THE UNIVERSITY OF ALABAMA® | Styslinger College of Engineering
Department of Mechanical Engineering

February 3, 2026

Dear Industry Representative,

I am pleased to introduce the National Science Foundation (NSF) Industry–University Cooperative Research Center (IUCRC) Planning Grant initiative for the proposed **Center for Smart Manufacturing using AI-based Revolutionary Technologies (SMART Center)**. I am also writing to formally invite your organization to participate in our upcoming Planning Meeting.

The proposed SMART Center aims to advance **applied, pre-competitive research** at the convergence of **artificial intelligence, advanced manufacturing, and construction**. By fostering strong collaboration among industry partners, academic researchers, and public-sector stakeholders, the Center seeks to accelerate the development, evaluation, and deployment of AI-enabled technologies that enhance productivity, quality, sustainability, and workforce readiness across industrial environments.

As part of the NSF IUCRC planning process, we will convene the **SMART Center Planning Meeting on March 5–6, 2026**, at the **Randall Welcome Center** at The University of Alabama. This meeting will bring together prospective industry members, participating faculty, university leadership, and NSF representatives to:

- Present the Center's mission and long-term vision
- Discuss industry-driven research priorities
- Share examples of proposed research projects
- Solicit feedback that will shape the final IUCRC proposal

Please note that participation in the Planning Meeting entails **no obligation or commitment**. Rather, it offers an opportunity for industry representatives to learn about the Center's objectives, provide input, and explore potential avenues for collaboration.

To support logistical arrangements and catering, we kindly request that interested participants **register by February 20** using the following link:

https://smart.eng.ua.edu/register/

Additional details, including a flyer and draft agenda, are enclosed for your review.
We would be honored to have representatives from your organization attend the Planning Meeting and contribute their valuable perspectives to this important planning effort.

Thank you for your time and thoughtful consideration. I look forward to the possibility of your participation.

Sincerely,

Hwan Yoon
Director, SMART Center (Proposed)
Associate Professor, Mechanical Engineering
The University of Alabama
hyoon@eng.ua.edu, 205-348-1136

National Science Foundation Industry University Cooperative Research Center (IUCRC) for

Smart Manufacturing using AI-based Revolutionary Technologies (SMART)

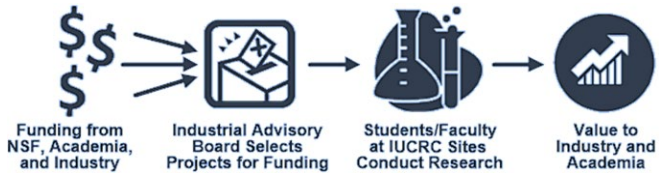
SMART Center
Smart Manufacturing using AI-based Revolutionary Technologies

Recent advancements in communication and information technologies have significantly transformed major industrial sectors, including manufacturing and construction. For example, automotive production lines today are highly automated and operated by various types of robots, while construction projects increasingly adopt digital tools and automation for equipment operation and site management. More recently, machine learning and AI have advanced rapidly, influencing many aspects of modern life, from consumer products to engineering practices. However, despite their potential, these technologies have not yet been adopted in the manufacturing and construction sectors at the same pace as in other areas.

In response to this challenge and opportunity, two universities with strong records of contribution to industry – The University of Alabama (UA) and The University of Alabama in Huntsville (UAH) – have collaborated to establish a National Science Foundation (NSF) Industry–University Cooperative Research Center (IUCRC) for Smart Manufacturing using AI-based Revolutionary Technologies (SMART). The proposed center will conduct fundamental and applied research on AI-enabled smart manufacturing and construction technologies to improve productivity, quality, sustainability, and workforce readiness, while also providing continuous learning and training opportunities for industry professionals.

What is IUCRC?

Industry University Cooperative Research Centers (IUCRCs) are funded by the National Science Foundation as collaborative efforts among universities, large and small companies, local, state and federal government agencies, and other organizations for the purpose of conducting pre-competitive research of shared value. This model has been successfully utilized and refined for over 40 years. The IUCRC Program's objectives are to grow U.S. innovation capacity by developing long-term partnerships among industry, academe, and government, and to leverage NSF funds with industry to support and train the next generation workforce within a global context.



NSF provides the centers' administrative and operational framework, networking opportunities, and more:

- Members pool their funds together to conduct pre-competitive research.
- Members meet two times per year and collectively vote to recommend which projects to fund.
- Members have access to faculty, students, and center resources at all participating university sites.
- Members have access to free online and in-person training and certificate programs on various manufacturing and AI subjects for their employees.
- Members have rights to royalty-free, non-exclusive licenses to center-generated intellectual property.

SMART Center Vision and Mission

Vision: *To become a globally leading research and education organization advancing the application of AI-based technologies to transform the manufacturing and construction industries.*

Mission: *To conduct fundamental and applied research and to provide education and workforce training in AI-enabled smart manufacturing and construction technologies by leveraging collaborations among corporate, nonprofit, government, and academic stakeholders.*

This mission is organized around four research thrust areas:

- Manufacturing Productivity: Predictive maintenance of manufacturing and construction equipment to reduce downtime; optimization of factory and job-site layouts using workflow monitoring and generative AI; development of knowledge-based systems using large language models.
- Product and Process Quality: Improvement of joining and fabrication processes using sensor data; vision-based quality inspection using deep learning; optimization of process parameters to enhance product and construction quality.
- Facility and Operational Sustainability: Supply-chain and material-flow optimization through demand prediction and inventory monitoring; improvements in building and facility energy efficiency through intelligent monitoring and control.
- Workforce Safety and Performance: Accident prediction and prevention using vision- and sensor-based monitoring; optimization of work schedules and task assignments through analysis of worker performance and fatigue.

Contact Information

Center Website: https://smart.eng.ua.edu/

Prospective Center Director

Hwan Yoon, Ph.D.
Associate Professor, Mechanical Engineering Department
The University of Alabama
Tuscaloosa, AL 35487
205-348-1136(o), 931-644-7715(c), hyoon@eng.ua.edu

Prospective Site Directors

University of Alabama (UA)
Dan Fonseca, Ph.D.
Associate Professor
Mechanical Engineering Department
The University of Alabama
Tuscaloosa, AL 35487
205-348-7268, dfonseca@eng.ua.edu

University of Alabama in Huntsville (UAH)
Judy Schneider, Ph.D.
Professor of Mechanical
and Aerospace Engineering;
Co-Director of Materials Science Program
The University of Alabama in Huntsville
Huntsville, AL 35899
256-824-5186, judith.schneider@uah.edu

Center Core Faculty

Nima Mahmoodi (UA)
Sadie Beck (UA)
Jackey Gong (UA)
Joseph Carpenter (UA)
Kaiwen Chen (UA)
Howard Chen (UAH)
Ana Wooley (UAH)
Vineetha Menon (UAH)
Nicholas Loyd (UAH)
Cheng Chen (UAH)

U.S. National Science Foundation
WHERE DISCOVERIES BEGIN

SMART Center
Smart Manufacturing using AI-based Revolutionary Technologies

Planning Meeting Agenda[1] (Tentative)

National Science Foundation Industry University Cooperative Research Center (IUCRC) for Smart Manufacturing using AI-based Revolutionary Technologies (SMART)

The University of Alabama
Randall Welcome Center
200 Bryce Lawn Dr., Tuscaloosa, AL 35487
March 5 - 6, 2026

Day 1 - Thursday, March 5

7:30-8:30 Participant Registration (Randall Welcome Center Lobby)

7:45-8:30 Breakfast and Networking Time (Randall Welcome Center Shumilas Reception Hall)

8:30-8:50 Welcome Remarks (Randall Welcome Center Shumilas Reception Hall)

- Hwan Yoon, SMART Center Director
- Dan Fonseca, UA Site Director
- Judy Schneider, UAH Site Director
- Clifford Henderson, Dean of Styslinger College of Engineering, The University of Alabama
- Keith Hollingsworth, Interim Dean of College of Engineering, University of Alabama in Huntsville

8:50-9:20 SMART Vision, Capabilities, and Value Proposition

- Vision, mission, and research thrust areas – Hwan Yoon
- Workforce development and training program – Dan Fonseca and Nima Mahmoodi
- Industry perspective on AI-based manufacturing – Industry representative (TDB)

9:20-10:15 NSF IUCRC Overview

- NSF IUCRC program overview – Seetha Raghavan, NSF IUCRC Program Director
- NSF IUCRC center evaluation and best practices – Zoe Hoeppner, NSF IUCRC Evaluator

10:15-10:30 Break

10:30-12:35 Project Progress Presentation - Session 1[2]

- 10:30-10:55 *Real-Time Detection of Product Defects using Camera-Based AI/ML Algorithms*, Nima Mahmoodi (UA), Cheng Chen (UAH), Hwan Yoon (UA), Dan Fonseca (UA), and Jackey Gong (UA).
- 10:55-11:20 *Knowledge Base System using LLM-RAG Model*, Cheng Chen (UAH) and Hwan Yoon (UA).
- 11:20-11:45 *AI and Smart Sensor Fusion for Energy Baselining, Assessment, and Preventive Maintenance*, Joseph Carpenter (UA).
- 11:45-12:10 *Digital Twin for Use in Human Injury Predictions in Real-Time*, Howard Chen (UAH), Nicholas Loyd (UAH), Ana Wooley (UAH), Vineetha Menon (UAH), and Daniel Fonseca (UA).
- 12:10-12:35 *Camera-Based Workspace Monitoring for Workflow Optimization and Workforce Safety*, Hwan Yoon (UA), Dan Fonseca (UA), and Jackey Gong (UA).

12:35-1:30 Lunch with Poster Discussion

---

[1] Contacts Center Director: Hwan Yoon, 931-644-7715, hyoon@eng.ua.edu (contact Dr. Yoon regarding meeting arrangements and travel).

[2] Project presentations are limited to 15 minutes, leaving 5 minutes for Q&A and 5 minutes for transition.

1:30-3:35 Project Progress Presentation - Session 2

- 1:30-1:55 *Developing Digital Training Set for Factory Equipment Maintenance*, Vineetha Menon (UAH) and Judy Schneider (UAH).
- 1:55-2:20 *Optimization of Advanced Manufacturing Processes using a PINN Approach*, Cheng Chen (UAH), Judy Schneider (UAH), and Sadie Beck (UA).
- 2:20-2:45 *Collaborative Robotic Assembly Strategy Using Reinforcement Learning*, Dan Fonseca (UA), Nima Mahmoodi (UA), and Hwan Yoon (UA).
- 2:45-3:10 *Systematic Approach to Digital Transformation*, Ana Wooley (UAH) and Nicholas Loyd (UAH).
- 3:10-3:35 *AI, Robotic Sensing, and Digital Twins for Smart Inspection of Infrastructure and Buildings*, Kaiwen Chen (UA) and Hwan Yoon (UA).

3:35-4:00 Break with Poster Discussion

4:00-5:00 Industry Workshop

- Discussion of projects & company needs not addressed in the project presentations

5:00-5:10 Review of Evening and Day 2 Activities - Hwan Yoon

5:10-6:00 Tour of the IMaDE facility (Paty Hall)

6:00-8:00 Poster Reception and Dinner (McAbee Grand Foyer in HM Comer)

Day 2 - Friday, March 6

7:30-8:00 Arrival and Breakfast (Randall Welcome Center)

8:00-8:05 Opening Remarks for Day 2 (Randall Welcome Center Shumilas Reception Hall)

- Bryan Boudouris, Vice President for Research and Economic Development, The University of Alabama

8:05-9:35 Project Feedback Review and Discussion (Randall Welcome Center Shumilas Reception Hall)

- PI facilitated discussion with all participants

9:35-10:15 Center Response to Feedback from Industry Workshop

- Center and Site Directors

10:15-10:30 Break

10:30-11:15 NSF Closed Session with Industry

- NSF IUCRC Program Director and Industry Members

11:15-11:45 Next Steps, Action Items & Closing Remarks

- Center and Site Directors

11:45 Adjourn

- Box lunches will be provided

Travel and Lodging

Meeting Venue

The Planning Meeting will be held at the Randall Welcome Center, conveniently located in the heart of The University of Alabama's beautiful campus.

200 Bryce Lawn Dr, Tuscaloosa, AL 35401

Parking

Parking is available on campus, and more details will be sent out prior to the workshop.

Hotel Reservations

We have reserved a block of rooms at Hotel Capstone and Hampton Inn-University. Please follow the links below to make your individual reservations.

- Hotel Capstone (on UA campus):

  320 Paul Bryant Dr., Tuscaloosa, AL 35401, TEL: +205-343-1118
  http://www.hotelcapstone.com
  Regular rates apply.

- Hampton Inn Tuscaloosa – University:

  600 Harper Lee Dr, Tuscaloosa, AL 35404, TEL: +205-553-9800
  Group Name: NSF IUCRC SMART
  Booking Link:
  https://www.hilton.com/en/book/reservation/deeplink/?ctyhocn=TCLALHX&groupCode=CHH90G&arrivaldate=2026-03-04&departuredate=2026-03-06&cid=OM,WW,HILTONLINK,EN,DirectLink&fromId=HILTONLINKDIRECT
  Code: 90G
  Cut-off Date: Friday, February 20th @ 11:59 p.m.
  Rate: $119.00
  Cancellation Policy: 6:00 p.m. date of arrival

- Embassy Suites by Hilton - Downtown Tuscaloosa:

  2410 University Boulevard, Tuscaloosa, AL 35401, TEL: +1-205-561-2500
  Booking Link: https://www.hilton.com/en/book/reservation/rooms/?ctyhocn=TCLRTES&arrivalDate=2026-03-04&departureDate=2026-03-06&room1NumAdults=2&inputModule=HOTEL_SEARCH&viewPackagesAndPromotionsRate=true&WT.mc_id=zLADA0US1ES2OLX3GGL4AMMETA_Oct5AMPBRNLAB6TCLRTES7EN8i144111__z22497766311z&adType=PD&gclid=CjwKCAiA1obMBhAbEiwAsUBbIhFBxhbiKDZX4AFWmTjTHVt5xKLKE58wEDD46szwZW1rNFVjp80YpxoCiqIQAvD_BwE&dsclid=76020061706399744
  Regular rates apply.

UA Campus Map with Event Locations