Fall 2023
*Pushing Intelligence to the Edge*
IAB Meeting

October 25-26
University of Michigan-Flint
Riverfront Conference Center
1 Riverfront Plaza
Flint, MI 48502
Welcome to University of Michigan-Flint, host of the fall 2023 PPI Center Advisory Board Meeting! The campus is located in the heart of downtown Flint, Michigan. Our community takes great pride in its strong history and reputation for attracting, cultivating, and recognizing “doers” — resilient individuals who aren’t afraid to take initiative and make the world a better place. We welcome the thought leaders in academic and industry research for this exciting Industry/University event.

The Riverfront Conference Center is Genesee County's largest conference venue, hosting thousands of visitors each year. Parking for Riverfront Conference Center is located in the attached parking structure located on Beach Street. Guests will take the elevator/stairs to level one and cross Union Street to the front entrance of the Riverfront Conference Center.

**Airports**
Flint Bishop International Airport  
Flint, MI  
Daily connecting flights to Chicago

DTW International  
Romulus, MI  
90 minutes by car to UM Flint

Car rental is available at both airports.

**Room Block Hotel - book by October 11**
Hilton Garden Inn - Downtown Flint  
110 W Kearsley Street, Flint MI 48502

**Parking**
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A parking map is available at https://www.umflint.edu/campus-map/

**Contact**
Any questions regarding the meeting logistics, travel, hotel, and accommodation can be directed to Laurel Ming, laurelmi@umich.edu
Welcome to this unique opportunity to network with industry leaders, academic scholars, and researchers as we come together to discuss the development of applications and platforms that push personalized intelligence to the edge of the network in the aerospace, automotive, manufacturing, national labs, and high-tech industries.

Internet of Things (IoT) marks the dawn of a technological revolution that rivals the industrial revolution. In this new era, intelligent computing becomes anticipatory, proactive, and adaptive. The next big growth in IoT systems will come from pushing Pervasive Personalized Intelligence (PPI) to the edge of the network, where latency is critical, and mobility, privacy, and context awareness are essential qualities of the application. The PPI Center will support the thrusts that enable an entirely new class of applications with intelligence that is predictive instead of reactive, thus making processes more efficient and saving time, energy, and money.

The PPI Center is a multi-university, industry-focused research center under the supervision of the US National Science Foundation (NSF). We operate under the NSF IUCRC model. The pre-competitive (i.e., of interest to many companies) and industry-applied research projects we work on are funded by industry members, by our universities, and by the NSF.

Our 60+ companies represented at our meetings include many of the global high-tech companies, the leading companies in the IoT domain (smart buildings, smart home, smart city, Industry 4.0, smart health), and many medium-size and startups from Colorado, Oregon, Silicon Valley, and Japan. Our mission is to engage our industry members through twice-a-year workshops, progress reports, student internships, etc. We do not simply accept members as Corporate Affiliations; we want to work with engaged industry members. We are project-driven, and we stay accountable to our members for the progress we make. It is this accountability that makes us better and helps us to serve our members.

We are an interdisciplinary group of academic researchers and industry thought-leaders coming together to work on the common challenges to realize intelligent software systems that we would want and are confident in. At the PPI Center, we believe that an open forum with startups, large corporate partners, and government agencies connecting directly with university researchers is necessary to turn fundamental research into innovative products. leverage the PPI Center.

We seek to

- Enable Diverse Thinking
- Collaborate on Industry-wide Challenges
- Leverage Access and Resources
WHAT WE DO
In discussions with our industrial members and partners, we understand the importance of intelligent transportation, software engineering, edge intelligence and smart energy so that businesses run more smoothly and profitability. It is for this reason that we have brought together leading experts from different sites in Colorado, Michigan, and Oregon.

The Colorado site leads activities primarily under three thrusts:

**Edge and Cloud Computing**
Is it possible to identify and develop a small set of fundamental system-level services at the middleware layer to integrate mobile nodes, IoT devices, and edge servers?

**Programming Languages and Verification**
Can new techniques be created that enable software developers to effectively create rich PPI applications that, by construction, are secure, privacy-preserving, and reliable?

**Software Engineering and Human-Computer Interaction**
How can we retrofit and evolve PPI programming models into existing software? How people interpret visualized data and how can we use these models to drive novel visualization systems that support accurate analysis of complex data that better scale to the needs of modern analytics?
The Michigan site pursues activities primarily in the following areas:

**Secure and intelligent transportation**
How do we manage the complexity in deploying ML applications on the edge in limited/constrained hardware environments such as embedded devices in cars?

**Software engineering**
How do we ensure isolated failure/impacts of applications? How do we quickly deliver and install software updates in a secure manner on the edge?

**Explainable multimodal distributed intelligence**
How can we design a common data-collection solution for fast-changing data on zonal controllers?

**Artificial intelligence (AI) and digital twins**
Can we develop personalized, context-aware sensing-analysis-actuation solutions in smart vehicles?

**Smart energy**
How can we enable smart electric systems that help customers use the most energy when demands are lower?

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**Machine Learning and Artificial Intelligence**
How do we increase the trust of developers and end-users in software that learns, detect anomalous behaviors and patterns, and on-boarding new users?

**Security and Privacy**
Can we help end-users make configuration decisions that do not violate their privacy and compute on users’ private data without revealing private information?

**Visualization and Visual Analytics**
How do we translate data into insight visually? Can we make this process of data-to-insight not only possible but also easy for our users? How can we help users better understand what their AI programs are telling them?

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Eugene Zhang  
Co-Director, OSU Site  
Professor, Oregon State University  
Expertise: Visualization

Weng-Keen Wong  
Director, OSU Site  
Associate Professor, Oregon State University  
Expertise: ML (Time Series)

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The Oregon State site pursues activities primarily under three thrusts:

**Machine Learning and Artificial Intelligence**
How do we increase the trust of developers and end-users in software that learns, detect anomalous behaviors and patterns, and on-boarding new users?

**Security and Privacy**
Can we help end-users make configuration decisions that do not violate their privacy and compute on users’ private data without revealing private information?

**Visualization and Visual Analytics**
How do we translate data into insight visually? Can we make this process of data-to-insight not only possible but also easy for our users? How can we help users better understand what their AI programs are telling them?

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Eugene Zhang  
Co-Director, OSU Site  
Professor, Oregon State University  
Expertise: Visualization

Weng-Keen Wong  
Director, OSU Site  
Associate Professor, Oregon State University  
Expertise: ML (Time Series)
### Day 1: Wednesday October 25
Riverfront Conference Center

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<tr>
<th>Time</th>
<th>Event</th>
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</table>
| 7:50 - 8:30am | Check-in/registration  
Lobby  
Continental Breakfast |
| 8:30 - 8:40am | Welcome from the PPI Leadership  
Marouane Kessentini |
| 8:40 - 9:00am | Opening Remarks  
UM-Flint Leadership |
| 9:00 - 9:10am | Introductions from Industry Members and Guests |
| 9:10 - 9:30am | Vision, Capabilities, and Value of the PPI Center  
Danny Dig, University of Colorado Boulder |
| 9:30 - 10:00am | Industry Advisory Board Meet & Greet  
Beppe Raffa, Intel |
| 9:30 - 10:00am | NSF IUCRC Model  
Dee Hoffman, NSF IUCRC Evaluator |
| 10:00 - 10:20am | Networking Break  
Refreshments in the Lobby |
| 10:20 - 11:30am | Project Status Reports from PPI Faculty  
Correlation Changepoint Detection  
Lead PI: Weng-Keen Wong (OSU)  
Global Explanations for Image Classification  
Lead PI: Prasad Tadepalli (OSU)  
ML Over Large Inconsistent Datasets  
Lead PI: Arash Termehchy (OSU)  
Context-Preserving Spatiotemporal Representation Learning & Anomaly Detection for IoT Data  
Lead PI: Morteza Karimzadeh (CU Boulder)  
Augmented Reality as an Interface for the Internet of Things and People  
Lead PI: Ellen Do (CU Boulder)  
Decentralized, Privacy-Preserving Data Collection & Aggregation at The Edge with Assistive Devices  
Lead PI: Bradley Hayes (CU Boulder) |
<p>| 11:30 - 12:30pm | Industry Panel 1 |
| 12:30 - 1:30pm | Lunch &amp; Networking Break |</p>
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<tr>
<th>Time</th>
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<tr>
<td>1:30 - 2:40pm</td>
<td>New Project Proposals from PPI Faculty</td>
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<td>Personalized Explanation of Knowledge Generation using Multimodal Edge AI Models.</td>
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<td>Lead PI: Dr. Khalid Malik (Michigan)</td>
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<td>Code Renovation for ML Software</td>
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<td>Lead PI: Danny Dig, (CU Boulder)</td>
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<td>My AI: Towards a Platform for Involving Customers in Design of Artificially Intelligent Technology.</td>
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<td>Lead PI: Dr. Douglas Zytko (Michigan)</td>
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<td>System Support to Enable AI on the Edge.</td>
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<td>Lead PI: Dr. Shiv Mishra (UC-Boulder)</td>
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<td>Automated Management of the Complexity of Deploying AI/ML Applications on the Edge.</td>
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<td>Lead PI: Dr. Marouane Kessentini (Michigan)</td>
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<td>Natural Language Explanations for Understanding AI System Failure Modes</td>
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<td>Lead PI: Steve Wilson (Oakland University)</td>
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<td>2:40 - 3:00pm</td>
<td>Networking Break</td>
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<td>Refreshments in the Lobby</td>
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<td>3:00 - 3:30pm</td>
<td>Lightning Talks from Poster Presenters</td>
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<td>5:30 - 8:00pm</td>
<td>Banquet Dinner and Student Poster Awards</td>
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<td>Hilton Garden Inn</td>
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**Day 2: Thursday October 26**

**Riverfront Conference Center**

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<th>Time</th>
<th>Event</th>
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<tbody>
<tr>
<td>8:00 - 8:30am</td>
<td>Check-in/registration</td>
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<td>Continental Breakfast</td>
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<td>8:30 - 9:30am</td>
<td>Industry Keynote</td>
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<td>Speaker TBA</td>
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<td>9:30 - 10:45am</td>
<td>PPI Faculty Review Project Feedback w/ Industry</td>
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<td>10:45 - 10:55am</td>
<td>NSF Surveys</td>
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<td>Dee Hoffman, NSF IUCRC Evaluator</td>
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<td>10:55 - 11:10am</td>
<td>Networking Break</td>
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<tr>
<td>11:10 - 12:00pm</td>
<td>Industry Meeting for Project Voting</td>
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<td>Beppe Raffa, Intel</td>
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<td>12:00 - 12:30pm</td>
<td>Moving Forward &amp; Closing</td>
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<td>PPI Leadership</td>
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<td>12:30 - 2:00pm</td>
<td>Lunch</td>
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<tr>
<td>2:00 - 5:00pm</td>
<td>Ad-hoc Meetings</td>
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