

PennState
College of Engineering

**HAROLD AND INGE MARCUS
DEPARTMENT OF INDUSTRIAL AND
MANUFACTURING ENGINEERING**

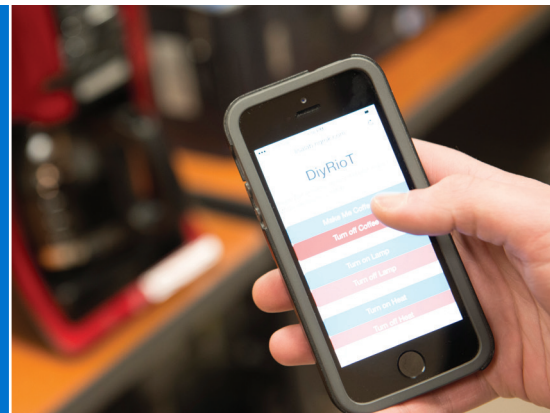
Our Labs, Centers, and Initiatives



The Harold and Inge Marcus Department of Industrial and Manufacturing Engineering is housed in the Leonhard Building, which is located in the West Campus area of University Park. Built in 1999, Leonhard Building has more than 60,000 square feet of laboratory, office, and classroom space, and offers more lab space for instruction and research per student than any other university in the United States.

- Additive Manufacturing and Reverse Engineering Lab
- Benjamin W. Niebel Work Design Lab
- Bridging Research in Innovation, Technology, and Engineering Lab
- Complex Systems Monitoring, Modeling, and Controls Lab
- Design Analysis Technology Advancement Lab
- Distributed Intelligent Systems and Controls: Research, Education, and Technology Lab
- Engineering Statistics and Machine Learning Lab
- Factory for Advanced Manufacturing Education
- Human Performance Assessment and Modeling Lab
- Human Subjects Testing Lab
- Laboratory for Intelligent Systems and Analytics
- Laboratory for Quality Engineering and Systems Transitions
- Optimization Modeling and Application Lab
- Precision and Quality Measurements Lab
- Process Mechanics and Workholding Lab
- Service Engineering and Applied Optimization Lab
- Smart Design and Manufacturing Systems Lab

- Center for e-Design
- Center for Innovative Materials Processing through Direct Digital Deposition
- Center for Health Organization Transformation
- Center for Service Enterprise Engineering
- Consortium for Digital Enterprises
- Initiative for Sustainable Electric Power Systems
- Service Enterprise Engineering Initiative
- Undergraduate Research Program



For more information, visit ime.psu.edu/research.



Research Areas

Students who major in industrial engineering at Penn State have a variety of research areas to choose from and have attained jobs in academia, government, industry, and more.

Human Factors and Ergonomics

- **Ergonomics:** Workplace analysis, mental workload evaluation, biomechanics, modeling crash impacts, human reliability modeling, safety planning, and work physiology
- **Human-centered design:** Ergonomic product design and analysis, design cognition, human and social dynamics in design, and problem-solving enabling methods
- **Human-computer interaction:** Human-computer interface and information visualization
- **Human-machine systems:** Human-in-the-loop simulation, behavioral decision-making modeling, human performance modeling, machine learning, and eye-tracking systems

Operations Research

- **Applied probability and stochastic systems:** Queuing systems, stochastic networks, control of telecommunications and information systems, call center modeling, and large-scale service systems
- **Financial engineering:** Auctions, real options, dynamic pricing of transportation services, mobile electronic commerce, and applied economics
- **Game theory:** Dynamic games, network equilibrium, variational inequalities, and equilibrium programming
- **Optimization:** Large-scale optimization, convex optimization, location theory, network optimization, integer programming, optimization of traffic networks, multiple criteria decision making, robust optimization, and compressed sensing
- **Statistics and machine learning:** Statistical learning theory, spatial statistics, time series models, response surface methods, analysis and design of experiments, and large-scale statistical inference
- **Quality engineering:** Total quality systems, process improvement strategies, design for quality, statistical modeling of tolerances, Taguchi loss function, and continuous quality improvement
- **Simulation:** Production modeling, operational scheduling, plant design and layout, process flow analysis, and robust optimization

Manufacturing

- **Digital design and manufacturing:** Areas of expertise include computer-aided design and manufacturing (CAD/CAM), integrated product development, product family and platform design, design analytics, geometric dimensioning and tolerancing, assembly planning, flexible and automated fixturing, automated process planning, non-destructive testing and evaluation, and virtual reality environments for design and manufacturing
- **Manufacturing processes:** Advanced and traditional manufacturing processes including 3D printing and additive manufacturing, computer numerical controlled (CNC) machining, forming and joining processes, lightweight material casting, micro-machining and micro-forming, nanotechnology, intelligent materials processing, robotics, automation, and machine tool and discrete part metrology
- **Manufacturing system informatics and control:** Focus areas include advanced sensing, process modeling, machine control, computer-integrated manufacturing, scheduling production and maintenance, distributed control systems, inventory and transportation management in supply chains, energy-aware operations of manufacturing enterprises, facility layout, and workplace design

Operations, Services and Analytics

- **Health systems engineering:** Health information technology, patient flow modeling, capacity management, staff scheduling, quality improvement, data visualization, health informatics, and cost-effective modeling
- **Production and distribution systems:** Material handling systems, material requirements planning, facility planning, capacity expansion, adaptive forecasting, multistage sequencing, and lean manufacturing
- **Service engineering:** Retail engineering, workforce modeling, data mining, demand management, pricing, employee training, employee retention, and resource allocation
- **Supply chain engineering and logistics:** Network design, enterprise integration, supply chain coordination and collaboration, contracting mechanisms, congestion modeling, and transportation modeling