

SMART WORLD LAB

Cyber-Physical Systems, AI Engineering, Digital Twin, and Smart Infrastructure Laboratory



An integrated research and education ecosystem that connects the physical world and the digital world through AI, robotics, advanced sensing, simulation, and intelligent systems.



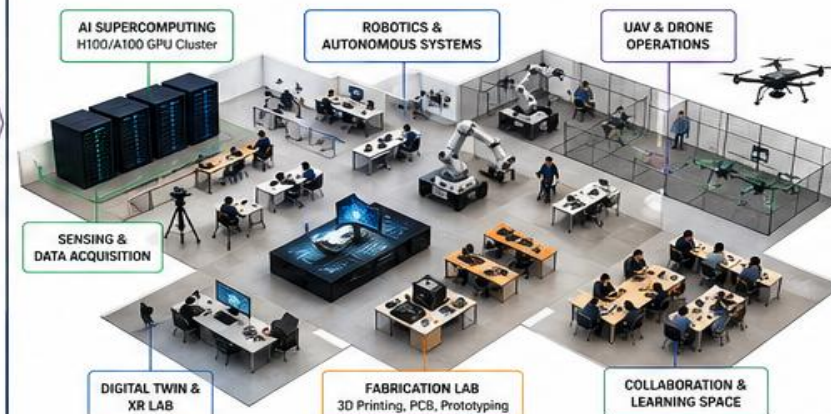
1 THE CPS LIFECYCLE: END-TO-END INTEGRATION

Sense → Compute → Simulate → Fabricate → Deploy → Monitor



2 SMART WORLD LAB ECOSYSTEM

A unified physical space for research, innovation, and education



3 DIGITAL TWIN: CONNECTING PHYSICAL AND DIGITAL WORLDS

Physical World

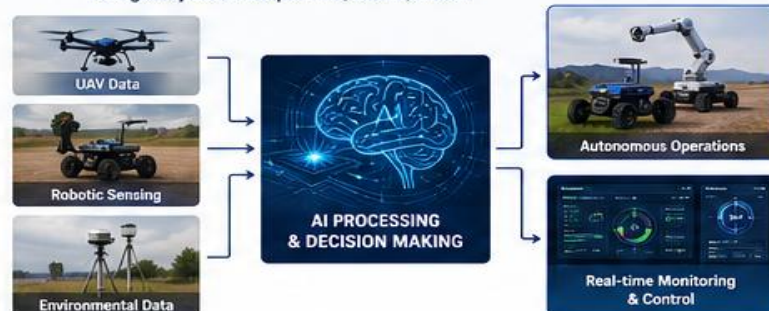
Digital Twin World



Enabling smarter infrastructure, resilient systems, and data-driven decisions.

4 ROBOTICS & UAV INTEGRATION

Intelligent systems that perceive, decide, and act



From data to intelligence to action in the real world.

5 EDUCATION & WORKFORCE DEVELOPMENT

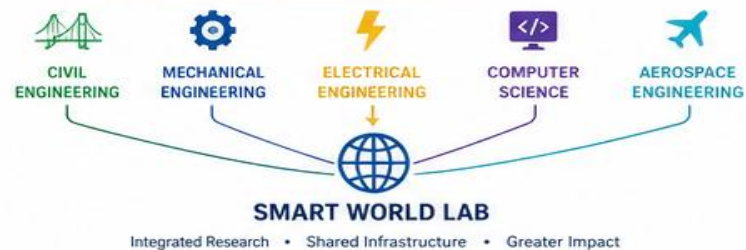
Hands-on learning for the next generation of innovators



Preparing a highly skilled workforce aligned with national STEM priorities.

6 MULTIDISCIPLINARY INTEGRATION

Uniting expertise. Solving real-world challenges.



IMPACT



7 INVESTMENT SUMMARY

TOTAL REQUESTED BUDGET

≈ \$300,000

- ✓ AI Supercomputing (H100/A100)
- ✓ Advanced Sensing (LiDAR, Hyperspectral, Thermal)
- ✓ Robotics & UAV Systems
- ✓ Industrial-scale 3D Printing & PCB Fabrication
- ✓ XR / Simulation & Edge AI Platforms
- ✓ Classroom-scale CPS & IoT Equipment

PRIORITIZED IMPLEMENTATION TIERS



High-impact investment for long-term institutional growth.

AI ICEBERG

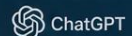
FROM AIR (INTELLIGENCE) TO
DEPLOY & MONITOR (REALITY)



SMART WORLD LAB

UNIVERSITY OF NORTH DAKOTA

AIR LAYER VISIBLE INTELLIGENCE



- Conversational AI
- Reasoning
- Knowledge
- Creativity



- Analysis
- Long-context
- Writing
- Insight



- Prompt Design
- Context Structuring
- Optimization
- Iteration



WATERLINE LAYER INTERFACE & ORCHESTRATION



- User Interfaces
- API Gateways
- Orchestration
- Workflows
- Safety & Guardrails



FOUNDATION LAYER MODELS & KNOWLEDGE



- Foundation Models (LLMs)
- Fine-tuned Models
- Embeddings & Vector DB
- Knowledge Graphs
- RAG Pipelines



INFRASTRUCTURE LAYER COMPUTE & DATA



- GPU/TPU Compute
- Cloud / On-Prem
- Data Storage
- Databases
- Data Lakes



FABRICATION LAYER BUILD & TEST



- Data Processing
- Model Training
- Simulation
- Testing & Validation
- CI/CD Pipelines



DEPLOYMENT LAYER REAL WORLD IMPACT



- API Deployment
- Edge Deployment
- Applications
- Integration
- User Adoption



MONITORING LAYER OBSERVE & IMPROVE



- Monitoring
- Logging
- Analytics
- Alerts
- Continuous Improvement



THE AI JOURNEY: FROM INTELLIGENCE IN THE AIR TO IMPACT IN THE REAL WORLD

ADVANCED INTELLIGENCE TECHNOLOGY TRANSFER CENTER (AIT CENTER)

Bridging AI Innovation and Practical Impact Across Our University Community



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Professor, Civil Engineering
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Co-Director
Mohammad Rasouli
Professor, School of ECECS

OUR VISION & MISSION



VISION
To be a leading hub for AI technology transfer and adoption, empowering our university community to innovate, learn, and thrive in an AI-driven world.



MISSION
To promote AI literacy, facilitate the responsible adoption of AI technologies, and enable practical applications in education, research, and operations across the university.



- Empower People
- Enable Innovation
- Promote Responsibility
- Drive Impact

WHAT IS THE AIT CENTER?

The Artificial Intelligence Technology (AIT) Center is a campus-wide hub that bridges advanced AI capabilities and everyday academic use.

- Promote AI Literacy**
Build knowledge and skills across all disciplines
- Provide Practical Support**
Workshops, mentoring, consultations, and help-desk services
- Enable Responsible Use**
Encourage ethical, transparent, and effective use of AI
- Foster Collaboration**
Connect people, ideas, and technologies across campus and beyond



KEY SERVICES

- AI Literacy Training**
Workshops, courses, and resources for all skill levels
- Mentoring & Consultation**
One-on-one and group mentoring by experts and student mentors
- AI Help Desk Support**
Technical assistance for AI tools, workflows, and problem solving
- Educational Resources**
Guides, tutorials, toolkits, and best practices for AI adoption
- Collaboration & Innovation**
Interdisciplinary projects, events, and industry partnerships

Supporting Students, Faculty, and Staff Across All Disciplines

AI SUPPORT TEAM

A dedicated team providing hands-on support and guidance.



Empowering the campus through people, knowledge, and technology.

PHASED IMPLEMENTATION



Continuous growth to maximize impact across UND and beyond.

ROLE IN THE AI ECOSYSTEM

The AIT Center connects innovation, infrastructure, and people.



Bridging AI expertise and practical everyday use for greater impact.

IMPACT & BENEFITS

- Improve AI Literacy**
Build confidence and competency in AI technologies
- Enhance Research & Innovation**
Accelerate AI adoption in research and academic projects
- Transform Education**
Enrich teaching and learning with AI-powered approaches
- Strengthen Collaboration**
Connect disciplines and foster partnerships
- Advance UND Leadership**
Position UND as a leader in AI adoption and innovation

Empowering today. Innovating tomorrow. Leading the future.

GET INVOLVED

- Learn**
Attend workshops and training sessions
- Collaborate**
Partner on projects and initiatives
- Get Support**
Reach out for consultations and help
- Stay Connected**
Follow events, updates, and opportunities

Together, let's build an AI-ready university community.

CONTACT US

AIT CENTER
University of North Dakota
aitcenter@und.edu
(701) 777-XXXX
www.und.edu/ait-center

Faculty and Staff

Artificial Intelligence Support Team

Undergraduates and Graduates

Faculty Members

AI Support Team

Students

Computer System

AI System & Database

Assignment & Test Drafting

Ideation

Learning

Research





Learning

Writing

Research

Creative Projects

Programming

 Specialized Knowledge Generation	 Student Tracking	 Optimization	 Specialized Knowledge Generation
 Plagiarism Detection	 AI-Resistant Question Generation	 Ethical Homework Assistance	

SMART WORLD LAB

UNIVERSITY OF NORTH DAKOTA

AI SUPERCOMPUTING

BUILDxM

DIGITAL TWIN SIMULATION

VOLTERA



AI SUPERCOMPUTING
SERVER RACKS

VIDEO WALL &
DISPLAY SCREENS

COLLABORATION &
RESEARCH WORKSTATIONS

3D PRINTING
STATION

BUNDM

DIGITAL TWIN
SIMULATION TABLE

INDUSTRIAL
ROBOTIC ARM

DRONE TESTING
ZONE

IOT DEVICE
TESTING BENCH

MOBILE ROBOT
PLATFORM

AREA LEGEND

- 1 AI Supercomputing Server Racks
- 2 Video Wall & Display Screens
- 3 Collaboration & Research Workstations
- 4 3D Printing Station
- 5 IoT Device Testing Bench
- 6 Digital Twin Simulation Table
- 7 Industrial Robotic Arm
- 8 Drone Testing Zone
- 9 Mobile Robot Platform
- 10 Networking & Storage Equipment
- 11 Hardware Prototyping & Development Bench
- 12 XR/VR Development Zone
- 13 Projector & Presentation Area

NETWORKING &
STORAGE EQUIPMENT

HARDWARE PROTOTYPING
& DEVELOPMENT BENCH

XR/VR DEVELOPMENT
ZONE

PROJECTOR &
PRESENTATION AREA

SMART WORLD LAB

UNIVERSITY OF NORTH DAKOTA



- AREA LEGEND**
- ① AI Supercomputing & Server Racks
 - ② Data Center Operations
 - ③ Video Wall & Display Screens
 - ④ Collaboration & Research Workstations
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FULL FABRICATION LINE: FROM SENSE TO DEPLOY & MONITOR

