INTELLIGENT SYSTEMS CENTER (ISC)

320 Engineering Research Lab
Frank Liou (Director)
https://isc.mst.edu

Senior Research Investigators

Sajal Das (CS), Ming Leu (MAE), Frank Liou (MAE), Sanjay Madria (CS), Jagannathan Sarangapani (ECE), Donald Wunsch II (ECE)

Research Investigators

Venkat Allada (EMSE), Ahmad Alsharoa (ECE), Daryl Beetner (ECE), Amy Belfi (PSYCH), Rui Bo (ECE), Douglas Bristow (MAE), Mario Buchely (MSE), Casey Canfield (EMSE), Nan Cen (CS), K. Chandrashekhara (MAE), Steven Corns (EMSE), Cihan Dagli (EMSE), Fatih Dogan (MSE), Xiangyang Dong (MAE), Xiaosong Du (MAE), David Enke (EMSE), Medhi Ferdowsi (ECE), Abhijit Gosavi (EMSE), Daoru Han (MAE), Wenqing Hu (MATH), Jie Huang (ECE), Chulsoon Hwang (ECE), Jonathan Kimball (ECE), Alanna Krolikowski (HST), Jinling Liu (EMSE), Tie Luo (CS), Siddhardh Nadendla (CS), Tayo Obafemi-Ajayi (EE-MSU), Anthony Okafor (MAE), Gayla Olbricht (MATH), Jonghyun Park (MAE), V.A. Samaranayake (MATH), Sahra Sedigh Sarvestani (ECE), Pourya Shamsi (ECE), Daniel Shank (PSYCH), Yun Seong Song (MAE), Arhendu Tripathy (CS), Haiming Wen (MSE), Guirong Yan (CArE), Xiaodong Yang (MAE), Maciej Zawodniok (ECE)

The mission of the Intelligent Systems Center (ISC) is to provide an interdisciplinary research environment in which faculty from various departments can cooperate and conduct research on sponsored projects involving real physical systems with special emphasis on an intelligent (smart) system approach. ISC has integrated its primary research mission with Missouri S&T's commitment to developing internationally recognized graduate research programs focused on key emerging and critical technologies.

The approaches that we are taking to accomplish ISC's objectives are to:

- Develop multidisciplinary research programs to address the emphasis areas of federal sponsoring agencies with the expertise of Missouri S&T faculty who are ISC members
- Obtain both short- and long-term federal research grants and industrial contracts
- Develop advanced research facilities

The education of graduate students is one of ISC's major activities. To this end ISC provides graduate research assistantships to selective graduate students through the Center Members. The interdisciplinary nature of ISC provides an excellent environment for ISC supported students to interact with fellow students from other departments. The students also gain valuable experience in working as a team and acquire oral and written communication and project organization skills. The interaction of graduate students with engineers from industries and program managers from federal agencies is very valuable.

Multidisciplinary research teams consisting of faculty members and graduate students from various departments have been established to conduct research. ISC has also developed state-of-the-art laboratories to conduct research and development on virtual prototyping, additive manufacturing, smart structures, machine learning and AI, energy systems, sensors, internet of things (IoT), unmanned aerial vehicles (UAVs), neural network-based control, cybersecurity, smart living, automatic inspection, robotics, and autonomous systems, and structural health monitoring. Cutting-edge research and funded projects are ongoing in the following thrust areas:

1. Intelligent Manufacturing Processes, Equipment and Systems
    - 1.1 Virtual & Rapid Prototyping
    - 1.2 Additive Manufacturing & 3D Printing
    - 1.3 Smart Manufacturing
    - 1.4 Cyber Manufacturing
    - 1.5 Eco Manufacturing
    - 1.6 Biomanufacturing
    - 1.7 Intelligent Robotics
    - 1.8 Human-Robot Collaboration
    - 1.9 Virtual & Augmented Reality
2. Cyber Physical and Smart Living Systems
    - 2.1 Smart City/Smart Home
    - 2.2 Smart Grid (Energy)
    - 2.3 Smart Mobility and Transportation
    - 2.4 Smart/Precision Health
    - 2.5 Smart/Precision Agriculture
    - 2.6 Smart Manufacturing
    - 2.7 Resilience and Sustainability
3. Advanced Simulation, Sensing, Control, and Communication
    - 3.1 Sensors and Sensor Networks
    - 3.2 Learning and Adaptation and Artificial Intelligence
    - 3.3 Safe and Trustworthy Intelligent and Adaptive Control
    - 3.4 Secure Networked Control Systems/Cyber-Physical-Human Systems
4. Computational Intelligence and Embedded Systems
    - 4.1 AI at the Edge
    - 4.2 Explainable AI
    - 4.3 Green AI
    - 4.4 Bio AI
    - 4.5 AI for National Security
5. Cyber Security and Trustworthiness
    - 5.1 Secure Cloud Systems and Software

5.2 Security of Critical Cyber Infrastructure

5.3 Wireless Networks and Big Data Management Security

5.4 Privacy and Security in Smart Health-Care and Social Systems