ASME® 2020 IDETC-CIE
International Design Engineering Technical Conferences
& Computers and Information in Engineering Conference

VIRTUAL CONFERENCE
AUG 17–19, 2020

2020 ASME-CIE HACKATHON KICK-OFF MEETING

Identifying, Extracting, Analyzing Value from Large Unstructured Data Sets in Mechanical Engineering

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on behalf of ASME Systems Engineering Information & Knowledge Management (SEIKM) Technical Committee

August 15, 2020

Introduction

- The ASME-CIE 2020 Hackathon is the first Hackathon event held by ASME and is expected to become one of the signature events of ASME.
- The goal is to build society-university-industry relations and impact the quality and quantity of data-skilled mechanical engineers.
- Sponsored by the ASME Technical Events and Content (TEC) Sector Council and the ASME Computers & Information in Engineering Division (CIE).

Motivation

- Majority of the data collected is unstructured data. This is true in many mechanical engineering subfields where sensors are ubiquitous and digitization is pervasive.
- The question of how to leverage the power of unstructured data to benefit product design and development, manufacturing and complex systems engineering is still yet fully answered.

Objectives

- To provide an open mechanism for researchers to explore new statistical and machine-learning techniques appropriate for the use of unstructured text, images, audio etc. in design, manufacturing and systems engineering.
- To explore new educational pathways to train the next generation of data-skilled mechanical engineers.

Quick Summary

- Two hackathon problems: 1) Generating a Data-Driven Surrogate Model for Machine Damage Accumulation. 2) In-Process Data Mining for Powder-Bed Fusion Additive Manufacturing
- Award: 1st place: $2000, 2nd place: $1000, and 3rd place: $500
- 40 participants; 18 different institutions (16 universities and 2 companies); 5 different countries.

- The number of teams for each problem will be announced after the first selection.
- You can switch to another problem or select both problems

- One team can work on both problems
- One person can only join in one team

Agenda – Day 1

SEIKM Technical Committee: idetccie.seikm@gmail.com

Date and Time (CST)		Agenda	Action	Virtual platform
DAY 1, Aug.15	3:00 – 4:15 pm	Hackathon kick-off and introduction of topic areas	• Hackathon kick off and introduction	Zoom
	4:15 – 5:30 pm	Team formation	• Team formation and team name/# assignment. • Team leaders will submit team information to the Google form, and a team number will assigned to you. Submit team info **by 5:30 pm**. • Every team can create a private channel in the Slack, or use Gather virtual space. • A GitHub repository will be created for every team for co-working.	Gather; Zoom, slack, GitHub
	5:30 – 8:30 pm	Hackathon starts and Problem formulation (Tutorial and Q&A session will be from 6:30 to 7:30 pm)	• Slack and Zoom are available to provide assistance on problem formulation. Datasets will be downloadable on GitHub. • Tutorial session will be offered from 6:30 to 7:30. More details about the problems and GitHub will be provided. • Finalize your problem selection **by 8:30 pm**.	Gather, Slack, Zoom
	8:30 – 10:30 pm	Hackathon continues; pitch ideas and teamwork	• Q&A will be available through Slack. Drs. Yan Lu and Chris McComb will be available to answer questions in Slack. • Frequently asked questions will be collected and posted on GitHub later. • Most questions will be addressed before 8:30 pm.	Gather, Slack

Agenda – Day 2

SEIKM Technical Committee: idetccie.seikm@gmail.com

Date and Time (CST)		Agenda	Action	Virtual platform
DAY 2, Aug. 16	8:30 – 9:00 am	Day 2 kick-off	• Day 2 overview; download the presentation template from GitHub • Q&A will be offered by topic area mentors. Judging criteria recap.	Zoom
	9:00 – 1:00 pm	Hackathon continues; Tutorial and Q&A session will be from 10:00 to 11:00 am	• Q&A in Slack, and Zoom meetings can be arranged upon request in the Slack. Gather virtual space is always available.	Gather, Zoom, Slack, GitHub
	1:00 – 4:00 pm	Hackathon continues; Tutorial and Q&A session will be from 2:00 to 3:00 pm	• Q&A in Slack, and Zoom meetings can be arranged upon request in the Slack. Gather virtual space is always available • Teams will be reminded to prepare for the submission.	Gather, Zoom, Slack, GitHub
	4:00 – 4:30 pm	Project submission	• Upload the final submission to your own GitHub repositories (recommended) • Send the submission as a zip file to: idetccie.seikm@gmail.com • Deliverables: a) presentation slides and b) test files are mandatory, whereas c) the codes and d) pre-trained models are optional.	GitHub, Gmail
	4:30 – 6:30 pm	Project presentations	• Each team will present in sequence based on their team numbers. • One session or two sessions depending on the final number of teams	Zoom, Slack
	6:30 – 7:00 pm	Judge discussion	• Participants will take a rest and can chat in Slack or the Gather virtual space	Zoom
	7:00 - 8:00 pm	Awards and closing ceremony	• Announcement of winners and hackathon wrap-up. • Q&A for any remaining concerns and/or questions.	Zoom

Acknowledgement

- **CIE SEIKM TC**: Bryan O'Halloran, Yan Lu, Zhuo Yang, and Zhenghui Sha
- **Topic Area Leadership**: Chris McComb, Yan Lu, Dehao Liu, Faez Ahmed, Anh Tran, and Zhenghui Sha
- **ASME Staff**: Barbara Zlatnik, Andrew Koleba, and Timothy Graves
- **IDETC/CIE Conference Organizing Committee**: Andreas Müller and Jim Schmiedeler
- **MED Division Executive Committee Representatives**: William Emblom and Radu Pavel
- **IMECE Representatives**: Chris Depcik and Marriner H. Merrill
- **TEC Council Representatives**: Gloria Wiens (DMM), Stephen Reese (DMM), and Mina Pelegri (ESS)
- **Judges**:
  - Brandon Lane: NIST: National Institute of Standards and Technology
  - Michael Lawton: Boeing: The Boeing Company
  - Lucia Mirabella: Siemens
  - Anant Mishra: Siemens
  - Rahul Rai: The University at Buffalo – SUNY
  - Dazhong Wu: University of Central Florida

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ASME, The Design Materials & Manufacturing Segment Leadership Team (DMM SLT) Leader (2019-2020)

ASME CIE Division Representatives

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ASME Computers and Information in Engineering Division (CIE) Program Chair (2019-2020)

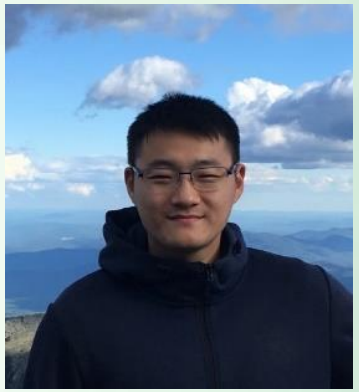
ASME SEIKM Technical Committee (2019-2020)

Bryan O'Halloran
Assistant Professor
Naval Postgraduate School

ASME CIE TC Chair

Yan Lu
Senior Research Scientist
NIST

ASME CIE TC Program Chair



Zhuo Yang
Guest Researcher
NIST

ASME CIE TC Secretary

Zhenghui Sha
Assistant Professor
University of Arkansas

ASME CIE TC Award Chair

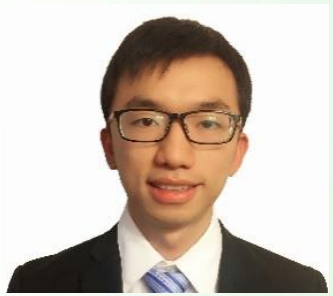
ASME-CIE Hackathon Topic Areas Leadership

Christopher McComb
Assistant Professor,
Penn State University

Faez Ahmed
Assistant Professor
MIT

Zhenghui Sha
Assistant Professor
University of Arkansas

Yan Lu
Senior Research Scientist
NIST



Dehao Liu
Graduate Research Assistant
George Institute of Technology

Anh Tran
Postdoctoral Appointee
Sandia National Laboratories

Shape Similarity
Information Fusion
Machine Learning
Multiphysics Simulation
Aesthetic Shapes
Shape Design
Internet Based CAD
Haptics
Internet
Bayesian
Cyber Physical Systems
Complex Systems
Shape Search
Cloud Computing
Risks
Graphs
Process Design
Human Behavior
Information Fusion
Knowledge Representation
Model
Information
Fuzzy Logic
Data Driven
Decision Support
Decision Making
User Experience
Finite Volume
Finite Element
Simulation
Robots
Lifecycle Management
Multidisciplinary Design Optimization
Topology
Security
Mesh Free
Human Behavior
Corrosion
Design Space Exploration
Emotion Engineering
Solid Modeling
Collaboration
Control Systems
Uncertainty
Assembly
Graphs
Conceptual Design
Visualization
Systems Engineering
Augmented Reality
Tolerance Analysis
Shape Search
Information Fusion
Artificial Intelligence
Inverse Problem
Biomechanics
Data Mining
Haptics
Ontologies
Path Planning
Reliability
Ergonomics
Life Cycle Assessment
Symbolic Computation
Design Synthesis
Internet
Visualization
Motion Planning
Multiagent Systems
Human Robot Interaction
Ontologies
Shape Similarity
Microstructure Reconstruction
Ontologies
Collision Detection
Inverse Problem
Sensing
Mesh Generation
Statistical Analysis
Virtual Reality
Feature
Failure
Design Education
Machine Learning
Reverse Engineering
Sustainability
Semantics
Human Modeling
Material Characterization
Evolutionary Computation
Decision Support
Feature Retrieval
Process Design Cyber Physical Systems
Solid Modeling
Multiscale Simulation
Systems Engineering
Evolutionary Computation
Finite Element
Mesh Generation
Path Planning
Reliability
Database
Virtual Reality
Shape Optimization
Augmented Reality
Collaborative Design
Constraint Satisfaction
Machine Vision
Rule Based Systems
Brain Machine Interface
Feature
Smart Structure
Reliability
Failure
Information Model
Knowledge Management
Machine Vision
Reliability
Semantics
Collaboration
Artificial Intelligence
Manufacturing
Multiagent Systems
Database
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Uncertainty
Surrogates
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Constraint
Sustainability
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Design Education
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Remanufacturing
Sensing
Complex Systems
Mechatronic Systems
Energy Systems
Multiphysics Simulation
Energy Systems
Semantics
Rapid Prototyping
MultiModal Interface
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Resilience
Reliability
Machine Vision