**JONGSEONG CHOI (BRAD)**

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| **RESEARCH INTERESTS** | |
| **Visual Analytics; Engineering Mechanics; Computer Vision; Machine Learning; Sustainable Structure; Big Visual Data; Multiview Geometry; Aerial Manipulation**; Nondestructive Testing; Composite Materials; Numerical Heat Transfer | |
| **EDUCATION** | |
| **PhD., Mechanical Engineering, Purdue University,** West Lafayette, Indiana, United States ………………………………….. 05/2020   * Dissertation: *Automating Visual Data Collection and Analytics toward Lifecycle Management of Engineering Systems* * Advisor: Dr. Shirley J. Dyke | |
| **MSc., Mechanical Engineering, University of Mississippi,** Oxford, Mississippi, United States …….………………..…….…. 05/2014   * Thesis: *Parametric Scramjet Analysis* * Advisor: Dr. Jeffrey A. Roux | |
| **BSc., Mechanical Engineering, University of Mississippi,** Oxford, Mississippi, United States ………………………...……. 05/2012 | |
| **RESEARCH RECORD** | |
| ***Professional Research Projects*** | |
| **Integrating Human and Machine for Post-Disaster Visual Data Analytics** ……………..…….…..................…… 01/2019 – Present   * 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]** | |
| **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]** | |
| **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]** | |
| **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]** | |
| **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]** | |
| **Soft Armor Non-Destructive Evaluation Test Method: Vibration Energy Signature Test** …………………………9/2014 – 08/2015   * Supported by U.S. Department of Justice under Grant No. 2014-MU-CX-K004 * Develop a non-destructive test method for soft body armor’s ballistic performance. * My role was to lead team, design systems, build experiment setup, derive model. | |
| **High Rate Compression Performance of Smartphone Buffer Materials** ……….…………………………….……..… 08/2014 – 10/2014   * Supported by Corvid co. * Assess the dynamic performance of various foam materials. * My contribution includes conducting experiments, analysis material behaviors. | |
| **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. | |
| ***Individual Non-Funded Research Projects*** | |
| **Future Lifecycle Infrastructure Management System toward Smart City and Resiliency***…*………………….... 01/2019 – Present   * Convolution Neural Networks (CNNs) enhanced SIFT features extraction, thus to achieve a robust image orientation and pose estimation. | |
| **Optimize Maintenance Design of the Large-scale Mechanical System toward Smart Factory ……………**…. 01/2019 – Present   * Develop a novel monitoring system toward smart factory. | |
| **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** **[P5],** 1 journal paper published **[J6]** | |
| **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 **[P2]**, **[P3]** | |
| **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 **[P1]**, **[P4]** | |
| ***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 |
| **TEACHING / MENTORING RECORDS** | |
| ***Research Advising (5 undergraduate students)*** | |
| * Undergraduate Research Advisor ................................................................................................... 08/2016 – current | |
| Yisong Yin, Undergrad Independent Research (Senior), 6 credits (Fall 2016 – Spring 2017)  Sharda Parth, Undergrad Independent Research (Senior), 3 credits (Spring 2017)  Gun Wook Park, Undergrad Independent 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 – Present | |
| * 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 | |
| * ReVitailse, Southport, Merseyside, UK * Responsibility: operate and maintain medical devices; train weekly volunteers for the devices. | |
| **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]** | **HDBE (E-Defense): Enabling Building Damage Assessment by Engaging Remote Experts** …………………….... 01/2018   * Co-authored on behalf of Prof. Shirley J. Dyke and requrested $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). |
| **[P2]** | **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). |
| **[P1]** | **Automated Vision-based Welding Inspection Methods on a Large-scale Structures** ……………….……...…….. 10/2015   * Co-authored proposal on behalf of Prof. Shirley J. Dyke and requested to INDOT. |
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| **PEER-REVIEWED JOURNAL PAPERS** | |
| **[J10]** | **Jongseong Choi**, Chul Min Yeum, Ali Lenjani, & Shirley J. Dyke, A Novel Building Searching & Identification Method for A Large Volume of Reconnaissance Images, in preparation - exp. submission in February 2020 |
| **[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 (2019), Towards fully automated post-event data collection and analysis: pre-event and post-event information fusion. *Engineering Structure,* accepted |
| **[J7]** | **Jongseong Choi**, Patrikakis Charalampos, Chul Min Yeum, & Shirley J. Dyke, Robust Graffiti Detection Approach in European Historical Monuments, *Sensors,* under review |
| **[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, submitted |
| **[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. |