MULTIDISCIPLINARY DESIGN CAPSTONE

APPLYING STUDENT KNOWLEDGE TO REAL-WORLD INDUSTRY NEEDS
Instructional Staff

Bob Rhoads, Director
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Bob Rhoads
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Course Sequence (6 Credits)

- Autumn
  - ENGR 5901.01 (3 cr)

- Spring
  - ENGR 5902.01 (3 cr)

Project duration
Capstone Objectives

Prepare students for engineering profession

- Practical, real-time problem-solving
- Professional communication
- Project management
- Professionalism
Multidisciplinary Capstone

- Define – Design – Build – Validate process
- Senior undergraduate engineering students from multiple disciplines
- Team-based project
- Teams often include non-engineering students
- Duration: 2-semester long project
- Industry driven
Design Process

1. Define Problem
2. Dev Needs/Specs
3. Develop Concepts
4. Create Detail Design
5. Build Prototype
6. Validate Design

Implementation
Real-world Projects

- Equipment Improvement
- System/Process Improvement
- Product Development
- Applied Research
- Modeling and Simulation
- Software Application Development
Student Benefits

- Improve students’ value to industry
- Develop professional skills
- Work on realistic industry projects
- Gain multidisciplinary team experience
- Network students and companies
- Implement rigorous design process
Multidisciplinary Capstone Students

- Engineering Students
  - 14 Engineering Majors
- Non-Engineering Students
  - Business
  - Humanities
  - Industrial Design
Typical Student Deliverables

• Regular Project Status Updates
• Oral Presentations
• Written Reports
• Prototypes, models, simulations, software, etc.
• Engineering Design Showcase Presentation
Industry Involvement

Contributions:
- Provide real-world projects
- Mentor students
- Project support

Benefits:
- Gain value-added project solutions
- Contribute to educational experience
- Interact with prospective employees
- Acquire new ideas from creative and innovative students
Representative Sponsors
Biometrics Monitoring/Occupant Wellbeing

Objective: Investigate how human biometric information can be utilized to predict vehicle occupant’s anxiety. Create a system to reduce this anxiety.

• Identified how biometric characteristics (e.g. heart rate, body temperature, body movement, etc.) change with anxiety
• Developed a system to measure and record biometrics
• Identified what reduces anxiety
• Developed a system based on human senses to reduce anxiety

What majors were on this team?

• Electrical/Computer, Biomedical, Material Science, Computer Science, Mechanical, Neuroscience, Info. Systems
Automated Visual Inspection of Engine Parts

Objective: Create an automated system to visually inspect engine blocks for imperfections (e.g. porosities).

- Identified defect size and system requirements to visually recognize imperfections
- Developed a camera and lighting system to measure and record defect
- Developed software algorithm to classify imperfection through machine learning methods

What majors were on this team?

- Electrical/Computer, Mechanical, Industrial Systems, Finance, Operations Management
Defect Detection within Aircraft Parts

Objective: Develop a system to identify defects in aircraft rotor blades using an autonomous 6-axis robotic system.

- Identified defect characteristics and system requirements to detect imperfections
- Implemented a camera to measure and record defects
- Created a system of sensors to maintain a distance from the part without touching it
- Programmed an autonomous robotic system
- Developed software algorithm to classify imperfection through machine learning methods

What majors were on this team?

- Electrical/Computer, Mechanical, Engineering Physics, Accounting, Finance, Public Policy
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Multidisciplinary Design Capstone
ENGR 5901.01/5902.01, Tues./Thurs. 9:35 – 10:55 am
Permission of Instructor

• Confirm pre-requisites eligibility/credits with your academic advisor

• To request enrollment, see website: https://eed.osu.edu/students-mdc

• Questions: please contact Bob Rhoads rhoads.2@osu.edu