Dear SERAD Members,

SEARD just successfully hosted a technical track at the 2018 International Mechanical Engineering and Congress and Exposition (IMECE) in November, at Pittsburgh, PA. We had 74 papers presented in 14 technical sessions. This year, for the first time, we also had winners of our annual student paper contest present their peer-reviewed works (both undergraduate and graduate groups) in appropriate conference sessions. This change has been proven plausible. The conference experience was also considered very valuable to our student attendees.

SEARD also hosted an award dinner during the IMECE, when the winners of our student contest were recognized and honored with cash honorariums and plaques.

Reimbursements for conference related expense were made available to winners and volunteers as well.

Thank you, all SERAD members and volunteers to make this conference experience a successful one!

Going forward, we are looking at some exciting events. In April 2019, SERAD would co-host an ASME forum with the University of Maryland on Safety, Risk, and Reliability of Autonomous Vehicles (such as UAVs and self-driving cars). This event will feature a one-day invitation-only workshop, followed by a potential congressional public policy briefing. There is another potential involvement of SERAD in a Multi-Society Safety Conference in 2020. In addition, we would be hosting a Best Paper Award for the Journal of Risk, Uncertainty in Engineering Systems, Part-B Mechanical Engineering, at the 2019 IMECE. SERAD is the ASME sponsor of this journal.

Finally, let me say that SERAD needs more of you volunteers in safety, reliability, risk engineering, and science disciplines. Your help and participation will be highly appreciated and at the same time, very rewarding to your own career.

Until next time!

Bin Zhou, PhD
ASME SERAD Chair 2018-2019
This book is the result of the compilation of class notes from several years of teaching a graduate course on accelerated life and damage testing to the graduate students pursuing Master of Science, Master of Engineering and PhD degrees in Reliability Engineering at the University of Maryland. The book provides probabilistic approaches to the physics-of-failure and mechanistic-based reliability prediction and assessment. It relies on various methods and techniques published in the open literature regarding the development and practice of physics-of-failure analysis, accelerated life testing and accelerated degradation testing. The authors discuss the overall concepts, objectives, and framework for accelerated life assessment through the use of formal probabilistic physics-of-failure models. They review important failure mechanisms to demonstrate the process of examining and developing appropriate physics and mechanistic models that describe the degradation and failure phenomena in accompanying accelerated testing and accelerated degradation testing methods, including step-stress testing. The book presents advanced data analysis methods to evaluate the probabilistic physics-of-failure models based on the observed data obtained from accelerated reliability tests and field data. Further, it discusses the steps and methods of probabilistic life assessment and integrity of structures, components, and systems based on the probabilistic physics-of-failure models. This book presents the concepts of life vs. stress and damage vs. time modeling, and describes maximum likelihood estimation (MLE) and Bayesian approaches for parameter estimation, including and step-stress analysis approach and models. In some cases, applications of the introduced physics-based models in reliability engineering and prognosis and health management (PHM) have been discussed. Readers are exposed to various practical examples and computer-based technique. Since the book is intended for students and more advanced reliability analysts, it provides supplementary solved examples to clarify complex technical topics within each chapter. Although qualitative accelerated tests such as the Highly Accelerated Life Test (HALT) and Environmental Stress Screening (ESS) have been briefly reviewed, the book is mainly about the quantitative methods in probabilistic physics-based and accelerated testing life assessment of structures, components, and systems.
Established in 2014, the ASCE-ASME Journal of Risk and Uncertainty in Engineering Systems, Part A: Civil Engineering and Part B: Mechanical Engineering, serves as a medium for dissemination of research findings, best practices and concerns, and for discussion and debate on risk and uncertainty-related issues in the areas of civil and mechanical engineering and other related fields.

Scope: The journal addresses risk and uncertainty issues in planning, design, analysis, construction/ manufacturing, operation, utilization, and life-cycle management of existing and new engineering systems. A distinctive feature of the journal is the ability to reflect the multidisciplinary character of risk and uncertainty by covering a broad range of sub-disciplines of civil and mechanical engineering and other related fields.

History: The founding and current Editor-in-Chief of the journal is Professor Bilal M. Ayyub from the University of Maryland, College Park. Professor Ayyub established the journal in 2014 in coordination and consultation with an advisory board representing leaders from ASCE and ASME. It is the first joint journal published by ASCE and ASME. Part A and Part B are published quarterly and are registered by ASCE and ASME, respectively, as separate journals that require submitting the papers through the respective journal management systems. To fulfil the ASCE and ASME vision, formal links and cooperation with the Committees and Divisions of the two societies are being promoted. Among ASME Divisions, a close cooperation with SERAD has already been established.

Indexes: The journal has been accepted into the Emerging Citation Sources Indexed by Clarivate Analytics, formerly Thomson Reuters, and it is eligible for indexing in 2018. From 2016 onward, all articles will be included in Web of Science. They are also included in Scopus.

Awards: Both Part A and Part B of the journal annually select peer-reviewers as recipients of the Outstanding Reviewer Award and Reviewer of the Year Award in recognition of their strong contributions to ensure high quality of published papers. Starting in 2019, the Best Paper Award will be given annually to one paper in Part A and one paper in Part B appearing in the preceding volume year. A selection committee appointed by the Editor-in-Chief will evaluate papers based on the following criteria: fundamental significance, potential impact, practical relevance to industry, intellectual depth and presentation quality. For part B, SERAD will present the award at the annual ASME IMECE conference.
Workshop on Risk Analysis for Autonomous Vehicles; Issues and Future Directions

April 26, 2019
Venue: Ray 1-2 Boardrooms, Kim Building of Engineering, University of Maryland, College Park

The world is witnessing remarkable technology advancements and competitions in autonomous and connected transportation vehicles. These include major developments of self-driving electric cars by high tech companies as well as the traditional automobile manufacturers. Urban areas are bracing for a rapid infusion of these technologies into their roads in the near future. While technology development has been the prime focus of most recent technology innovations, we have witnessed only limited advances on issues of risk, reliability, and resilience. A number of accidents have already occurred.

Most surveys show that while the public at large is extremely excited about these technologies, concerns over safety, software reliability, security, hacking/misuse, and licensing remained as paramount.

The objective is to gather the experts from academy, research institutes, and industry to discuss the issues, identify the gaps, and propose the directions for basic and applied research activities.

The conference will follow with a congressional briefing to update the policy makers about the risk of the technology and potential directions for necessary funding.

Workshop topics:

- Risk, reliability and resilience (R3) engineering,
- Communications, information and network security,
- Transportation and road infrastructure,
- Learning and reasoning to control complex behavior
- Legal, ethical and regulatory issues
- Educational programs related to autonomy

Sponsors

Co-Organizers

- Professor Mohammad Modarres · · · · · · · · Centre for Risk and Reliability (CRR), University of Maryland, College Park
  modarres@umd.edu
- Dr. Mohammad Pourgol-Mohammad · · · · · · American Society of Mechanical Engineers (ASME)/Ducted Systems
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Ford Motor Company

Center for Risk and Reliability

Safety Engineering and Risk/Reliability Analysis Division
Dr. McCarthy explained that in the 130+ years since Karl Benz put the first gasoline engine his “automobile” no vehicle technology has caused more excitement, investment, than potential vehicle “autonomy” (SAE or NHTSA level 4 & 5). Since the “critical pre-crash event” of ~94% of US traffic accidents is a “driver critical reason(s),” vehicles are driven by a fast-autonomous agent that does not blink, sleep, drink, etc. spawn “predictions” of unprecedented safety impact. Autonomous vehicle potential to revolutionize western economies is inestimable. The 8% utilization of current automobiles could increase 10X as autonomous cabs.

Predicting the speed, scale and impact of autonomous vehicle technology on national traffic safety are crucial for planners in every nation in the world. The potential economic impact of any widely deployed vehicle guidance technology that might be more, or less, forgiving of flaws, changes or inevitable wear and weathering of the roadway must be considered. The vast tracts of real estate now dedicated to roadside parking, driveways, and garages could be reclaimed.

Unfortunately, the “hype” surrounding all US self-driving vehicles, even though they are using somewhat different technologies, significantly overstates the current capabilities of the technology, and the foreseeable improvements in the next few years, to operate on normal roads interacting with human drivers, with no demonstrated ability in snow or rain. The Google self-driving technology requires an “intricate” and detailed map about prospective routes involving “vastly more effort” than Google maps and are “an order of magnitude more complicated.”

The early overall crash rates for self-driving prototype vehicles under ideal conditions have been less than promising, even though crashes are virtually always the fault of the other driver. UMTRI observed, “the current best estimate is that self-driving vehicles have a higher [emphasis in original] crash rate per million miles traveled than conventional vehicles (9.1 vs. 4.1), the corresponding 95% confidence intervals overlap.” In response to the UMTRI study, Google funded a study at the Virginia Tech Transportation Institute (VTTI) which concluded: “When compared to national crash rate estimates that control for unreported crashes (4.2 per million miles), the crash rates for the Self-Driving Car operating in autonomous mode when adjusted for crash severity (3.2 per million miles; Level 1 and Level 2 crashes) are lower.” The author has updated these studies with his own that which still do not provide optimism. The fatal crash rate of Tesla’s on “autopilot” appears to be even worse,
Annually, SERAD hosts a challenge to undergraduate and graduate students to submit papers on Safety Engineering, Risk and Reliability Analysis topics. The papers are peer reviewed by experts in these areas. The top two winning papers in each the undergraduate and graduate groups will be presented in a special SERAD session at the ASME International Mechanical Engineering Congress & Exposition (IMECE) 2019, and honored at a SERAD awards banquet during the conference. Recognitions also include cash honorariums for first place winning authors, and reimbursement with a limit for conference related expense (travel, registration) for all students presenting paper at the special session.

**Submitting papers for 2019 SERAD Student Paper Contest:**

*Participants:*
- Undergraduate and Graduate students
- An academic sponsor/advisor is required

*Important Dates:*
- Student paper Submission by **May 28, 2019**.
- SERAD announces 1st and 2nd place winners in respective undergraduate and graduate group **June 25, 2019**.
- Presentation Only Abstract Submission by 1st and 2nd place winners by **TBD**.
- SERAD special session for student contest, and awards banquet in **November 8-14 2019** during IMECE 2019 in Salt Lake City, Utah (actual location, date & time TBD).

*Submittals:*
- Initial submittals must be previously unpublished work, but can be papers used for academic credits.
- Submittals are not required to follow ASME’s conference paper format, although it is encouraged. Suggested paper size is 4-6 pages including figures.
- Recommendation and statement of student status from the academic sponsor is required with submission.

Questions regarding 2019 student contest: Prof. Stephen Ekwaro-Osire (stephen.ekwaro-osier@ttu.edu), Prof. Dengji Zhou (zhoudj@sjtu.edu.cn).
“Safety Engineering, Risk and Reliability Analysis” is a track for ASME 2019 International Mechanical Engineering Congress and Exposition. We are now to seek for topic organizers to fill following topics. If you are interested in this opportunity, please contact us by email. The Track contains a collection of Topics in the broad area of safety engineering and risk analysis, which are individually organized by leading researchers in the field. The Topics give a comprehensive coverage of experimental, computational, and analytical approaches.

Dengji Zhou Ph.D, Shanghai Jiao Tong University, <zhoudj@sjtu.edu.cn>
Mihai Diaconeasa Ph.D, B. John Garrick Institute for the Risk Sciences, UCLA, <mihai@risksciences.ucla.edu>
Mohammad Pourgol-Mohammad Ph.D, Johnson Controls Inc./Sahand University of Technology, York, PA, United States, <pourgol-mohamadm2@asme.org>
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**Topic:**
1. Reliability Methods.
2. Failure and forensic analysis.
3. Testing for product reliability and safety.
4. Reliability and risk in energy systems.
5. Reliability and risk in manufacture systems.
6. Prognostic and health management.
7. Safety, risk and reliability of emerging technologies.
8. General topics on risk, safety and reliability.
10. Crashworthiness, occupant protection, and biomechanics.
11. Student contest presentation

Researchers and presenters are invited to participate in this event to expand international cooperation, understanding and promotion of efforts and disciplines in the area of Reliability, Safety, and Risk. Dissemination of knowledge by presenting research results, new developments, and novel concepts in Reliability, Safety, and Risk will serve as the foundation upon which the conference program of this area will be developed.
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**Special Collections and Special Issues:** Part A and Part B publish Special Collections and Special Issues, respectively, gathering contributions from both academia and industry on emerging topics in the field of risk and uncertainty in engineering systems. Active calls for such issues are listed below.

**Events:** A number of papers presented at the ASME IMECE annual conference are selected for publication consideration in the ASCE-ASME Journal of Risk and Uncertainty in Engineering Systems, Part B: Mechanical Engineering, based on their quality and relevance to the scope of the journal (e.g., SERAD track entitled “Design, Reliability, Safety and Risk” at IMECE 2018). The selection starts immediately after the conference. According to ASME policy, authors of selected papers are invited to update and expand their manuscripts with new results and details, and the submitted papers will go through the regular peer review process. Cooperation with other reputable conferences in the field of risk and uncertainty is being promoted by inviting conference chairs and mini-symposium organizers to select high-quality contributions for submission to the journal as regular papers or as part of Special Issues/Special Collections.

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**Autonomous Vehicle Safety: Tomorrow’s Rewards Versus Today’s Reality**

with a point estimate of more than 40 driver fatalities per million vehicle years compared to 11-13 for the luxury vehicle class. Even the “airbag deployment” rate on Tesla’s is higher than that for all conventionally driven vehicles.

Because of these challenges, and issues of liability, security, and privacy, the most significant active accident prevention will increasingly result from the deployment of automatic “backup” systems that monitor the driver, automatically intervene to prevent crashes, such as the automatic emergency braking (AEB) system.
Call for Papers

ASCE-ASME Journal of Risk and Uncertainty in Engineering Systems:
Part A. Civil Engineering and Part B. Mechanical Engineering
More information at http://www.asce-asme-riskjournal.org/
Contact Professor Bilal M. Ayyub, Editor in Chief, ba@umd.edu

New Award!


The award shall be given annually to one paper in Part A and one paper in Part B appearing in the preceding volume year based on significance and impact (including impact to industry) among others. The selection committee will be appointed by the Editor-in-Chief.
### Executive Committee Positions 2018-2019

**Chair:**
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**1st Vice-Chair:**
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**2nd Vice-Chair-Treasurer:**
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**4th Vice-Chair-Secretary:**
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**Past Chair:**
Jennifer Cooper  
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### Appointed Positions

**Nominating Chair:**
Open

**Student Paper Award Chair:**
Stephen Ekwaro-Osire  
Dengji Zhou

**Newsletter Editors:**
Stephen Ekwaro-Osire  
Mohammad Pourgol-Mohammad

**Webinars/Outreach Chair:**
Open

**IMECE2019 Chairs:**
Dengji Zhou  
Mihai Diaconeasa