



Burcu H. Akinci

Dr. Burcu Akinci is Paul Christiano Professor of Civil & Environmental Engineering at Carnegie Mellon University and a member of the National Academies of Construction. She earned a bachelor's degree in civil engineering from the Middle East Technical University (Ankara, Turkey), MBA from Bilkent University (Ankara, Turkey), and master's and PhD degrees in civil and environmental engineering from Stanford University.

Dr. Akinci's research interests modeling and reasoning about information rich histories of buildings and infrastructure systems, to streamline construction and infrastructure operations. She specifically focuses on investigating utilization and integration of building information models with data capture technologies, such as 3D imaging and embedded sensors, to create digital twins of construction projects and infrastructure operations, and develop approaches to support proactive and predictive operations and management.

Dr. Akinci is the recipient of the IAARC Tucker-Hasegawa Award in 2021, the ASCE Computing in Civil Engineering award in 2020, Professor of the year award in 2011 from the ASCE Pittsburgh section, the CETI Outstanding Early Career Researcher award from the FIATECH in 2008 and the ASCE Walter L. Huber Civil Engineering Research Prize in 2007. She has best paper awards from the Journal of Computing in Civil Engineering in 2002, and from the Construction Research Congress, ISARC and ICCBE in 2009, 2011 and 2014, respectively.

Dr. Akinci has two patents, and one provisional patent and over 70 refereed journal publications and 100 conference publications. She was the PI of more than \$6M grants and co-PI of more than \$10M grants, supported by federal and state agencies and industry. She has given over 100 invited presentations and co-edited books on CAD/GIS Integration and on Embedded Commissioning. She co-founded and is the Chief Innovation Officer at the LeanFM Technologies, which received the 2017 Pittsburgh Business Times Innovation Award. She also serves on the National Academies Board on Infrastructure and the Constructed Environment.

BURCU H. AKINCI

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Education

- *Leadership courses and certifications:*
 - Leadership and Negotiation Academy, Tepper Business School, September 2017-March, 2018
 - ELATE (Executive Leadership in Academic Technology and Engineering), August 2015-March 2016
- *PhD, Civil and Environmental Engineering, Stanford University, 2000*
 - Thesis Title: Automated Generation of Activity Work-Space Requirement and Time-Space Conflict Analyses
 - Advisor: Prof. Martin Fischer
- *Engineering, Civil and Environmental Engineering, Stanford University, 1996*
 - Thesis Title: Contractors' Risk of Cost Overburden
 - Advisor: Prof. Martin Fischer
- *MS, Civil and Environmental Engineering, Stanford University, 1995*
- *MBA, Graduate School of Business, Bilkent University, Turkey, 1993*
 - Thesis Title: Determinants of Marketing and Manufacturing Interface
 - Advisor: Prof. Mehmet Pasa
- *BSc., Civil Engineering, Middle East Technical University, Turkey, 1991*

Employment

07/2009 - *Prof. Civil and Environmental Engineering, Carnegie Mellon University*

01/2016 - *Chief Innovation Officer and Co-Founder, LeanFM Technologies*

09/2015 -09/2021 *Associate Dean for Research, College of Engineering*

01/2016 – 09/2021 *Director of Engineering Research Accelerator, College of Engineering*

07/2013 - 17 *Co-director of Smart Infrastructure Institute (formerly known as Pennsylvania Smart Infrastructure Incubator)*

07/2006 - 09 *Assoc. Prof. Civil and Environ. Eng., Carnegie Mellon University*

2000-2006 *Assist Prof. Civil and Environ. Eng., Carnegie Mellon University*

1994-2000 *Research Assistant, Civil and Environmental Engineering, Stanford Univ., CA.*
1999 *Teaching Assistant, Civil and Environmental Engineering, Stanford Univ., CA.*
1998 *Production Analyst, Pacific Contracting, San Francisco, CA.*
Sum. 1997 *Project Engineer, Kutlutas Construction Inc, Ankara, Turkey.*
1992-1993 *Teaching Assistant, Bilkent University, Grad. Sch. of Business, Ankara, Turkey*
Sum. 1988-89 *Assistant Project Engineer, Kutlutas Construction Inc, Mersin, Turkey.*

Awards, Prizes, Honors

1. Inducted to National Academies of Construction, 2021
2. Tucker-Hasegawa Award, IAARC, 2021
3. Computing in Civil Engineering Award, ASCE, 2020.
4. Honorary member of the WTS Pittsburgh Chapter, 2020.
5. Co-recipient, 2017 Pittsburgh Business Times Innovation Award, December, 2017
6. Co-recipient, Best Paper Award, ICCCB 2014
7. Co-recipient, Outstanding Reviewer, ASCE Journal of Computing in Civil Engineering, 2013.
8. Co-recipient; Best Poster Award, CII Annual Meeting, 2011.
9. Co-recipient; Best Paper Award, ISARC 2011.
10. Professor of the year, ASCE Pittsburgh Chapter, 02/2011.
11. Co-recipient; The most cited paper between the years of 2005-2010, Advanced Engineering Informatics, 09/2010.
12. Paul P. and Norene Christiano Fellowship, Carnegie Mellon University, 05/2010.
13. Steven J. Fenves Award for Systems Research, Inst. For Complex, Eng. Systems, March 2010.
14. Co-recipient; ACE Award to Recognize Innovative Use of Technology to Promote Internationalism, American Council on Education, 02/2010.
15. Best Paper Award, Construction Research Congress, ASCE, 2009.
16. CETI, Outstanding Early Career Researcher, FIATECH 2008.
17. ASCE 2007 Walter L. Huber Civil Engineering Research Prize
18. NSF CAREER award, National Science Foundation, 2005.
19. George Tallman Ladd Research Award, Carnegie Institute of Technology, Carnegie Mellon University, 2003,
20. Best Paper Award, Journal of Computing in Civil Engineering, ASCE, 2002.
21. Lieberman Fellowship, School of Engineering, Stanford University (1999-2000).
22. NATO doctoral student scholarship through Turkish National Science Foundation (TUBITAK) (1997-1998).

Teaching and Education – Courses Taught at Carnegie Mellon Univ.

Throughout my career at Carnegie Mellon, I have taught the following courses:

- *Symbolic Modeling in Civil Engineering (2001-2006)*: This course gives an overview of approaches to symbolic modeling using some Artificial Intelligence Techniques, introduces key concepts of object-oriented modeling and programming, and discusses symbolic modeling trends in the A/E/C industry. This course will give students core concepts of general object-oriented modeling (e.g., UML and Express-G) and process modeling (IDEF0) approaches and techniques. It will provide an overview of product and process modeling trends in Architecture/Engineering/Construction industry and introduce key concepts for designing and developing symbolic model-based systems.
- *Decision Contexts (2006-2009)* : This course covers representative model-based reasoning approaches (heuristic classification, model-based diagnosis, configuration and planning) from the general Artificial Intelligence domain and discuss its applications to the Architecture/Engineering/Construction industry. The students are asked to apply these techniques to a problem of their choice.
- *International Collaborative Construction Management (2007-2013)*: One known problem reported by several construction companies is that their engineers and project managers are not prepared to deal with the requirements of increasing globalization, created by new opportunities from expanding markets all over the world. Construction companies, engineers and project managers are realizing that their domain knowledge on materials, equipment, construction techniques, management techniques and methods, and social skills are local and that when they are bidding and planning international projects to be built abroad they have to learn to work, collaborate and acquire information from local engineers and managers. This course will provide this experience to our students by exposing them to an international collaboration experience. Students in the US, Brazil, Israel, and Turkey will be teamed in a virtual international joint venture. The students are expected to produce schedules, cost estimates, and risk assessment plans for a facility that would be built in Turkey, Brazil, Israel, and in the US. Students will have to apply knowledge about local construction methods, materials, labor, and equipment costs, labor productivity, local standards, etc to compare their solutions for the different countries. This course won ACE award from American Council on Education in 2010.
- *Project management for Construction (2001-2019)*: Introduction to construction project management from owner's perspective in organizing planning, design, construction and operation as an integrated process. Examination of labor productivity, material management and equipment utilization. Cost estimation and financing of constructed facilities. Contracting, construction planning and fundamental scheduling procedures. Cost control, monitoring and accounting for construction. This is a required course for students doing BS in Civil and Environmental Engineering and MS in Architecture/Engineering/Construction Management.

- *Building Information Modeling (2011-2014)* The intent of this course is to introduce students to the concepts associated with information modeling and analysis. The students will learn the building information modelling efforts in the Architecture/Engineering/Construction and Facility Management (AEC/FM) industry, fundamentals of object-oriented modelling and techniques to develop information models. At the same time, the students will be exposed to and will have hands-on experiences with some of the existing software systems in the AEC/FM industry that leverage such information models for decision support. This is a required course for students doing MS in Architecture/Engineering/ Construction Management.

Student Research Projects

Undergraduate Research Projects

1. Nick Carter. "Implementation of IFC representations in Java for distributed space planning." Spring, 2001.
2. Sarah Schrass. "A framework for Classification of Defects on Construction Sites." Summer, 2002. (REU student)
3. Martha Alunkal. "Assessing the Role of Surveyors and Inspectors on Construction Sites." Summer, 2002.
4. Linda Wang. "Network Organizations and Construction Project Teams." Spring 2003. (CIT Honor's project)
5. Peter Allen. "Development of a Visualization Environment for Viewing As-Built and As-Designed Construction Information." Summer 2003. (REU student, mainly advised by Daniel Huber and Chris Gordon)
6. Allison Spare. "Construction Inspection Process Models." Summer 2004. (REU student)
7. Arthur Goh. "Utilization of RFID tags to access history of building material for environmental assessment." May, 2005 (advised jointly with Prof. Cliff Davidson). (CIT Honor's project)
8. Malena M. Yablinsky. "Evaluation of Laser Scanner Data from Construction Job Sites using a Commercially Available System." 05/2005-2006. (REU student)
9. Tommy Hendrickson. "Experiments for assessing the reliability of RFID signal strength." Summer, 2006.
10. Owen Jarrett. "Evaluation of the capability of 3D imaging technologies for detecting edges of components." Summer, 2008 (REU Student).
11. Katherine Basta. "Differing dashboard needs of construction project team members", Fall 2008 and Spring 2009 (CIT Honor's Project)
12. Brittani Grant. "BIM usage in the Architecture/Engineering/Construction industry." Fall 2009 and Summer 2010.
13. Sarah Zakrajsek. "Laser Scanning and Building Information Modeling of a Facility Renovation Project." Summer 2011.
14. Jeannette Baker. "Identification of assumptions made during construction planning: A bridge construction case study." Summer 2011.

15. Christopher Ejiolor, Michael Oden, Millard Mc. Elwee. "Development of the building information model for a campus building." Fall 2012.
16. Michelle Couste and Rachel Browne. "Impact of different communication technologies and face-to-face meetings on collaboration within multi-cultural teams." Fall 2013 and Spring 2014.
17. Millard McElwee. "Sherman and Joyce Bowie Scott Hall Case Study." Fall 2013
18. Sara Guo. Building Information Modeling." Fall 2014, Fall 2016.
19. Ava Badie, "Fault Detection and Diagnosis in Building Systems." Summer 2021
20. Skylar McAuliffe " Digital Twins," Summer 2021
21. Chris Robert, "3D Imaging Technologies and their use for education." Fall 2021

Master's Thesis/Project Students

1. Min Young Hwang (advising jointly with Prof. Berges). Application of Causal Discovery Algorithms in the Root Cause Analysis of Faults in Heating, Ventilation, and Air Conditioning (HVAC) Systems, December, 2020.
2. Crystal Fernandez (advising jointly with Prof. Berges). Possible values of prescriptive maintenance for facility management, May 2020
3. Rahim Ali. Understanding the Impact of Construction Processes on Building Envelope Thermal Performance. December 2019.
4. Bingqing Chen (advised jointly with Prof. Berges). Intelligent Facility Management. December 2018.
5. Yasamin Hashemi Tari (advised jointly with Prof. Berges and Prof. Pozzi), Predictive Models For Estimating The Number Of Methane Leak Events In Natural Gas Distribution Pipelines. December 2018.
6. Minkyung Kang (advised jointly with Prof. Berges). Airport Energy Management. (12/2016).
7. Merthan Koc (advised jointly with Prof. Berges). Context-driven localization of temperature sensors (05/2014).
8. Miguel Mora (advised jointly with Prof. Berges) Information exchanges for coordination and quality control of mechanical elements to support energy-efficient retrofits of facilities (08/2014).
9. Jennifer Frazier (advised jointly with Prof. Ergan). Information requirements for risk-based analyses of dams (12/2012).
10. Tim Lam (advised jointly with Prof. Ergan), Visualization of Dam related data for risk assessment and asset management, (05/2012).
11. Eyb Poosh, Matineh (advised jointly with Prof. Mario Berges). Capturing and modeling as-is conditions, (05/2012).
12. Salih Demir (advised jointly with Prof. Jim Garrett) A Semantic Web-based Approach for Representing and Reasoning with Vocabulary for Computer-based Standards Processing (12/2009)

13. Saurabh Taneja (advised jointly with Prof. Jim Garrett) Formalization of data fusion to support facility managers and first responders (09/2009).
14. Ziqi Chen, (advised jointly with Prof. Jim Garrett) A multi-sensor data fusion model for decision support in building facility management (08/2007).
15. Berkay Baykal. Overview of Different Building Information Modeling Approaches and Software Systems (05/2007).
16. Sharad Oberoi. (advised jointly with Prof. Jim Garrett) "Functional Requirements for CAD and GIS integration." May 2006.
17. Jerry Himes. "Situation Awareness for Lean Construction." May 2006.
18. Xing Wu. " Model-based Sensor-Enabled Water Management." May 2006.
19. Subhash Tuladhar. "Distributed Constraint-based Scheduling on Construction Sites." August 2004.
20. DeWitt Latimer (advised jointly with Prof. Jim Garrett). "Estimating the Cost of Software Components in Civil System Development Using Function Point Analysis." May 2002.
21. Kevin Tantisevi. "An Approach for Automating the Generation of a Simulation Model of Construction Processes from a Schedule." May 2002.

Ph.D. Students

1. Jan Reinhardt (advised jointly with Prof. Jim Garrett). Navigational Models For Effective And Efficient Interaction With Integrated Product And Process Models On Construction Sites, 12/2003. Dr. Reinhardt is the Founder and the Principal of ADEPT Project Delivery, LLC.
2. Esin Ergen. Formalization of Life-Cycle Data Management of Pre-engineered Components using Advanced Tracking Technologies, 11/2005. Dr. Ergen is Assoc. Professor at the Civil Engineering department at Istanbul Technical University, Istanbul, Turkey.
3. Kevin Tantisevi. Formalization and Automation of Generation of Equipment Work Spaces on Construction Sites. 05/2006. Dr. Tantisevi is a tenure-track Assistant Professor of Civil Engineering at King Mongkut's University of Technology, North Bangkok.
4. Frank Boukamp. Modeling of and Reasoning about Construction Specifications for Automated Defect Detection. 05/2006. Dr. Boukamp is a Senior Lecturer for Construction Management at Royal Melbourne Institute of Technology. Melbourne Area, Australia.
5. Hongjun Wang (advised jointly with Prof. Jim Garrett). Domain-Oriented Semi-Automated Model Matching for Supporting Building Commissioning-Related Data Exchange, 05/2006. Dr. Wang is a Software Engineer at Google.
6. Chris Gordon (advised jointly with Prof. Jim Garrett). A Formalism and a Framework for Planning of Sensor-Based Inspections on Construction Sites, 12/2006. Dr. Gordon is Assoc. Professor and Chair at the Civil Engineering department at Southern University of Illinois at Edwardsville.

7. Semiha Kiziltas, Formalization of Creating a Method-Based Project History for Supporting Cost Estimating Decisions, 05/2008. Dr. Kiziltas is a tenured Assoc. Prof. at the Civil and Environmental Engineering department at New York University.
8. Anu Pradhan, Formalization of multi-source data fusion to support construction productivity monitoring, 08/2009. Dr. Pradhan is a senior machine learning and software engineer at Bloomberg.
9. Pingbo Tang, Extraction of Surveying Goals from Point Clouds Obtained from Laser Scanners to Support Bridge Inspection, 08/2009. Dr. Tang is a tenure-track Assoc. Prof. of Civil and Environmental Engineering at Carnegie Mellon University.
10. Fernanda Leite. Computational Support for First Responders, 08/2009. Dr. Leite is a tenured Prof. at the University of Texas at Austin.
11. Asli Akcamete (advised jointly with Prof. Jim Garrett). A formalism and a framework for updating building information models, 08/2011. Dr. Akcamete is a tenure track Assist. Prof. at the Civil Engineering department at Middle East Technical University, Ankara, Turkey.
12. Pine Liu (advised jointly with Prof. Garrett and Prof. Berges), Framework for Supporting Reconfigurable HVAC Systems, 09/2012. Dr. Liu is an Adjunct Faculty Member at Civil and Environmental Engineering at Carnegie Mellon and Co-founder and CTO of LeanFM Technologies.
13. Guzide Atasoy, A visualization framework for construction progress monitoring. 02/2013. Dr. Atasoy is a tenure track Assist Prof. of Civil Engineering at Middle East Technical University.
14. Saurabh Taneja (advised jointly with Prof. Garrett and Prof. Soibelman). A Framework for Fusing Sensing Data with Building Information: An Application for Indoor Localization, 05/2013. Dr. Taneja is a Product Specialist-Predictive Analytics Applications at SAP Labs LLC.
15. Te Gao (advised jointly with Prof. Garrett and Prof. Ergan), Development of Complete and Accurate as-is BIMs from Progressive Laser Scanned Data to Support Information Handover, February 2014. Dr. Gao is a research scientist at Amazon.
16. Engin Burak Anil (advised jointly with Prof. Garrett and Prof. Kurc), Utilization of As-is Building Information Models Obtained from Laser Scan Data for Evaluation of Earthquake Damaged Reinforced Concrete Buildings, February 2015. Dr. Anil is Lead Engineer at 3D Data Ltd.
17. Jerry Lei (advising jointly with Prof. Berges). Systematic Control Logic Fault Identification and Localization of Heating, Ventilation and Air Conditioning System, May 2019. Dr. Lei is a Research Scientist at PNNL.
18. Yujie Wei. "Updating an as-designed digital twin of occluded components by using unstructured images captured during construction." September 2021. Dr. Wei is currently a postdoc at Carnegie Mellon.
19. Varun Kasireddy. "Vision-based probabilistic assessment of bridges". December 2021.

20. Raghuram Sunnam (advising jointly with Prof. Ergan). "Formalizing the Representation of HVAC Sequence of Operations for Automated Diagnosis of Control Problems", May 2022.
21. Chi Yon Cho (advising jointly with Prof. Liu). "Automated generation of asset design information of mechanical systems using 2D drawings." May 2022.
22. Miguel Mora. "An Approach To Assess Social Impact Of Innovations In Processes Of Fabrication And Delivery Of Temporary Housing In Hybrid Business Organizations." May 2022.
23. Zhuoran Zhang. "Causal Inference with High-resolution Observational Data to Mitigate Work Zone Crash Risk." (advising jointly with Prof. Qian). TBD
24. Elvin Vindel Pinto (advising jointly with Prof. Berges). TBD
25. Min Young Hwang (advising jointly with Prof. Berges). TBD
26. Nicholas Gratius (advising jointly with Prof. Berges). TBD
27. Zhichen Wang (advising jointly with Prof. Berges). TBD

Postdoc students

1. Yu Hou (with Prof. Berges) (09/01/2021-)
2. Yujie Wei (10/01/2021-)
3. Jooho Kim (with Prof. Qian) (05-12/2018)
4. Justin Yeoh (08/2015-08/2017)

Grants and Contracts Awarded to Date

Principal Investigator

1. B. Akinci. "A Distributed Space-Scheduling System for Construction Sites." The Berkman Faculty Development fund, \$6,244, 11/2000-06/ 2002.
2. B. Akinci, J. Garrett, M. Hebert, R. Krishnamurti, M. Patton, S. Thayer. "Early detection and management of defects on construction sites using integrated project models, laser scanners, and embedded sensing systems." NSF, \$1,999,598, 09/2001- 08/2006.
3. B. Akinci, I. Karaesmen. "Designing Dynamic Service Networks Effectively through Information Management: Case Studies on Construction Project Management and Crisis Management." NSF, \$148,376, 09/2002-03/2003.
4. B. Akinci, R. Krishnamurti, S. Thayer. " REU: Undergraduate Student Support for the Early Detection and Management of Defects on Construction Sites using Integrated Project Models, Laser Scanners, and Embedded Sensing Systems Project" NSF, \$30,000, 06/2002-09/2002.
5. B. Akinci, S. Smith. "Exploration for the Development of a Framework and Algorithms for Effective Distributed Scheduling on Construction Projects." PITA, \$48,997, 10/2002-01/2004.

6. B. Akinci, R. Sacks. "Real-time Tracking and Monitoring of Precast Concrete Pieces during production, erection and maintenance phases in support of Lean Supply-Chain Management." PITA, \$37,043, 10/2003-10/2004.
7. B. Akinci. "Real-time Tracking and Monitoring of Precast Concrete Pieces in the Manufacturing Plant." PCI, \$18,000, 09/01/2004 – 08/31/2005.
8. B. Akinci. "Lifecycle Data Management of Building Components for Operations and Maintenance Activities Utilizing RFID Technology." CERL, \$14,574, 12/01/2004 – 02/28/2005.
9. B. Akinci, O. Akin, M. Hebert, J. Gibson, N. Pollard. "MRI: Acquisition of a High- Performance Laser Scanner for Research and Education in Civil Engineering, Architecture, Robotics and Computer Graphics." NSF, \$195,413, 10/01/2004 – 09/30/2007.
10. B. Akinci, H. Karimi. "Exploration and Formalization of an Ontological Engineering Approach for Integrating CAD and GIS in Infrastructure Management Systems." PITA, \$47,760, 1/1/2005 – 12/31/2005.
11. B. Akinci. "CAREER: Development of an Integrated Framework for Capturing, Modeling and Visualizing the History of Construction Projects." NSF, \$406,623, 02/01/2005-01/31/2010.
12. B. Akinci. "Development of and Integrated Framework for Capturing, Modeling, and Visualizing the History of a Construction Project." NSF, \$406,623.00, 09/2005 – 06/2011.
13. B. Akinci, J. Garrett, O. Akin. "An Integrated Approach for Interpreting and Fusing Building and Mobile Sensor Streams in a Facility into high-Level information." NIST, \$350,000, 10/01/2005 – 9/31/2007.
14. B. Akinci, C. Gonzalez. "Learning from the Past: Improving Estimation of Future Construction Projects." PITA, \$60,049, 01/01/2007-12/31/2007.
15. B. Akinci, D. Huber. "Evaluation of capabilities of different types of laser scanners and corresponding data processing software systems for quality control." Bombardier and PITA, \$50,856, 07/01/2006-06/31/2007.
16. B. Akinci, P. Narasimhan, J. Garrett. "Intelligent facility components to guide navigation within a facility." PITA, \$59,102, 01/2007-12/2007.
17. B. Akinci, D. Huber. "Real-time quality control for running surfaces and guide-rails on transit systems." PITA and Bombardier Transportation Systems, \$56,667, 09/2007-09/2008.
18. B. Akinci, D. Huber. "Active Utilization of 3D Imaging Technologies Throughout The Lifecycle Of Facilities." GSA, \$62,214, 10/2007-10/2008.
19. B. Akinci, D. Huber. "Extending/Augmenting Current Building information Models with Scanned Data." NIST, \$50,824, 10/2007-10/2008.
20. B. Akinci, J. Garrett. "Assessment of Leveraging of Building Information Models for Construction Progress Monitoring and Control on a Real-world Case." PITA, \$54,000, 01/2008-12/2008.
21. B. Akinci, J. Garrett. "Development of a Framework for Evaluating and Fusing Different Data Capture Technologies to Support Continuous Construction Productivity Analyses and

Improvement.” NIST – Nat. Inst. of Standards and Technology, \$249,410, September 2009 - August 2011.

22. B. Akinci, D. Huber. “Tools for Modeling and Analyzing Structural Steel, Pipes, and Other Thin Objects in Process Plants, Construction Sites, and Infrastructure.” PITA, \$49,917, January 2011 - December 2011.
23. B. Akinci, M. Berges. “Greater Philadelphia Innovation Cluster For Energy Efficient Buildings (year 1 Task 2).” DOE, \$351,007, September 2010 - August 2011.
24. B. Akinci, J. Garrett, L. Soibelman. “Indoor Positioning System Using Inertial Navigation to Recalibrate Ambient RF Signaling.” Army, \$235,061, April 2010 - March 2011.
25. B. Akinci, J. Garrett, L. Soibelman. “Requirements for and approaches toward context-aware BIM.” US Army, \$182,180, June 2009 - June 2011.
26. B. Akinci, J. Garrett. “Facilities Management in 3D world.” PITA, \$49,781.00, January 2011 - December 2011. And an additional \$30,000 gift from Gannett Flemming.
27. B. Akinci, M. Berges, J. Garrett. “GPIC: Enterprise Architecture for Integrated Practice with Building Information modeling: HVAC focus.” DOE/PSU, \$152,566.00, February 2012 - February 2013.
28. B. Akinci, M. Berges, B. Sinopoli, K. Lam. “Exploratory Study of Building Energy Management and Modeling Technologies.” Toshiba, \$500,000, March 2014-March 2015.
29. B. Akinci, M. Berges, A. Singh. “Towards Useful Benchmarking and Understanding of Energy Use in Urban Facilities.” Metro21, \$35,000.00, January 2015 - December 2015.
30. B. Akinci, M. Berges. “Identification of Information Requirements for BIM and Approaches to Generate and Utilize BIM for Airport Facility Operations.” PITA \$56,873, and an additional \$25,000 gift from Honeywell.
31. B. Akinci, D. Armanios, Z. Qian. “Work Zone Safety Management through Dynamic Traffic Simulation.” CMU University Transportation Center, \$127,000.00, October 2017 - August 2018.
32. B. Akinci, Berges, M. “Comparison and Assessment of Information-based, Physics-based and Hybrid Digital Twins: An HVAC Case study.” \$73,999 PITA, August 2021 and with \$15,000 from Ansys.

Co-Principal Investigator

1. J. Garrett, B. Akinci, C. Paredis, S. Thayer. “Design of a System for Early Detection of Guideway Safety Envelope Incursions.” PITA, \$41,000, 09/2000-09/2001.
2. J. Garrett, B. Akinci, C. Paredis, S. Thayer. “Design of a System for Early Detection of Guideway Safety envelope Incursions.” Adtranz. (Bombardier), \$80,000, 09/2000-09/2001.
3. B. Akinci, C. Hendrickson, J. Garrett, I. Karaesmen, S. Matthews, M. Patton, E. Subrahmanian. “Multi-disciplinary Exploratory Research to Exploit Motor Vehicle Information and Communications Technology.” NSF, \$99,281, 01/2002-12/2002.
4. O. Akin, B. Akinci, J. Garrett. “Determining the Requirements on Product and Process Models that Support Building Commissioning.” NIST, \$219,892, 10/2002-05/2004.

5. C. Hendrickson, S. Matthews, B. Akinci. "Exploring the Use of Automatic Real-Time Photographic Data Acquisition and Archival for Construction Project Documentation." PITA, \$37,308, 10/2002-01/2004.
6. J. Garrett, B. Akinci, O. Akin. "The Development and Use of an Automated Test Rig for Assessing the Effectiveness of the IFC Rel. 2x Data Exchange Standard for Exchange of Building Commissioning Data." NIST, \$199,803, 09/2003-02/2005.
7. B. Akinci, C. Hendrickson, C. Davidson. "Towards an Automated Environmental Assessment of Building Designs." PITA, \$45,506, 1/1/2005 – 12/31/2005.
8. Akin, O., Akinci, B., Garrett, J. "Embedded Commissioning for Improved Building Operations and Maintenance: Case Studies, Data Models and Exchange for Interoperability." NIST, \$200,000, 09/2004-08/2006.
9. C. Earls (University of Pittsburgh), B. Akinci, M. Gallick (Rhea Engineers). "Safety assessment for steel bridges damaged by truck strikes." PennDOT, \$155,480 (CMU subcontract amount), 03/01/2005 – 02/28/2007.
10. J. Garrett, C. Hendrickson, L. Soibelman, O. Akin, R. Krishnamurti, D. Huber, A. Steinfeld. "Indefinite Delivery Contract for Research Support in the Area of Engineering Processes for Facility Delivery Activities and Facility Sustainment Management." \$1,000,000, 09/2006-09/2010.
11. Soibelman, L., Akinci, B. "ICCM - International Collaborative Construction Management." Carnegie Mellon University, \$15,000, 02/2006-02/2008.
12. Akin, O., Akinci, B., Garrett, J. "Functionalizing Product and Process models for Embedded Commissioning of Low Energy Buildings." NIST, \$300,000, 10/2006-10/2008.
13. Soibelman, L., Akinci, B., Matthews, S. "A demonstration of Sensor Andrew as a Framework to Support Data Fusion and Integration from multiple Sensor Platforms." PITA. \$56,000, 01/2008-12/2008.
14. Soibelman, L., Akinci, B., Matthews, S. "A demonstration of Sensor Andrew as a Framework to Support Data Fusion and Integration from multiple Sensor Platforms using IBM's System-S." IBM, \$40,000, 02/2008-01/2009.
15. J. Garrett, B. Akinci, L. Soibelman. "E-RIC Energy Innovation Hub." PSU/DOE, \$5,501,247.00, November 2010 - September 2015.
16. S. Ergan, B. Akinci. "Bridging facilities operations with maintenance to improve understanding of building system behaviors." PITA, \$50,000, January 2013 - May 2014.
17. S. Ergan, B. Akinci. "Building Energy Information Visualization: Development of Customized Dashboards." Department of Energy, EEB Hub, \$188,903, January 2013 - February 2014.
18. M. Berges, A. Rowe, A. Akinci, S. Ergan. "A Fully Instrumented Building Laboratory for Energy Management and Control." CIT, \$90,000, April 2013 - July 2013.
19. S. Scherer., D. Huber, B. Akinci. "Multi-modal Infrastructure Inspection using Low-flying Robots." PITA, \$50,000, February 2013 – Present.
20. D. Huber, B. Akinci. "Automating the Creation of As-Built Information Models." NSF, \$439,990, August 2009 - July 2012.

21. S. Ergan, M. Berges, B. Akinci, J. Garrett. "Instrumentation Infrastructure for Monitoring the Health and Behavior of Dams and Levees." Hurricane Protection Alliance Joint Venture, \$176,309, July 2011 - June 2012.
22. S. Ergan, M. Berges, B. Akinci, J. Garrett. "Research on Development and Testing of Formalisms and Approaches to Support Construction Planning Management and Quality Assurance." Army, \$188,463, September 2006 - September 2011.
23. B. Akinci, J. Garrett. "Requirements For Creating And Measuring Computer-Processable Versions Of Engineering Codes And Standards." National Institute Of Standards & Technology, \$152,610, September 2008 - February 2011.
24. M. Berges, B. Akinci, S. Ergan, J. Garrett. "Identification of Requirements for Information Modeling, Analysis and Visualization using a Pilot Study of a Specific Dam." HURRICANE PROTECTION ALLIANCE JOINT VENTURE, \$225,000.00, September 2012 - August 2013.
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26. Gordon, C., Akinci, B., Garrett, J. (2004) "An Approach for Planning Sensor-Based Inspection of the Built Environment." *Xth International Conference on Computing in Civil and Building Engineering*, Bauhaus-Universität Weimar, June 02-04, 2004, Weimar.
27. Wang, H., Akinci, B., Garrett, J., Akin, O., Turkaslan-Bulbul, T., Gursoy, I. (2004) "Towards Domain-Oriented Semi-Automated Model Matching for Supporting Data Exchange." *Xth International Conference on Computing in Civil and Building Engineering*, Bauhaus-Universität Weimar, June 02-04, 2004, Weimar.
28. Reinhardt, J., Akinci, B., Garrett, J.(2004) "SiDaCoS: Product and Process Models on Construction Sites." *Xth International Conference on Computing in Civil and Building Engineering*, Bauhaus-Universität Weimar, June 02-04, 2004, Weimar.
29. Akinci, B. (2004) "Using Sensor Systems and Standard Project Models to Capture and Model Project History for Building Commissioning and Facility Management." *Facility Area Network Workshop*, Civil Engineering Research Lab, Urbana-Champaign, IL, Feb. 26-27, 2004. <http://www.cecer.army.mil/pl/project/projects/fan/briefing/CERLpaper.pdf>
30. Pekerikli, M. K, Akinci, B., Karaesmen, I. (2004) "Engineering the Incorporation of Information Technologies into Construction Service Networks." *2004 National Science Foundation Design, Service and Manufacture and Industrial Innovation Grantees and Research Conference*, January, 7-9, 2004, Texas.
31. Gordon, C., Akinci, B., Garrett, J. (2003) "The Need for Value Analysis and Planning for Effective Quality Control Technology Decision-making." *Towards a Vision for Information Technology in Civil Engineering*, 11/15-16, 2003, Nashville, TN.
32. Pekerikli, M. K., Akinci, B., Karaesmen, I. (2003) "Modeling Information Dependencies In Construction Project Network Organizations." *Towards a Vision for Information Technology in Civil Engineering*, 11/15-16, 2003, Nashville, TN.
33. Karimi, H. A., Akinci, B., Boukamp, F., Peachavanish, R.(2003) "Semantic interoperability in infrastructure systems." *Towards a Vision for Information Technology in Civil Engineering*, 11/15-16, 2003, Nashville, TN.

Other Writings (Technical Reports and Testimony)

1. Akinci, Burcu; Anumba, Chimay (2008) Editorial - Sensors in Construction and Infrastructure Management, *ITcon* Vol. 13, Special Issue Sensors in Construction and Infrastructure Management, pg. 69-70, <http://www.itcon.org/2008/5>.
2. Brilakis, I., Akinci, B. (2009). "Computing in Civil Engineering – Lessons Learned from the ASCE International Workshop on Computing in Civil Engineering." *Journal of Computing in Civil Engineering*.
3. Brilakis, I., Akinci, B. (2009). "Special Issue – Selected & Revised Papers from the ASCE International Workshop on Computing in Civil Engineering 2007, Special Section 1." *Journal of Computing in Civil Engineering*.

4. Brilakis, I., Akinci, B. (2009). "Special Issue – Selected & Revised Papers from the ASCE International Workshop on Computing in Civil Engineering 2007, Special Section 2." *Journal of Computing in Civil Engineering*.
5. Brilakis, I., Akinci, B. (2009). "Special Issue – Selected & Revised Papers from the ASCE International Workshop on Computing in Civil Engineering 2007, Special Section 3." *Journal of Computing in Civil Engineering*.
6. Song, J., Haas, C., Caldas, C., Ergen, E., Akinci, B., Wood, C. R., Wadephul, J. (2004). "Using RFID to Track Fabricated Pipe- Field Trials and Potential Benefit Assessment." *FIATECH Smart Chips Report*, 11/14/2004.
7. Akinci, B., Ergen, E., Haas, C., Caldas, C., Song, J., Wood, C. R., Wadephul, J. (2004). "Field Trials of RFID Technology for Tracking Fabricated Pipe." *FIATECH Smart Chips Report*, 02/25/2004.
8. Latimer, D. IV, Gujar, S., Garrett, J., Akinci, B., Thayer, S., Paredis, C. (2002) "Running Surface Assessment Technology Review." *ICES Technical Report Number 04-03-02*, Institute For Complex Engineered Systems, Carnegie Mellon University, May 2002.
9. Akinci, B., Fischer, M., Kunz, J., Levitt, R. (2000). "Representing Work Spaces Generically in Construction Method Models." *Working Paper # 057*, Center for Integrated Facility Engineering, Stanford University, CA, June 2000.
10. Akinci, B., Fischer, M., Kunz, J. (2000). "Automated Generation of Work Spaces Required by Construction Activities." *Working Paper # 058*, Center for Integrated Facility Engineering, Stanford University, CA, June 2000.
11. Akinci, B., Fischer, M., Levitt, R., Carlson, B. (2000). "Formalization and Automation of Time-Space Conflict Analysis." *Working Paper # 059*, Center for Integrated Facility Engineering, Stanford University, CA, June 2000.

Patents and Disclosures

1. B. Akinci, M. Berges, J. Garrett, X. Liu. "An Integrated Information Framework for Automated Performance Analysis of Heating, Ventilation, and Air Conditioning (HVAC) Systems". Patent submitted in 09/05/2013, and approved. US Patent No: 14/019,261
2. B. Akinci, J. Garrett, A. Akcamete, X. Liu. "A formal approach for linking Building Information Models (BIMs) with work-order (WO) data to enable displaying and querying WO information in BIM." Patent submitted on 12/03/2010.
3. B. Akinci and A. Pradhan. "Automated planning based approach to fuse data from multiple sources." Patent submitted on 08/01/2011, approved on 03/2014, U.S. Patent No.: 8,862,614

Invited talks and Seminars

1. "Towards Predictive Situation Awareness and Assessment of Infrastructure Systems.", ASCE Tech Talk, October 2021 (held over zoom).

2. "Computing in Civil Engineering on Earth and Beyond – Personal Reflections." Computing in Civil Engineering Workshop Plenary Session, Orlando, FL, September, 2021.
3. "Context Aware AI for Infrastructure and Facility Management," National Academy of Engineering Section 4 Civil Engineering Webinar on Applications of AI in Civil Engineering and Beyond, June 2021 (held over zoom).
4. "AI in Construction at Carnegie Mellon." AI Institute Planning workshop, April 2021.
5. "Context Aware AI for Infrastructure and Facility Management." GNI International Symposium on Artificial Intelligence for the Built world, April 2021 (held over zoom).
6. "Research in Smart Infrastructure", UT Austin Civil and Architecture department, Smart Cities class, March 3, 2021 (held over zoom).
7. "Context Driven Analytics and AI for Infrastructure and Facility Management" Keynote Presentation at IPC 2020 (International Conference on Innovative Production and Construction), Dec 6, 2020 (held over zoom).
8. "Context Driven Analytics and AI for Infrastructure and Facility Management" Departmental Presentation at Civil and Environmental Engineering department at Northeastern University, November 5, 2020 (held over zoom).
9. "Context Driven Analytics and AI for Infrastructure and Facility Management" Keynote Presentation at BuildSys, New York, November 13, 2019.
10. "Accelerating Engineering Research" Invited Speaker at the College of Engineering retreat at University of Illinois at Chicago, October 15, 2019.
11. "Integration of Building Information Models with Data Capture Technologies" Invited presentation at department of Civil and Environmental Engineering, University of Illinois at Chicago, October 15, 2019.
12. "Integration of Building Information Models with Data Capture Technologies" Keynote presentation at SBTIC 2019 Science, Technology & Engineering in Campinas, August 2019, Sao Paulo, Brazil.
13. "Digitizing Buildings and Infrastructure Systems" Invited Lecturer, European Council of Computing in Construction Summer School, July 17, 2019, Senigallia, Italy.
14. "'Big' data analytics for construction and infrastructure management: Good, Bad Ugly". Keynote Presentation, 2019 ASCE International Conference on Computing in Civil Engineering, June 18, 2019.
15. "Smart Construction/Smart Infrastructure" Invited presentation at the Foreign Economic Relations Board of Turkey (DEİK) meeting, May 29, 2019.
16. "Research at Carnegie Mellon – The end of disciplinary silos" CMU Istanbul Alumni Event, Istanbul, Turkey, June 2, 2019.

17. "Sensors and Information Models for Construction and Infrastructure Management." Departmental Seminar, Civil and Environmental Engineering department, Syracuse University, Syracuse, April 05, 2019.
18. "Sensors and Information Models for Construction and Infrastructure Management." Distinguished Lecture Series, Architecture, Civil and Environmental Engineering department, UT Austin, Austin, TX, February 18, 2019.
19. "Achieving Sustainability Goals: Energy and Infrastructure Monitoring Applications to Hazelwood Green Development." Hunt Foundation Board Meeting, November 16, 2018.
20. "Sensors and Information Models for Construction and Infrastructure Management." Prota BIM Conference, keynote speaker, October 11, 2018.
21. "Smart Infrastructure - Resilient Bridges." PennDOT Research Conference, September 20, 2018, Harrisburg, PA.
22. "Big Data Analytics for Facility/Infrastructure Operations and Management: Opportunities and Challenges." Machine Learning in Science and Engineering Symposium, Pittsburgh, PA, June 6, 2018.
23. "3D Imaging for Construction and Infrastructure Management Technological Assessment and Future Research Directions." EG-ICE, invited preliminary speaker, June 10 2018.
24. " Smart Infrastructure – Digital Revolution in Construction and Operations of Infrastructure Systems" Invited Presentation to the C-level executives of Chevron, 04.04.2018
25. Panel speaker on the topic of "Driving Innovation, Efficiency and Performance in the Built Environment." Prospect Silicon Valley, CA, February 21, 2018.
26. "Research in Smart Infrastructure" Annual Conference of PennDOT District 11, February 8, 2018, Pittsburgh, PA.
27. "Internet of Risky Infrastructure Things", Presentation to the board of directors of National Safety Council (NSC), January 30, 2018, Pittsburgh, PA.
28. "Technology-based Construction and Infrastructure Management" Chi Epsilon Seminar, Carnegie Mellon University, Pittsburgh, PA, October 5, 2017.
29. "BIM and Sensors for Construction and Facility Management" NASA Ames Research Center, Silicon Valley, CA, September 28, 2017.
30. "Autonomous Aerial Mapping and Inspection For Infrastructure Management" Annual Conference of Pennsylvania Society of Professional Engineers, September, 6, 2017, Pittsburgh, PA.
31. "Sensors and Information Models for Construction and Facility/Infrastructure Operations" Korean Construction Institute, July 18, 2017, Seoul, South Korea.

32. "3D imaging technologies and Information Models for Construction and Infrastructure Management." Invited Keynote Speaker. International Conference On Maintenance and Rehabilitation of Constructed Infrastructure Facilities (<http://maireinfra.org/>), July 19, 2017, Seoul, South Korea.
33. "Smart Infrastructure" Invited lecture at the College of Engineering at University of Texas El Paso, June 8, 2017.
34. "Smart Infrastructure – Backbone of Sustainable Smart Cities." Invited speaker for the NSF Sustainable Smart Cities International workshop, May 9, 2017, Alexandria, Egypt (<https://www.sscworkshop.com/>).
35. "Internet of Risky Infrastructure" Internet of Risky Things Conference, sponsored by NYU and AIG, April 18, 2017, New York, NY.
36. "Big data analytics for Facility Management." Invited speaker for the energy innovation session, Energy Week, Energy Institute, Carnegie Mellon, 03.27.2017
37. "Autonomous Aerial Mapping and Inspection For Infrastructure Management" American Council of Engineering Companies (ACEC) luncheon, March 10, 2017, Pittsburgh, PA.
38. "Using Flying Machines to Assess Infrastructure in Hard-to-Reach Locations" Invited hands-on demo and exhibition. The White House Frontiers Conference, Pittsburgh PA, Oct 13, 2016. Selected as one of the three exhibitors to give a hands-on demonstration to President Obama.
39. "Sensors and Information Models for Construction and Infrastructure Management" Keynote presentation at the 12th International Congress on Advances in Civil Engineering, Bogazici University, Istanbul, Turkey, Sept 23, 2016.
40. "Big Data Analytics for Facility/Infrastructure Operations and Management: Opportunities and Challenges." Big Data in the Built Environment Workshop, Ryerson University, June 2016.
41. "Energy Efficiency Opportunities at the Pittsburgh International Airport " Honeywell Users Group Conference, June 23, 2016, Phoenix, Arizona
42. "Sensors and Information Models for Construction and Facility/Infrastructure Operations." John L. Tishman Distinguished Lecture, Department of Civil and Environmental Engineering, University of Michigan, February 8, 2016.
43. "Cognitive Computing for Engineering, Construction, Facility/Infrastructure Management" IBM Day at Carnegie Mellon, December 9, 2015.
44. "Smart Infrastructure for Smarter Decisions." Faculty to Global Leaders program, YPO-WPO, September 2015.
45. "Aerial Inspection Robots in Civil Engineering." Invited Speaker at CII Board Meeting Dinner, October 2015.

46. "Visual Sensing and Analytics for Construction and Infrastructure Management." Plenary Presentation at the Construction Industry Institute's Annual Conference, 08/04/2015.
47. "BIM and 3D Imaging for Increasing Situation Awareness and Assessment." CSC'15-The International Construction Specialty Conference; The UBC Construction Innovations Symposium, 06/09/2015 https://www.youtube.com/watch?v=1_Xp4D08ycA
48. "Making Infrastructure Systems More Resilient, Sustainable and Robust." College of Engineering, Carnegie Mellon University. (2015). <https://www.youtube.com/watch?v=VzBa5drG7ZM>
49. "Building Information Modeling for Asset Management." United States Chapter of the Institute of Asset Management, US New York Branch, 10/21/2014.
50. "Model-based Sensor-driven Construction and Infrastructure management", 3D Laser-scanning and Imaging Symposium Japan 2014, 09/26/2014, Tokyo, Japan.
51. "Situational Awareness In Construction And Facility Management", ICEST 2014, 06/03/2014.
52. "Sensors and Information Models for Construction and Facility/Infrastructure Operations." Georgia Tech, 05/02/2014.
53. "Smart Infrastructure Opportunities and Challenges. " TASSA 2014, Smart Cities Panel, 03/23/2014.
54. "Sensors and Information Models for Construction and Facility/Infrastructure Operations." Technion University, Tel Aviv, Israel, 03/11/2014.
55. Sensors and Information Models for Construction and Facility/Infrastructure Operations, Carnegie Mellon ASCE student Chapter 01/29/2014.
56. "Research in Smart Infrastructure" Engineering News Record (ENR) Webinar, October 23, 2013.
57. "Smart Infrastructure" The Peggy Smedley Show, Radio, 08/02/2013.
58. "Building Information Modeling and Laser Scanning for Construction and Facility Operations. Huazhong University of Science and Technology, June 18, 2013.
59. "Sensors and Information Models for Construction and Facility Operations", Georgia Tech., February 12, 2013.
60. "Sensors and Information Models for Construction and Facility Operations", John Hopkins, November 28, 2012.
61. "Big Data: Sensors and Information Models for Construction and Facility Operations" University of Virginia, April 14, 2012.
62. "Facility Information Modeling and Visualization." PSII/IBM day, June 2011.

63. "Sensors and Information Models for Construction and Facility Operations." University of Madera, May, 2011.
64. "PSII: Infrastructure/Facilities Information Modeling Laboratory." PSSI Inauguration Event, April 2011.
65. "Introduction to Building Information Modeling." To Brazilian Contractors Association, Pittsburgh, 09/2010.
66. "Building Information Modeling for Efficient Facility Operations and Energy Management – A survey." NIBS/CERL Energy Efficient Facilities workshop, July 2010.
67. "Model-based sensor-enabled construction and facilities management." Various companies; IBM, CAT. Fall 2010.
68. "A prototype for integrating work orders with building information models." Cleveland Clinic Facilities Management, August 2010.
69. "Building Information Modeling and other Information Technologies for Energy-Efficient Facility Operations and Management." Carnegie Mellon/Delegates from the congress visit, April 2010.
70. "Reality Capture Technologies and Building Information Modeling for Situation Awareness and Assessment on Construction Sites." Columbia University, January 2010.
71. "Reality Capture Technologies and Building Information Modeling for Situation Awareness and Assessment during Construction and Facility Operations Management." CIB W78, October 2009, Istanbul, Turkey.
72. "Building Information Modeling @ Carnegie Mellon" Eco-Build USA, December 2008.
73. "Model-based Sensor-Enabled Construction Management." Istanbul Technical University, June 2008.
74. "Utilization of Building Information Models throughout the Life-Cycle of Facilities: Opportunities and Challenges." Society of Military Engineers, Pittsburgh, February 2008.
75. "Utilization of Radio-Frequency Identification Tags (RFID) for Construction Supply-Chain and Facility Management." Bautech, Berlin, Germany, February 2008.
76. "Bridge Inspection and Asset management using 3D Imaging Technologies." International Bridge Conference, Pittsburgh, June 2007.
77. "Sensor-Enabled Model Based Construction." May 16, 2007. CenSCIR symposium Carnegie Mellon University.
78. "Test-beds for construction research." Construction Congress Testbeds workshop, May 2007.
79. "Active Quality Control and Generation of As-Built Models During Construction Using 3D Imaging Technologies" SPAR 2007, March 2007, Sugarland Texas.

80. Utilization of Radio-Frequency Identification Tags (RFID) for Transportation Infrastructure Management: Tracking Engineered-To-Order Elements and Materials throughout their Life-Cycles. *Transportation Research Board*, January, 2007.
81. "Automated Tracking of and Capturing Information Related to Engineered-to-Order Products using RFID and GPS", TRB RFID workshop, 10/17/2006.
82. "Test-beds for construction research." NSF/NIST workshop, 09/26/2006.
83. "Sensor-Enabled Model-Based Construction Management." Carnegie Mellon University, Qatar Campus, 05/09/2006.
84. "Model-Based Sensor-Assisted Construction Engineering and Management." Qatar Foundation, 05/08/2006.
85. "Model-Based Sensor-Assisted Construction Engineering and Management." KEO Consultants, 05/07/2006.
86. "Sensor-enabled construction management" Advanced Infrastructure Systems Symposium, April 28, 2006.
87. "Automated material tracking and capturing product history using Radio Frequency Identification (RFID) technology." Transportation Research Board, Committee on New Technology for Design, Pre-construction, and Construction, 01/23/2006.
88. "ASDMCon Advanced Sensor Based Deviation Detection and Management at Construction Sites, CMU AIS Lab, 12/2005.
89. "Model-based Sensor-Assisted Construction Engineering and Management." University of Michigan, 10/20/2005.
90. "Radio Frequency Identification Tags (RFID) for Tracking of Precast Components and their Histories." PCI Productivity Improvement Domain, 10/2005.
91. "Model-based Sensor-Assisted Construction Engineering and Management." Applied computing and mechanics laboratory, Ecole Polytechnique Federale de Lausanne (EPFL), Lausanne, Switzerland, 07/21/2005.
92. "Model-based Computer-Aided Construction Engineering and Management." Department of Civil Engineering, Middle East Technical University, Ankara, Turkey, 07/08/2005.
93. "Robust Planning, Situation Awareness and Situation Assessment on Construction Sites." Advanced Infrastructure Systems symposium, Carnegie Mellon, Pittsburgh, 04/29/2005.
94. "Building Information Models (BIMs) and research at the Civil and Environmental Engineering at Carnegie Mellon," Michael Baker, Jr. Inc. 03/16/2005.
95. "Situation awareness and situation assessment on construction sites," Bombardier, Pittsburgh, (10/2005).

96. "ASDMCon: Advanced Sensor Based Deviation Detection and Management at Construction Sites." NSF ITR Grantees meeting, June 9, 2004, (one of the eight plenary speakers out of roughly four hundred PIs attended the meeting).
97. "ASDMCon and Collaborative Innovation Center" Dean's advisory council, 04/07/2004, Pittsburgh.
98. "Using sensor systems and standard project models to capture and model project history for building commissioning and facility management." Civil Engineering Research Lab, US Army, 02/26/2004.
99. Situation awareness, situation assessment and proactive scheduling on construction sites. Department of Civil Engineering, Construction Management program, University of Illinois, IL, 02/27/2004.
100. "Utilizing Radio Frequency Identification on Precast Concrete Components – Supplier's Perspective." FIATECH Smart Chips Project Virtual Workshop, 12/16/2003.
101. "Visualization of as-built conditions on construction sites." Civil Engineering Conference & Exposition, Visualization session, Nashville, TN, 11/13/2003.
102. "Combining Reality Capture Technologies for Construction Defect Detection: A Case Study." *EIA9*, Istanbul, Turkey, 10/2003.
103. "Overview of the Civil Infrastructure Systems Program at Carnegie Mellon University." Presented to the board of advisors of the Civil Engineering department at Rensselaer Polytechnic Institute, Pittsburgh, PA, 10/2003.
104. "Early Construction Defect Detection using Laser Scanners, Embedded Sensors and Integrated project Models." Dow Chemical Corp., Houston, Texas, 06/2003.
105. "Early Construction Defect Detection using Laser Scanners, Embedded Sensors and Integrated project Models." Intel Corp., Phoenix, Arizona, 06/2003.
106. "Data Exchange Issues on Sensor-Based Defect Detection and Management on Construction Sites." Workshop on Data Exchange, NIST, May 28-29, 2003, Gaithersburg, MD.
107. "ASDMCon: Advanced Sensor Based Defect Detection and Management on Construction Sites – Year 2 Review." NIST, May, 2003, Gaithersburg, MD.
108. "ASDMCon: Advanced Sensor Based Defect Detection and Management on Construction Sites." Advanced Infrastructure Systems Lab Workshop, 10/16/2002, Carnegie Mellon University.
109. "Active Defect Detection at Construction Sites using Integrated Project models, Laser Scanners and Embedded Sensing Systems," Advanced Infrastructure Systems Lab Open house, 04/13/2002 (poster presentation), Carnegie Mellon University.

110. "4D CAD Simulation of the Installation of PSC's Terrascale Computer," Advanced Infrastructure Systems Lab Open house, 04/13/2002 (poster presentation), Carnegie Mellon University.
111. "Early Defect Detection at Construction Sites using Integrated Project Models, Laser Scanners and Embedded Sensing Systems," NIST, Construction Automation and Construction Metrology research groups, 03/13/2002.
112. "Early Defect Detection at Construction Sites using Integrated Project Models, Laser Scanners and Embedded Sensing Systems," ICES, Advanced Infrastructure Lab meeting, Carnegie Mellon University, 03/01/2002.
113. "Automated Time-Space Conflict Analysis and Active Defect Detection at Construction Sites Using Integrated Project Models and Advanced Sensor Systems," Civil Engineering Department, Purdue University, December 2001.
114. "Early Defect Detection at Construction Sites," Senator Stouff and PennDOT representatives, Carnegie Mellon University, July 2001.
115. "Modeling, Visualizing and Analyzing Construction Processes," representatives of Hochtief's research and development branch, Carnegie Mellon University, March 2001.
116. "Project Management – Making it Real," CEE 100, Introduction to Civil and Environ. Eng. course, Carnegie Mellon University, September, 200-2014.
117. "4D WorkPlanner: Hands-on Session," Center for Integrated Facility Engineering, Stanford University, Stanford, California, September 15, 2000.
118. "Formalization and Automation of Time-Space Conflict Analysis," University of California, Berkeley, June 30, 2000.

Membership and Activities in Honorary Fraternities, Professional Societies

1. Chair on Taskforce on Computing in Civil Engineering for All, ASCE, 2021 -
2. Board Member, International Association and Automation in Construction
3. Board Member, Engineering Research Council, ASEE, June 2019 – September 2021
4. Assoc. Member, American Society of Civil Engineers (ASCE)
5. Member, Building Smart Alliance Education Committee, NIBS
6. Member of Chi-Epsilon
7. Member, American Society of Engineering Educators (ASEE)
8. Board Member, Turkiye'nin Muhendis Kizlari (Engineering girls of Turkey), Limak.
9. Board Member, International Facility Management Association, Health Care Institute. – 2014-2016
10. Member, Construction Research Council, ASCE, 03/2003
11. Member, Database and Information Management Committee, ASCE, 11/2003 –
12. Member, Intelligent Computing Committee, ASCE, 06/2006 –

13. Member, AGC BIM-Education committee.
14. Co-Chair, International workshop on computing in civil Engineering, ASCE, July 24-27, 2007, Pittsburgh, USA

Professional Service

1. NAS Board Member, Board on Infrastructure and the Constructed Environment (02/2020-)
2. NAS Committee Member on the Review of Effectiveness and Efficiency of Defense Environmental Cleanup Activities of the Department of Energy's Office of Environmental Management (02/2020 -).
3. ASCE Blue Sky Advisory Committee (05/2021 -)
4. Organized 2020-2021 CEE Rising Stars workshop.
5. Board Member, Engineering Research Council, ASEE, June 2019 -
6. Associate Editor (member of editorial board), Journal of Computing in Civil Engineering.
7. Review Board, Purdue Construction Engineering and Management program, March 2019.
8. Review Board, City University of Hong Kong: 5 Year Review of Academic Excellence (RoE5) for Division of Building Science and Technology, January 2018.
9. Specialty Editor on Construction Informatics/Editorial Board, Journal of Computing in Civil Engineering, ASCE
10. Associate Editor, Advanced Engineering Informatics.
11. Associate Editor, Automation in Construction.
12. Specialty Editor, Sensors in Construction and Infrastructure Management, ITCon
13. Editorial board, ITCon
14. NRC Committee Member on Predicting the Outcomes of Facility Investments (09/2009 - 2012)
15. Reviewer for the following journals:
 - a. Journal of Construction Engineering and Management
 - b. Automation in Construction
 - c. Journal of Computing in Civil Engineering
 - d. Advanced Engineering Informatics
 - e. Computer-Aided Civil and Infrastructure Engineering
 - f. Construction Management and Economics
 - g. Journal of Infrastructure Systems
 - h. Canadian Journal for Civil Engineering
 - i. IT in A/E/C
16. Reviewer for the following funding agencies: National Science Foundation, EPSRC, EPSCOR, Swiss National Foundation
17. Regular reviewer and session chair for the following conferences: Construction Congress, Workshop on Computing in Civil Engineering, ICCCBCE and ISARC.

18. Advisory Board, Division of Building Science and Technology, City University of Hong Kong (January 2017).
19. Invited participant of the following workshops (examples):
 - a. NSF workshop on SUS Workshop on Sustainable Integration of Urban Automation, July 29-30, 2019, Pittsburgh, PA.
 - b. NSF Workshop on Setting a Broader Impact Innovation Roadmap; May 26-27, 2016, Arlington, Virginia
 - c. Construction Research Council's workshop on "Attracting minorities for graduate studies within the construction domain."
 - d. NSF Supported workshop on "NSF Workshop – Collaborative Practice: When Engineering Design Meets Architecture." November 4-5, 2010, Philadelphia, PA.
 - e. NSF supported workshop on "Academic Response to the FIATECH roadmap," 10/2004.
 - f. Intel Corp. supported, Intel University Day, 2003, Phoenix, AZ, October, 2003
 - g. NSF Engineering Education Scholars Workshop 2000, Carnegie Mellon Univ., Pittsburgh, PA, July 16-21, 2000.
 - h. NSF Defining a Research Agenda for AEC Process/Product Development in 2000 and Beyond, Stanford University, Stanford, CA, August 25-28, 2000.

Selected University Services

1. Co-chair, Civil and Environmental Engineering Diversity, Equity and Inclusion Strategic Planning Committee, 2020 -
2. Co-chair, Civil and Environmental Engineering Strategic Planning Committee, 2018-
3. Co- Chair, Civil and Environmental Engineering Undergraduate Mentorship Program, 2019
4. Chair, College of Engineering Research Ecosystem Committee, 2016-2021
5. Co-chair, College of Engineering Research Computing Infrastructure Committee, 2020 - 2021
6. Co-chair, College of Engineering Dean Search, 2019.
7. Member, GAANN Program Committee, 2019 -
8. Member, University Research Council, 2018 –
9. Member, College of Engineering Awards Committee, 2018-
10. Member, University VPR Search Committee, September 2021 -
11. Member, University International Engagement Committee, 2018-2019
12. Member, CMU-Highmark Joint Project Committee, 2017 – 2021
13. Member, University Design Review Committee, 2018-2020
14. Chair of Graduate Curriculum Committee, 2006-2017.
15. Chair of Civil and Environmental Engineering Search Committee, 2009-2010, 2011-2012.

