ZACHARY BALL, Ph.D.

PROFESSIONAL BIOGRAPHICAL OUTLINE

BACKGROUND

Dr. Ball received a Bachelor of Science in Mechanical and Aerospace Engineering, a Master of Science in Aerospace Engineering, and a Doctor of Philosophy in Mechanical Engineering from the University at Buffalo. Following his Ph.D., Dr. Ball conducted post-doctoral research studies at Carnegie Mellon University. His doctoral research centered around engineering design theory and methodology with an emphasis on the development of more efficent design processes. He has an extensive background in product design, supporting and teaching multiple undergraduate courses specifically pertaining to the fundamentals of engineering practice. He has also reviewed papers for the Journal of Mechanical Design and the International Design and Engineering Technical Conferences.

Dr. Ball is a Senior Mechanical Engineer at ARCCA specializing in mechanical failures and accident investigation. He investigates failed consumer and industrial products/equipment and machinery design/failure. He is certified as a BOSCH Crash Data Retrieval (CDR) technician.

AREAS OF SPECIALTY

- Mechanical Engineering
  - Product Design
  - Failure Modes and Effects Analysis
  - Root Cause Analysis
  - Reverse Engineering
- Forensic Engineering
- Oxygen Safety
- Accident Investigation
- Static and Dynamic Testing
- Failure Investigation and Analysis of:
  - Mechanical Components
  - Electrical Components
  - Consumer Products
- Codes and Standards
- Automotive Mobile Electronics
- Manufacturing Processes
- Simulation and Optimization Techniques

EDUCATION

- Doctor of Philosophy in Mechanical Engineering, University at Buffalo, 2020
- Master of Science in Aerospace Engineering, University at Buffalo, 2016
- Bachelor of Science in Mechanical and Aerospace Engineering, University at Buffalo, 2012

PROFESSIONAL EXPERIENCE

April 2021 – Present | ARCCA, Incorporated | Senior Mechanical Engineer

- Conducts engineering analysis and evaluation related to human protection and safety issues.
- Forensic failure analysis of automobile components and systems and mechanical devices.
- Designs, fabricates, investigates, and evaluates various mechanical systems.
- Conducts failure analyses of residential, commercial, and industrial appliances and equipment involving property damage and personal injury.

March 2020 – April 2021 | Carnegie Mellon University | Postdoctoral Research Assistant

- Conducted interviews with product development managers related to optimal team composition and management strategies.
- Explored best practices in teaching design courses for a remote learning environment.
- Supported transition of experiential based project courses to remote instruction in response to COVID-19
- Developed and conducted experiments exploring factors to improve shared understanding in engineering design.

August 2014 – February 2020 | University at Buffalo | Instructor/Graduate Research Assistant

- Planned and taught undergraduate course on engineering fundamentals and the introduction to the mechanical engineering practice.
- Supported multiple engineering courses including manufacturing practices, thermodynamics, mechanical design, and senior design projects.
- Conducted and published peer-reviewed research in engineering design, theory, and methodology.
- Gave numerous presentations at internationally recognized engineering conferences.
- Mentored multiple students with undergraduate and graduate research projects.

December 2012 – July 2014 | Zodiac Aerospace Oxygen Systems, US | Design Engineer

- Created designs for new products and created design improvements for existing products focusing on quality control and hazard analysis.
- Evaluated, selected, and defined material requirements for all parts in the design. Overseeing the procurement of prototype parts and the production of final designs.
- Defined the geometry and sizing of individual parts and the end assemblies while supervising the preparation and release of engineering drawings as performed by designers.
- Performed calculations including finite element analysis, tolerance stack up analyses, and reliability predictions to ensure design integrity.
- Supported Manufacturing Engineering and Test Engineering by recommending manufacturing methods and product test requirements.

December 2009 – April 2013 | Best Buy Corporation | Master Geek Squad Automotive Technician

- Communicated with clients to recommend and install various vehicle components.
- Supervises and trains new employees on the policies and methods of installation.
- Collaborates with colleagues to problem solve and trouble shoot problem situations.
- Received highest level of certification being a Master MECP (Mobile Electronics Certified Professional) installer

PROFESSIONAL AFFILIATIONS

- American Society of Mechanical Engineering (ASME)
- Society of Automotive Engineers (SAE)
- National Association of Fire Investigators (NAFI)
- National Association of Professional Accident Reconstruction Specialists (NAPARS)
- American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) –Associate Member

CERTIFICATIONS AND TRAINING

- Bosch CDR Technician
- Mobile Electronics Certified Professional – Master Technician (2012)
- Licensed Engineer in Training (EIT) PA # ET029477

PUBLICATIONS

Ph.D. Dissertation

D1. Ball, Z. 2020, "Intelligent Group Structuring for Mass Collaboration within Engineering Design," Doctoral Thesis, The School of Engineering and Applied Sciences, State University of New York at Buffalo, Buffalo, NY.

M.S. Thesis

T1. Ball, Z. 2016, "Understanding Design Team Performance Through the Utilization of Social Network Metrics," Master's Thesis, The School of Engineering and Applied Sciences, State University of New York at Buffalo, Buffalo, NY.

Archived Journals

J4. Ball, Z., and Lewis, K., 2020, "Predicting Design Performance utilizing Automated Topic Discovery," *Journal of Mechanical Design,* **142**(12), DOI:10.1115/1.4048455.

J3. Ball, Z. and Lewis, K., 2019, "Mass Collaboration Project Recommendation within Open-Innovation Design Networks," *Journal of Mechanical Design*, **141**(2), DOI: 10.1115/1.4041858.

J2. Odonkor, P**.**, **Ball, Z.**, Chowdhury, S., 2019, "Distributed Operation of Collaborating Unmanned Aerial Vehicles for Time-sensitive Oil Spill Mapping," *Swarm and Evolutionary Computation*, **46**, pp. 52-68.

J1. Ball, Z. and Lewis, K., 2017, "Observing Network Characteristics in Mass Collaboration Design Projects," *Design Science,* 4. DOI: 10.1017/dsj.2017.26.

Peer Reviewed Conference Proceedings

C7. Ball, Z., Bessette, J., Lewis, K., 2020, "Who, What, and When? Exploring Student Focus in the Capstone Design Experience," *ASME International Design Technical Conferences, Design Education Conference*, St. Louis, MO, DETC2020-22027. (*Nominated for best paper for the International Conference on Design Education)

C6. Ball, Z. and Lewis, K., 2019, "Predicting Multi-Disciplinary Design Performance Utilizing Automated Topic Discovery," *ASME International Design Technical Conferences, Design Theory and Methodology Conference*, Anaheim, CA, DETC2019-97189.

C5. Ball, Z. and Lewis, K., 2018, "Project Recommendation for Mass Collaboration Design Networks," *ASME International Design Technical Conferences, Design Theory and Methodology Conference*, Quebec City, Canada, DETC2018-85978.

C4. Ball, Z. and Lewis, K., 2017, "The Design of the Crowd: Organizing Mass Collaboration Efforts," *ASME International Design Technical Conferences, Design Theory and Methodology Conference*, Cleveland, OH, DETC2017-68127. (*Awarded top 5 papers for the Design Theory and Methodology Conference)

C3. Ball, Z., Szabo, J., Pasquali, F., and Hall, J. F., 2017, "A Framework for Wind Energy Conversion to Promote Sustainability in Product Design", *ASME International Design Technical Conferences*, Cleveland, OH, DETC2017-68393.

C2. Odonkor, P., **Ball, Z.**, Chowdhury, S., 2017, "A Distributed Intelligence Approach to Using Collaborating Unmanned Aerial Vehicles for Oil Spill Mapping," *ASME International Design Technical Conferences*, Cleveland, OH, DETC2017-68320.

C1. Ball, Z., Odonkor, P., and Chowdhury, S., 2017, "A Swarm Intelligence Approach to Oil Spill Mapping using Unmanned Aerial Vehicles," *AIAA SciTech*, Grapevine, TX, AIAA 2017-1157.

INVITED TALKS

Seminar at Systems Realization Lab Summer Convivium, "Intelligent Group Structuring for Mass Collaboration with Engineering Design", University of Oklahoma, May 2020

COMMUNITY OUTREACH

August 2018 – February 2020 | Science is Elementary | Volunteer Teacher

- Taught students from 1st grade to 5th grade lessons on topics such as sound, light, magnetic forces, etc.
- Demonstrated robotic abilities for 5th graders using Baxter by Rethink Robotics