessing Productivity Improvement of Quick Connection Systems in the Steel Construction Industry Using Building Information Modeling (BIM),” proc.s, Construction Research Congress, Purdue, IN, 2012.*
    - *Haas, C.T., O’Connor, J.T., Borcherding, J.D., Glover, R.W., Tucker, R.L., and Eickmann, J.A., “Prefabrication and Preassembly Trends and Effects on the Construction Workforce,” Center for Construction Industry Studies, Report No. 10, University of Texas at Austin, 2000.*
    - *Kim, C., Haas, C., et al, “New Joining Technology for Metal Pipe in the Construction Industry,” BTSC Document 2003-2, Construction Industry Institute, College of Engineering, University of Texas, Austin TX, August, 2003.*
    - *Haas, C., et al., “Prefabrication, Preassembly, Modularization, and Offsite Fabrication in Industrial Construction: A Framework for Decision-Making,” Construction Industry Institute, Research Summary 171-1, August 2002.*
    - *Haas, C., Song, J., and Tatum, B., “Implementing the Prefabrication, Preassembly, Modularization and Offsite Fabrication (PPMOF) Decision Framework: Guide and Tool,” Construction Industry Institute, Implementation Resource 171-2, August 2002.*
  + **Practices and processes**
    - Zhang, D., Nasir, H., and Haas, C., “Development of an Internal Benchmarking and Metrics Model for Industrial Construction Enterprises for Productivity Improvement,” CSCE Journal of Civil Engineering, 2017.
    - Nasir, H., Haas, C., Caldas, C, and Goodrum, P., “An Integrated Productivity Practices Implementation Index for Infrastructure Projects Execution Planning,” ASCE Journal of Infrastructure Systems, 2016.
    - Shan, Y., Zhai, D., Goodrum, P., Haas, C., and Caldas, C.,"Statistical Analysis of the Effectiveness of Management Programs in Improving Construction Labor Productivity on Large Industrial Projects." J. Manage. Eng., 04015018, 2015.
    - Kim, Y., Caldas, C., Goodrum, P., Haas, C., and Zhang, D., “Method to Assess the Level of Implementation of Productivity Practices on Industrial Projects,” published online by ASCE Journal of Construction Engineering and Management, August, 2014.
    - Gouett, M., Haas, C., Caldas, C., and Goodrum, C., “Activity Analysis in Industrial Construction,” ASCE Journal of Construction Engineering and Management, 137(12), pp. 1117-1124, 2012.
    - Zhang, D., Haas, C., Goodrum, P., and Caldas, C., “Construction small-projects rework reduction for capital facilities,” ASCE Journal of Construction Engineering and Management 138 (12), pp. 1377-1385, 2012.
    - Shan, Y., Goodrum, P., Zhai, D., Haas, C., and Caldas, C., “The impact of management practices on mechanical construction productivity,” Construction Management and Economics 29 (3), pp. 305-316, 2011.
    - Zhai, D., Goodrum, P., Haas, C., and Caldas, C., “The Relationship between Automation and Integration of Construction Information Systems and Labor Productivity,” ASCE JCEM, Vol. 135, no. 8, August, 2009.
    - Grau, D., Caldas, C., Haas, C., Goodrum, P., and Gong, J., “Assessing the Impact of Materials Tracking Technologies on Construction Craft Productivity,” Automation in Construction Vol. 18, pp. 903-911, 2009.
    - *Fiolet, J., and Haas, C., “Application of Prospect Theory to management decisions under risk on construction projects,” Proc.cs, The CSCE International Construction Specialty Conference 2015, June 8 - 10, 2015, University of British Columbia, Vancouver, Canada.*
    - *Shahtaheri, M., Nasir, H., Haas, C., and Salimi, T., “A Time-Cost-Quality Trade-Off Model for Nuclear-Type Projects,” Proc.cs, The CSCE International Construction Specialty Conference 2015, June 8 - 10, 2015, University of British Columbia, Vancouver, Canada.*
    - *H. Nasir, C. Haas, M. Shahtaheri, C. Caldas, P. Goodrum, ``Labour Productivity Improvement through the Use of Best Practices for Infrastructure Construction Projects,`` proc.s, Canadian Society for Civil Engineering (CSCE) Annual Conference, Montreal, Quebec, May 29 to June 1, 2013.*
    - *Shan, Y., Goodrum, P., Haas, C., Caldas, C., and Zhai, D., ``A Comprehensive Analysis Of Project Management Practices To Improve Craft Productivity,`` proc.s, Canadian Society for Civil Engineering (CSCE) Annual Conference, Montreal, Quebec, May 29 to June 1, 2013.*
    - *Goodrum, P., Haas, C., and Caldas, C., et al, Craft Productivity Program – Phase V. Research Summary 252-1d. Construction Industry Institute, University of Texas at Austin, 2013.*
    - *Goodrum, P., Haas, C., and Caldas, C., et al, The Construction Productivity Handbook, The Construction Productivity Program, Construction Industry Institute (CII), Implementation Resource 252-2d, University of Texas at Austin, 2013.*
    - *Goodrum, P., Haas, C., and Caldas, C., et al, Best Productivity Practices Implementation Index – Infrastructure Projects, Implementation Resource 252-3d, the Construction Productivity Research Program Team, Construction Industry Institute, University of Texas at Austin, 2013.*
    - *Goodrum, P., Haas, C., and Caldas, C., et al, Best Productivity Practices Implementation Index – Industrial Projects, Implementation Resource 252-3e, the Construction Productivity Research Program Team, Construction Industry Institute, University of Texas at Austin, 2013.*
    - *Goodrum, P., Haas, C., and Caldas, C., et al, Craft Productivity Program – Phase IV. Research Summary 252-1c. Construction Industry Institute, University of Texas at Austin, 2012.*
    - *Zhang, D., Haas, C., Goodrum, P., Caldas, C., and Granger, R.., “Analysis of a Rework Reduction Program for Construction Productivity Continuous Improvement,” CSCE 3rd International/9th Construction Specialty Conference, Ottawa, Ontario, June 14-17, 2011.*
    - *Gouett, Granger, Christian, Stofega, Toon, Goodrum, Haas, and Caldas, Craft Productivity Program – Phase II. Innovations in Mechanical Construction Productivity IR 252-2. Construction Industry Institute. University of Texas at Austin, 2011.*
    - *Zhang, Z., Granger, R., Goodrum, P., Haas, C., and Caldas, C. Craft Productivity Program – A Guide to Construction Rework Reduction IR 252-2b. Construction Industry Institute. University of Texas at Austin, 2011.*
    - *Goodrum, P., Haas, C., and Caldas, C., et al, Craft Productivity Program – Phase III. Research Summary 252-1b. Construction Industry Institute. University of Texas at Austin, 2011.*
    - *Gouett, C., Haas, C., et al. Guide to Activity Analysis. Implementation Resource 252-2a. Construction Industry Institute. University of Texas at Austin, 2010.*
    - *Goodrum, P., Haas, C., and Caldas, C., et al, Craft Productivity Program – Phase II. Research Summary 252-1a. Construction Industry Institute. University of Texas at Austin, 2010.*
    - *Goodrum, P., Haas, C., and Caldas, C., et al, Craft Productivity Program – Phase I. Research Summary 252-1. Construction Industry Institute. University of Texas at Austin, 2010.*
    - *Grau, D., Caldas, C., Haas, C., Goodrum, P., and Gong, J., “Leveraging Materials Tracking Technologies to Improve Industrial Project Performance,” proceedings of CIB W78 – Managing IT in Construction, Istanbul, Turkey, October 1-3, 2009.*
    - *Grau, D., Caldas, C., Haas, C., Goodrum, P., and Gong, J., “Impact of Fast Automated Tracking of Construction Components on Labor Productivity,” proceedings of 26th Annual International Symposium on Automation and Robotics in Construction (ISARC), Austin, Texas, June 24-26, 2009.*
    - *Haas, C., Goodrum, P., and Caldas, C. Leveraging Technology to Improve Construction Productivity. Research Summary 240-1. Construction Industry Institute. University of Texas at Austin, 2008.*
    - *Haas, C., Goodrum, P., and Caldas, C.. LEVER Tool 240-2. Construction Industry Institute. University of Texas at Austin, 2008.*
    - *Haas, C.T., Gibson, G.E., O’Connor, J.T., Zhang, Z., Anderson, C.K., and Somali, B., “Development and Validation of a Method Selection Tool for Expediting Highway Construction”, Center for Transportation Research, Bureau of Engineering Research, University of Texas at Austin, research report no. 0-4386-2, March, 2004.*
    - *Simon, E., Gibson, G.E., Haas, C.T., O’Connor, J.T., Somali, B., and Zhang, Z., “Development of a Tool for Expediting Highway Construction While Retaining Quality, Center for Transportation Research, Bureau of Engineering Research, University of Texas at Austin, research report no. 4386-1, October, 2002.*
    - *Haas, C.T., Borcherding, J.D., Glover, R.W., Tucker, R.L., and Alemany, C., “The Effects of Computers on Construction Foremen,” Center for Construction Industry Studies, Report No. 9, University of Texas at Austin, 2000.*
    - *Chun, D., Seo, J., and Haas, C., “Leveling Technologies for Building Construction,” Proceedings of the ASCE Construction Congress V in Minneapolis MN, pp. 1030-1037, Oct. 5-7, 1997.*
    - *Thompson, T., Haas, C., Dailey, C., and Traver, A., “An Assessment of Automated Surface Finishing Technologies,” Proc., ASCE Construction Congress IV, San Diego, CA, Oct. 22-24, 1995.*
    - *Haas, R., and Haas, C., “The Paving Industry: Issues, New Technologies, and Opportunities,” Proceedings Canadian Society of Civil Engineers' Conference, Vol. III pp. 265-274, Ottawa, Canada, June 1995.*
    - *Haas, C., Fowler, D., Wright, C., Conegliano, B., and Bauhan, T., “Evaluation of Sewer Spot Repair Technologies,” Proceedings, North American NO-DIG '95, pp. 6B-1:1-6B-1:11, Apr. 30 - May 3, 1995.*
  + **Benchmarking and metrics** 
    - Zhang, D., Nasir, H., and Haas, C., “Development of an Internal Benchmarking and Metrics Model for Industrial Construction Enterprises for Productivity Improvement,” Canadian Journal of Civil Engineering, 2017.
    - Safa, M. Sabet, A. MacGillivray, S. Davidson, M. Kaczmarczyk, K. Haas, C. T. Gibson, G. E. Rayside, D. “Classification of Construction Projects,” International Journal of Civil, Environmental, Structural, Construction and Architectural Engineering Vol:9, No:6, 2015.
    - Nasir, H., Eisa, H., Haas, C., and Goodrum, P., “An analysis of construction productivity differences between Canada and the United States,” Construction Management and Economics, 32 (6), pp. 595-607, 2014.
    - Nasir, H., Haas, C., Forgues, D., Fayek, A., Ruwanpura, J., and Rankin, J., “Development and implementation of a benchmarking and metrics program for construction performance and productivity improvement,” Canadian Journal of Civil Engineering 39 (9), pp. 957-967, 2012.
    - Hwang, B., Thomas, S., Haas, C., and Caldas, C., “Measuring the Impacts of Rework on Construction Cost Performance,” ASCE Journal of Construction Engineering and Management, Vol. 135, No. 3, pp. 187-198, 2009.
    - Rankin, J., Fayek, A., Meade, G., Haas, C., and Manseau, A., “Initial Metrics and Pilot Program Results for Measuring the Performance of the Canadian Construction Industry,” Canadian Journal of Civil Engineering, vol. 35, no. 9, Sept., 2008.
    - Goodrum, P., and Haas, C., “The Long Term Impact of Equipment Technology on Labor Productivity in the U.S. Construction Industry at the Activity Level,” ASCE Journal of Construction Engineering and Management, vol. 130, no. 1, Jan/Feb 2004, pp. 124-133.
    - Goodrum, P., and Haas, C., “Partial Factor Productivity and Equipment Technology Change at the Activity Level in the U.S. Construction Industry,” ASCE Journal of Construction Engineering and Management, Vol. 128, no.6, pp 463-472, Nov/Dec, 2002.
    - Goodrum, P., Haas, C., and Glover, R. "The Divergence in Aggregate and Activity Estimates of US Construction Productivity." Journal of Construction Management and Economics. Taylor and Francis. 20(5). pp. 415-423, 2002.
    - Allmon, E., Haas, C., Borcherding, J., and Goodrum, P., “U.S. Construction Labor Productivity Trends from 1970 - 1998,” ASCE Journal of Construction Engineering and Management, Vol. 126, No. 2, pp. 97-104, Mar./Apr. 2000.
    - *Safa, M., MacGillivray, S., Davidson, M., Kaczmarczyk, T., Haas, C., and Gibson, G., “Identifying Influential Factors for Capital Construction Project Planning Strategies,” Proc.cs, The CSCE International Construction Specialty Conference 2015, June 8 - 10, 2015, University of British Columbia, Vancouver, Canada.*
    - *Rankin, J., Froese, T., Issaa, M., Quaigrain, R., Haas, C., and Nasir, H., “Assessing the Management Practices for Small to Medium Sized Canadian General Contractor Organizations,” Proc.cs, The CSCE International Construction Specialty Conference 2015, June 8 - 10, 2015, University of British Columbia, Vancouver, Canada.*
    - *M. Safa, A. Sabet, S. Macgillivray, M. Davidson, K. Kaczmarczyk, C. T. Haas, G. E. Gibson, D. Rayside, “Classification of Construction Projects,” International Conference on Urban and Civil Engineering-Toronto, June 15 - 16, 2015.*
    - *Nasir, H., Haas, C., Forgues, D., Fayek, A., Ruwanpura, J., and Rankin, J., “Development and Implementation of a Construction Performance and Productivity Benchmarking Program,” CSCE 3rd International/9th Construction Specialty Conference, Ottawa, Ontario, June 14-17, 2011.*
    - *Nassir, H., Dorji, U., Attalla, M., Rankin, J., Robinson, A., and Haas, C., “Studies in Construction Performance Benchmarking,” proc.s, CSCE Annual Conference, Quebec, QC, June 10-13, 2008.*
    - *Goodrum, P., Haas, C., Borcherding, J. and Allmon, E., “Case Studies of U.S. Construction Labor Productivity Trends, 1970-1998,” ASCE Construction Congress VI Proceedings, pp. 808-817, Orlando FL, Feb. 20-22, 2000.*
    - *Haas, C.T., Borcherding, J.D., Allmon, E., and Goodrum, P., “U.S. Construction Labor Productivity Trends, 1970-1998,” Center for Construction Industry Studies, Report No. 7, University of Texas at Austin, 1999.*
  + **Diagnostics**
    - Shahtaheri, M., Nasir, H., and Haas, C., “Setting Base-line Rates for On-site Work Categories in the Construction Industry,” Journal of Construction Engineering and Management 141 (5), 04014097, 2014.
    - Gouett, M., Haas, C., Caldas, C., and Goodrum, C., “Activity Analysis in Industrial Construction,” ASCE Journal of Construction Engineering and Management, 137(12), pp. 1117-1124, 2012.
  + **Automation**
    - Safa, M., Shahi, A., Nahangi, M., and Haas, C., “Automating Measurement Process to Improve Quality Management for Piping Fabrication,” Structures, online in March, 2015.
    - *Safa, M., Nahangi, M., Shahi, A., and Haas, C., “Using New Technology for Improving Quality Control of Piping Fabrication,” proc.s, ASCE 2015 International Workshop on Computing in Civil Engineering, Austin, TX, June 21-23, 2015.*
* **Construction crafts training**
  + Health and safety
    - Seo, Alwasel, Lee, Abdel-Rahman, and Haas, “A Comparative Study of In-field Motion Capture Approaches for Body Kinematics Measurement in Construction" accepted for Robotica Journal special issue in October 2017.
    - Alwasel, Sabet, Nahangi, Abdel-Rahman, and Haas, “Identifying Poses of Safe and Productive Masons Using Machine Learning," accepted by Automation in Construction in August 2017.
    - Alwasel, Abdel-Rahman, Haas, and Lee, “Experience, Productivity, And Musculoskeletal Injury Among Masonry Workers" Journal of Construction Engineering Management, 2017.
    - Alwasel, A., Yung, M., Abdel-Rahman, E., Wells, R., and Haas, C., “Fatigue Detection Using Phase-Space Warping,” ASME Journal of Biomechanical Engineering, 139(3), 2592750, 2017.
    - *Alwasel, Nahangi, Haas, Abdel-Rahman, “Level-Of-Expertise Classification For Identifying Safe And Productive Masons,” proc.s International Workshop on Computing for Civil Engineering (IWCCE), Seattle, WA, USA, from 6/25 to 6/27, 2017.*
    - *Gambatese, J., Hinze, J., and Haas, C., “Tool to Design for Construction Worker Safety,” ASCE Journal of Architectural Engineering, Vol. 3, No.1, pp. 32-41, Mar. 1997.*
    - *Brown, D., Matuszak, P., Hinze, J., Haas, C., et al, “Design for Safety,” Construction Industry Institute publication No. 101-1, Sept. 1996.*
    - *Haas, C.T., Burleson, R.C., and Goodrum, P.M., “A Multi-media Design Aid for Project Hazard Identification and Remediation, Part I: Functional Capabilities and Design of the Design for Safety Toolbox Prototype,” Construction Industry Institute SD, University of Texas at Austin, 1995.*
  + Return on investment in training
    - Wang, Goodrum, Haas, Glover, and Vaziri, “Analysis of the benefits and costs of construction craft training in the United States based on expert perceptions and industry data,” Construction Management and Economics 28 (12), pp. 1269-1285, 2011.
    - Srour, I., Haas, C., and Morton, D., “Optimizing Investment in Construction Skills,” ASCE Journal of Construction Engineering and Management, Vol. 132, No. 11, November 2006, pp. 1158-1166.
    - Srour, I., Haas, C., and Borcherding, J., “What Does the Construction Industry Value in its Workers?” ASCE Journal of Construction Engineering and Management, Vol. 132, No. 10, October, 2006, pp. 1053-1058.
    - *Glover, W.G., Long, D.W., Haas, C.T.M., and Alemany, C., “Return-on-Investment (ROI) Analysis of Education and Training in the Construction Industry,” Center for Construction Industry Studies, Report No. 6, University of Texas at Austin, 1999.*
  + Organization of training systems
    - Wang, Y., Goodrum, P., Haas, C., and Glover, R., “Analysis of observed skill affinity patterns and motivation for multiskilling among craft workers in the US industrial construction sector,” ASCE Journal of Construction Engineering and Management, Vol. 135, no. 10, pp. 999-1008, October, 2009.
    - Wang, Y., Goodrum, P., Haas, C., and Glover, R., “Craft Training Issues in American Industrial and Commercial Construction,” Journal of Construction Engineering and Management 134 (10), pp. 795-803, 2008.
    - Brandenburg, S., Haas, C., and Byrom, K., “Strategic Management of Human Resources in Construction,” ASCE Journal of Construction Engineering and Management, Vol. 22, Issue 2, April 2006, pp. 89-96.
    - Castenada, J., Tucker, R.L., and Haas, C., “Workers’ Skills and Receptiveness to Operate Under the Tier II Construction Management Strategy,” ASCE Journal of Construction Engineering and Management. Vol. 131, no. 7, July 2005, pp. 799-807.
    - Carley, L., Goodrum, P., Haas, C., and Borcherding, J., “Experiences with multiskilling among non-union craft workers in U.S. industrial construction projects,” Engineering, Construction, and Architectural Management, Loughborough Univ., U.K., vol. 10, no. 6, Dec., 2003, pp. 374-381.
    - Gomar, J., Haas, C., and Morton, D., “Assignment and Allocation Optimization of a Partially Multiskilled Workforce,” ASCE Journal of Construction Engineering and Management, Vol. 128, No. 2, pp. 103-109, March/April 2002.
    - Haas, C.T., Rodriguez, A.M., Glover, R., and Goodrum, P., “Implementing a Multiskilled Workforce,” Journal of Construction Management and Economics, 19(6), pp. 633-641, Aug. 2001.
    - Burleson, R., Haas, C., and Tucker, R., “Multiskilled Labor Utilization Strategies in Construction,” ASCE Journal of Construction Engineering and Management, Vol. 124, No. 6, pp. 480-489, Nov./Dec. 1998.
    - *Goodrum, P. M., Wang, Y., Haas, C., Vaziri, S., Glover, R., “Construction Industry Craft Training in the United States and Canada,” A Report to the Construction Industry Institute at The University of Texas at Austin, Research Report 231-11, October 30, 2007.*
    - *Paul M. Goodrum, Carl T. Haas, Robert W. Glover, “Construction Industry Craft Training: Experience to Date and the Path Forward,” CIB-ASCE Specialty Conference on Leadership and Management, Bahamas, May 4-6, 2006.*
    - *Hyatt, B., Pappas, M., and Haas, C., “Comparison of Naval Construction Force Personnel and Civilian Construction Workers in the United States Utilizing the Workforce Assessment Package,” Proceedings of the ASCE Specialty Conference on Leadership and Management in Construction, Hilton Head, South Carolina, March 25-26, 2004.*
    - *Srour, I., Saillard, J., Haas, C., Tucker, R., “Skill Standards for the Construction Industry,” Proceedings of the ASCE Specialty Conference on Leadership and Management in Construction, Hilton Head, South Carolina, March 25-26, 2004.*
    - *Castenada, J., Tucker, R., Haas, C., Glover, R., and Shields, D., “A Revolutionary and Structured Approach to Construction Workforce Management: The Tier II Strategy,” ASCE Construction Congress Proceedings, Hawaii, March 20, 2003.*
    - *Brandenburg, S., Haas, C., and Glover, R., “The Tier I Construction Workforce Management Strategy,” ASCE Construction Congress Proceedings, Hawaii, March 20, 2003.*
    - *Brandenburg, S., Byrom, K., and Haas, C., “The Shortage of Skilled Craft Workers in the US,” Construction Industry Institute, Research Summary 182-1, November 2003.*
    - *Borcherding, J.D., Glover, R.W., Haas, C.T., and Tucker, R.L., “Metric-Based Implementation of Tier II Workforce Strategy,” Center for Construction Industry Studies, Report No. 18, University of Texas at Austin, 2001.*
    - *Haas, C.T., Glover, R.W., Tucker, R.L., and Terrien, K.R., “Impact of the Internet on the Recruitment of Skilled Labor,” Center for Construction Industry Studies, Report No. 18, University of Texas at Austin, 2001.*
    - *Haas, C.T., Morton, D.P., Tucker, R.L., and Gomar, J.E., “Assignment and Allocation Optimization of a Partially Multiskilled Workforce,” Center for Construction Industry Studies, Report No. 11, University of Texas at Austin, 2000.*
    - *Tucker, R.L., Haas, C.T., Glover, R.W., Alemany, C., Carley, L., Rodriguez, A., and Shields, D., “Key Workforce Challenges Facing the American Construction Industry: An Interim Assessment,” Center for Construction Industry Studies, Report No. 3, University of Texas at Austin, 1999.*
    - *Haas, C.T., Borcherding, J.D., Glover, R.W., Tucker, R.L., Carley, L., and Eickmann, J., “Craft Workers Experiences With and Attitudes Toward Multiskilling,” Center for Construction Industry Studies, Report No. 4, University of Texas at Austin, 1999.*
    - *Haas, C.T., Borcherding, J.D., Glover, R.W., Tucker, R.L., Rodriguez, A., and Gomar, J., “Planning and Scheduling a Multiskilled Workforce,” Center for Construction Industry Studies, Report No. 5, University of Texas at Austin, 1999.*
    - *Burleson, R., and Haas, C., “An Analysis of Multiskilled Labor Strategies in Construction,” Construction Industry Institute Research Summary 137-1, Apr. 1998.*
    - *Haas, C., Burleson, R., and Tucker, R., “An Analysis of Multiskilled Labor Strategies in Construction,” Construction Industry Institute SD No. 137-1, University of Texas at Austin, 1998.*
    - *Haas, C., Villalobos, J., and Tucker, R., “Implementation of Multiskilling in the Construction Industry,” Construction Industry Institute SD No. 137-2, University of Texas at Austin, 1998.*
    - *Haas, C., Stanley, A., and Tucker, R., “Benefits, Impediments, and Limitations Associated with the Use of Multiskilled Labor Strategies in Construction,” Construction Industry Institute SD No. 137-3, University of Texas at Austin, 1998.*
* **Sustainable infrastructure management**
  + **Water and waste water**
    - Ganjidoost, A., Knight, M., Unger, A., and Haas, C., “Benchmarking Performance Indicators for Utilities' Water and Wastewater Pipelines Infrastructure,” Journal of Water Resources Planning and Management, accepted in July, 2017.
    - Rehan, R., Unger, A., Knight, M., and Haas, C., “Water Utility Management and Financial Planning Using System Dynamics,” AWWA Journal, 107 (1), 87-88, 2015.
    - Shadpour, A., Unger, A.J.A., Knight, M.A., Haas C.T., and Forsyth, P.A., “A Numerical DAE Approach for Solving a System Dynamics Problem,” published online by ASCE Computing in Civil Engineering, August, 2014.
    - Rehan, R., M.A. Knight A.J.A. Unger, and C.T. Haas, “Financially sustainable management strategies for urban wastewater collection infrastructure - development of a system dynamics model, Tunneling and Underground Space Technology, 39, pp. 116-129, 2014.
    - Rehan, R., Unger, A.J.A.. Knight M.A.. and C.T. Haas, “Financially sustainable management strategies for urban wastewater collection infrastructure - Implementation of a system dynamics model,” Tunneling and Underground Space Technology, 39, pp. 102-115, 2014.
    - Rehan, R., Knight, M., Unger, A., and Haas, C., “Development of a system dynamics model for financially sustainable management of municipal watermain networks,” Water Research, online 23 October, 2013.
    - Rehan, R., Knight, M., Unger, A., and Haas, C., “Application of System Dynamics for developing financially self-sustaining management policies for water and wastewater systems,” Water Research 45 (16), pp. 4737-4750, 2011.
    - *Ganjidoost, A., Haas, M., Knight, M., and Unger, A., “Integrated Asset Management of Water and Wastewater Infrastructure Systems - Borrowing from Industry Foundation Classes,” Proc.cs, The CSCE International Construction Specialty Conference 2015, June 8 - 10, 2015, University of British Columbia, Vancouver, Canada.*
    - *Shadpour, A., Unger, A., Knight, M., and Haas, C., ``A Numerical DAE Approach for Solving a System Dynamics Problem,`` 2013 ASCE International Workshop on Computing in Civil Engineering (IWCCE), University of Southern California , Los Angeles, CA, USA, June 23-25, 2013.*
    - *Rehan, McGoldrick, Hausser, Schachowskoj, Unger, Knight, and Haas, “A collaborative research partnership for financially self-sustaining municipal water and wastewater systems,” OWWA/OMWA Joint Annual Conference & Owwea Trade Show 2012, Niagara Falls, Ontario, May 6th – 9th, 2012.*
    - *Rehan, R., M. Knight, A. Unger, C. Haas, D. McGoldrick, M. Hausser and K. Schachowskoi (2012), A collaborative research partnership for financially self-sustaining municipal water and wastewater system. OWWA/OMWA Joint Annual Conference & OWWEA Trade Show, May 6-9, 2012, Niagara Falls, ON.*
    - *Rehan, R., M. Knight, C. Haas and A.J.A Unger (2012), A New Approach to Water and Wastewater Infrastructure Asset Management. Invited presentation at Canadian Network of Asset Managers Conference, May 6 to 9, 2012 Montreal, QC.*
    - *Rehan, R., M. Knight, C. Haas and A.J.A Unger (2012), Financially Sustainable Management Strategies for Wastewater Management. 2012 Trenchless Roadshow and Underground Infrastructure Research Conference, June 5 to 8, 2012 Niagara Falls, ON.*
    - *Rehan, R., M. Knight, C. Haas and A.J.A Unger (2011), A framework for financially sustainable management of water resources and urban water infrastructure. GeoHydro2011 conference hosted by Canadian Quaternary Association and the Canadian Chapter of the International Association of Hydrogeologists. August 28-31, 2011. Quebec City, PQ.*
    - *Rehan, R., Knight, M., Haas, C., and Unger, “A framework for financially sustainable management of water resources and urban water infrastructure, ” Quebec City, Canada, August 28-31, 2011.*
  + **Pavements** 
    - *Nasir H., Haas C., Casello, J., and Haas, R., “A STUDY OF ACCOUNTING AND REPORTING OF PUBLIC INFRASTRUCTURE IN CANADA,” CSCE 8th International Transportation Specialty Conference, Winnipeg, Manitoba, June 9-12, 2010*
    - *Tighe, S., Haas, R., Kennepohl, G., and Haas, C., “A Contribution to Knowledge Management Through a Canadian Research Initiative,” Annual Conf. of Transp. Assoc. of Canada, Charlottetown, PEI, Sept., 18-20, 2006.*
  + **Steel and other construction materials** 
    - Yeung, J., Walbridge, S., Haas, C., and Saari, R., “Understanding the total life cycle cost implications of reusing structural steel,” Environment Systems and Decisions, 37(1), pp. 101-120, 2017.
    - Yeung, J., Walbridge, S., and Haas, C., “The Role of Geometric Characterization in Supporting Structural Steel Reuse Decisions,” published online in Resources, Conservation and Recycling in September, 2015.
    - *Sanchez, Haas, “Methodology for improving the net environmental impacts of new buildings through product recovery management,” CSCE Annual Conference and Construction Specialty Conference, Vancouver, BC, May 31 to June 3, 2017.*
    - *Yeung, J., Walbridge, S., and Haas, C., “Life Cycle Analysis of Reused Steel Using the Economic Input-Output Method,” Proc.cs, The CSCE International Construction Specialty Conference 2015, June 8 - 10, 2015, University of British Columbia, Vancouver, Canada.*
  + **Capital projects** 
    - Safa, M., Safa, M., Allen, J., Shahi, A., and Haas, “Improving Sustainable Office Building Operation by Using Historical Data and Linear Models to Predict Energy Usage,” Sustainable Cities and Society, 29, 107-117, 2017.
    - Chong, W.K., Kumar, S., Haas, C.T., Beheiry, S.M., Coplen, L., and Oey, M., “Understanding and interpreting baseline perceptions of sustainability in construction among civil engineers in the United States,” ASCE Journal of Management in Engineering, Vol., 25, no. 23, pp. 143-154, July, 2009.
    - Beheiry, S. M., Chong, W., and Haas, C.T., “Examining Business Impact of Owner Commitment to Sustainability,” ASCE J. of Construction Engineering and Management Volume 132, Issue 4, April 2006, pp. 384-392.
    - *Chong, W., Haas, C.T. and Kim, S., “Benchmarking for Sustainable Practices in the Construction Industry,” Greening the Heartland 2006: Advancing Sustainable Practices, May 17-19 2006, Kansas City Missouri (Abstract Accepted).*
    - *Chong, W., Haas, C. and Kim, S., Benchmarking for Project Development Sustainability Practices, CSCE 1st International Construction Specialty Conference, Calgary, Canada, (Submitted) May 23-26, 2006.*
    - *Beheiry, S., Chong, W., and Haas, C., T., Identifying sustainability parameters for capital project performance, INCEED 2005, Charlotte, North Carolina, 27 July 2005.*
* **Engineering research and practice issues**
  + - Liu,J., Shahi, A., Haas,C., Goodrum,P., and Caldas, C., “Validation Methodologies for Construction Engineering and Management Research,” published online by the ASCE Journal of Construction Engineering and Management, August, 2014.
    - Shahi, A., Haas, C., West, J., and Akinci, B.,”Workflow-Based Construction Research Data Management and Dissemination.” J. Comput. Civ. Eng., 28(2), 244–252, 2014.
    - Haas, C., Waugh, L., and Froese, T., “History and Renaissance of Construction Engineering and Management in Canada,” Journal of Construction Engineering and Management 133 (9), pp. 678-683, 2007.
    - *Shahi, A., Carlson, K., Chettupuzha, A., Haas, C., West, J., and Akinci, B., “Construction Research Data Management,” proc.s, Construction Research Congress, Purdue, IN, 2012.*
    - *Berbash, K., Hegazy, T., and Haas, C., “Developing a New Metric to Assess Security Systems in Airports,” proc.s, CSCE Annual Conference, Quebec, QC, June 10-13, 2008.*
    - *Haas, R., Kennepohl, G., Tighe, S., Haas, C., and Rothenburg, L., “Strategic Planning for Waterloo’s Centre for Pavement and Transportation Technology,” proc.s, CSCE Annual Conference, Quebec, QC, June 10-13, 2008.*
    - *Ochoa-Franco, L., Haas, C., and Dailey, C., “Construction Automation Research Database,” Automation and Robotics in Construction XI, Proceedings of the 11th International Symposium on Automation and Robotics in Construction, Brighton, UK, ed. Chamberlain, D.A., pp. 523-530, Elsevier, New York, NY, May 24-26, 1994.*