

Steven K. Ayer, Ph.D., E.I.T.

Arizona State University
Del E. Webb School of Construction
School of Sustainable Engineering
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Education:

- 2013 Ph.D., Architectural Engineering, The Pennsylvania State University
Concentrations:
The use of simulation games and mixed reality technologies to improve:
 1. Engineering education
 2. Building operation / facility management
Dissertation:
Sustainability Education of Engineering Students Using Augmented Reality and Simulation Games
- 2008 M.A.E., Architectural Engineering, The Pennsylvania State University
- 2008 B.A.E., Architectural Engineering, The Pennsylvania State University

Academic Experience:

- 2014 – Present Assistant Professor, Del E. Webb School of Construction, School of Sustainable Engineering and the Built Environment, Ira A. Fulton Schools of Engineering, Arizona State University
- 2013 – 2014 Postdoctoral Scholar, The Pennsylvania State University

Industrial Experience:

- 2013 Clark Construction Group, LLC, Research Intern, Bethesda, MD
- Developed process for improving site planning visualization with SketchUp
 - Created and taught course to provide fundamental site utilization modeling skills to employees
- 2009 – 2010 Bentley Systems, Inc., Research Intern, University Park, PA
- Tested effectiveness of new software tools in development

- Developed an intelligent virtual prototype to aid in facility management with the use of Bentley's ProjectWise Explorer, ProjectWise Administrator, Microstation, Navigator, and DM Studio

2006 – 2008 Gilbane Building Co., Engineering Intern, State College, PA

- Organized BIM coordination efforts using Navisworks, Revit, and AutoCAD
- Developed virtual mock-up using 3D CAD and rendering software

2006 – 2007 The Pennsylvania State University, Lab Assistant, University Park, PA

- Modeled architectural elements of buildings using Revit
- Created instructional videos on how to use lab resources

2004 – 2005 Department of Conservation and Natural Resources, Commonwealth of PA, Engineering Intern, Harrisburg, PA

- Designed waste-water treatment systems for PA State Park facilities
- Tested soil to find percolation rates, designed the system, and prepared permit application documents

Professional Licensure:

2008 Engineer In Training (E.I.T.) status achieved

Areas of Expertise:

Teaching

- Building information modeling (BIM) project execution planning strategies
- Technical BIM computer skills
- Construction project management strategies

Research Topics

- Mobile computing technologies for virtual design and construction (VDC)
- Augmented (and mixed) reality technologies for the AEC fields
- Visualization strategies and simulation games for pedagogical research

Honors and Awards:

2012 Partnership for Achieving Construction Excellence (PACE) award for best graduate poster, Annual S:PACE roundtable

2012 Fiatech Technology Showcase student scholarship for graduate students. Approx. \$1500

- 2012 National Sciences Foundation Graduate Engineering Education Consortium for Students Fellowship. Approx. \$1000
- 2009 William L. and Barbara A. Keefauver Scholarship in Engineering. Amount. \$5000
- 2008 Charles A. Merica award for leadership in Architectural Engineering

Refereed Journal Publications:

1. Ayer, S.*, Messner, J., and Anumba, C. (2016). "Augmented reality gaming in sustainable design education." *Journal of Architectural Engineering*, 22(1), 1-8.
2. Ayer, S.*, Messner, J., and Anumba, C. (2014). "Development of ecoCampus: A prototype system for sustainable building design education." *Journal of Information Technology in Construction*, 19, 520-533.
3. Ayer, S.*, Messner, J., and Anumba, C. (2014). "Challenges and benefits of open-ended sustainable design in first year engineering." *Journal of Professional Issues in Engineering Education and Practice*, 140(2), 1-7.

Refereed Conference Publications:

(* indicates the leading author, **bold** indicates student advisee of Ayer)

1. **Rahman R., Alsafouri, S.**, Tang, P.*, and Ayer, S. (2016). "Comprehending Building Information Modeling skills of project managers based on social media analysis." International Conference on Sustainable Design, Engineering and Construction, Tempe, AZ.
2. **Beauregard M., Alsafouri, S.**, and Ayer, S.* (2016). "Development of a peer review-based activity to improve students' BIM process mapping understanding." BuildingSMART's 10th BIM Academic Symposium, Gainesville, FL.
3. **Rahman R., Alsafouri, S.**, Tang, P., and Ayer, S.* (2016). "Building Information Modeling skills for career success." BuildingSMART's 10th BIM Academic Symposium, Gainesville, FL.
4. **Alsafouri, S.**, Ayer, S.*, and Tang, P. (2015). "Mobile virtual design and construction adoption in the Architecture, Engineering, Construction, and Operation Fields." 15th International Conference on Construction Applications of Virtual Reality, Banff, Alberta, Canada.
5. Ayer, S.*, Messner, J., and Anumba C. (2015). "Understanding the implications of augmented reality out of context in engineering education." International Construction Specialty Conference, Vancouver, British Columbia, Canada.

6. Ayer, S.*, Cribbs, J., Hailer, J., and Chasey, A. (2015). "Best practices and lessons learned in BIM project execution planning in construction education." BuildingSMART's 9th BIM Academic Symposium, Washington DC, USA.
7. Ayer, S.*, Macht, G., Leicht, R., and Nembhard, D. (2014). "Teams assessing teams: How peer evaluation is affected by team member personality traits." 2014 Construction Research Congress, Atlanta, Georgia.
8. Ayer, S.*, Messner, J., and Anumba, C. (2013). "ecoCampus: A new approach to sustainable design education." 13th International Conference on Construction Applications of Virtual Reality, London, England.
9. Ayer, S.*, Messner, J., and Anumba, C. (2013). "Assessing the impact of using photographic images to influence building retrofit design education." 2013 Architectural Engineering Institute, University Park, Pennsylvania.
10. Ayer, S.*, Leicht, R., and Smith, C. (2012). "Assessing the impact of physical prototyping in first- year engineering education." 2012 Construction Research Congress, West Lafayette, Indiana.
11. Ayer, S.*, Messner, J., and Anumba, C. (2011). "Determining the appropriate role for mixed reality technologies in facility management." 11th International Conference on Construction Applications of Virtual Reality, Weimar, Germany.
12. Ayer, S.* (2011). "Analysis of how construction managers can address facility managers' needs with the use of BIM." 2011 College of Engineering Research Symposium, University Park, Pennsylvania.

Invited Talks National or International Meetings:

1. Veatch, J., Voeller, J., Vo, D., Wible, R., and Ayer, S. (2016). "Cognitive Computing Breakout Session." Fiatech 2016 Technology Conference and Showcase, Austin, Texas.
2. Ayer, S. (2015). "Change Readiness & Scanning the Horizon." Presented at the 2015 Fiatech and COMIT Efficiency Through Digital Projects Conference, London, UK.
3. Leite, F., Sattan, R., Sutton, T., Ayer, S. (2015). "The Future Now – Game Changing Technologies & Practices H-360 Team" Presented at the 2015 Fiatech Leadership Forum, Glendale, Arizona.
4. Ayer, S. (2015). "Technology to Solve Problems." Presented on September 15, 2015 for Fiatech's Tech Tuesday Webinar.

5. Sattan, R., Sutton, T., Hijazi, F., Ayer, S., and Golparvar-Fard, M. (2015). "Scanning the horizon: Identifying and tracking global technologies and processes." Presented at the Fiatch 2015 Technology Conference and Showcase, Boca Raton, Florida.

Conference Presentations:

1. Ayer, S. (2015). "Mobile virtual design and construction adoption in the Architecture, Engineering, Construction, and Operation Fields." Paper presented at the 15th International Conference on Construction Applications of Virtual Reality, Banff, Alberta, Canada.
2. Ayer, S. (2015). "Understanding the implications of augmented reality out of context in engineering education." Paper presented at the International Construction Specialty Conference, Vancouver, British Columbia, Canada.
3. Ayer, S. (2015). "Best practices and lessons learned in BIM project execution planning in construction education." Paper presented at the 9th BIM Academic Symposium and Job Task Analysis Review, Washington DC, USA.
4. Ayer, S. (2015). "Building information modeling: Collaboration for engineering buildings redefined." Presented at the Vietnam Engineering Education Conference 2015, Danang, Vietnam.
5. Ayer, S. (2015). "Construction Technology: Introduction to BIM." Presented at the Construction in Indian Country Conference 2015, Scottsdale, AZ.
6. Ayer, S. (2014). "Teams assessing teams: How peer evaluation is affected by team member personality traits." Paper presented at the 2014 Construction Research Congress, Atlanta, Georgia.
7. Ayer, S. (2013). "ecoCampus: A new approach to sustainable design education." Paper presented at the 13th International Conference on Construction Applications of Virtual Reality, London, England.
8. Ayer, S. (2013). "Sustainability education of engineering students using augmented reality and simulation games: An overview of dissertation research." Ph.D. research presented at BIM workshop at University of Reading, England.
9. Ayer, S. (2013). "Assessing the impact of using photographic images to influence building retrofit design education." Paper presented at 2013 Architectural Engineering Institute (AEI), University Park, Pennsylvania.
10. Ayer, S. (2012). "Assessing the impact of physical prototyping in first-year engineering education." Paper presented at 2012 Construction Research Congress, West Lafayette, Indiana.

11. Ayer, S. (2011). "Determining the appropriate role for mixed reality technologies in facility management." Paper presented at the International Conference on Construction Applications of Virtual Reality (CONVR), Weimar, Germany.
12. Ayer, S. (2011). "Analysis of how construction managers can address facility managers' needs with the use of BIM." Paper presented at the College of Engineering Research Symposium (CERS), University Park, Pennsylvania.

Invited Talks Local Professional Meetings:

1. Ayer, S. (2015). "Construction Technology: BIM and Emerging Technologies." Presented on November 19, 2015 at the Association for the Advancement of Cost Engineering member meeting, Tempe, Arizona.
2. Ayer, S. (2015). "Construction technology: Introduction to BIM." Presented at the 2015 Construction in Indian Country Conference, Scottsdale, Arizona.
3. Ayer, S. (2014). Invited panelist for the Arizona Commerce Authority's "Strategic Futures Roundtable Discussion" in Tempe, AZ.
4. Ayer, S. (2014). Invited panelist on Fiotech's Implementation Subgroup Panel Discussion: "Challenges in Augmented Reality and Visualization in the Field" online webinar.

Member of University or College Committee:

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| 2014 – 2016 | School of Sustainable Engineering and the Built Environment Laboratory Committee |
| 2016 | Ira A. Fulton Schools of Engineering, New Faculty Advisory Committee (NFAC) |

Member or Chair of Department Committee:

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| 2014 – 2016 | Del E. Webb School of Construction, Curriculum Committee |
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Member of National or International Committee:

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| 2014 – 2016 | Fiotech Horizon 360 Team Member
This group is comprised of both industry and academic members. This group identifies and studies new and emerging technologies that may offer potential benefits to the building industry. The documents developed in this group are shared with all Fiotech member organizations across the nation and internationally. |
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2014 – 2016 Academic Interoperability Coalition Member
This group is comprised of industry and academic members. The group is currently focused on identifying necessary attributes for building industry professionals using Building Information Modeling (BIM). The goal of this work is to define a baseline metric that educators may use to define BIM learning objectives and industry members may use for recruiting individuals with specific levels of BIM skills. When the results are compiled and documented, they will be made publically available.

2015 – 2016 Construction Industry Institute Academic Committee Member
The Academic Committee (AC) is the primary forum for the academic community within CII to provide its wisdom and expertise to CII. Among its duties are designating subject matter experts, providing input to the research process, identifying and grooming new academics to serve as effective CII researchers, integrating CII research and products into the undergraduate and graduate curriculums, and offering insights for new directions for CII.

Professional Memberships:

Associate Member of the American Society of Civil Engineers (ASCE)

Member of ASCE's Construction Research Congress

Additional Service Activities:

Conference Session Chair

The 15th International Conference on Construction Applications of Virtual Reality, Banff, AB, Canada. (Session 1D: Design and Construction Visualization) October 6, 2015

Conference Technical Committee

2016 – International Conference on Sustainable Design, Engineering, and Construction, Tempe, AZ.

Journal Paper Reviewer

Automation in Construction (AutoCon): 2 papers
Advances in Engineering Education: 1 paper
Journal of Computing in Civil Engineering: 13 papers
Sustainable Cities and Society: 2 papers

Conference Paper Reviewer

International Conference on Sustainable Design, Engineering, and Construction (ICSDEC) 2016: 4 papers

Academic Interoperability Coalition (AiC) 10th BIM Academic Symposium
2016: 4 papers
ASCE Construction Research Congress 2016: 5 papers
ASCE Computing Conference 2015: 7 papers
Innovative Technologies in Construction Conference 2014 (ITC): 1 paper
13th International Conference on Construction Applications of Virtual
Reality (CONVR): 3 papers
Architectural Engineering Institute 2013 (AEI): 2 papers
Penn State's College of Engineering Research Symposium 2013 (CERS):
1 paper

2015 – 2016 AGC Student Competition Coach. Assisted students in preconstruction team with BIM strategies for competition.

2015 K-12 Outreach
-Engaging high school students with construction technology through presentations in DEWSC outreach efforts
-"STEM Role Model" for Maricopa County Education Service Agency. Discussed my career path and reason for interest in STEM fields.

2014 – 2016 E2 Camp
Served as faculty volunteer for a session each year

2013 – 2014 Undergraduate Advising, The Department of Architectural Engineering, The Pennsylvania State University
Advised 9 undergraduate students

2013 – 2014 Co-Advisor, The United States Department of Energy's Challenge Home Student Design Competition Team
Advised graduate and undergraduate students with other Penn State faculty members to create a net-zero residential home design

2012 – 2013 Graduate Advisor/Representative, The Student Chapter of the Partnership for Achieving Construction Excellence (S:PACE)

2011 – 2012 Graduate Advisor/Representative, United States Green Building Council Students (USGBC Students)