2020 ASME-CIE HACKATHON KICK-OFF

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

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ASME® 2020 IMECE®
International Mechanical Engineering Congress & Exposition®
VIRTUAL CONFERENCE
Nov 16–19, 2020

ASME® 2020 HACKATHON
COMPUTER / INFORMATION / ENGINEERING

Introduction

- 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, the ASME Computers & Information in Engineering Division (CIE), ASME Manufacturing Engineering Division (MED)
  ASME IMECE / Advanced Manufacturing Track (AMT).
- ASME MED Centennial Celebration Event – 100-Year Anniversary in 2020!

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 an interpretable surrogate model for predicting damage accumulation. 2) Smart manufacturing – Melt-pool size prediction for powder-bed fusion additive manufacturing.
- Award: 1st place: $2000, 2nd place: $1000, and 3rd place: $500
- **33** participants; >**16** different institutions; **3** different countries.

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

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

2020

Agenda – Day 1

SEIKM Technical Committee: idetccie.seikm@gmail.com

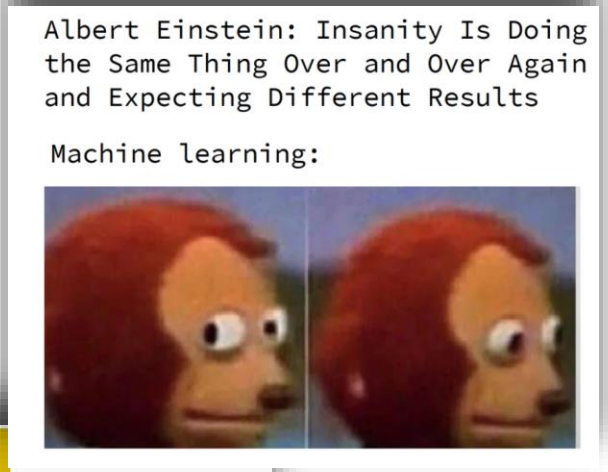
Date and Time (ET)		Agenda	Action	Virtual platform
DAY 1, Nov.14	2:00 – 4:15 pm	Hackathon kick-off and introduction of topic areas	• Hackathon kick off and introduction	Zoom
	4:15 – 5:15 pm	**Team formation**	• Team formation and team name/# assignment. • Team leaders will submit team information to the Google form, and a team number will be 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
	5:15 – 8:30 pm	Hackathon starts and problem formulation (Q&A and tutorial session will be available)	• Zoom will be available from 5:15 – 6:15 to provide assistance on problem formulation. Datasets will be downloadable on GitHub. • Tutorial session will be offered from 6:30 to 8:30. 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; pitching ideas and teamwork	• Q&A will be available through Slack. Mentors 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 9:30 pm.	Gather, Slack

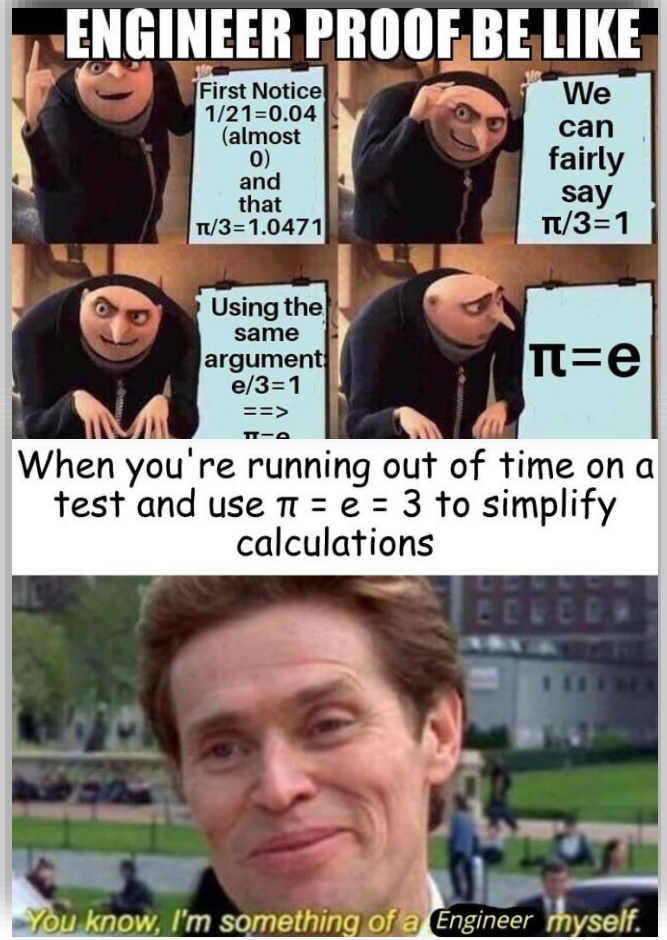
Agenda – Day 2

SEIKM Technical Committee: idetccie.seikm@gmail.com

Date and Time (ET)		Agenda	Action	Virtual platform
DAY 2, Nov. 15	10:00 – 10:15 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
	10:15 –1:00 pm	Hackathon continues; One Zoom Q&A session will be available from **11:30 to 12:30 am**	• Additional Zoom meetings can be arranged upon request. • Q&A in Slack and Gather virtual space are always available.	Gather, Zoom, Slack, GitHub
	1:30 – 4:30 pm	Hackathon continues; One Zoom Q&A session will be available from **2:30 to 3:30 pm**	• Additional Zoom meetings can be arranged upon request. • Q&A in Slack and Gather virtual space are always available. • Teams will be reminded to prepare for the submission.	Gather, Zoom, Slack, GitHub
	4:30 – 5:00 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
	5:15 – 7:30 pm	Project presentations	• Each team will present in sequence based on their team numbers. • Two sessions will be held in parallel.	Zoom, Slack
	7:30 – 8:00 pm	Judge discussion	• Participants will take a rest	Zoom
	8:00 - 9:00 pm	Awards and closing ceremony	• Announcement of winners and hackathon wrap-up. • Q&A for any remaining concerns and/or questions.	Zoom

2020 IMECE MEME Challenge





Acknowledgement

- **ASME-CIE Hackathon Committee**: Zhenghui Sha, Yan Lu, Chris McComb, Zhuo Yang, Dehao Liu, Faez Ahmed, Anh Tran, Dazhong Wu, Bryan O'Halloran, and Binyang Song
- **ASME Staff Support**: Barbara Zlatnik and Jessica Barnes
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- **MED Division Executive Committee Representatives**: William Emblom and Radu Pavel
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  - Mr. Anant Mishra: Siemens
  - Prof. Rahul Rai: Clemson University
  - Dr. Binyang Song: Pennsylvania State University

Dr. Yan Lu: National Institute of Standards and Technology
Dr. Brandon Lane: National Institute of Standards and Technology
Prof. Dazhong Wu: University of Central Florida
Prof. Hui Yang: Pennsylvania State University
Dr. Ho Yeung, National Institute of Standards and Technology

ASME TEC Council Representative

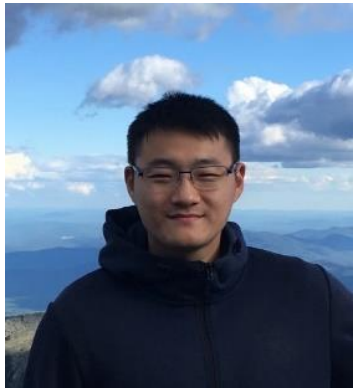
Gloria J. Wiens
Associate Professor
Department of Mechanical & Aerospace Engineering
University of Florida

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

ASME SEIKM Technical Committee (2020-2021)

Yan Lu
Senior Research Scientist
NIST

ASME SEIKM TC
Chair



Zhuo Yang
Guest Researcher
NIST

ASME SEIKM TC
Program Chair

Dazhong Wu
Assistant Professor
University of Central Florida

ASME SEIKM TC
Secretary

Bryan O'Halloran
Assistant Professor
Naval Postgraduate School

ASME SEIKM TC
Award Chair

ASME-CIE Hackathon Topic Areas Leadership

Christopher McComb
Assistant Professor,
Pennsylvania State University

Problem 1: Generating an interpretable surrogate model for predicting damage accumulation.

Yan Lu
Senior Research Scientist
National Institute of Standards and Technology

Problem 2: Smart manufacturing – Melt-pool size prediction for powder-bed fusion additive manufacturing.

Thank You!
Questions?

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