

JONGSEONG CHOI (BRAD), Ph.D.

Research Associate

School of Mechanical Engineering, Purdue University

Address: Herrick Labs, 177 S Russell St, Purdue University, West Lafayette, IN 47906

Email: bradchoi343@gmail.com, Homepage: bradjchoi.github.io, Phone: (765) 426-4688

RESEARCH INTERESTS

Visual Analytics; Structural Health Monitoring; Computer Vision; Machine Learning; Sustainable Structure; Big Visual Data; Multiview Geometry; Aerial Manipulation

EDUCATION

PhD., Mechanical Engineering, Purdue University, West Lafayette, IN, USA 05/2020

✚ Dissertation: *Automating Visual Data Collection and Analytics toward Lifecycle Management of Engineering Systems*

MSc., Mechanical Engineering, University of Mississippi, University, MS, USA 05/2014

✚ Thesis: *Parametric Scramjet Analysis*

BSc., Mechanical Engineering, University of Mississippi, University, MS, USA 05/2012

EMPLOYMENT HISTORY

Assistant Professor, Department of Mechanical Engineering 08/2020 – Present

The State University of New York, Korea (SUNY Korea) – Stony Brook University, Incheon, South Korea

Graduate Research Assistant, School of Mechanical Engineering 08/2014 – 05/2020

Purdue University, West Lafayette, IN, USA

Research Associate, Resilient ExtraTerrestrial Habitats Institute 05/2018 – 01/2019

Purdue University, West Lafayette, IN, USA

Graduate Research and Teaching Assistant, Department of Mechanical Engineering 08/2012 – 05/2014

University of Mississippi, University, MS, USA

RESEARCH PROJECTS

1. Integrating Human and Machine for Post-Disaster Visual Data Analytics 01/2019 – 07/2020

- Supported by NSF under Grant No. NSF-1835473
- Develop a visual data retrieving software to search for data based on visual similarity, using Siamese Network.
- My contribution includes developing similarity-based image classification tool such as PyTorch and Tensorflow.
1 journal paper accepted [J10]; 1 journal paper in preparation [J9]; 1 conference paper submitted [C6]

2. STORM: Safeguarding Cultural Heritage through Organisational Resources Management 04/2017 – Present

- Collaboration with European Union Grant No. H2020 n. 700191
- Develop automated monitoring system for graffiti in a community
- My contribution includes developing a unique graffiti detector working with 3D point cloud.

- 1 conference paper published [C4]; 1 journal paper under review [J7]
- 3. RETH: Resilience ExtraTerrestrial Habitat** 08/2018 – 01/2019
- Supported by New Horizon Program at Purdue University.
 - Develop the expertise needed to address the grand challenge of permanent human settlements outside Earth.
 - My contribution includes creating 3D models to capture features inside lava tubes using over 10 GB visual data.
 - 3D models & videos were published in numerous articles worldwide (e.g., usatoday.com, space.com, phys.org, etc.); Available in <https://phys.org/news/2019-07-humans-lava-tubes-moon.html>
 - 1 conference paper published [C5]
- 4. Active Citizen Engagement to Enable Lifecycle Management of Infrastructure Systems** 05/2017 – 08/2018
- Supported by NSF under Grant No. NSF-1645047
 - Develop a lifecycle structural management system using crowdsourced images.
 - My role is to lead project, develop demos, collect data, and publish.
 - 1 journal paper published [J6]; 1 journal paper accepted [J8]
- 5. Vision-based Visual Inspection System for A Large Number of Aerial Images** 01/2017 – 12/2017
- Develop a building façade visual inspection technique using drones and orthophoto generation.
 - 1 proposal generated and funded [P4], 1 journal paper published [J6]
- 6. Sensor Integrated Autonomous Flight UAV System Development** 05/2016 – Present
- Use various sensors (LIDAR, stereo camera, and IMU) to achieve autonomous flight.
 - 2 proposal generated [P1], [P2]
- 7. Automated Region-of-Interest Localization and Classification for Facility Visual Assessment** 05/2015 – 05/2017
- Develop an image localization technique that can be used in structures using a large volume of images.
 - 1 journal paper published [J5]; 1 conference paper published [C2]; 2 proposal generated [P3], [P5]
- 8. Image-Based Collection and Measurements for Construction Pay Items** 05/2015 – 08/2017
- Supported by INDOT under Grant No. SPR-4006
 - Develop a tool of graphical measurement to improve efficiency and safety at a construction site
 - My contribution includes constructing model, developing tool, building a drone.
 - 1 journal paper published [J4]; 1 conference paper published [C1]; 1 Technical Report published [C3]
- 9. Parametric Analysis of Scramjet Engine Varying Material and Fuel** 08/2012 – 05/2014
- Supported graduate program by University of Mississippi.
 - Analytic research of Propulsion and Heat Transfer of an engine optimization problem.
 - 3 journal papers published [J1], [J2], [J3]; 1 Master thesis generated.

TEACHING / MENTORING RECORDS

Research Advising (5 undergraduate students)

- Undergraduate Research Advisor 08/2016 – 05/2020
Yisong Yin, Undergrad Research (Senior), 6 credits (Fall 2016 – Spring 2017)
Sharda Parth, Undergrad Research (Senior), 3 credits (Spring 2017)
Gun Wook Park, Undergrad Research (Senior), 6 credits (Spring – Fall 2017) – 1 conference paper published [C5]
Jonghyun Park, Undergrad Independent Research (Senior), 6 credits (Spring 2018 – current)
Wookjin Chung, Undergrad Independent Research (Senior), 6 credits (Spring 2018 – current)

Course Teaching

- Teaching Assistant 05/2013 – 05/2014
 ME325 Dynamics (typ. 70 students)

- Primary responsibilities included weekly setup of equipment, presentation of pre-lab lectures, and grading.

STEM Curriculum Development for K-12 Students

- TRAILS: Teachers and Researchers Advancing Integrated Lessons in STEM 02/2016 – 01/2020
 - Supported by NSF under Grant No. NSF-1513248
 - Promote practices that increase students' motivations and capacities to pursue careers in STEM area.
 - My role includes analyzing video data to observe students' behavior. (08/2016 – 05/2017)
- SLED: Science Learning through Engineering Design 09/2010 – 08/2019
 - Supported by NSF under Grant No. NSF-0962840
 - Collaboration between STEM disciplinary faculty and grades 3-6 teachers to develop engineering-based tasks.
 - My role includes analyzing video data to observe students' behavior (09/2015 – 08/2016)

Teaching and Educational Services

- TRAILS K-12 Outreach: Collaborated Eng. Project & Activity w/ McCutcheon High School (Lafayette, IN)
- TRAILS K-12 Outreach: Collaborated Project Evaluation w/ Mishawaka High School (South Bend, IN)
- TRAILS K-12 Outreach: Collaborated Eng. Project Activity w/ Wea Ridge Middle School (Lafayette, IN)
- TRAILS K-12 Outreach: Collaborated Project Evaluation w/ Peru High School (Peru, IN)
- TRAILS K-12 Outreach: Collaborated Eng. Project Activity w/ Battle Ground Middle School (Lafayette, IN)

PROFESSIONAL SERVICE & OTHER QUALIFICATIONS

Awards & Scholarships

- **Honorable Mentions** from 3rd Midwest Smart Structure Colloquium, University of Illinois (UIUC) 10/2017
- **Travel Award & Workshop Invitation** from NHERI RAPID Experimental Facility, NSF..... 07/2019
This award selects 20 attendees who has professional research background for the RAPID 4 days Equipment Training Workshop at the University of Washington, Seattle, as well as support up to \$1,500 Travel Fund.
- **Travel Award for Conference** from College of Engineering, Purdue University..... 05/2018
This award recognizes excellence PhD candidates supporting up to \$1,000 for 2019 EWSHM conference at Hilton Hotel, Manchester, UK
This award recognizes excellence in research presentation.
- **Resident Assistant Scholarship** from University of Mississippi 08/2012 – 08/2013
- **Honor Program Scholarship** from University of Mississippi 01/2011
This scholarship is awarded to prominent undergraduate students in the School of Engineering.

Professional Affiliation

- President of Siloam Purdue Presbyterian church, Purdue University 01/2018 – 01/2019
- President of Korean Student Association (Olemiss KSA), University of Mississippi 05/2014 – 08/2014
- American Society of Engineering Education (ASEE) since 08/2017
- American Society of Mechanical Engineering (ASME) since 04/2011

PROFESSIONAL LEADERSHIP EXPERIENCE

IT Manager 03/2016 – 05/2020

- IISL Laboratory, Purdue University, West Lafayette, IN, USA
- Responsibility: manage website and update.

Workshop director 04/2019

- 4th Midwest Smart Structure Colloquium from Apr 12014, 2019 at Purdue University West Lafayette, IN, USA.
- K-12 Video Data Collector & Analyzer** 09/2015 – 05/2017
- TRIALS & SLED research groups (NSF-1513248 & NSF-0962840), Purdue University, West Lafayette, IN, USA
 - Responsibility: analyze the video data to observe K-12 student behavior in scientific & communicate with teachers and students to proceed a newly developed curriculum from our engineering education team.
- Volunteer Staff Caregiver** 09/2009 – 10/2010
- ReVitalise, Southport, Merseyside, UK
 - Responsibility: operate and maintain medical devices; train weekly volunteers for the devices.

PROFESSIONAL TALK & PRESENTATION

- [T3]** Professional Presentation, Midwest Smart Structure Colloquium (MSSC), Midwest US ... 10/2016, 10/2017, 4/2019
- [T2]** Professional Presentation, 9th European Workshop on SHM, Manchester, UK, July 08/2018
- [T1]** Poster Session, Herrick board meeting, West Lafayette, IN, USA 11/2015, 11/2016, 11/2017, and 11/2018

PROPOSAL DEVELOPMENT

- [P5]** **Active Citizen Engagement to Enable Lifecycle Management of Infrastructure Systems** 07/2016
- **(Funded** under Grant No. **CMMI-1645047**) Co-authored successful proposal on behalf of Prof. Shirley J. Dyke with funded \$100,000 from National Science Foundation (NSF).
- [P4]** **Automating Damage Quantification, Localization and BIM Updating Using Voluminous Optical Data**..... 02/2020
- **(Submitted** to NSF HDBE program) Co-authored successful proposal on behalf of Prof. Shirley J. Dyke and requested \$400,000 to National Science Foundation (NSF).
- [P3]** **HDBE (E-Defense): Enabling Building Damage Assessment by Engaging Remote Experts** 01/2018
- Co-authored on behalf of Prof. Shirley J. Dyke and requested \$700,000 to National Science Foundation (NSF).
- [P3]** **S&SA: Autonomous Infrastructure Inspection and Condition-Based Maintenance** 05/2017
- Co-authored proposal on behalf of Prof. David. Cappelleri and requested to National Science Foundation (NSF).
- [P1]** **S&SA: Reconfigurable Aerial Robots for Intelligent Assessment to Industrial Disasters**11/2016
- Co-authored proposal on behalf of Prof. Xinyan Deng and requested to National Science Foundation (NSF).

PEER-REVIEWED JOURNAL PAPERS

- [J11]** Xiaoyu Liu, Shirley J. Dyke, Chul Min Yeum, Ilias Bilonis, Ali Lenjani, & **Jongseong Choi** (2020), Automated Indoor Image Localization to Support Post-Event Building Assessment. *Sensors*, 20(6), 1610.
- [J10]** **Jongseong Choi**, Chul Min Yeum, Ali Lenjani, & Shirley J. Dyke (2020), A Novel Building Searching & Identification Method for A Large Volume of Reconnaissance Images, *Structures*, submitted.
- [J9]** **Jongseong Choi** & Shirley J. Dyke (2020), CrowdLIM: Crowdsourcing to Enable Lifecycle Infrastructure Management. *Computers in Industry*, 115, 103185.
- [J8]** Ali Lenjani, Shirley J. Dyke, Ilias Bilonis, Chul Min Yeum, Kenzo Kamiya, **Jongseong Choi**, Xiaoyu Liu, & Arindam G. Chowdhury (2020), Towards fully automated post-event data collection and analysis: pre-event and post-event information fusion. *Engineering Structure*, 109884.
- [J7]** **Jongseong Choi**, Lazaros Tomanidis, Shirley J. Dyke, Chul Min Yeum, Patrikakis Charalampos, Ali Lenjani, Xiaoyu Liu, & Panagiotis Kasnesis (2020), Automated Graffiti Detection: A Novel Approach for Maintaining Historical Structures in Community, *ACM Journal on Computing and Cultural Heritage (JOCCH)*, submitted.

- [J6] Chul Min Yeum, Jongseong Choi, & Shirley J. Dyke. (2019), Automated region-of-interest localization and classification for vision-based visual assessment of civil infrastructure. *Structural Health Monitoring*, 1475921718765419.
- [J5] Jongseong Choi, Chul Min Yeum, Shirley J. Dyke, & Mohammad J. Jahanshahi (2018), Computer-aided approach for rapid post-event visual evaluation of a building façade. *Sensors*, 18(9), 3017.
- [J4] Chul Min Yeum, Jongseong Choi, & Shirley J. Dyke (2017), Autonomous image localization for visual inspection of civil infrastructure. *Smart Materials and Structures*, 26(3), 035051.
- [J3] Jeffrey A. Roux, Jongseong Choi, & Neerad Shakya (2014), Parametric scramjet cycle analysis for nonideal mass flow rate. *Journal of Thermophysics and Heat Transfer*, 28(1), 166-171.
- [J2] Jeffrey A. Roux, Neerad Shakya, & Jongseong Choi (2013), Scramjet: minimum thrust-specific fuel consumption with material limit. *Journal of Thermophysics and Heat Transfer*, 27(2), 367-368.
- [J1] Jeffrey A. Roux, Neerad Shakya, & Jongseong Choi (2012), Revised parametric ideal scramjet cycle analysis. *Journal of Thermophysics and Heat Transfer*, 27(1), 178-183.

CONFERENCE PROCEEDINGS & OTHER ARTICLES

- [C6] Shirley J. Dyke, Xiaoyu Liu, Jongseong Choi, Chul Min Yeum, Juan Park, Ali Lenjani, Julio A. Ramirez, & Randall Poston (2020), "Learning from Earthquakes Using the Automatic Reconnaissance Image Organizer," Proceedings of 17th World Conference on Earthquake Engineering, Sendai, Japan, Sep 13-18, 2020, accepted
- [C5] Audai Theinat, Anahita Modiriasari, Antonio Bobet, Jay Melosh, Shirley J. Dyke, Julio A. Ramirez, Jongseong Choi, Amin Maghareh, & Daniel Gomez (2019, March), "Geology Explorations of Lava Tubes in the National Beds Lava Monuments," In Lunar and Planetary Science Conference (Vol. 50).
- [C4] Jongseong Choi, Chul Min Yeum, Shirley J. Dyke, Mohammad R. Jahanshahi, & Gun Wook Park (2018), "Rapid Vision-Based Inspection of Nonstructural Components in Buildings," Proceedings of the 9th European Workshop on Structural Health Monitoring, Manchester, UK, July 10-13, 2018.
- [C3] Chul Min Yeum, Anup Mohan, Shirley J. Dyke, Mohammad R. Jahanshahi, Jongseong Choi, Ziyi Zhao, & Julio A. Ramirez (2017), "Image-Based Collection and Measurements for Construction Pay Items," Purdue University e-publication.
- [C2] Chul Min Yeum, Jongseong Choi, & Shirley J. Dyke (2017), "Automated Region-of-Interest Localization and Classification for Visual Assessment on Civil Infrastructure," Proceedings of the 11th International Workshop on Structural Health Monitoring, Stanford, CA, September 12-14, 2017.
- [C1] Chul Min Yeum, Jongseong Choi, & Shirley J. Dyke (2017), "Image Localization for Computer-enhanced Visual Inspection of Civil Infrastructure," Proceedings of Engineering Mechanics Institute Conference, San Diego, CA, United States, June 4-7, 2017.