# INTRODUCING AIDA³

CENTER ON AI FOR DIGITAL, AUTONOMOUS AND AUGMENTED AVIATION AT PURDUE

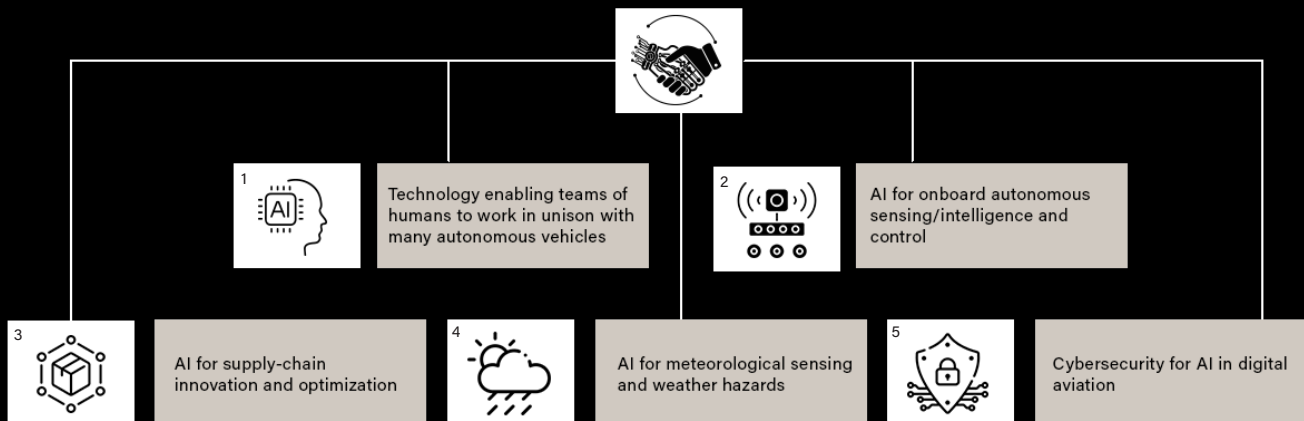### A NEW ERA IN PHYSICAL ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

The Purdue Center on AI for Digital, Autonomous and Augmented Aviation (AIDA³) is a hub of innovation, where cutting-edge research meets practical application. At AIDA³, we harness the power of artificial intelligence to revolutionize aviation and transportation. Our multidisciplinary team is pioneering AI and machine learning (ML) models to address industry challenges — from optimizing commercial logistics to enhancing safety in autonomous transportation.

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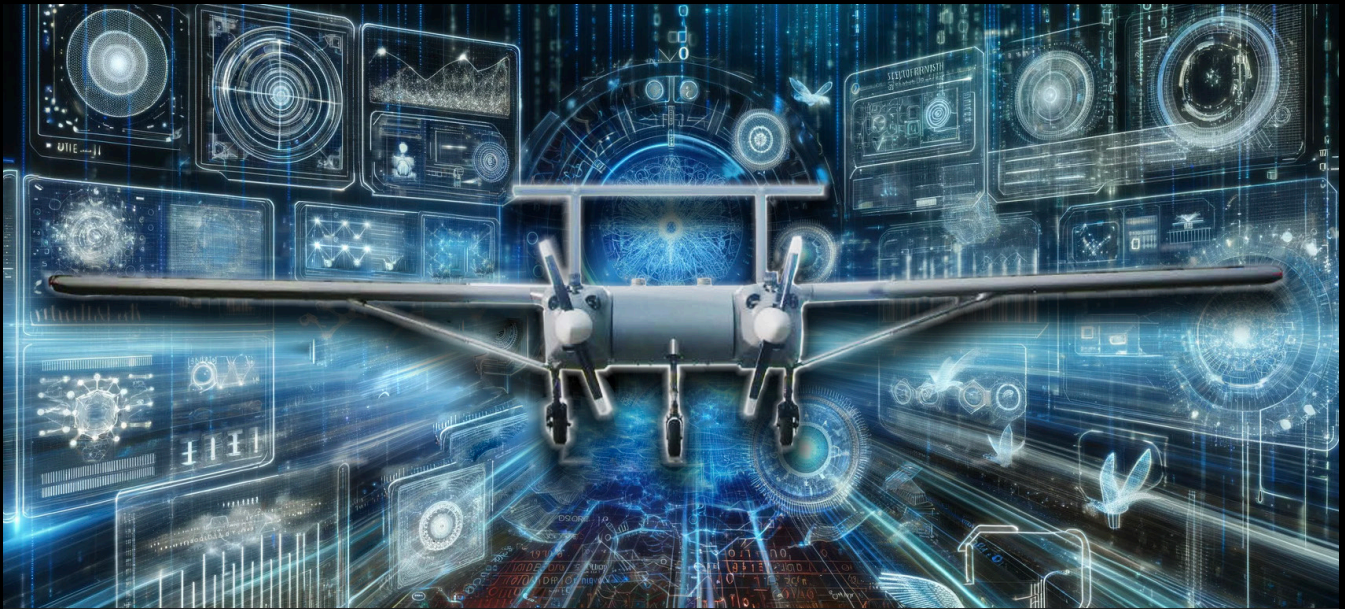
WHAT AIDA³ DOES

AIDA³ performs research that leads to scientific discoveries by tackling two primary challenges in leveraging AI for aviation: Increasing the autonomy and intelligence of uncrewed aerial vehicles (UAVs) and other systems used throughout the aerial value chain while ensuring economically efficient, safe and trustworthy human involvement. AIDA³'s team will realize new models and systems that allow UAVs to sense data in real-time and take independent actions in a way that they translate in trustworthy actions not just in simulated environments but in the physical world. Further, researchers will design and validate systems that pair human and autonomous systems to ensure safe and scalable operations while augmenting humans to perform novel remote tasks.

RESEARCH THRUSTS

1. Technology enabling teams of humans to work in unison with many autonomous vehicles
2. AI for onboard autonomous sensing/intelligence and control
3. AI for supply-chain innovation and optimization
4. AI for meteorological sensing and weather hazards
5. Cybersecurity for AI in digital aviation

Moving from lab to the real world, the team will design physical AI that will facilitate the collaboration between humans and increasingly intelligent UAVs across the entire value chain — from demand analytics to remote interaction with those without any expertise in aviation. UAVs, also called drones, are controlled by a human on the ground but can be flown increasingly autonomously with little direct human intervention.

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AIDA³ SOCIETAL IMPACT AND BENEFITS

Our groundbreaking research will revolutionize various sectors, significantly enhancing safety, efficiency, and collaborative capabilities in critical real-world applications. Windracers is providing Purdue with two fixed-wing UAVs, valued at $1.5 million, to be used by AIDA³ researchers.

- Multimodal Cargo & Transportation
- Emergency Response & Public Safety
- Humanitarian Aid
- Defense
- Health Care
- Training & Education

WHO IS AIDA³?

We are a multidisciplinary consortium founded by Purdue University and Windracers, with opportunities for additional partners to join. Purdue brings together four esteemed colleges and one dedicated institute, along with a team of expert faculty. Windracers, developer and operator of the ULTRA unmanned aerial vehicle platform, provides extensive experience in parcel and humanitarian aid delivery services across the United Kingdom.

INSTITUTE FOR PHYSICAL AI

| COLLEGE OF **ENGINEERING** | COLLEGE OF **LIBERAL ARTS** | COLLEGE OF **SCIENCE** | **POLYTECHNIC** INSTITUTE |

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For more information or to partner, contact Professor Brunswicker at **sbrunswi@purdue.edu** or visit **go.purdue.edu/aida3**

AIDA³ FACILITIES

To design and implement physical AI for next generation air mobility, AIDA³ can leverage unique research and testing facilities. **Purdue's UAV Research and Test (PURT) facility** boasts the largest indoor motion-capture facility in the world. A high-tech **smart operations center (SOC)** with a screen grid, VR/AR and smart wearables, will enhance remote research on next-generation remote operations teams, leveraging advances in neuroscience and engineering.

Purdue Urban Proving Ground (PUP), supported by AIDA³'s Consortium Partners and grants, aims to be the largest outdoor motion-capture facility, offering precise real-time sensing, digital twins, integrated UTM coordinate system, and mixed-reality potentials on 12 acres.

PURDUE URBAN PROVING GROUND (PUP)
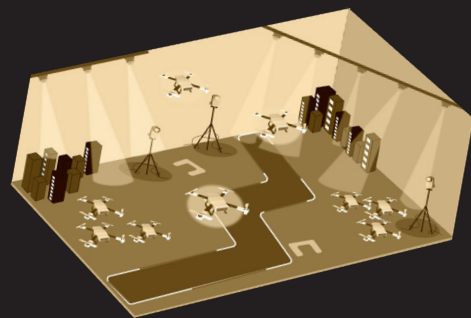
PURDUE'S UAV RESEARCH AND TEST (PURT) FACILITY

SMART OPERATIONS CENTER (SOC)

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