

# **Enhanced Preparation for Intelligent Cybermanufacturing Systems (EPICS)**

**DE-EE-0008303**

**Georgia Institute of Technology**

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Dr. Thomas Kurfess

Dr. Christopher Saldana

George W. Woodruff School of Mechanical Engineering

Georgia Institute of Technology

U.S. DOE Advanced Manufacturing Office Program Review Meeting

Washington, D.C.

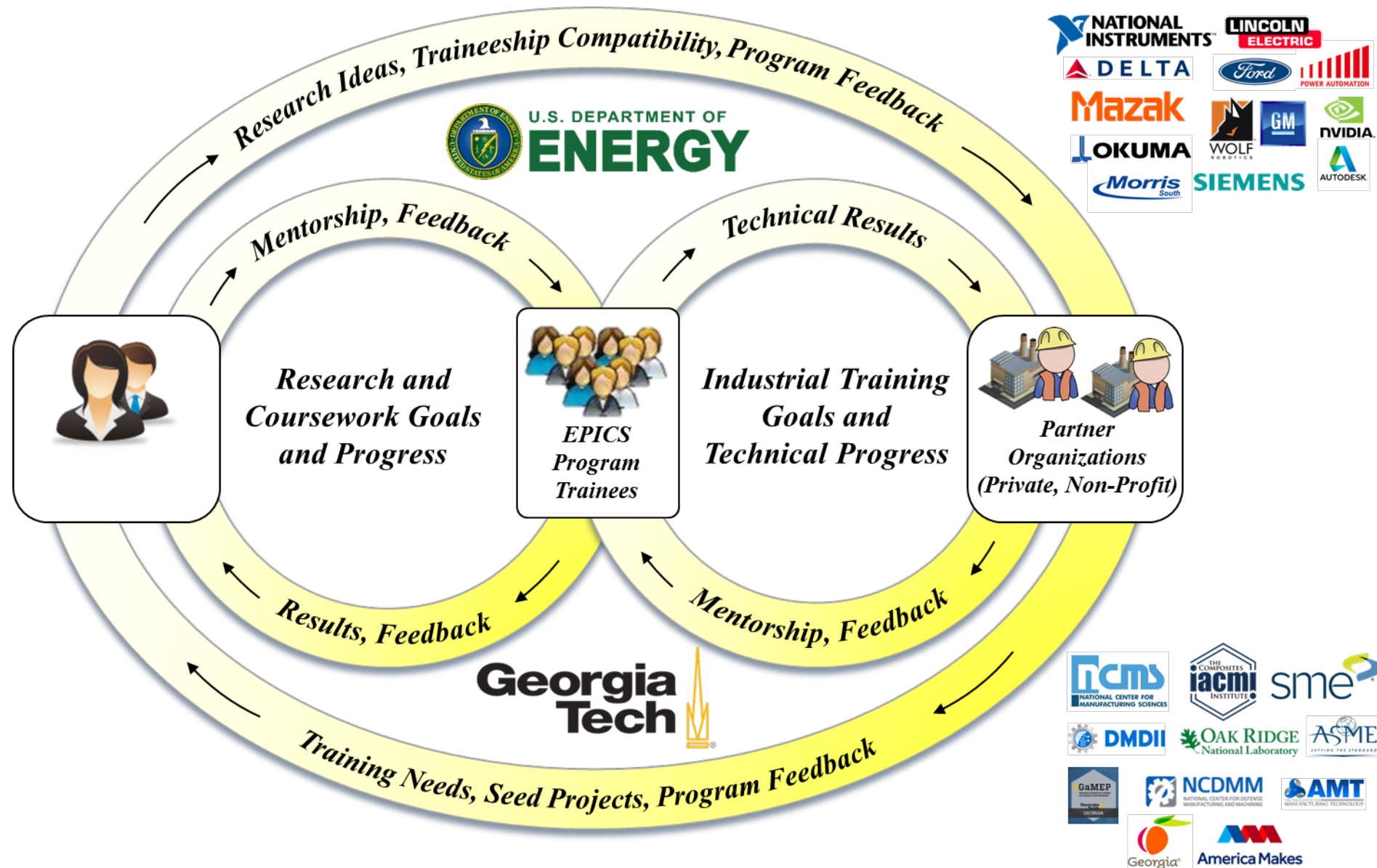
June 13-14, 2017

# Project Objective

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- Need: Opportunities exist for realizing transformative advances in productivity and reductions in energy footprint through ubiquitous sensing in manufacturing environments.
- Industrial training: 2-year projects with MS students (8/year, 32 total), industrially-driven project topics. Students rotate to internships in summer semester to work on scoping and implementation at project partners.
- Academic training: embedded systems, process modeling, data science, cloud-based systems design
- Target projects: sensor retrofit, process monitoring, root cause analysis, sensor fusion

# Technical Partnerships



# Technical Approach

1. Training undergraduates in cyberphysical systems skills
2. Targeted coursework in cyber/digital manufacturing, mechatronics, computer graphics, computer-aided engineering
3. Project development with organizational partners, on-site mid-term internship
4. Participation and leading industry-focused workshops (M360, IoTfM)

Term 1 (Fall)	Term 2 (Spring)	Summer	Term 3 (Fall)	Term 4 (Spring)
Basic Skill Set Training		Internship		
Mentor Instructor ME 2110	Mentor Instructor ME 2110			
	Identify Project Topic		Digital Mfg. Project Execution	Digital Mfg. Project Execution
Attend IoTfM Workshop	Attend M360 Workshop		Lead Elements of IoTfM Workshop	Lead Elements of M360 Workshop
	Plan Elements of IoTfM Workshop		Plan Elements of M360 Workshop	
Mfg. Course	Cyber/Digital Mfg. Course		Comp. Graphics or CAE Course	Tech Elective
Mechatronics Course	Math Course		Tech Elective	

Company	Technical Area
Siemens	CNC Programming (828D / 840D Controller)
NI	Real-Time Data Acquisition and Control (LabVIEW Real-Time)
Autodesk	CAD/CAM Systems Design and Simulation (Fusion 360)
GA Tech	Manual Machining/Shop Safety/EHS Protocol
GA Tech	Technical Communication

# Technical Approach

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## **Program Tasks:**

### **Traineeship Curriculum Design and Implementation**

- 1.1. Graduate Digital Manufacturing Course Development
- 1.2. Smart Manufacturing Basic Skills Training Development

### **Research Project Definition and Execution**

- 2.1. Standardized Template for Project Effort Definition
- 2.2. Technical M.S. Project Definition and Scoping
- 2.3. Student Recruiting and Project Compatibility Matching

### **Program Evaluation**

- 3.1. Curriculum Survey Instrument Design
- 3.2. Post-Graduate Industrial Skills Survey Instrument Design
- 3.3. Industrial Partner Engagement Survey Instrument Design
- 3.4. Recruiting Activities Effectiveness Survey Instrument Design

### **Program Sustainability Model**

- 4.1. Financial Projection Models for Program Sustainability
- 4.2. Technical Roadmapping with Industrial Partners

# Measure of Success

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- Recruitment strategy: Reach undergraduate students in technical seminars for minority student populations (NSBE, SWE, SHE) and technical societies (ASME, SME), engage in undergraduate research internships, enroll as MS students in following years
- Program evaluation: Quantitative effectiveness measures for graduate student training, technical and scholarly output, mentoring, industrial partner engagement and recruiting
- Program sustainability: (i) 75% industrial support for research projects with multiple projects per student, (ii) primary teaching assistant support through GT

# Project Management & Budget

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- 5-year project effort
- Project task and key milestone schedule
  - EOY 1 – 8 EPICS Fellows 50% complete, and guaranteed to graduate. Initial digital manufacturing graduate course alpha piloted.
  - EOY 2 – 16 EPICS Fellows graduated or guaranteed to graduate. Digital manufacturing graduate course updated and beta piloted.
  - EOY 3 – 24 EPICS Fellows graduated or guaranteed to graduate. Digital manufacturing graduate course finalized and deployed.
  - EOY 4 – 32 EPICS Fellows graduated or guaranteed to graduate.

Total Project Budget	
DOE Investment	\$2,499,865
Cost Share	\$1,506,906
Project Total	\$4,006,771

# Questions?

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