# JONGSEONG BRAD CHOI, Ph.D.

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## RESEARCH INTERESTS

**Visual Analytics; Structural Health Monitoring; Computer Vision; Smart Structure; Big Visual Data; Multiview Geometry**; Aerial Manipulation; Propulsion; Heat Transfer

## 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 – 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
Unversity of Mississippi, University, MS, USA

## RESEARCH RECORDS

**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.
- 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
- 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.
- 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.
- 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
- 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)


## HONORS & AWARDS

### *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

**Colloquium Director** ......................................................................................................................................... 04/2019
- 4th Midwest Smart Structure Colloquium from Apr 12014, 2019 at Purdue University West Lafayette, IN, USA.

**IT Manager** ...................................................................................................................................... 03/2016 – 05/2020
- IISL Laboratory, 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
- ReVitailse, Southport, Merseyside, UK
- Responsibility: operate and maintain medical devices; train weekly volunteers for the devices.


## PROFESSIONAL TALKS & PRESENTATIONS

**[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 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 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 and requrested $700,000 to National Science Foundation (NSF).

**[P3]** **S&SA: Autonomous Infrastructure Inspection and Condition-Based Maintenance** ………………………………. 05/2017 Co-authored proposal and requested to National Science Foundation (NSF).

**[P1]** **S&SA: Reconfigurable Aerial Robots for Intelligent Assessment to Industrial Disasters** ……………………………11/2016 Co-authored proposal and requested to National Science Foundation (NSF).


## PEER-REVIEWED JOURNAL PAPERS

**[J11]** Xiaoyu Liu, Shirley J. Dyke, Chul Min Yeum, Ilias Bilionis, 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 Bilionis, 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 Toumanidis, 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-publidation.

**[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 Diago, CA, United States, June 4-7, 2017.