

The MSU College of Engineering

Design Day

May 1, 2009

MICHIGAN STATE
UNIVERSITY

design 
program



A note from the Design Day Coordinator

On behalf of the College of Engineering it is my honor to welcome you to this Design Day. We wish you a very memorable experience as our students demonstrate their amazing talents through design competitions, oral presentations, and posters.

For the first time in the history of this event, Design Day includes participation from all of our engineering disciplines. Along with Applied Engineering Sciences, Civil Engineering, Computer Science and Engineering, Electrical and Computer Engineering and Mechanical Engineering, Spring 2009 Design Day welcomes the addition of Biosystems Engineering, and Chemical Engineering and Materials Science.

As you visit our activities, please interact with our students and faculty. They are an incredible group of people who love to share their accomplishments on display.

To add further to the excitement of the day, approximately 200 middle school and high school students are participating in the Dart Foundation Day of Engineering Innovation and Creativity for 7th-12th Grade Students. These students will have the opportunity to explore engineering principles with hands-on projects that require the application of their creativity and ingenuity.

The headliners of the day are our graduating seniors as they present their capstone design projects through posters, videos, and oral presentations. Their projects represent the culmination of years of education and provide unique opportunities for the seniors to demonstrate all that they have learned and mastered. You will see that MSU engineers are ready to lead, create, and innovate.

Design Day would not be possible without the generous support of our project sponsors and donors. Project sponsors provide not only funding, but, just as important, a professional experience for our capstone design teams. Donors support the humanitarian projects and the operating costs of Design Day. We thank all for their generosity and time.

Please join us for the Design Day Awards ceremony in the Ballroom at 1:15 pm when we will honor all of our talented Spartans—the best of the best.

Sincerely,

A handwritten signature in black ink that reads "Maureen E. Blazer-Adams". The signature is written in a cursive style.

Maureen E. Blazer-Adams
College of Engineering
Design Day Coordinator



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**Shell is a proud
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out there



Achieving more together



MICHIGAN STATE
UNIVERSITY

Spring 2009

Dear Friends:

As Dean of the College of Engineering, it is my pleasure to welcome you to Design Day.

Having begun Design Day with just a single discipline, the College has been working for the past two years towards the goal of including all of the engineering disciplines. Today marks the realization of that vision culminating in a Design Day that features all of the College's programs.

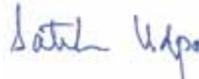
One of the hallmarks of design itself can be summed up in a single, short Latin phrase, *ex nihil*, which means "out of nothing". Our teams of students start the semester with nothing more than a concept or an idea, with nothing more than the statement of a challenging problem. In the fifteen short weeks that follow, they must architect, build, test and deliver a working solution, *ex nihil*, out of nothing.

In the College of Engineering, design is pervasive. It begins in the freshmen cornerstone course and continues throughout the curriculum, culminating in our senior capstone courses. By sharing these experiences with pre-college students on Design Day, we hope to plant seeds of inquisitiveness and excitement that will motivate them to pursue careers in engineering.

Design Day is about our students. As their Dean, I congratulate them on their successes. The projects and presentations are truly amazing.

Be prepared for a Design Day full of excitement, energy, and awe!

Sincerely,



Satish Udpa, Dean
College of Engineering

**COLLEGE OF
ENGINEERING**

Office of the Dean

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Michigan State University
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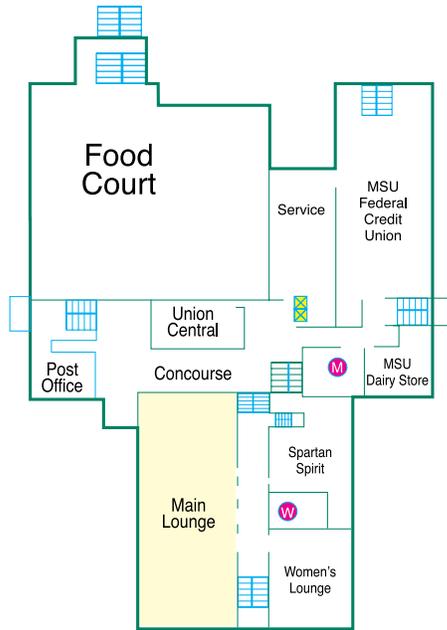
Design Day Events Schedule: Friday, May 1, 2009

EVENTS	8 a.m.	9 a.m.	10 a.m.	11 a.m.	Noon	1 p.m.
Audio Enthusiasts and Engineers	2nd Floor Concourse 8:00 a.m. – 1:00 p.m.					
Engineering Student Organizations		2nd Floor Concourse 9:00 a.m. – noon				
EGR 100 Presentations		2nd Floor Ballroom 9:00 a.m. – noon				
ME 371 Demonstrations		Gold A&B 9:00 a.m. - noon				
ME 412 Competition		Parlor A 9:00 a.m. - 11:40				
ME 471 Competition		2nd Floor Ballroom 9:00 a.m. - 11:00				
ChE 491 Project Presentations	Lounge 8:00 a.m. - noon					
CAPSTONE COURSES						
Capstone Posters	2nd Floor Ballroom 8:00 a.m. - noon					
EGR 410 Presentations	Lake Ontario Room 7:40 a.m. – 1:00 p.m.					
ChE 434 Presentations	Lounge 8:00 a.m. - noon					
MSE 466 Presentations	Lounge 8:00 a.m. - noon					
ECE 480/ME 481 Project Presentations	Lake Huron Room 8:00 a.m. - 11:40 a.m.					
ME 481 Project Presentations	Lake Superior Room 8:00 a.m. - 12:30 p.m.					
ME 481 Project Presentations				Tower Room 10:00-11:15 a.m.		
BE 485/487 Project Presentations	Lounge 8:00 a.m. - noon					
CE 495 Project Presentations	Lake Michigan Room 7:50 - 12:30 p.m.					
CE 495 Project Presentations	MSU Room 7:50 - 12:30 p.m.					
CSE 498 Project Presentations	Lake Erie Room 7:35 a.m. - 11:45 p.m.					
LUNCH AND AWARDS						
Woodcreek Lunch			Green Room 12:00 p.m. - 1:00 p.m.			
MSU Lunch			2nd Floor Concourse 12:15 p.m. - 1:00 p.m.			
MSU Awards			Ballroom 1:15 p.m.- 2:00p.m.			
School Lunch			Parlor C Noon - 12:30 p.m.			
School Awards			Ballroom 12:30p.m. - 1 p.m.			

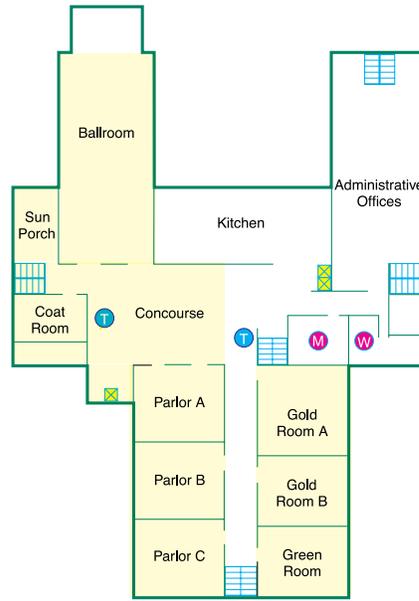
KEY: BE event
 ChE event
 EGR event
 MSE event

CE event
 CSE event
 ME event
 School event

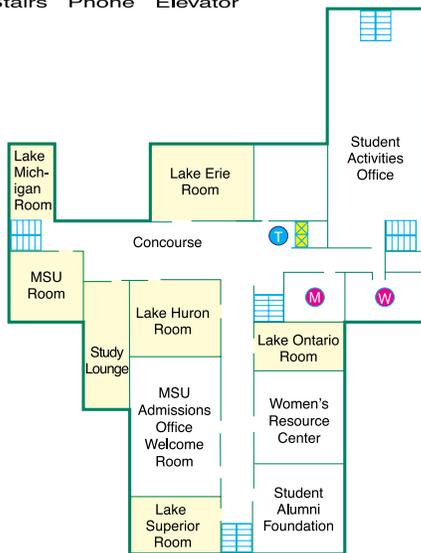
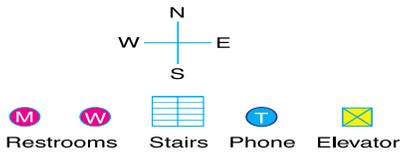
Conference Events Schedule: Floor Maps



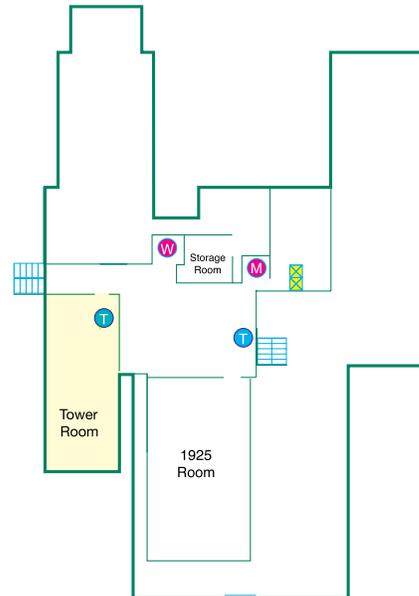
First Floor



Second Floor



Third Floor



Fourth Floor

MSU Union Floor Plan

College of Engineering Design Day: 1st May 2009

THE DESIGN FACULTY:



Mr. Robert Chalou



Ms. Hope Croskey, P.E.



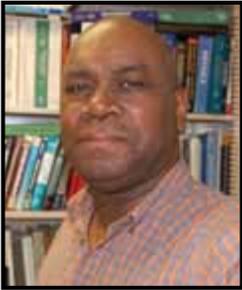
Prof. Wayne Dyksen



Prof. Erik Goodman



Prof. Martin Hawley



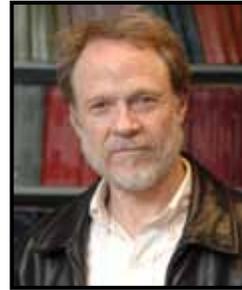
Prof. James Lucas



Prof. Steve Safferman



Prof. Craig Somerton



Prof. Roger Wallace

STAFF ACKNOWLEDGEMENTS:



Roy Bailiff



Jill Bielawski



Linda Clifford



Kelly Climer



Cathy Davison



Craig Gunn



Brittany Haberstroh



Phil Hill



Matt Jennings



Debbie Kruch



Matt Luciw



Jamie Lynn Marks



Elizabeth Meyer



Garth
Motschenbacher



Mary Mroz



Gregg Mulder



Roxanne Peacock



Adam Pitcher



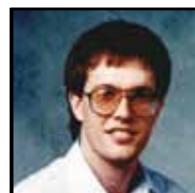
Eva Reiter



Norma Teague



Teresa VanderSloot



Brian Wright

MACHINE SHOP AND DESIGN LAB STAFF:

Ken Barlage
Dan Klein
Ken Maisonville
Russ Tindall

Audio Enthusiasts and Engineers

**Design Days:
Friday 1st May, 2009
8 a.m. 'til 1 p.m.**

**Come and HEAR us in the
2nd Floor Concourse**

OUR HISTORY

In the Fall of 2006 a small group of like-minded engineers turned their dreams into reality by founding Audio Enthusiasts and Engineers, an organization open to all Michigan State University students. AEE hit the ground running its first semester by designing and building their first masterpiece 'Revolution Audio', a stereo system engineered to produce true stereo sound regardless of which direction the listener is facing. AEE quickly became the means for students passionate about audio to get together and turn ideas into realities. Five semesters later, the group has evolved into an independent, student run, project oriented organization accomplishing amazing things in remarkable amounts of time.

ALL YOU NEED IS A LOVE FOR AUDIO

AEE consists of students from various backgrounds including almost every engineering discipline as well as telecommunications, business, psychology, and many others in between. The common trait bringing all these creative minds together is a love for audio. AEE members have represented Michigan State University at the following national Audio Engineering Society conventions:

121st, San Francisco, CA, USA - October 5-8, 2006

123rd, New York, NY, USA - October 5-8, 2007

124th, Amsterdam, The Netherlands - May 17-20, 2008

125th, San Francisco, CA, USA - October 2-5, 2008

AEE has become one of the most active student organizations in the College of Engineering. Its members are devoted to expanding the understanding of audio concepts, as well as finding inventive ways to implement this knowledge. This is the fifth consecutive Design Day since their inaugural semester showcasing their work and accomplishments.

aeemsu@gmail.com



EGR 100

9:00 – Noon
Second Floor
Ballroom

EGR 100 Introduction to Engineering Design

NEED-BASED CONCEPT ENGINEERING

INSTRUCTIONAL TEAM: Dr. David Grummon, Mr. Timothy Hinds, Dr. Bradley Marks, Dr. Susan Masten, Dr. Jon Sticklen, Dr. George Stockman, Dr. Xiaobo Tan, Dr. S. Patrick Walton, Dr. Thomas Wolff

TA STAFF: Mark Gaustad, Adam Rogensues, Emily Wandell

UNDERGRADUATE MENTORS: Amy Bittinger, Wouter Brink, Michael Douglass, Eric Ford, Nate Geib, Jamie Jacobs, Nicholas Lehman, Tracey Lynch, Mike McPhail, John Murphy, Stephan Remias, Russell Tindall, Patrick Triscari, Ollie Zemanek

PROBLEM STATEMENT

EGR 100, Introduction to Engineering Design, is a new, college-level course being taken by all incoming engineering freshmen beginning fall semester 2008. It is an integral part of the Cornerstone Experience / Spartan Engineering program. The course introduces students to the engineering profession and the engineering design process through team-based, interdisciplinary design projects and assignments. Nearly 200 students are enrolled in EGR 100 this semester. This course is generously supported by General Motors Corporation and the Chrysler Foundation.

The final course project had teams of EGR 100 students design a new product or process to remove a frequent inconvenience in their daily lives. Their design concepts were to be something new or a significant improvement to an existing product or process. The teams were to approach the project using the perspective of the engineering discipline they plan to pursue through their academic careers. The teams built prototypes of their concepts not exceeding a total material cost of \$20. The teams will display their prototypes at Design Day along with a poster detailing their concept designs. Pre-college students will recognize the most outstanding projects with awards.



The Chrysler Foundation





THRILLS FOR PRE-COLLEGIATES: MECHANISMS THAT FASCINATE, CAPTIVATE, STIMULATE AND ENTICE

INSTRUCTOR: Professor Brian Thompson

PROBLEM STATEMENT

Teams of students were required to design and manufacture mechanisms that would thrill an audience of pre-collegiate students. The only constraints imposed upon the assignment were that each mechanism must incorporate at least one linkage, one gear set and one cam-follower combination. These engineering marvels will be displayed along with a complementary poster explaining the subtleties of each mechanism and each device will be demonstrated to the eager audience. Every ME371 team will be interviewed by the pre-collegiate students who will assign points to each MSU team. Subsequently these points will be tallied and the winning team awarded the *Sparty Plaque* for creating the most thrilling mechanism. This inspiring plaque was designed and fabricated by students at Holt Junior High School.

Teams and members

Team 1

Daniel Goettlicher
Spiros Kakos
Nicholas Odell
Ryan Rosenberg

Team 2

Devesh Chaphalkar
Derek Mayoros
Thomas Michalik
James Peers

Team 3

Andrew Harbin
Michael McPhail
Keith Solomon
Eric Wickenheiser

Team 4

Nathan Geib
Nicholas Lehman
Brian Rockwell
Oliver Zemanek

Team 5

Hasib Mohammed
Alexandre Oliveira
Stephen Santavicca
Andrew Tonkovich

Team 6

Trevor DeLand
Lucas Fratta
Eric Waggy
Jessica Warda

Team 7

Christopher Lange
Michael Magner
Jeffrey Movsesian
Matthew Pung

Team 8

Muamer Abdurahmanovic
Mirsena Lekovic
Mollie Montague
Cody Wagner

Team 9

Adrienne Burger
Neil Jessel
David Parke

Team 10

Mark Goldy
Mark Holmes
Nicholas Stuart
Diana Toan

Team 11

Alexander Dupay
Christopher Fairbanks
Kyungmin Lee
Jonathan Pishney

Team 12

Dakota Easlick
Andrew Nolan
Hengye Zhang

Team 13

Ankit Aggarwal
Admir Trnjanin
Nicholas Zhu

Team 14

Kyle Bateman
Ricardo de Majo
Ahmed Mohamed
James Yizze



ME 412

9:00 – 11:40
Second Floor
Parlor A

ENHANCEMENT OF ELECTRONIC COOLING



INSTRUCTOR: Dr. Laura J. Genik

TA Staff: Alan Katz, Jin Zhang Tam, Doug Neal

Special Thanks to Matt Brzezinski, ME 412 Lab Manager

Computers are all around us and have really become an integral part of our daily lives. We interact with microprocessors when we use our microwave oven, start and then drive our cars, even when we are just sitting in the old recliner watching television. Microprocessors are an essential feature in the enhanced global competitiveness of American manufacturing. One of the critical factors in the continued development and utilization of microprocessors is the maintenance of operating temperatures to acceptable levels. Being electronic devices, microprocessors will produce heat due to Joule heating that must be dissipated. The ME 412 design project will look at efficient ways of enhancing the heat transfer from an electrically heated plate.

PROBLEM STATEMENT

The project team is to design, analyze, build and test a heat transfer device to minimize the operating temperature in the center of the upward facing side of an electrically heated plate. The electrically heated plate is composed of a flexible heater sandwiched between two thin metal plates. The plate is of dimensions 2" by 3" and approximately 17 Watts of electric power will be applied. The plate must be maintained in a horizontal position. A box fan that will provide an air flow within a specified velocity range will be used to augment the heat transfer. The heat transfer device may be placed no closer than one foot in front of the fan. The device must also include any supporting structure needed to suspend the heated plate in the air flow. The objective will be to minimize the operating temperature of the plate, subject to cost and weight considerations. The device will be judged on the basis of the center surface temperature, the mass of the device, and its cost. The device, including any supporting structure, must fit inside a box of dimension 14" x 14" x 12".

TIME	STATION	DESIGN TEAM
9:00 am	A	Muhammad Nabeel Aslam, Ryan Kelly, Kayton Lenhart
9:00 am	B	Lauren Heitzer, Arun Mahapatra, Joshua Samp
9:20 am	A	Kenneth Maisonville, Amanda Ruhno, Jenna Sandel
9:20 am	B	Zef Ivanovic, Marcus Peters, Thomas Theisen
9:40 am	A	Christopher Cater, Gregory Moy, Derek Riparip
9:40 am	B	Joshua Davis, Stephen Hammack, Kevin McAlpine
10:00 am	A	Bryant Ennis, Andrea Vivian, Matthew Wolf
10:00 am	B	Clifford Carlson, Craig Helewski, Michelle Raetz
10:20 am	A	Michikazu Aono, Matthew Werner, Scott Williams
10:40 am	A	Daniel Barlach, Kevin McPhail, Ryan McPhee
10:40 am	B	Anthony Dellicolli, Jacob Haf, John Sachs
11:00 am	A	Ryan Blake, Daniel Masterson, Peter Mott
11:00 am	B	Brent Augustine, Imoh Eno-Idem, Christopher Gandy
11:20 am	A	Andrew Armstrong, Allison Freeman, Stephen Griffith
11:20 am	B	Gregory Pelkie, Daniel Schleh, Ryan Smith



“SIP-AND-PUFF” CONTROLLED FISHING ROD FOR QUADRIPLÉGICS

INSTRUCTOR: Dan Isaac

TA Staff: Payam Darbandi

PROBLEM STATEMENT

Students in the ME 471 course were challenged to design and build a prototype apparatus that will permit a quadriplegic to cast a fishing lure accurately, to retrieve that lure, to make additional casts without assistance, and to reel in and lift a heavy object simulating a fish at least once. Each team is allotted four minutes to successfully cast the lure five times. After the fifth cast the simulated fish will be attached to the line. Groups will be judged on the accuracy of casts as well as the ability to reel in and lift the “fish” and demonstration of a working prototype of their product.

Mechatronics Systems Design

TIME	TRACK	GROUP MEMBERS
9:00	A	Mike Karoub, Amanda Ruhno, Nick Schock, Ryan Wood
9:08	B	Stephanie Bonner, Katie Donoughe, Steve Hukill, Brandon Uhl
9:15	A	Stephanie Bonner, Katie Donoughe, Steve Hukill, Brandon Uhl
9:23	B	JP Goncalves, Fernando Oliveira, Syed Saleem, Eric Tauzer
9:30	A	Elizabeth Carroll, Drew Darling, James Guitar, Marshall Mendoza
9:38	B	Nathaniel Davis, David Lantzy, Ryan Lindeman, Eric McElmurry
9:45	A	Tim Aspinall, Jared Dorvinen, Matt Owens, Mathieu Rich
9:53	B	Charles Baird, Neil Ferguson, Ben Llewellyn, Matthew Perelli
10:00	A	Diego Avila, Dae-Keun Chun, Mike Hinds, Joe Marotta
10:08	B	Derek Baker, Amy Bittinger, Caitlin Hojnacki, Raghav Nanda, Kyle Scicluna
10:15	A	Amy Gizicki, Kunjan Patel, Jon Stukel, Sam Tkac
10:23	B	Andrew Armstrong, Louis Cervone, Joel Darin, Jeff LaForge
10:30	A	Ryan Emmorey, Brittany Haberstroh, Luke Rabideau, Ross Weaver
10:38	B	Paul Allen, Mohanad Bahshwan, Ben Lindstrom, Derwin Parkin, Jeremy Zalud

Summarized Capstone Course Descriptions

BE 485/487 Capstone Design in Biosystems Engineering

Steven Safferman, P.E. and Hope Croskey, P.E.

The two-semester capstone design experience for Biosystems Engineering undergraduates includes BE 485 Biosystems Design Techniques and BE 487 Biosystems Design Project. Client projects contain both engineering and biology in the application areas of bioenergy, biomedical, ecosystems, and food engineering.

Upon completion of the capstone experience the student will have:

- Implemented the basic steps of the design process for a client by establishing the project problem, constraints, and quantifiable objectives;
- Conducted a thorough literature review;
- Established a defensible project design;
- Developed and used a project management plan;
- Evaluated economic considerations of design alternatives;
- Utilized project relevant QA/QC industry standards;
- Analyzed data using statistical concepts;
- Utilized mathematical models to design a system, process or component;
- Demonstrated professional presentation and writing skills;
- Considered ethical, safety, and product liability issues;
- Presented the design project to engineering faculty and industry representatives;
- Justified the project design and conclusions to assigned technical faculty and industry advisors;
- Prepared a professional poster and major technical document.

CE 495 Senior Design in Civil Engineering

Professor Roger Wallace

All undergraduates pursuing BS degrees in civil engineering must take CE 495. This course prepares students for the workplace by providing a team based, transitional capstone experience with many challenges that civil engineers face in the design/consult business:

- Participation in an engineering project with multiple issues that must be resolved using knowledge from six specialty areas of civil engineering;
- Formulation of specific conceptual solutions to the issues and resolution of conflicting design elements in the project;
- Development of preliminary plans that comply with government regulations and standards, and provide a basis for initial cost estimates;
- Assuming individual responsibility in a team based effort;
- Preparation of written reports for technical and non-technical audiences; and preparation of oral presentations.

Engineers and scientists from the following Michigan firms currently donate their time to provide students with the perspective of practicing professionals: Bergmann Associates; DLZ Corporation; Fishbeck, Thompson, Carr & Huber; NTH Consultants; Soil & Materials Engineers; STS Consultants; Tetra Tech MPS; URS Corporation; and Wilcox Professional Services. We gratefully acknowledge their generous contribution.

ChE 434 Senior Design Course in Chemical Engineering

Professor Martin Hawley

ChE 434: Process Design and Optimization II is the second of a two-part senior design course for ChE majors. This course aims at preparing students for an industrial situation, including:

- Designing equipment for a plant and performing thorough economic analysis for optimization, often required in industrial situations
- Improving team-building skills, including leadership skills and written communication skills
- Increasing awareness of ethical and contemporary issues related to the design and operation of chemical processes
- For the 40th successive year, we have worked the American Institute of Chemical Engineers (AIChE) Student Contest Problem. From the groups presenting at Design Day today, 2 teams of two and 2 individuals will be chosen to compete in the national AIChE competition.

MSE 466 Capstone in Materials Science and Engineering

Professor James P. Lucas

MSE466: Design and Failure Analysis is a senior course for MSE majors, which provides students with a team-based capstone design experience, including:

- Applying basic mechanical behavior materials concepts to failure in metallic, polymer, and ceramic materials
- Identifying the technical cause of failure by i) procuring failed parts, ii) collecting background information, iii) conducting laboratory experiments, iv) analyzing and interpreting experimental results, v) recommending design revisions
- Functioning on teams with multi-disciplinary strengths that makes effective use of subtasking and communicating findings in oral and written reports

CSE 498 Collaborative Design

Professor Wayne Dyksen

CSE 498, Collaborative Design, provides the educational capstone experience for all students majoring in computer science. The course objectives include the following:

- Learning to architect, develop, and deliver a comprehensive software system to a client;
- Learning to work effectively in a team environment;
- Developing written and oral communication skills;
- Becoming proficient with software development tools and environments;
- Learning about system building and system administration; and
- Considering issues of professionalism and ethics.

Corporate clients are local, regional, and national, including Accident Fund, Auto-Owners Insurance, Boeing, Chrysler, Ford, GE Aviation, GM, IBM, Microsoft, Motorola, Sircon, TechSmith, Terex, Toro, the Union Pacific Railroad, and Urban Science.

ECE 480 Senior Capstone Design

Professor Erik Goodman

ECE 480 is required of all electrical engineering or computer engineering majors at MSU.

It prepares students for the workplace, or for graduate school, including:

- Putting into practice the technical skills learned in the classroom, on industrially sponsored team projects, under faculty guidance, doing open-ended design, giving them experience in teamwork, project management, product life cycle management, legal, intellectual property and accommodation issues, and in entrepreneurship.
- Polishing their communication skills – individual and team – on proposals, reports, resumes, evaluations, posters, web pages, and oral presentations.
- Requiring each student to complete four individual hardware/software laboratory assignments.

Current semester's sponsors are: Chrysler Foundation; Lenovo; MSU Biogeochemical Environmental Research Initiative; MSU Resource Center for Persons with Disabilities (Wochholz Endowment); Marathon Oil; Texas Instruments; Mobile Digimedics, LLC; and BorgWarner.

EGR 410 Systems Methodology

Mr. Robert Chalou

EGR 410 is required for all applied engineering science majors at MSU.

The course prepares students for future employment with a team-based capstone experience by:

- Using technical skills learned to make educated choices.
- Allowing team members to choose real world problems to address.
- Using problems that are important to the group team members.
- Using Design Decision Matrixes to remove emotion from the decision process.

ME 481 Mechanical Engineering Design Projects

Professor Craig Somerton

ME481 is required for all mechanical engineering majors at MSU.

The course provides students with a team-based capstone design experience:

- Using the technical expertise, communication skills, and teaming methodologies they have learned throughout their mechanical engineering curriculum, along with their creativity, to solve real world problems.
- Collaborating with practicing engineers to address problems sponsored by industry.
- Developing new products or re-designing existing products to reduce costs or enhance reliability.

- Interacting with large, medium-sized, and small companies involved in orthodontic devices, furniture, aerospace structures, automotive parts, consumer electronics, materials recycling, food processing, and machine tools.

Other projects are humanitarian based, in which the students work with individuals who have special challenges.

Project sponsors include Alcoa, American Hydromech, BBI – PetStar, Blue Sky Chicago, HDR|Cummins & Barnard, Louis Padnos Iron & Metal Company, Motorola, Motorola Foundation, MSU Biogeochemistry Environmental Research Initiative, Phoenix Composite Solutions, and Shell Oil Company.

EGR 410: SYSTEMS METHODOLOGY SENIOR CAPSTONE COURSE, TEAMS 1-8, SECTION 1

EGR 410 is the capstone course for the Applied Engineering Science major. Students learn and put to use Systems Methodology tools to arrive at the best possible solution to a problem. Students use this course to explore societal issues and arrive at an optimal choice using various decision processes.

Team 1 section 1

Future of MSU Parking

Members L-R: Brad Zonca, Jessica Schmansky, Marcelo Rolim, Ryan Silvino

Team 2 section 1

Future Success for AES

Members L-R: Alexander Fergus, Kaitlin Noren, Brooke Babin, Chris Jolly

Team 3 section 1

Cost Savings Through Engineering Utility Reductions

Members L-R: Matthew Beabout, Andrew White, Todd George, Bryan Sienkowski

Team 4 section 1

Utilizing and Reducing MSU Cafeteria Food Waste

Members L-R: Chris Seidel, Roy Setsuda, Lisa Dabkowski, Ross Scott

Team 5 section 1

Air Filtration: An Alternative to a Smoking Ban

Members L-R: Luke Kosnik, Eryn N. Richmond, Kevin Kennedy, Curtis Jelken

Team 6 section 1

Rebuilding the Detroit Lions

Members L-R: Pierre Holt, Nancy Diel, Chris browett (missing), Mike Fox (missing)

Team 7 section 1

The Engineering Building: A Study in Sustainability

Members L-R: Ross Ricelli, Mark Carrier, Nicole Currie, Fumiya Kawahara

Team 8 section 1

An Educational Program for a U.S. Conversion to the Metric System

Members L-R: Kyle Urban, Amy Warren, Megan Klimecki, Kristen Dunkel



Mr. Chalou



Team 1, Section 1



Team 2, Section 1



Team 3, Section 1



Team 4, Section 1



Team 5, Section 1



Team 6, Section 1



Team 7, Section 1



Team 8, Section 1

EGR 410: SYSTEMS METHODOLOGY SENIOR CAPSTONE COURSE, TEAMS 1-7, SECTION 2

Section 2

Team 1 section 2

Spartan Stadium: Controlling the Student Mob

Members L-R: Kelsey Johnson, Daniel Voegler, Kamry Selley, Lance Blair (missing)

Team 2 section 2

Building a Green Future

Members L-R: Matthew Candela, Thomas Hull, David Kalis, Haris Kapetanovic

Team 3 section 2

Plan to Regionally Optimize Energy Efficient Homes

Members L-R: Josn Giovanatti, Michael Maher, Gregory Fitch, Andrew Adams

Team 4 section 2

Sustainable Waste Management

Members L-R: Justin Zhu, Tracey Lynch, Tim Kole, Brian Athmer (missing)

Team 5 section 2

Biking: How to Make it a Viable Means of Transportation

Members L-R: Kenneth LaChance, Mariame Yaqob, Paul Simon

Team 6 section 2

Emergency Room: Don't Wait... Get Treated

Members L-R: Ann Stavale, Quoc Hung Dinh, Garrett Frank

Team 7 section 2

2020 Parking Solutions: Making the Commuter Lot Convenient

Members L-R: Nick Pafke, Kamyle Jackson, Sahib Singh



Team 1, Section 2



Team 2, Section 2



Team 3, Section 2



Team 4, Section 2



Team 5, Section 2



Team 6, Section 2



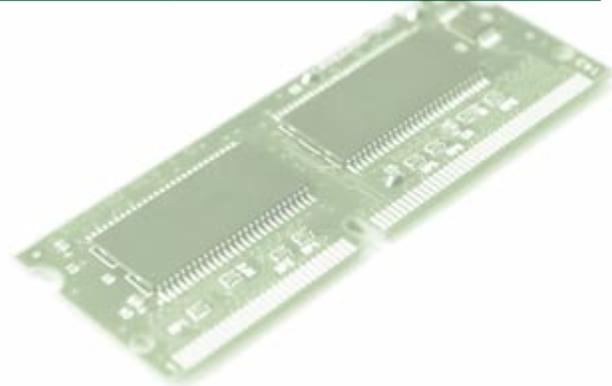
Team 7, Section 2

COMPUTER SCIENCE AND ENGINEERING CAPSTONE COURSE DESIGN PROJECTS

PRESENTATION SCHEDULE – Lake Erie Room

Prof. Wayne Dyksen

Time	Company	Project Title
7:35	Altair Engineering	3D Visualization on the Web
8:00	Auto-Owners Insurance Company	Telephone Log Self-Service Dashboard
8:25	The Boeing Company	KML Urban Scene Builder 2009
8:50	Ford Motor Company	Conference Room Monitor
9:15	GE Aviation	Flight Management System Voice Interface
9:40	Motorola	User Generated Video Service for Cable Systems
10:05	TechSmith Corporation	Collaborative Video Editing
10:30	Terex Corporation	Project Portfolio Management
10:55	The Toro Company	Water Smart Irrigation Software
11:20	Urban Science	Web-Based Geography Management



ALTAIR ENGINEERING

3D VISUALIZATION ON THE WEB

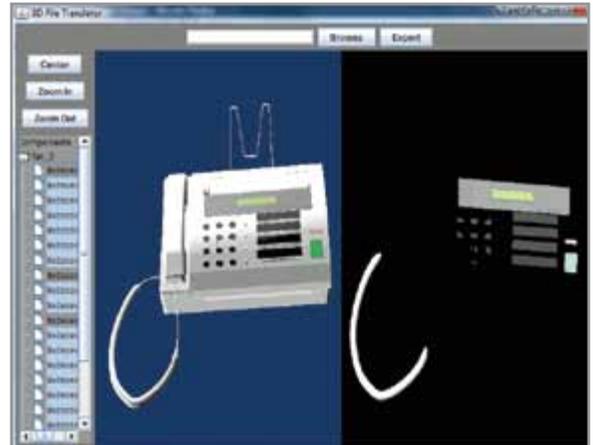
The Web has already become the de-facto standard of communication, for manufacturers and consumers. As of today, all web sites can display two dimensional objects, but the future will allow for quickly loading three dimensional objects and greater interaction.

As it is becoming more critical for companies to be able to communicate with one another, it is also important for designers to allow collaboration between each other regarding their designs.

Working with Altair Engineering, we built software that displays 3D files on the Internet, and allows manipulation of the object shown. The software allows users to select a 3D file and display it within a web browser. This will help designers communicate three dimensional information more effectively.

This technology promises to offer new ways to compare similar products through a web site. It is predicted that this type of technology will be integrated within various web browsers. Technology like this will greatly increase the quality and value of the products that will be made and will help decrease errors and miscommunication between parties.

Our software is written using Java, XML and makes use of a new 3D format, X3D.



Michigan State University Team Members (left to right)

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Evan Bowling
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Ben Grossman
Negaunee, Michigan

Altair Engineering Corporate Sponsors

Alhad Joshi
Troy, Michigan

Shashi Lakshminarayana
Troy, Michigan

Binu Panicker
Troy, Michigan

AUTO-OWNERS INSURANCE COMPANY TELEPHONE LOG SELF-SERVICE DASHBOARD

Auto-Owners Insurance Company is one of the premier insurance companies in the nation. Over the years, they have consistently provided their customers with great service while maintaining affordable rates.

Minimizing company costs and effectively managing time are key factors in maintaining a high level of customer service. Employees need to make proper use of company resources, as well as give each customer the same level of attention.

Working with Auto-Owners Insurance Company, we developed a web application called the Telephone Log Self-Service Dashboard. With this dashboard, managers can set thresholds for their employees' call usage, which can then be used to monitor usage of company resources and make sure that each unit's clients are receiving the service they need.

When a manager logs in to the dashboard, he or she is shown a list of any recently broken thresholds. The manager can then go to the call logs page to look up the phone records to determine which actions should be taken. The Call Logs page also allows the manager to generate reports for call data.

On the Preferences page, managers are able to set values for thresholds. They can also select which thresholds will be applied to their units and set the date ranges for viewing broken thresholds and generating reports.

The dashboard is written in C# and ASP.NET using the .NET framework 3.5. The database is SQL Server 2005.



Michigan State University Team Members (left to right)

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Michael Eaton
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Gina Chernoby
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Auto-Owners Insurance Corporate Sponsors

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Scott Lake
Lansing, Michigan

Todd Scoggins
Lansing, Michigan

THE BOEING COMPANY

KML URBAN SCENE BUILDER 2009

In the heat of battle, soldiers are forced into making tough decisions that can determine the fight's outcome. Having the ability to plan how strikes are to be carried out significantly raises a unit's chances of success. Using the simulation software that we've developed this semester, any military organization can do just that.

Using images taken by satellite, users are able to trace out building layouts, or footprints, which are built into three-dimensional models. After adding other objects such as stairwells, couches, and tables into these models, the full-scale building is loaded as one of many into a vast scene. This, however, is simply the first step of the software package.

The real meat and potatoes of our application is being able to drive a vehicle through the simulation which not only shoots lasers but also forwards messages about what was shot at over a network that others watching the scene can connect to.

While piloting about the scene, the user may fire a laser at any object, including walls and ceilings outside and inside of buildings. Should the object become damaged or destroyed, a message is sent over the network to anyone who is connected and watching so that they can know what has just occurred.

Our software was written using C++ applied to the OpenEagles Distributed Interactive Simulation framework with embedded Ruby scripting and JavaScript.. Google Earth provided all satellite images used for the footprint creator.



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Taufik Hidayat
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Keith Schonberger
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Nicholas Ramirez
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The Boeing Company
Corporate Sponsors

Jayson Vincent
St. Louis, Missouri

Steve Yallaly
St. Louis, Missouri

FORD MOTOR COMPANY CONFERENCE ROOM MONITOR

The Ford Conference Room Monitor revolutionizes how people and groups find and utilize conferencing areas. Above and beyond the benefits that it provides to general employees, the Ford Conference Room Monitor allows building management to better oversee their facilities and administer the resources at their disposal.

Using a collection of small wireless sensors, data is collected about conference rooms in real time. This data is transmitted back to a server where it is analyzed and available to users through a web application. Floor plans using a color-coded highlighting scheme indicate available, possibly occupied, and unavailable conference rooms to the user. From this interface, users can also view the schedule of a given room as well as schedule new meetings in open time.

Historical information is maintained in a database, in order to better inform building managers of room usage. Metrics such as temperature, light usage, humidity, and room cancellations are at the fingertips of those who need to know. Custom graphical output, and statistical summaries are available to view through a web browser, or print off for later.

In addition to the simple accessibility of the data, building managers can add new buildings, floors, and conference rooms with ease. After the building manager uploads a floor plan through the web interface, it is automatically converted to the map viewed by the user.

Welcome to the future of conference room management.



Michigan State University Team Members (left to right)

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Gregory Kent
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Lauri Marc Ahlman
Naperville, Illinois

Michael Peteuil
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Ford Motor Company Corporate Sponsors

Michael Volk
Dearborn, Michigan

Matthew Whitaker
Dearborn, Michigan

GE AVIATION FLIGHT MANAGEMENT SYSTEM VOICE INTERFACE

Air Traffic Control/Pilot communication has remained largely unchanged since the 1950s. But recently, text based communication between air traffic controllers and pilots is being used with increased frequency.

GE's current system provides direct data link communication between air traffic controllers and pilots. It provides the flight crew with the ability to send and receive messages similar to today's email or text messages. Communication supported by this system provides position reporting, pilot request, and air traffic control clearances. This technology reduces air traffic controller workload.

GE's software allows controllers to input text using a computer keyboard. Our software extended this functionality by allowing the controller to speak the message he/she wishes to send into a microphone. Our software automatically translates the controller's voice message into a formatted text message and is sent to the desired aircraft.

As an example scenario, an air traffic controller would speak a command into the microphone such as "descend to 13,000 feet." This message is then displayed in our software to allow the controller to verify the message before sending it to the aircraft. The aircraft crew would then receive the message and make the appropriate course corrections.

Our development was done with C# and C++ languages. The speech recognition was done using SAPI 5.1.



Michigan State University
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Eric Partlo
Brighton, Michigan

William Rogers-Snodgrass
Holt, Michigan

GE Aviation
Corporate Sponsors

Don Moore
Grand Rapids, Michigan

Greg Sykes
Grand Rapids, Michigan

Robert Taylor
Grand Rapids, Michigan

MOTOROLA

USER GENERATED VIDEO SERVICE FOR CABLE SYSTEMS

Modern cable networks were designed in a closed fashion and thus content on these networks has been controlled by a small set of providers. In today's technologically infused homes many forms of video capture devices can be found. As cable networks slowly become accepting of new content and new sources of content, the possibility has opened for anyone to become a content provider on these networks.

We have created a set of services that allow users to upload their own content and subsequently make that content accessible on a set top. The user does this by uploading video via their computer over the internet to what amounts to a social networking service. The user gives the video a name and description, and then sets who in their buddy list is permitted to view the video on their set top.

Once the video is uploaded to the social network, the social network alerts the appropriate Cable Headend that a new video has been uploaded and is associated with one of the Headend's users. The Cable Headend then retrieves the video, converts it to a stream-ready format and stores it.

When a user navigates to the User Generated Content Portal on their set top, they are presented with a display listing the videos they are permitted to watch. Upon selecting a video, it is then streamed to their set top.

All services are implemented in Java, deployed on a Glassfish application server and use a MySQL database.



MOTOROLA



Michigan State University

Team Members (left to right)

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Maitland Marsh
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Bethany Wenzel
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Motorola

Corporate Sponsors

Kabe VanderBaan
Schaumburg, Illinois

TECHSMITH CORPORATION

COLLABORATIVE VIDEO EDITING

Popular video sites such as YouTube and Google have recently expanded their audiences by adding the feature of closed captioning to their videos. However, speech recognition technologies are far from perfect and often create incorrect transcriptions of the videos.

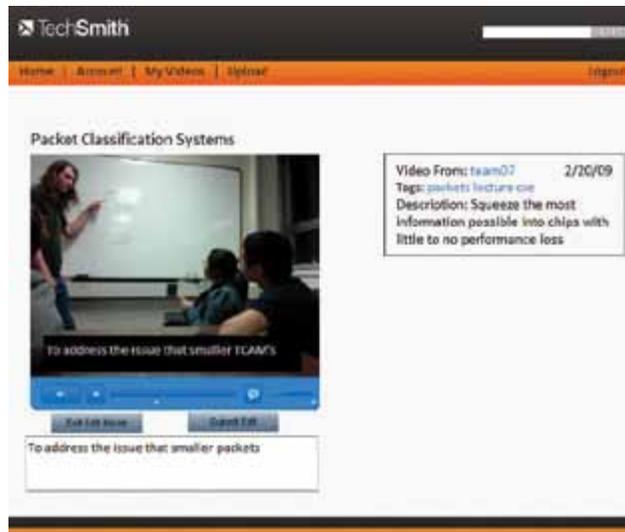
With the guidance of TechSmith, we have developed a solution to these issues by creating a web site where users can upload their videos to be automatically transcribed, find other captioned videos, and correct any incorrect captions. This allows for the entire community to edit video transcriptions.

Our web site enables users to search for captioned videos of interest. Besides uploading videos for automatic captioning, users can submit corrections for incorrect computer-generated captions, both for their own videos as well as for others.

If a user finds an error in the caption, they can make their desired correction in “Edit Mode” to access the captions and make the appropriate changes. These edits will officially be made to the video upon the approval of the video’s owner.

Users can search for what was said in the video as well as tags of uploaded videos. Still shots from the videos along with a brief description are displayed as results of the search.

This software automatically generates captions by using the Windows Speech Recognition Engine v5.1 on Windows Server 2003. Captioned videos are viewed with Adobe Flash Player while video information is stored in a MySQL database.



Michigan State University Team Members (left to right)

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Stephanie Ortiz
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Robert Victoria
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TechSmith Corporation Corporate Sponsors

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Dean Craven
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Scott Schmerer
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TEREX CORPORATION PROJECT PORTFOLIO MANAGEMENT

Terex Corporation is a global equipment distributor that prides itself on producing quality and cost-effective products. To efficiently produce these products and grow its business operations, Terex must effectively manage its Information Technology (IT) projects. Currently, Terex has a need to expand its project tracking capabilities so that the Global Project Management Office (GPMO) can assist project managers in successful project execution.

The Project Portfolio Management (PPM) System implements a standard project format that will be used to track projects from creation to completion in a sleek, easy-to-use, web site application. The use of a single PPM web site will enable Terex Team Members to adhere to a standard format for all projects. The site includes a project creation page, an edit project page, a detailed project view page, a dashboard page, as well as a few other useful pages.

The project creation page ensures that all projects start with the same standard of information, while the edit project page implements security to allow certain users to edit a project. The detailed project view displays the list of all information for a single project. Finally, the dashboard acts as a home page that provides an overview of all projects, displaying only the most relevant information for each project.

This web site application is created as a Microsoft SharePoint Site, which uses ASP.NET, C#, and XML to create and display web pages.



Pictured Above is the PPM Dashboard Page



Pictured Left is the Detailed Project View Page



Michigan State University
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Michael Vo
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Brandon Gualdoni
Westport, Connecticut

Leslie Hershey
Westport, Connecticut

Matt Wyman
Westport, Connecticut

THE TORO COMPANY

WATER SMART IRRIGATION SOFTWARE

The Toro Company, a leader in the irrigation industry, provides a wide variety of irrigation solutions on both the personal and professional level. One of these solutions is the ECXTRA irrigation controller, which provides homeowners the ability to customize the way their lawns are watered.

The ECXTRA controller allows the capability to dynamically water 10-12 different zones (different areas of a lawn) depending on the model. Toro supplies software that users install on their computer to collect necessary information in order to provide accurate suggested watering schedules. The current software is implemented in older technology and lacks certain features leaving room for improvement.

Once all the information is collected such as local weather, topology descriptions of zones and certain descriptions, Toro will create an editable schedule using their own algorithm. This schedule is then passed from the computer to the ECXTRA controller via a custom-made Toro USB flash drive. The ECXTRA connects to the user's water pump and automatically controls all aspects of the watering.

In collaboration with Toro, we have designed new software that entails simple usability alongside professional graphical representation. This software was built with scalable architecture to encapsulate all future Toro controllers that wish to utilize the software. The water smart irrigation software was written in C# with all Graphical User Interface coding done in Expression Studio.



Count on it.



Michigan State University Team Members (left to right)

Daniel DeMeyere
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Brian Osborn
Richmond, Michigan

Dominic DiCicco
Southgate, Michigan

Lionel Li
Medan, Indonesia

The Toro Company Corporate Sponsors

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Minneapolis, Minnesota

Randy Pearson
Riverside, California

Nathan Fujimoto
Riverside, California

URBAN SCIENCE

WEB-BASED GEOGRAPHY MANAGEMENT

It's difficult to look at columns of numbers and try to visualize data trends. Whether you want to develop sales territories, or plan a marketing program based on demographic data, Web-Based Geography Management is the answer.

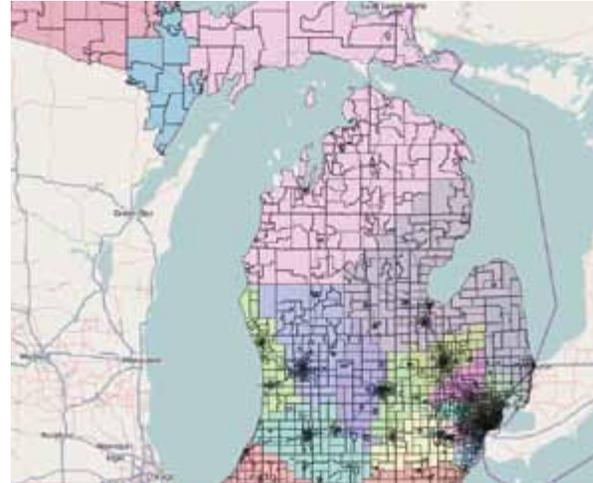
This software is designed to facilitate the geographical visualization and analysis of marketing territories for companies with many merchandisers, distributors or dealers.

The major features of Web-Based Geography Management revolve around the seamless retrieval and grouping of massive amounts of census tract geographies. Census tracts are population areas of 1,500-8,000 people and are provided by the U.S. Census Bureau.

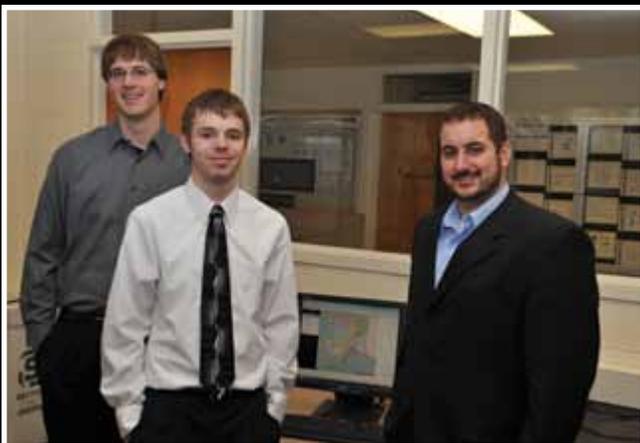
With this application, a user can assign a group of census tracts to a merchandiser's Primary Marketing Area (PMA). The user is then able to assign a group of PMAs to a higher level of aggregation called a Market. The software realizes a hierarchy of aggregations that can go beyond the Market level.

At the core of the Web-Based Geography Management software is a database that processes the geographies, a web service to correctly retrieve and send the data, and a web browser interface to render the geographies to the end user.

Web-Based Geography Management ultimately provides a method to increase profits through a visual understanding of marketing territories and an easy-to-use web interface to modify spatial data anywhere a web browser is available.



URBAN SCIENCE.



Michigan State University

Team Members (left to right)

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Lapeer, Michigan

Jeremy Kocks
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Jason Weber
Flint, Michigan

Urban Science

Corporate Sponsors

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Detroit, Michigan

Mark Colosimo
Detroit, Michigan

Suzanne DuBois
Detroit, Michigan

Computer Science and Engineering Capstone Course Sponsors

We thank the following companies for their generous support of the computer science capstone course.

Auto-Owners Insurance Co.
Lansing, Michigan



The Boeing Company
St. Louis, Missouri



Chrysler LLC
Auburn Hills, Michigan



GE Aviation
Grand Rapids, Michigan



IBM Corporation
Rochester, Minnesota



Motorola, Inc.
Schaumburg, Illinois



TechSmith Corporation
Okemos, Michigan



Terex Corporation
Westport, Connecticut



The Toro Company
Riverside, California



Urban Science
Detroit, Michigan



ELECTRICAL AND COMPUTER ENGINEERING AND MECHANICAL ENGINEERING PROJECTS

PRESENTATION SCHEDULE — Lake Huron Room

Course Coordinators: Professors Erik Goodman and Craig W. Somerton

Faculty Advisors: Professors Aslam, Ayres, Baek, Choi, DeMaagd, Goodman, Mason, McGough, Shanblatt

Time	Project Sponsor(s)	Sponsor Contact(s)	Faculty Advisor(s)	Project Title
8:00 ECE 480	Chrysler Foundation and MSU RCPD	S. Blosser	R. McGough	Heat-Reactive Clothing Electric Wheelchair Accessory
8:25 ECE 480	Lenovo Corporation	A. Makley J. Swansey	E. Goodman K. DeMaagd	Locally Networked Satellite-Based Computer Labs for Tanzanian Classrooms
8:50 ME 481/ ECE 480	MSU BERI and MSU SML	E. Lichtman	D. Aslam J. Choi	Autonomous Robotic-Fish-Based Sensor to Detect Harmful Algal Blooms
9:40–10:00 Break				
10:00 ECE 480	Texas Instruments	R. Sathappan J. Shastry	M. Shanblatt	Home Automation HMI Demo
10:25 ECE 480	Mobile Digimedics, LLC	K. Scheel	A. Mason	Wireless Blood Pressure Module
10:50 ECE 480	BorgWarner Thermal Systems	R. Boyer	V. Ayres	Automated Inspection Device for Electronic Fan Clutch Actuators
11:15 ME 481	MSU College of Engineering	C. Ostrom	S. Baek	A Mobility Device for John Montalvo with the Montalvo Family

CHRYSLER FOUNDATION: HEAT-REACTIVE CLOTHING ELECTRIC WHEELCHAIR ACCESSORY

Spinal injuries can cause a disorder in which the body cannot properly regulate its own temperature. Hot or cold weather causes large swings in core temperature, severely impairing basic body functions. This disorder typically accompanies paralysis of the legs or arms, leaving a person wheelchair-bound. In an effort to provide greater independence and increased safety for people with this disability, we have designed a wheelchair accessory which regulates body temperature. A network of tubes circulates temperature-controlled liquid around an all-weather garment, keeping the wearer's core temperature within a comfortable range. This keeps the wearer safe and allows a greater degree of mobility and freedom in a variety of environments.

<http://www.egr.msu.edu/classes/ece480/goodman/spring09/group01>



A. Alexander
Electrical Eng



S. Zajac
Electrical Eng



S. Shane
Electrical Eng



M. Stroud
Electrical Eng



Resource Center for
Persons with Disabilities

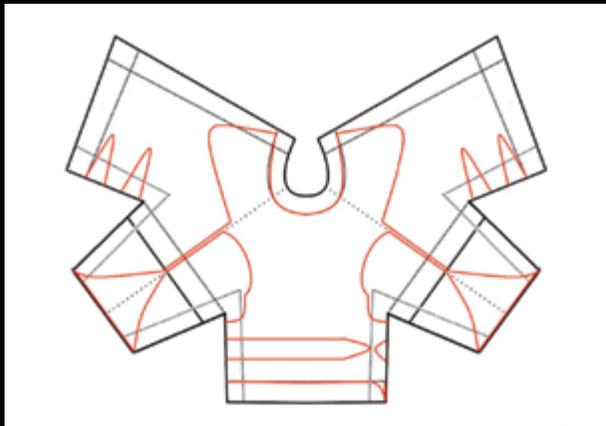
The Chrysler Foundation



Mr. Blosser



Dr. McGough



Project Sponsor
MSU RCPD
Chrysler Foundation

Sponsor Representative
Mr. Stephen Blosser

Faculty Facilitator
Dr. Robert McGough

Team Members & Non-Technical Roles

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Manager

Steven Shane
Webmaster

Melissa Stroud
Documentation Prep

Stephen Zajac
Lab Coordinator

LENOVO CORPORATION: LOCALLY NETWORKED SATELLITE-BASED COMPUTER LABS FOR TANZANIAN CLASSROOMS

Our team, sponsored by Lenovo Corporation, is tasked with the construction of a computer system suitable for implementation in rural schools in developing countries. As a continuation of the previous semester's project, we have created a multi-seat computer system configured using Open Source software. The goal of this project is to create a system that will work in environments with either intermittent or no power to provide access to computers, and more importantly the Internet.

In conjunction with MSU Telecommunications students and students at the University of Dar es Salaam in Tanzania, we will provide content for the multi-seat system as well as a shared Internet connection. The current design will link the Baraka Primary school and the Manyara Secondary School, giving each access to a satellite-based Internet connection.

The installation at Baraka Primary School is run using a solar power system created by the previous semester's team. However, the Manyara Secondary School is located on the power grid. Unfortunately, the power available is unreliable. Our design will implement an Uninterruptible Power Supply so that the computer system can continue to be used even if the power fails.



B. Holt
Electrical Eng



S. Sadler
Electrical Eng



K. Bishop
Computer Eng



D. Newport
Computer Eng



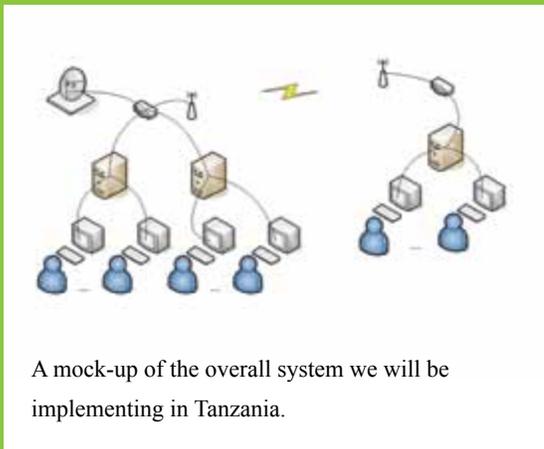
<http://www.egr.msu.edu/classes/ece480/goodman/spring09/group02>



Dr. Goodman



Dr. DeMaagd



Project Sponsor
Lenovo Corporation

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Mr. John Swansey

Faculty Facilitators

Dr. Erik Goodman
Dr. Kurt DeMaagd

Team Members & Non-Technical Roles

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Daniel Newport
Webmaster

Steven Sadler
Documentation Prep

Kevin Bishop
Presentation Prep & Lab Coordinator

MSU Communication Arts & Science

Joe Larsen
Przemyslaw Dogiel
Tor Bjornrud
Telecommunications

University of Dar es Salaam

Victor Crallet
Louis Magali
Prof. Dominic Chambege
Prof. Aloys Mvuma

MSU BERI: AUTONOMOUS ROBOTIC-FISH-BASED SENSOR TO DETECT HARMFUL ALGAL BLOOMS

With the environment constantly changing due to human abuse of the planet, scientists must continually come up with more effective methods of understanding or predicting an ecosystem's response to global change. Aquatic ecosystems are of particular concern. As a result of contaminants and toxins already disturbing our water, proper functionality of ecosystems and human welfare are dangerously at risk. Specifically, the abundance of harmful algal blooms (HABs) is a critical issue. In freshwater, HABs are caused by cyanobacteria producing potent toxins.

Our group was challenged by the Biogeochemistry Environmental Research Initiative (BERI) and the Smart Microsystems Laboratory (SML) to improve upon the pre-existing third generation robotic fish. The updated Generation Four fish is equipped with an HAB sensor as well as directional controls and sensors for collision avoidance. The updated device is capable of detecting specific concentrations of harmful algae blooms in diverse aquatic ecosystems and transmitting wirelessly the location and concentration of these algal blooms. With the help of BERI, the product will exist as a prototype for developing a group of sensor-carrying robotic fish that will monitor lakes and possibly help prevent deteriorating water quality.



J. Jacobs *Electrical Eng* C. Coppola *Mechanical Eng* W. Williams *Electrical Eng* T. Tareen *Electrical Eng*



E. Jackson *Mechanical Eng* S. Garrett *Electrical Eng* R. Morris *Mechanical Eng* A. Eyler *Mechanical Eng*



www.egr.msu.edu/classes/ece480/goodman/spring09/group04



Dr. Choi



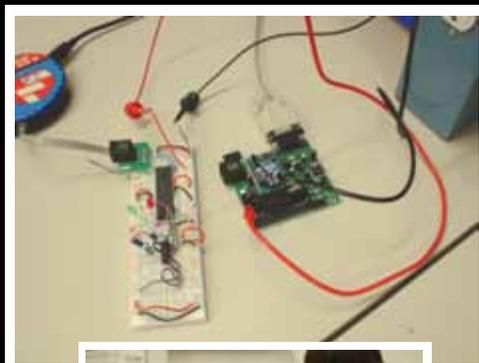
Dr. Aslam



Dr. Tan



Dr. Litchman



Project Sponsors
 MSU's Biogeochemistry Environmental Research Initiative (BERI)
 MSU's Smart Microsystems Laboratory (SML)

Sponsor Representatives
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 Dr. Xiaobo Tan

Faculty Facilitator
 Dr. Dean Aslam

Faculty Advisor
 Dr. Jongeun Choi

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 Eric Jackson
 Webmaster

Taha Tareen
 Documentation Prep

Carl Coppola
 Robert Morris
 Presentation Prep

Allen Eyler
 ME Lab Coordinator

Woodard Williams
 ECE Lab Coordinator



TEXAS INSTRUMENTS: HOME AUTOMATION HMI DEMO

Home automation is an emerging trend in modern households. Through the use of a central control panel, residents can manage every aspect of their house at the touch of a button. Users can arm the security system, turn on the air conditioner, or simply turn off the lights in the kitchen easily and quickly.

Our team is developing a demonstration of one such control panel. Our sponsor, Texas Instruments, wants us to show that their OMAP3 series processors are a powerful yet economical way to run this kind of panel. Using Java Virtual Machine, we are creating a graphical user interface (GUI) that displays data about the house to the user, and prompts for their next command. Using a series of easy-to-use menus, the resident can prompt action from various devices we are integrating into our design. These devices include:

- A video camera, placed at the front door, which allows the resident to see their guest before letting them in.
- A radio receiver, which gathers data from the National Weather Service's broadcast network, to get local weather information.
- A basic climate-control system, which allows users to automatically switch a fan on and off.

Our control panel will combine user-friendliness, aesthetics, and affordability in order to make this new technology standard in all new homes.

<http://www.egr.msu.edu/classes/ece480/goodman/spring09/group03/>



D. Ke
Computer Eng



S. Flynn
Computer Eng



R. Behera
Computer Eng



E. Myers
Electrical Eng



S. Kim
Computer Eng



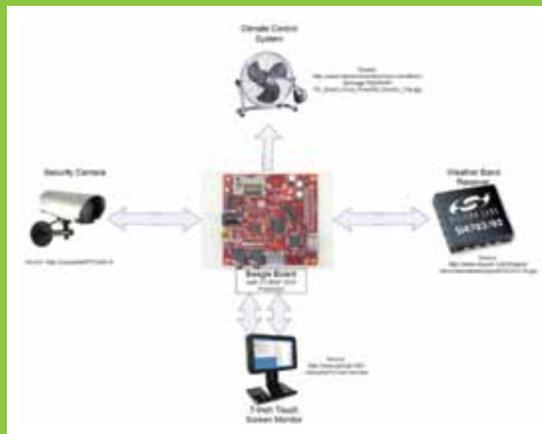
Ram Sathappan



Dr. Michael Shanblatt



Jay Shastry



Project Sponsor
Texas Instruments

Da Ke
Webmaster

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Sungsoo Kim
Lab Coordinators

Team Members & Non-Technical Roles
Samuel Flynn
Manager

MOBILE DIGIMEDICS, LLC

WIRELESS BLOOD PRESSURE MODULE

The objective of this project is to integrate a wireless Bluetooth module with a blood pressure monitoring system. This will be accomplished by using a wrist cuff blood pressure monitor. Upon successful completion, the product will allow doctors to keep track of many different patients' blood pressure readings, possibly reducing the frequency of human error.

This project is sponsored by Mobile Digimedics, LLC, a division of Intelligration Inc. It is a continuation of an earlier effort to create a blood pressure monitoring system. Since many of the basic components such as the Bluetooth module and interface software are already developed, the risk involved in attempting this project is low.

<http://www.egr.msu.edu/classes/ece480/goodman/spring09/group05/>



T. French
Electrical Eng



J. Harris
Computer Eng



M. Symanow
Electrical Eng



L. Tangataevaha
Electrical Eng



Mr. Scheel



Prof. Mason



Project Sponsor
Mobile Digimedics, LLC

Sponsor Representative
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Faculty Facilitator
Dr. Andrew Mason

Team Members & Non-Technical Roles

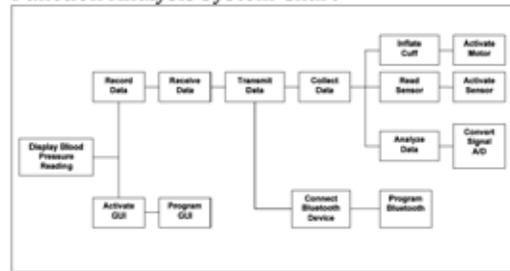
Michael Symanow
Manager

Thomas French
Webmaster

Jordan Harris
Documentation Prep

Luseane Tangataevaha
Presentation Prep & Lab Coordinator

Function Analysis System Chart



BORGWARNER: AUTOMATED INSPECTION DEVICE FOR ELECTRONIC FAN CLUTCH ACTUATORS

In tumultuous economic times, the automotive industry seeks more efficient and quality components. BorgWarner, Inc. is an industry leader in supplying quality parts to companies in the automotive industry, specializing in engine and drivetrain systems. In conjunction with a previous design team, BorgWarner developed an electric fan clutch actuator. This device controls mechanisms responsible for cooling the engine in an automobile. Design Team 6 is working with BorgWarner to create an automated inspection device for these actuators, providing an accurate and efficient testing method.

The current inspection method is manually-driven, using multiple connections and hand-recorded measurements. The team proposes an inspection device that will connect to any USB-enabled PC. The device will interface with the fan clutch actuator using a single connection. The team will design circuitry to condition and process raw signals from the actuator which are input to a PC-based data acquisition module. An easy-to-use graphical user interface will allow the operator to quickly conduct inspections. Inspection results will be stored as both a hardcopy printout and in a database. In an industry striving for excellence, this solution promises automation and higher levels of diagnostics for electric fan clutch actuators.



S. Sutara
Electrical Eng



J. Dubois
Electrical Eng



J. Co
Electrical Eng



C. Wilson
Computer Eng

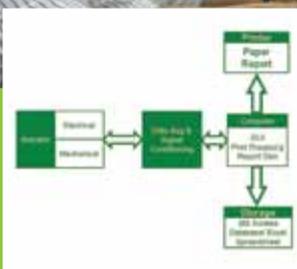
<http://www.egr.msu.edu/classes/ece480/goodman/spring09/group06/>



Mr. Boyer



Dr. Ayres



Project Sponsor
BorgWarner Thermal Systems

Sponsor Representative
Mr. Rick Boyer

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Jacob Co
Documentation Prep

Codie Wilson
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A HUMANITARIAN PROJECT FOR PEOPLE WITH DISABILITIES: A MOBILITY DEVICE FOR JOHN MONTALVO WITH THE MONTALVO FAMILY

People often take for granted how easy it can be to get around and exercise. For John Montalvo, an adult male with severe physical disabilities that limit his arm and leg movement, it is not that simple. For this year's humanitarian project for people with disabilities, the student design team was assigned the task of building a mobility device that allows John to get exercise and improve his quality of life.

Several years ago, a cycle was built by the MSU design program for John's niece, Mari. John has used this cycle and found that it is an effective and enjoyable way of getting exercise. The Montalvo family has expressed their satisfaction with the previous cycle that was constructed for Mari and has requested a similar cycle that is better suited to John's needs.

The team has designed a mobility device that can be used for recreational driving on sidewalks and roads. The two-seater sociable tandem bicycle has been designed to be lightweight, easily stored, and safe. Seatbelts, armrests, and feet straps have been added to keep John comfortable and secure while riding. Other specialized features include a cargo basket, radio mount, and gear shifts for each set of pedals. These special features will allow John to thoroughly enjoy his bike rides while being able to pedal at a speed that is comfortable to him.

...The John Montalvo Mobility Device Student Design Team

*The design team would like to thank the MSU Bike Shop for donating parts that assisted in the building of this mobility device.



Ms. Ostrom

It is my family's hope that with the help of the MSU students, my brother's new bicycle will allow him to enjoy being outdoors while also providing therapy for his legs.

Carol Ostrom
Professional Advisor
John Montalvo's sister



Prof. Baek

Project Sponsor
Michigan State
University
College of Engineering
East Lansing, Michigan

**Professional
Advisor**
Ms. Carol Ostrom

Faculty Advisor
Prof. Seungik Baek

**Team Members
and Home Towns**
Cliff Carlson
Novi, Michigan

Craig Helewski
Ubly, Michigan

Kevin McAlpine
Brighton, Michigan

Michelle Raetz
Caledonia, Michigan



REMEMBER WHEN YOUR CAREER CHOSE YOU?

FINDING SOMETHING YOU'RE PASSIONATE ABOUT doesn't happen every day, so when you do find it, you embrace it. At Boeing, we believe passion is what fuels our innovations and inspires our employees to be more than they ever thought possible. As we continue on our journey to amazing destinations, we want you to help take us there. You'll be joining an organization known for its support of learning both on and off the job, and one that has also been honored as higher education's top corporate sponsor. The job categories below include some of the key skills we are seeking.

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- Civil Engineering
- Electrical Engineering
- Electromagnetic Engineering
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- Industrial Engineering
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- Mechanical Engineering
- Optics
- Payloads
- Physics/Math
- Propulsion
- Reliability Maintainability Testability Engineering
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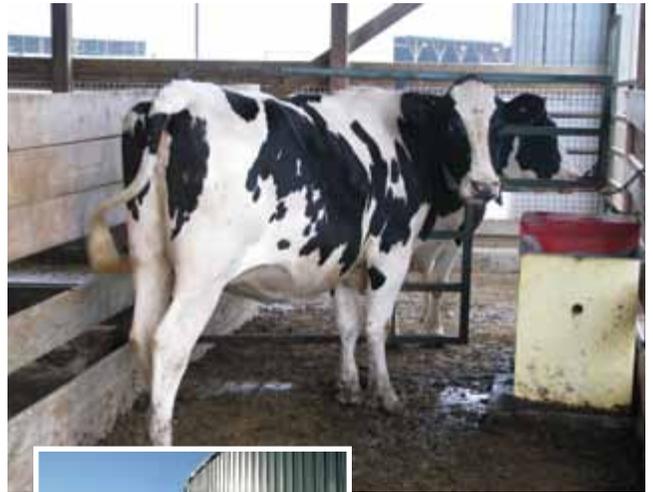


PROCESS DESIGN OF AN ANAEROBIC DIGESTER FOR THE KELLOGG BIOLOGICAL STATION

Anaerobic Digestion is a biochemical process by which microorganisms digest biomass in an environment lacking oxygen. Products include biogas, available to generate heat or electricity, and digestate. The digestate is a slurry that is either applied to the soil as an amendment or separated into solid and liquid components that are individually used as resources.

As an extension education facility aiming to showcase technological advances in sustainable agricultural practices, the Kellogg Biological Station dairy farm expressed interest in installing an anaerobic digester to effectively and sustainably treat manure.

To ensure a sustainable system, a process design for an anaerobic digester was developed to produce biogas at a rate adequate to satisfy the system heat requirements. The process design included feedstock source identification, system modeling, digester selection, and the development of a byproducts management plan.



Prof. Safferman



Biosystems Engineering Team Members (left to right)

Thomas Shedd
Tekonsha, MI

Andrew Hoyles
Okemos, MI

Christopher Gancsos
Jackson, MI

Michigan State University,
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Industry Advisors

Michelle Crook
Michigan Department of
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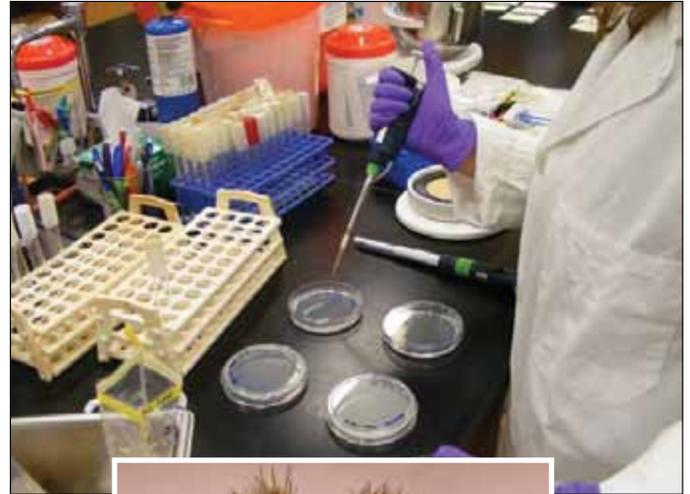
Todd Forbush
Techmark, Inc.

POST-PROCESSING MICROBIAL CONTROL ON SHELLLED CHESTNUTS

Chestnut Growers, Inc. is a cooperative of farmers that process chestnuts into a peeled, refrigerated consumer product. The wholesale distribution of this value added commodity is rapidly increasing throughout the U.S. During processing a microbial build-up occurs on the surface of the product that creates a spoilage biofilm after a short period of refrigerated storage. A solution to reduce the microbial load must be devised to prevent an unsightly and unpalatable product from reaching consumers.

To achieve the objective, a two-log reduction in total microbial count is needed based on previously collected data. After an extensive literature search, the project focused on steam treatment, a food grade chemical bath, and ultraviolet light as processing methods to reduce the amount of biofilm. Project constraints include capital investments, operation and maintenance costs, maximum throughput, floor space, and minimal change to the product texture, appearance, and taste.

Data from treated chestnuts is collected using standard microbiological measurement techniques and is statistically analyzed to evaluate the ability of each treatment method to reduce the microbial load. Sensory evaluations of treated chestnuts are used to assess changes to the overall product taste and texture. Proposed alterations to the existing process, which meet the client's needs, are based on bench-scale results, general observations, and published literature.



Source: Chestnut Growers, Inc.



Prof. Marks



Prof. Guyer



Biosystems Engineering

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Kyle Anderson
Westland, MI

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Chestnut Growers, Inc.

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Chestnut Growers, Inc.

Industry Advisors

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ENGINEERING AND TECHNOLOGY FOR DETECTING MEDICAL DEVICE RELATED TAMPERING

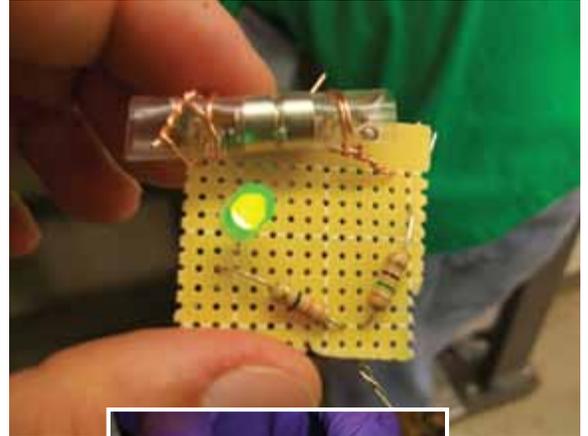
The epidemic level of infections following surgery has prompted the U.S. Center for Disease Control to urge hospitals to include biological indicators to identify defective medical packaging for both invasive and noninvasive devices. Incorporating a tamper detection method to current medical packaging is a major step in reducing surgical site infections.

Designing tamper evident packaging includes theoretical modeling, prototype testing, design evaluation and management planning. Based on a comprehensive literature review, four design alternatives were selected for initial testing.

Preliminary data prompted testing and design optimization of the following two oxygen indicator prototypes that are contained inside modified atmosphere packaging that is 99% oxygen free.

- Zinc-air battery, light emitting diode - two zinc air batteries connected in series to a light emitting diode (LED). The batteries provide power and light the LED only in the presence of oxygen.
- Colorimetric, ultraviolet (UV) light-activated - a mixture of methylene blue (dye), anatase titania, triethanolamine (semi-electron donor), and hydroxyethyl cellulose is dried on a paper substrate and inserted into an oxygen-free package. When exposed to UV light, the dye lightens in the oxygen free environment. When the package is opened or compromised, oxygen enters the package and the dye reverts to the original color.

These indicators provide hospitals a way to indicate compromised product package and verify instrument sanitation with a quality control checkpoint. The quality control is maintained by implementing a management plan that includes a checklist.



Biosystems Engineering

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Trevor McLean
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Neogen Corporation

Steve Steffes
Perrigo

Rebecca Leaper
Abbott Medical Packaging

SILAGE LEACHATE AND RUNOFF MITIGATION USING A CONSTRUCTED TREATMENT WETLAND

The MSU Kellogg Biological Station (KBS), located in Hickory Corners, Michigan, operates a small-scale dairy farm that serves as a teaching and research facility where new and common farming practices are displayed and implemented. KBS uses silage as cattle fodder, which consists of fermented high moisture corn. Silage, compacted and stored in bunker (horizontal) silos, leaches liquid that is high in nutrients. With improper management, silage leachate contaminates surface and groundwater, causing eutrophication of ponds and lakes, fish kills, and vegetation burn. KBS requested the design of a constructed treatment wetland to manage this waste stream.

Constructed treatment wetlands are a low-cost sustainable solution to treating agricultural, industrial, and municipal wastewater. Wetlands use an abundant supply of water to increase biological productivity, while overcoming shortages of other essential chemical elements such as oxygen. The relatively high rate of biological activity transforms wastewater pollutants into byproducts or essential nutrients that benefit the wetland system.

The wetland area and hydraulic loading rate required to reduce nitrogen, phosphorus, and biochemical oxygen demand in the silage leachate to regulatory levels are calculated using empirical design equations. A vegetation tolerance study is performed as a preliminary assessment of the effects of silage leachate nutrient concentrations on the growth of bulrush and duckweed, two species of plants commonly used in constructed treatment wetlands. Detailed constructed wetland design plans and specifications are provided for implementation at KBS.



Prof. Reinhold



Biosystems Engineering

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Daniel Cycholl
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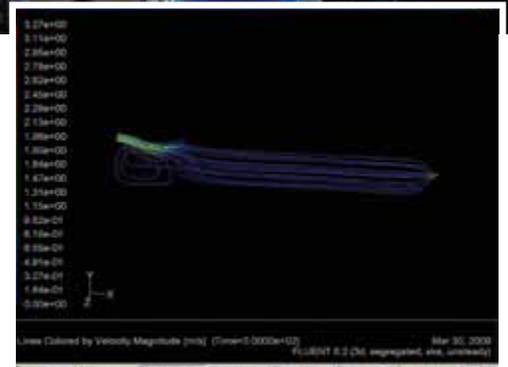
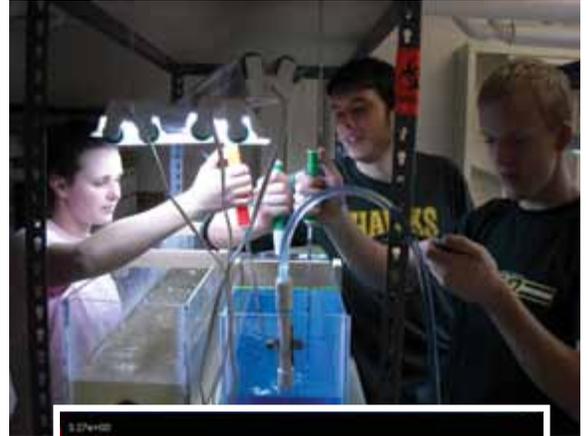
Larry Stephens
Stephens Consulting Services

FARM NUTRIENT MANAGEMENT THROUGH ALGAE PRODUCTION

Waste from small to medium dairy farms contains nutrients that are damaging to the environment when applied to soil at levels that exceed plant needs. Anaerobic digestion converts biomass, such as animal waste, into methane gas and digestate. The digestate solids are used as fertilizer or in other byproducts, while the remaining liquid digestate is available as a concentrated nutrient source.

Use of this liquid digestate as feed to benthic algae culture systems is being explored. During growth, the algae sequester nutrients from the liquid digestate. The produced algae is then converted into products such as fertilizer amendments, animal feed supplements, and biofuels. As a sustainable solution to manure management, the MSU Dairy Farm plans to construct an anaerobic digester and utilize the liquid digestate as a nutrient source in an onsite algae raceway reactor. This project involves the construction and operation of four raceway reactor prototypes to simulate algae growth and nitrogen and phosphorus removal rates under varying flow velocities while temperature, light exposure and fluid depth are held constant. Data analysis will determine if flow velocity significantly affects biomass yield and nutrient removal rates at the 95% level of confidence.

A protocol for scaling up the bioreactor prototype to the proposed large-scale MSU's Dairy Farm raceway reactor was developed using computational fluid dynamic modeling. The prototype reactors are available for use by the client for future evaluation of other factors that influence algae yield and nutrient removal, prior to implementing the full-scale design.



Biosystems Engineering Team Members (left to right)

Katie Borga
Norway, MI

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Bancroft, MI

Aaron Work
Farmington Hills, MI

Dr. Jan Stevenson, MSU
Department of Zoology
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Industry Advisors

Norma McDonald
Phase 3 Renewables

Paul Eisele
Private Consultant



CHE 434: PROCESS DESIGN AND OPTIMIZATION II

INSTRUCTOR: Professor Martin Hawley

TEACHING ASSISTANT: Susan Farhat

This course is a logical extension of the first semester of chemical engineering senior design. The abilities developed over a wide range of chemical engineering courses are now applied to a problem extending over a somewhat longer period of time; requiring more initiative, enterprise, care, and a greater measure of individual responsibility. For the 40th successive year, we have worked on the American Institute of Chemical Engineers (AIChE) Student Contest Problem. While this may sound like the name of some sort of game, we must note that industrial companies have put hundreds of thousands of dollars worth of engineering time into developing and evaluating these problems. Certainly, one of their purposes in spending this money is to have a direct input into the educational processes which their future employees are following. We use these industry designed problems for three reasons: 1) they are well-rounded problems, 2) they tell our students and our faculty something about the kind of abilities that industrial companies would like graduating chemical engineers to have, and 3) there is the advantage of seeing how well our students compare with graduates of other universities in a national competition of this quality.

From the class of 45 students, 13 teams of two and 19 individuals completed this project. For Design Day, 4 teams and 4 individuals were chosen to present their design via a poster presentation. From this final group, 2 teams of two and 2 individuals will be chosen to compete in the national AIChE competition. Since 1968, about half of the students whose reports rated first or second at MSU also finished among the top six nationally.

PROBLEM STATEMENT: Butanol production via fermentation

The purpose of this problem is to synthesize a process, size, cost, and optimize a plant to produce butanol by fermentation for use as a biofuel. The expected outcome of this work is a finalized process description, mass and energy balance, equipment list with specifications and costs, utility consumptions, economic analysis, optimization, and safety, health, and environmental analysis. Energy consumption for the plant is specifically important, since the main product is, ultimately, energy.

Acetone, ethanol, and butanol were produced by fermentation before the advent of the petrochemical industry, which made the former process uneconomic. However, with growing interest in biofuels as well as the marked increase in petroleum and petrochemicals, this older process of fermentation is being revisited. It can be noted that butanol has several advantages over the more conventional biofuel ethanol in blending with gasoline. The ultimate goal of this project will be to develop the most economical conceptual design for using corn as a feedstock to produce 50 million US gallons of fuel grade butanol, along with other corresponding products. If the final plant is shown as economically unfavorable, a thorough discussion of courses of action that could make the process suitably economical to justify investment must be made. This may include research objectives.



Team 1: Maria Isabel Tenorio-Bernal and Jennifer Hall



Team 2: Manindra Joshi and Allister Chang



Team 3: Michelle Marinich and Chad Rogers



Team 4: Andrew Kraus and Michael Dittmer



Team 5: Alex Nelson



Team 6: Shaun Kleiber



Team 7: Daniel Siemen



Team 8: Linpei Chang

AICHE®

MSE 466

8:00 – Noon
First Floor
Lounge



MSE 466: SENIOR CAPSTONE IN MATERIALS SCIENCE AND ENGINEERING

INSTRUCTOR: Professor James P. Lucas
TEACHING ASSISTANT: Sara Longanbach

MSE466 is a senior course for MSE majors which provides students with a team-based capstone design experience. A major objective of this course is to have students apply their course learned background and skills in materials science to real-life design problems. Failures are a major motivating force for generating innovative designs or design changes. A failure analysis investigation provides a unique platform to systematically design and solve a real-world engineering problem. By focusing on a specific design failure, the student teams face an open-ended problem that requires them to design a strategy plan and execute the methodology for assessing how and why the design failure occurred. The analysis is conducted using established investigative procedures and constraints for conducting failure analysis investigation. This semester, there are five 4-5 member teams working on five real engineering failures. Team projects and failures being investigated include the following:

1. Fracture of a Main Drive Gear
2. Failure of a Salisbury Differential Front Output Shaft
3. Cracking of a Ni-based Alloy Bushing
4. Bolt Fracture used in a 240-Ton Mechanical Press
5. Fracture of a Ni-Alloy/C-22 Chlorine Compressor Shaft

Successfully completed team projects culminate in a comprehensive written final report and a strategic redesign plan to improve the design or mitigate future failures. The teams will be presenting posters summarizing their findings.



Team 1: (rear) l-r: Marc Schlaud, Warren Knapp**, (front) l-r: Daniel Lynam, Kristen Khabir



Team 2: l-r: Adam Kotlarek, Steve Schofield**, Daniel Kleinow, Thomas Santini



Team 3: (rear) l-r: Minyoung Jeong, Ibramina Diallo, Pao-Hao Huang (front) l-r: Mahlet Garedeew, Kendell Pawelec**



Team 4: l-r: Chi-En Hung, Shawn Patterson, Reem Banu, Shawna Collins**, Ryan Green



Team 5: l-r: Scott Gillard, Robert Friederichs**, Dylan Cimock, Jerome Leboeuf

** Team leader



ChE 491: ENGINEERING ENTREPREUNERSHIP

INSTRUCTOR:
Professor Ramani Narayan

Entrepreneurship is the vehicle that fuels economic growth. This course exposes students to the “entrepreneurial process,” with consideration of issues such as the nature of entrepreneurship, opportunity identification, intellectual property creation and strategy, market research, operations, financial analysis, valuation of technology, and cash flow analysis in a technical environment. These are necessary ingredients of all successful technical ventures, regardless of size. Students in this course will not only see and hear, but they will do: students will be required, as the main course activity, to propose an idea for a new technical venture and to generate a formal product feasibility plan.

Students will be formed into groups of 2 to develop a product or process innovation/idea for commercialization through a start-up entrepreneurial venture or by working with a small or medium size business – entrepreneurial internship.

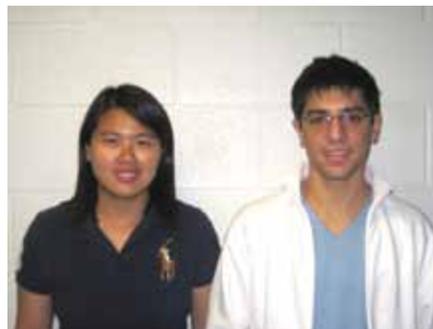
In this course, students learn first-hand to apply their engineering skills and abilities in a business environment to identify innovative product and processes, and investigate the potential for an entrepreneurial opportunity, keeping in mind the differences between an "idea" and an "opportunity." They will develop a sound business plan to bring the innovation to commercial reality or not as the case may be.

Students learn the language of business and understand the importance behind the numbers. They will communicate more effectively with accounting and finance peers. They will read and interpret a company’s financial statements as well as a company’s profitability, solvency and liquidity.

The following 4 student are working on two product feasibility plans which will be presented in poster format on Design Day:



Team 1: l-r: Michelle Marinich, Chad Rogers
Project title: “Economic Feasibility of Canola Products in Michigan”



Team 2: l-r: Linpei Chang, Richard Rauser
Project title: “Reading Balance Sheets to report on Company Viability”

CE 495 SENIOR DESIGN IN CIVIL ENGINEERING

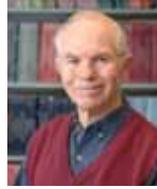
FACULTY ADVISORS: Professors Baladi, Chatti, Hatfield (emeritus), Maleck, Masten and Wallace



Baladi



Chatti



Hatfield
(emeritus)



Maleck



Masten



Wallace

In this one-semester, required course, seven student teams have developed preliminary designs for a new rail/bus transportation facility on the west side of MSU’s main campus. The facility will include a rail/bus station, access roads, parking, storm water facilities, as well as either grey water or rainwater for onsite non-potable use. The station will be housed in the lower level of a new multistory building that will be located between Harrison Road and Farm Lane. The station platform must be at least 500 feet long and located so that passenger trains do not stop traffic on Harrison Rd. Engineering designs have been developed for the geometric layout of the roads, the structure of the building that will house the station, the soils that provide the support for this building, the onsite storm water management facilities, the pavement cross sections of the roads and parking areas, as well as, the onsite non-potable water supply.

PROFESSIONAL EVALUATORS

Christopher R. Byrum, Ph.D., PE
Soil & Materials Engineers
Plymouth, MI

Matt Junek, PE
HNTB
E. Lansing MI

John Saller, PE
Wilcox Prof. Services, LLC
Lansing, MI

Daniel Christian, PE
Tetra Tech MPS
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John LeFevre, PE
FTCH, Inc.
Lansing, MI

Jimmy Spangler, PE
Tetra Tech MPS
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Jim Corsiglia, PE
Harley Ellis Devereaux
Southfield, MI

Mike Livernois, PE
Harley Ellis Devereaux
Southfield, MI

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NTH Consultants
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Michael C. Isola, PE
Bergmann Associates, Inc.
Lansing, MI

Tom Myers, PE
Wilcox Prof. Services, LLC
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CE 495 SENIOR DESIGN IN CIVIL ENGINEERING



Team 1: Back: Derek Ambs, Adam Wolfsen, Josh Luckritz
Front: Kris Hammerle, John Baldauf, Chris Ciesa, Lisa Goodrich



Team 2: Back: Jason Provines, Alexander Hop. Front: Melissa Howe, Michelle O'Donoghue, Zachary LaCroix.
Not present: Brent Dustin, Ryan Weiss.



Team 3: Back: Mike Staal, William Lansing. Front: Elizabeth Stieber, Nathan Arnett, Kiel Murphy, Andrew Zanotti.
Not present: Antonio Testolin.



Team 4: Back: Stephan Maxe, Terry Stines, Rachel Chojnacki, Adarsh Menon, Jason Mirjah.
Front: Justin Dunevant, Elizabeth Cramer.



Team 5: . Back: Matthew Garratt, Kevin Barton, Christian Lambarth, Rick Thorne. Front: Luke O'Brien, Ashley Washabaugh, Valerie Ingle.



Team 6: Back: Steven Mikula, Michael Little, Ed Kantz, Tim Francisco. Front: Brandon Onan, Nnaemeka Ezekwemba, Scott Rasmussen



Team 7: Back: Steve Remias, James Ensign, Wouter Brink, Jonathan Noble. Front: Laura Burke, Roham Lahiji.
Not present: George Wimbrow.

TEAM	TIME	ROOM
1	7:50 a.m.	MSU Room
2	7:50 a.m.	Lake Michigan Room
3	9:00 a.m.	MSU Room
4	9:00 a.m.	Lake Michigan Room
5	10:10 a.m.	MSU Room
6	10:10 a.m.	Lake Michigan Room
7	11:20 a.m.	MSU Room

Superior

8:00 – 12:30
Third Floor
Lake Superior Room

MECHANICAL ENGINEERING PROJECTS

PRESENTATION SCHEDULE —Lake Superior Room

Course Coordinator: Professor Craig W. Somerton

Faculty Advisors: Professors Averil, Kwon, Lee, Liu, Müller, Patterson, Pence, Pourboghrat, Somerton

Time	Project Sponsor(s)	Sponsor Contact(s)	Faculty Advisor	Project Title
8:00 ME 481	Blue Sky Chicago	M. Eichorn T. Koenigsknecht	T. Pence	Unmanned Food Demo System (White Team)
8:25 ME 481	American Hydromech	T. Droste	N. Müller	Value Line Series of Filters
8:50 ME 481	BBi–Petstar	T. Parkin B. Adams	R. Averill	Petstar/Petnet (Pet Safety/Convenience Center)
9:15 ME 481	Heartwood School	M. O’Brien	D. Liu	An Adaptive Errand/Utility Cart for Heartwood School
9:40–10:00 Break				
10:00 ME 481	Blue Sky Chicago	M. Eichorn T. Koenigsknecht	T. Lee	Unmanned Food Demo System (Green Team)
10:25 ME 481	HDR/Cummins & Barnard/Alcoa	B. Dreher D. Mutschler L. Thering	F. Pourboghrat	Mercury Removal Technology Assessment
10:50 ME 481	Phoenix Composite Solutions, LLC	J. Glomski S. Phillips J. Scanlon	P. Kwon	Low Cost Wind Turbine
11:15 ME 481	Motorola	J. Wojack	E. Patterson	Sensory Wireless Alert Device
11:40 ME 481	Woodcreek Elementary School and the Motorola Foundation	D. Graham S. Raymer	C. Somerton	Wind Power Demonstrator for Woodcreek Elementary
12:05 ME 481	Somerton Family Trust and The Appropriate Technology Design Collaborative	J. Barrie	C. Somerton	A Vaccine Refrigerator for Remote Regions with The Appropriate Design Collaborative

BLUE SKY CHICAGO: AUTOMATED DISTRIBUTION SYSTEM (WHITE TEAM)

Blue Sky Chicago is a marketing consulting firm based in Chicago, Illinois. During the last 5 years, Blue Sky Chicago has carved out a business niche by delivering simple yet unconventional solutions to marketing challenges posed by manufacturers of consumer packaged goods.

The company's clients spend a lot on marketing and Blue Sky Chicago's mission is to improve their return on investment. Every solution conceived must be able to show a direct link between the marketing program and an increase in sales. This often requires Blue Sky Chicago to rethink how traditional marketing programs are executed.

The company's next endeavor goes beyond conventional marketing services and incorporates information technology, engineering and manufacturing. Two Capstone Design student teams were chosen to lead the refinement of Blue Sky Chicago's proof-of-concept prototype. The goal for both teams is to create a prototype that reliably distributes a wide variety of small bags, with a touch of a button, while retaining the integrity of the bags within a confined space.

...The Blue Sky Chicago Student Design Green Team



Mr. Eichorn



Prof. Pence



Mr. Koenigsknecht

The results of this project will have significant impact and benefit to Blue Sky Chicago's continued success in the food marketing services industry. The system designed by this MSU Team will be used for partnering discussions with retail and manufacturing companies in the next six months leading up to a 10-store market test targeted for late 2009.

Matt Eichorn
Blue Sky Chicago

Project Sponsor
Blue Sky Chicago
Chicago, Illinois

Professional Advisors
Mr. Matt Eichorn
Mr. Tony Koenigsknecht

Faculty Advisor
Prof. Thomas Pence

Team Members and Home Towns
Sergey Korobov
Beverly Hills, Michigan

Ken Maisonville
Farmington Hills,
Michigan

Amanda Ruhno
DeWitt, Michigan

Matthew Werner
St. Clair, Michigan

AMERICAN HYDROMECH: VALUE LINE SERIES OF FILTERS

American Hydromech is working in cooperation with NTZ Micro Filtration to redesign the AL, ALH, and ATF series of oil filters. In their current configuration, the filters offer superior system protection; they provide better than 99% removal of contaminant particles of 2 microns and larger. The team investigated the feasibility of using alternative materials and design elements to reduce weight, cost, and unnecessary features based on the market's needs. Additionally, customers have requested a new universal mounting system be designed so that on-site fabrication of mounting brackets is not required.

The goal of this project was to redesign the existing hydraulic filters to significantly increase value offered to customers by lowering installed cost and increasing feature content. To complete the task of lowering the installed cost, the team conducted a Value Analysis/Value Engineering session. This was done in order to identify areas of improvement and analyze the functions of each component within the filters. As an added feature, the team was tasked with creating and implementing a compact visual flow indicator to assist in hydraulic system maintenance. Following the principles of Design for Manufacture, Assembly and Service, and the Taguchi principle of robustness, the team created three prototypes. The CAD model of each prototype was analyzed via FEA and tolerance stacking. The design drawings were then sent out to be manufactured. Once the prototypes were received by the team, design verification tests were conducted.

...The American Hydromech Student Design Team



Mr. Droste



Prof. Müller

These filters have proven to be a significant benefit to the machine owner/user; they extend service intervals, increase machine useful life by wear rate reduction, and reduce the toxic waste load to the environment. The most effective way to accelerate market penetration is to make these components more attractive to end users. This team has simplified and reduced the installed cost, and provided short term visual demonstration of the filter effectiveness at providing long term benefit.

Timothy Droste
American Hydromech

Project Sponsor

**AMERICAN
HYDROMECH**
Howell, Michigan

Professional Advisor

Mr. Timothy Droste, PE

Faculty Advisor

Prof. Norbert Müller

Team Members and Home Towns

Ryan Blake
Petoskey, Michigan

Bryant Ennis
Anchorage, Alaska

Andrea Vivian
Detroit, Michigan

Matt Wolf
Lansing, Michigan

BBI-PETSTAR: PETSTAR/PETNET (PET SAFETY/ CONVENIENCE CENTER)

BBi – PetStar is addressing the safety of vehicle occupants as well as the safety of the family pet with the PetStar/PetNet Pet Safety/Convenience Center. The purpose of the Pet Safety/Convenience Center is to provide a safe environment for the family pet while also providing the owner and pet conveniences of food, toy, and accessory containers.

Most pet safety devices require physically restraining the animal in the back or front seat, allowing for multiple distractions. AAA ranks “attending to pets” as the #3 cause of driver distraction-related accidents. In comparison, accidents caused from cell phone use rank sixth. The project entailed creating a zone in the cargo area of SUVs and Crossovers that minimizes pet injury from car accidents, creates a comfortable environment for the animal, and eliminates the need to attend to a pet while driving.

To complete this project, animal injury data were collected, different methods of impact attenuation were addressed, and currently available SUVs and Crossovers were analyzed in order to make the pet safety center adaptable to any model SUV or crossover. Impact simulations for energy absorption, material deflection, and stress were carried out for model projections. Packaging for animal safety, cost, and aesthetics were other main design concerns when designing for OEM fit.

...The BBi-PetStar/PetNet Student Design Team



Mr. Parkin



Prof. Averill



Mr. Adams

This Pet Safety/Convenience Center is an opportunity for BBi to design, develop, and market an OEM-styled accessory system that addresses a quantified consumer demand for a safe and convenient environment for the traveling pet. Successfully launching this product will differentiate BBi from its competitors by being first to market with a unique “one of a kind” automotive Pet Safety/Convenience Center. This differentiation will afford BBi increased sales, revenue, workforce hiring, and brand recognition.

Project Sponsor

Bbi - PetStar
Bloomfield Hills,
Michigan

Professional Advisors

Mr. Tim Parkin
Mr. Bob Adams

Faculty Advisor

Prof. Ron Averill

Team Members and Home Towns

Josh Davis
Flat Rock, Michigan

Joshua Heyden
Las Vegas, Nevada

Daniel Masterson
Dewitt, Michigan

Scott Williams
Grand Rapids, Michigan

A SHELL OIL COMPANY CHILDREN'S HUMANITARIAN PROJECT: AN ADAPTIVE ERRAND/UTILITY CART FOR HEARTWOOD SCHOOL

Hearthwood School was founded in 1978 with the purpose of providing a quality education for all students regardless of their cognitive or physical limitations. Reserved for students aged 2 to 26 years, the Ingham Intermediate School provides enrollees a curriculum centered around academics, personal care, communication, mobility, domestic activities, and finally community involvement.

Due to the push toward the Mobility Opportunities Via Education (MOVE) program, which is designed to help children and adults with disabilities acquire increased independence in sitting, standing, and walking, there is a motivation for students to help with chores. Currently, Heartwood School is using a generic utility cart strapped to the mobility devices by a strip of Velcro. This cart is not only too large in size but becomes very cumbersome, and because of this, only the larger students or those who are in power chairs are able to assist with any type of chore. This constraint lowers the motivation behind the MOVE program for a majority of the students. The issue has created the desire for a much more adaptable cart to be used by the students of Heartwood School and also an opportunity for the Heartwood School Student Design Team.

The objective was to design and construct a new device that can be used by the students to safely transport small items, such as two lunch trays. The successful completion of this project would improve the quality of the MOVE initiative and, in turn, the personal health and dignity of the students. After thorough modeling and analysis, the optimal design was chosen and pursued.

...The Heartwood School Student Design Team



Ms. O'Brien



Prof. Liu

This project will enhance the educational day of physically impaired students. Increased abilities to functionally mobilize decreases the burden of care for families and other care providers. These increased abilities also bring new opportunities for fuller participation and involvement in family life, school life, integration, and inclusion in the wider community. Additionally, students enjoy the interactions and increased communication with others while on their errands.

Marcia O'Brien
Principal
Heartwood School

Project Sponsor

Heartwood School
Mason, Michigan

Professional Advisor

Ms. Marcia O'Brien

Faculty Advisor

Prof. Dahsin Liu

Team Members and Home Towns

Allison Freeman
DeWitt, Michigan

Steve Griffith
Grosse Pointe, Michigan

Greg Pelkie
Terre Haute, Indiana

Andrea Turkiewicz
Clinton Twp., Michigan

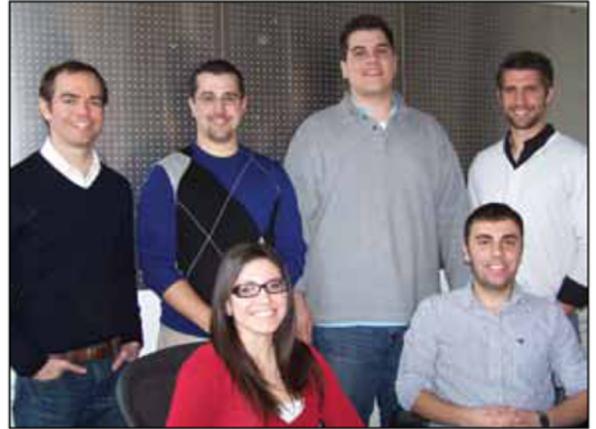
BLUE SKY CHICAGO: AUTOMATED DISTRIBUTION SYSTEM (GREEN TEAM)

Blue Sky Chicago is a marketing consulting firm based in Chicago, Illinois. During the last 5 years, Blue Sky Chicago has carved out a business niche by delivering simple yet unconventional solutions to marketing challenges posed by manufacturers of consumer packaged goods.

The company's clients spend a lot on marketing and Blue Sky Chicago's mission is to improve their return on investment. Every solution conceived must be able to show a direct link between the marketing program and an increase in sales. This often requires Blue Sky Chicago to rethink how traditional marketing programs are executed.

The company's next endeavor goes beyond conventional marketing services and incorporates information technology, engineering and manufacturing. Two Capstone Design student teams were chosen to lead the refinement of Blue Sky Chicago's proof-of-concept prototype. The goal for both teams is to create a prototype that reliably distributes a wide variety of small bags, with a touch of a button, while retaining the integrity of the bags within a confined space.

...The Blue Sky Chicago Student Design Green Team



Mr. Eichorn



Prof. Lee



Mr. Koenigsknecht

The results of this project will have significant impact and benefit to Blue Sky Chicago's continued success in the food marketing services industry. The system designed by this MSU team will be used for partnering discussions with retail and manufacturing companies in the next six months leading up to a 10-store market test targeted for late 2009.

Matt Eichorn
Blue Sky Chicago

Project Sponsor
Blue Sky Chicago
Chicago, Illinois

Professional Advisors
Mr. Matt Eichorn
Mr. Tony Koenigsknecht

Faculty Advisor
Prof. Tonghun Lee

Team Members and Home Towns
Lisa Chapman
White Lake, Michigan

Zef Ivanovic
Sterling Heights,
Michigan

Chris Miller
Auburn, Michigan

Fadi Yousif
Troy, Michigan

HDR|CUMMINS & BARNARD (HDR|CB) / ALCOA: MERCURY REMOVAL TECHNOLOGY ASSESSMENT

Alcoa is the world's leading manufacturer of primary alumina, aluminum, and fabricated aluminum products and is active in all major aspects of the industry including power generation. HDR|CB is responsible for the engineering services on power generating facilities within HDR and has offices located in both Ann Arbor and Chicago. HDR|CB supports Alcoa with a variety of strategic consulting and engineering design activities.

The Alcoa Warrick Power Plant, which produces 742 MW, supplies all power to Alcoa's aluminum smelting and fabricating facilities near Evansville, IN. It is a coal-fired power plant using bituminous coal from the Illinois Basin. It produces aluminum sheets primarily used for beverages and food. Can ends and tabs are made along with other flat-rolled aluminum products. The Warrick plant has a very strong advantage over its competitors in that it generates all of the power required for all of its aluminum production at that one location. This advantage comes mainly in the form of cost savings as the power needed for production is not purchased from an outside source.

Coal-fired electrical generating facilities are the largest man-made source of mercury emissions, accounting for an estimated 40% of the national total. Mercury emissions are a major environmental hazard and public health concern, resulting mainly from the consumption of fish living in contaminated water sources.

The goal of the student design team was to help research new and existing mercury reduction technologies in conjunction with HDR|CB for Alcoa's Warrick Plant. At the end of the project, the team provided a recommendation based on design parameters relating to the Warrick Power Plant. These parameters included cost, availability, regulations, and spatial constraints. Anticipated future governmental mercury regulations were the basis behind this project, and it was important that the final recommendation provide the power plant with at least an overall mercury reduction of 90%.

...The HDR|CB and Alcoa Student Design Team



Mr. Mutschler

MSU students will assist HDR|CB in an actual environmental betterment assessment to identify, evaluate and recommend a mercury removal technology which WPP could implement to achieve its future environmental objectives. The potential design, procurement and implementation of the recommended equipment will be subject to further HDR|CB and WPP review subsequent to the completion of this Capstone Design Project.

Dan Mutschler
HDR|CB



Prof. Pourboghra

Project Sponsors

HDR|CB
Ann Arbor, Michigan

Alcoa
Newburgh, Indiana

Professional

Advisors
Mr. Ben Dreher
Mr. Dan Mutschler
Mrs. Laurie Thering

Faculty Advisor

Prof. Farhang
Pourboghra

Team Members and Home Towns

Imoh Eno-Idom
Okemos, Michigan

Luan Huynh
Lansing, Michigan

Gregory Moy
Des Plaines, Illinois

Derek Riparip
Troy, Michigan

PHOENIX COMPOSITE SOLUTIONS, LLC: LOW COST WIND TURBINE

Phoenix Composite Solutions, LLC is a company that repairs aerospace, composite parts to better-than-new condition and produces original equipment for aerospace and other industries. Located in Oscoda, Michigan, their specialty is composite work, but they also anodize aluminum inserts and have one of the largest autoclaves in the region.

The purpose of this project was to design and prototype a low-cost 5- to 10-kilowatt wind turbine. This turbine size can produce enough electricity to power a residence or a small business. Our three-blade, horizontal-axis, wind turbine also aids in the effort to reduce fossil fuel consumption by producing clean, renewable energy. Since Phoenix Composite Solutions produces its own tools for the manufacturing of composite components, the cost of the prototype was reduced dramatically compared to other small wind turbines.

The project team's goal was to design the various components through research, mathematical modeling, and mechanical analysis. Examples included blade design, using Blade Element Momentum (BEM) theory, and hub integrity evaluation, using FEA stress analysis. The biggest challenges were producing a safe, working prototype at the best possible value.

...The Phoenix Composite Solutions Student Design Team



Mr. Glomski



Mr. Phillips



Mr. Scanlon



Prof. Kwon

Our company plan is to diversify into medical, nuclear and alternative energy industries. We already have production projects in the medical and nuclear industries and now desire to penetrate alternative energy with a low-cost wind turbine that will be sold directly from our factory. The wind turbine will be sized to provide supplemental power to a house or small business. This new product will allow us to make a small contribution to reduction of our country's dependence on fossil fuels and foreign oil-producing countries. At the same time our company will be able to hire new employees in an area of Michigan that has an extremely high unemployment rate. Large company profits are not a goal of this project. Our goal will be to generate enough profit to cover liability risk.

John Scanlon
President
Phoenix Composite Solutions

Project Sponsor
Phoenix Composite Solutions, LLC
Oscoda, Michigan

Professional Advisors
Jeremy Glomski
Scott Phillips
John Scanlon

Faculty Advisor
Prof. Patrick Kwon

Team Members and Home Towns
Jeff Elberling
Livonia, Michigan

Kyle Elliot
Waterford, Michigan

Lauren Heitzer
Troy, Michigan

Brian Steffes
Ortonville, Michigan

John Tysman
Kalamazoo, Michigan



MOTOROLA: SENSORY WIRELESS ALERT DEVICE

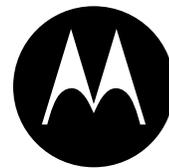
Motorola is a global communications leader that has been at the forefront of communication inventions and innovations for the past 80 years. With global headquarters based in Schaumburg, Illinois, Motorola employs approximately 66,000 people worldwide. It provides technologies, solutions, and services that make mobile experiences possible. Its products include cellular phones, wireless accessories, and digital entertainment devices. The spirit of invention is what drives Motorola's success.

With the rapid technological convergence of cellular phones, computers, and MP3 devices in today's market, there is a growing consumer demand for the next generation mobile phone. With the high popularity of Bluetooth headsets, Motorola is exploring new unique concepts to design and integrate Bluetooth technology into a sensory alert device, a product that will be completely different than any mobile cellular accessory that is currently on the market.

The goal of this project was to design a device to silently alert a segment of mobile device users to incoming calls when they do not have their phone on their person and do not want to use a loud ring tone. Use cases include quiet environments such as a business meeting or classroom; or a noisy environment, for example, a train commute.

Emphasis was placed on uniqueness, and this project fits into Motorola's mindset by breaking through preconceived design barriers and exploring new ideas and innovations concerning mobile devices.

...The Motorola Student Design Team



MOTOROLA



Mr. Wojack

The development of a Sensory Wireless Alert Device aligns with Motorola's ambition to develop compelling mobile devices and accessories that allow consumers to be more productive. The goal of this project is to create a new paradigm for a wireless alert device.

Jason Wojack
Principal Staff Mechanical Engineer
Motorola



Prof. Patterson

Project Sponsor
Motorola
Libertyville, Illinois

Professional Advisor
Mr. Jason Wojack

Faculty Advisor
Prof. Eann Patterson

Team Members and Home Towns
Daniel Barlach
Troy, Michigan

Matthew Berger
Williamston, Michigan

Sara Murawa
Hartford, Michigan

Beverly Starrak
Lansing, Michigan

THE MOTOROLA FOUNDATION YOUTH IN ENERGY AND ENVIRONMENT HUMANITARIAN PROJECT: WIND POWER DEMONSTRATOR FOR WOODCREEK ELEMENTARY

Woodcreek Elementary is a magnet school in the Lansing school district, which focuses its curriculum around math, science, and engineering and is recognized as the first “Official Michigan Green School.” Woodcreek Elementary educates kindergarten through fifth grade students and exposes these students to hands-on, real-world projects that allow the students to be creative and explore renewable energy sources such as wind power. With growing concerns of greenhouse emissions and global warming, this project exposes the students to a major political issue that will be very important in their lifetime. This project also provides an educational tool that will be capable of teaching current and future Woodcreek students about the potential of wind energy.



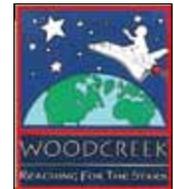
In the past presidential election, renewable energy sources were a widely debated topic, and it has been recognized that the depletion of natural resources and consumption of fossil fuels by countries around the world must change. The implementation of alternative energy through renewable sources will allow our growing society to spare our natural resources and minimize greenhouse emissions. Renewable energy sources include, but are not limited to, wind, solar, ocean, hydroelectric, and geothermal heat, which are current applications that emit little to zero emissions and have minimal negative environmental effects.

The Michigan State University Student Design Team had the opportunity to teach fifth grade students at Woodcreek Elementary lessons on engineering design processes, basics of energy, and the capabilities of wind power. With the class’ support, the MSU design team was able to construct a wind power demonstrator. This allowed the Woodcreek students to gain an understanding of the design process from day one until the final product was completed. The project was monetarily supported by the Motorola Foundation through its Youth in Energy and Environment Humanitarian Project. The main goal of this foundation is to inspire young students to expand their interests in math, science, and problem solving by involving the students in crucial global concerns that will impact their futures.

...The Motorola Foundation and Woodcreek Elementary School Student Design Team



MOTOROLA



Ms. Graham



Ms. Raymer



Prof. Somerton

Keeping our staff and students informed, updated and knowledgeable on current issues in our environment is challenging. The Wind Power Demonstrator will be used to teach and pique student interest in the field of alternative energy. It is designed to increase understanding of the dynamics of harnessing wind energy and using it in place of energy sources that pollute and are of limited supply. Our 5th grade students learned current and important environmental facts and also benefited by actually being a part of the “design process.” Participating along with ‘real’ engineers to problem-solve environmental issues has empowered our students. The Wind Power Demonstrator will serve to educate many other students and adults in an engaging and interactive way.

Diane Graham
Woodcreek Elementary School

Project Sponsors
Woodcreek Elementary School
Lansing, Michigan

Motorola Foundation
Schaumburg, Illinois

Professional Advisors
Ms. Diane Graham
Ms. Sandy Raymer

Faculty Advisor
Prof. Craig Somerton

Team Members and Home Towns
Brent Augustine
Rockford, Michigan

Christopher Gandy
Kalamazoo, Michigan

Ryan Kelly
Dewitt, Michigan

Marcus Peters
Republic of Trinidad and Tobago



THE SOMERTON FAMILY TRUST HUMANITARIAN PROJECT FOR DEVELOPING COUNTRIES: A VACCINE REFRIGERATOR FOR REMOTE REGIONS WITH THE APPROPRIATE TECHNOLOGY DESIGN COLLABORATIVE

Many of the vaccines used to control diseases require cold temperatures for preservation. Without a reliable power infrastructure, developing countries often lack the resources to keep these vaccines cool for an extended time period, hampering the ability to adequately protect citizens. It is estimated that 50 percent of vaccines in rural areas are wasted due to spoilage.

The Appropriate Technology Collaborative Student Design Team has been charged with the task of developing a refrigerator to solve this problem. Design specifications called for an adsorption refrigerator capable of maintaining a temperature between 2°C and 8°C that utilizes passive solar energy and can be built in developing countries. As the second team of a two-semester project, the students were given the tasks to create a design that was easily and affordably constructed and to build two prototypes.

During a 13-day trip to Guatemala, the team built the refrigerator with locally-available materials and tested it in a real-world scenario. The team's final product is a clear and comprehensive set of instructions for building the device distributed freely online.

...*The Appropriate Technology Design Collaborative Student Design Team*



The Appropriate Technology Design Collaborative



Mr. Barrie

This project will help people who live without power in the poorest communities on earth to have access to lifesaving vaccines and medical supplies. Farmers will be able to transport their produce to more distant markets which will increase their capacity to make money and for communities to feed themselves.

John Barrie
Executive Director
The Appropriate Technology Design Collaborative



Prof. Somerton

Project Sponsor
The Appropriate Technology Design Collaborative
Ann Arbor, Michigan

Professional Advisor
Mr. John Barrie

Faculty Advisor
Prof. Craig Somerton

Team Members and Home Towns
Nabeel Aslam
Rochester Hills, Michigan

Kevin McPhail
Carleton, Michigan

Ryan McPhee
Cheboygan, Michigan

Brent Rowland
Greenville, Michigan

Eric Tingwall
Novi, Michigan

A world leader in automotive parts and accessories

Delphi designs, engineers and manufactures a wide variety of components, integrated systems and modules on a worldwide basis. As the largest and most diversified supplier of automotive parts, Delphi can provide our vehicle manufacturer customers with global, single-point sourcing capability and systems tailored to meet their specific needs.



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DELPHI | Brake Systems
Automotive Holdings Group



Tower

10:00 –11:15
Third Floor
Tower Room

MECHANICAL ENGINEERING PROJECTS

PRESENTATION SCHEDULE —Lake Superior Room

Course Coordinator: Professor Craig W. Somerton

Faculty Advisors: Professors Restivo, Wichman

Time	Project Sponsor(s)	Sponsor Contact(s)	Faculty Advisor	Project Title
9:40–10:00 Break				
10:00 ME 481	URBANcart	R. Reynolds M. Gruender	I. Wichman	Urban Shopping Cart
10:25 ME 481	Louis Padnos Iron and Metal Company	M. Przekadzinski	G. Restivo	Gaylord Box Rotator for Hilo Rollover System
10:50 ME 481	Louis Padnos Iron and Metal Company	B. Herweyer	G. Restivo	Copper Wire Removal System

RENEE REYNOLDS AND MICHELLE GRUENDER: URBAN SHOPPING CART

The goal of this project is to meet the needs of urban shoppers by designing and building a quality personal shopping cart. Urban grocery shopping is unique because shoppers can only purchase what they are capable of carrying down the street. There are several products on the market that city dwellers can use to transport groceries; however, no product has been created specifically with this task in mind. Available designs are lacking in quality and design. For example, the wheel selection is one that will not allow for rolling over cracks or holes in the sidewalk, as well as the ability to get up stairs and over curbs. Others lack the volume necessary for a weekly grocery load for a family of four.

A successful design for an urban cart that has marketing potential has many requirements. The most important is quality. The cart must be robust and must be easy and comfortable to use. It must be able to withstand the weight of the groceries while smoothly rolling over small cracks and potholes. Since storage is hard to come by, it must collapse into something that is small and easy to carry. We feel that the quality and thoughtfulness of our design will set it apart from other available products.

To complete this project, similar items were investigated and initial ideas were proposed. From here we refined the many ideas, both structurally and functionally, until a final design was agreed upon by the group and project sponsors. Material selection and structural integrity were carefully studied and data were gathered. Average grocery volumes, typical items and total weights were all studied. Understanding the operating conditions and urban environments was critical.

...*The Urban Shopping Cart Student Design Team*



Ms. Reynolds



Prof. Wichman

This product is being developed by an individual for better shopping experience and possible for mass marketing.

Renee Reynolds

Project Sponsor
Urban Shopping Cart Team

New York, New York

Professional Advisors

Ms. Michelle Gruender
Ms. Renee Reynolds

Faculty Advisor
Prof. Indrek Wichman

Team Members and Home Towns

Adam Alderman
Midland, Michigan

Logan Beam
Plymouth, Michigan

David Cain
Novi, Michigan

Mike Maurer
Novi, Michigan



Ms. Gruender

LOUIS PADNOS IRON & METAL CO: GAYLORD BOX ROTATOR FOR HILO ROLLOVER SYSTEM

Louis Padnos Iron & Metal Company is a network of scrap material management facilities serving the Western Michigan area. It has been a leader in metal recycling for nearly 100 years and has expanded to include paper and plastic to meet an ever increasing demand for earth friendly products.

Louis Padnos Iron & Metal Company receives and stores a majority of its scrap materials in Gaylord boxes on standard pallets. In order to process the material, it must be dumped out of the box onto conveyors or into hoppers. Forklift trucks are used to lift and rotate the boxes, emptying their contents. The problem was that the boxes fell off the pallets with the scrap material and then had to be retrieved by hand to continue processing.

The goal of this project was to develop an attachment for the forklift that would hold the box securely in place while dumping its contents. This device will allow one operator to quickly and easily perform the emptying task. To be an effective attachment it had to be compact to maintain maneuverability of the forklift. It also had to be retractable to allow for general forklift use without removal of the device.

In order to complete the goal, existing designs were considered and analyzed. Stress calculations and finite element analysis were performed on several design options. Based on those results, the most promising design was chosen. A prototype was then manufactured and tested experimentally to validate the design.

...The Louis Padnos Student Design Team



Mr. Przekadzinski

“Gaylord Box Rotator attachment will be used to handle plastic, paper and metal scrap. Rotator attachment will allow hi-lo operator to empty the contents of the box safely and quickly, while remaining in the hi-lo. This will streamline our operation and greatly improve efficiency.”

Martin Przekadzinski
Louis Padnos Iron & Metal Company



Prof. Restivo

Project Sponsor
Louis Padnos Iron and Metal Company
Holland, Michigan

Professional Advisor
Mr. Martin Przekadzinski

Faculty Advisor
Prof. Gaetano Restivo

Team Members and Home Towns
Anthony Carlo
Wilson, New York

Tyler Grab
Grand Rapids, Michigan

Peter Mott
Grand Blanc, Michigan

Adam Smith
Rochester Hills, Michigan

LOUIS PADNOS IRON & METAL CO: COPPER WIRE REMOVAL SYSTEM

Louis Padnos Iron & Metal Company has been an industry leader in recycling for over 100 years. Founded and located in Holland, Michigan, Padnos is committed to improving our planet by reducing waste in the form of paper, plastics, metals and more. Items commonly recycled by Padnos include automobiles, household appliances, post-industrial metals, paper and plastics.

Recycled automobiles contain a large source of ferrous metals, aluminum, and stainless steel. After an initial shredding process, the ferrous materials of scrap are magnetically separated. The remaining scrap is then sorted by size, and an eddy current system is used to filter out stainless steel and aluminum. The remaining waste stream contains various types and sizes of foam, plastic, wood and copper wire.

The goal of this project was to develop a machine that can effectively separate various lengths of copper wire from a stream of nonmetal scrap. Constraints of performance, energy use, and safety were considered during the development process of the machine. This mechanism was designed to allow for a larger percentage of incoming material to be recycled and to expand the current range of items that Padnos can recycle.

The design effort required the analysis of current processing rates at the Grandville location of Padnos, copper content in the waste stream, and the potential economic and environmental losses due to the copper that is currently being landfilled. Samples were collected from the site and tested on prototypes fabricated in the MSU machine shop. The final design was then analyzed to determine feasibility and to predict benefits for the Louis Padnos Iron & Metal Company.

...The Louis Padnos Iron & Metal Company Student Design Team



Mr. Herweyer



Prof. Restivo

The present system includes an eddy current separator and diverter sorting system. A rotary screen is used to size the auto shredder residue stream before its introduced to the eddy currents and diverter sorting system. This sizing will help both machines perform more efficiently. The final waste stream still contains a small amount of plastic coated copper wires. The purpose of this project is to design a system to remove small copper wires from our residue stream. Our expectation would be to create a small working model; from that we would build a full-size system that would operate in line on our current system. The recovery of this copper will help generate a new income source and reduce landfill waste.

Bob Herweyer
IXL Machine Shop Supervisor
Louis Padnos Iron & Metal Company

Project Sponsor
Louis Padnos Iron and Metal Company
Holland, Michigan

Professional Advisor
Mr. Bob Herweyer

Faculty Advisor
Prof. Gaetano Restivo

Team Members and Home Towns
Jenilkumar Bhanvadia
Rajkot, India

Kayton Lenhart
Dorr, Michigan

Arun Mahapatra
Saline, Michigan

Anwelli Okpue
Port Harcourt, Nigeria

Design Day Awards:

MICHIGAN STATE COLLEGE OF ENGINEERING

Computer Science and Engineering Awards

CSE 498, Collaborative Design, is the senior capstone course for students majoring in computer science. Teams of students design, develop, and deliver a significant software system for corporate clients. The CSE capstone teams compete for four prestigious awards. The winners are selected on Design Day by a panel of distinguished judges.

Auto-Owners Insurance Exposition Award



CSE 498 capstone teams present their projects on Design Day in a variety of ways. Teams create and set up an exhibit where they demonstrate their software systems and answer questions to Design Day attendees. Each team plays their project videos and answers questions for a panel of judges.

The CSE capstone team with the best overall Design Day performance is honored with the Auto-Owners Insurance Exposition Award, which is sponsored by Auto-Owners Insurance Company of Lansing, Michigan.

Team 1. Auto-Owners Insurance
Recruiting Contacts and Events System



Tom Randall, Jonathan Lindsey, Ashleigh New, Michael Korynski
Presented by Scott Lake and Bob Buchanan of Auto-Owners Insurance
December 2008

Chrysler Praxis Award



One of the hallmarks of CSE 498 capstone projects is that of praxis, the process of putting theoretical knowledge into practice. Teams apply a wide variety of information technologies to produce solutions to complex problems in areas such as business, engineering, computing, and science.

The CSE capstone team that engineers the software system that is the most technically challenging is recognized with the Chrysler Praxis Award, which is sponsored by Chrysler LLC of Auburn Hills, Michigan.

Team 7. TechSmith
Cloud Powered Media Searching



Caitlin Nelson, Scott Lamparski, Derek Gebhard
Presented by Paul Van Hese of Chrysler
December 2008

Design Day Awards:

MICHIGAN STATE COLLEGE OF ENGINEERING

Computer Science and Engineering Awards

May 2009 Design Day Judges

Lisa Byington
WLNS TV

Naim Falandino
Covisint

Brian Loomis
Microsoft

Kevin Ohl
Crowe Horwath LLP

Karen Wrobel
Chrysler LLC

Richard Enbody
Michigan State University

Louise Hemond Wilson
IBM

Brian Niemiec
Sircon

Marty Strickler
Rose Packing

Crowe Horwath Sigma Award



The CSE 498 experience represents the capstone of the educational career of each computer science major. An intense semester of teamwork produces impressive deliverables that include a formal technical specification, software, documentation, user manuals, a video, a team web site, and Design Day participation. The resulting sum, the capstone experience, is much greater than the parts.

The capstone team that delivers the best overall capstone experience is recognized with the Crowe Horwath Sigma Award, which is sponsored by Crowe Horwath LLP of Oak Brook, Illinois.

Team 4. Ford
Ford Test Drive



Taylor Rice, Jeffrey Ignatius, Ryan Wagoner, Ronald Rodrigues
Presented by Kevin Ohl of Crowe Horwath
December 2008

TechSmith Screencast Award



Each CSE 498 capstone team produces a video that describes and demonstrates its software product. Starting with a storyboard and a script, teams use Camtasia Studio 5 to synthesize screen recordings, video, audio and other multimedia to produce their project videos.

And the TechSmith Screencast Award goes to...the CSE capstone team with the best project video. The award is sponsored by the creators of Camtasia Studio, TechSmith of Okemos, Michigan.

Team 8. Toro
GolfVision Interface for Turf Guard



Brett Lesnau, Jacob Denzer, Brian Walsh, Eric Jensen
Presented by Dean Craven of TechSmith
December 2008

Design Day Awards:

MICHIGAN STATE COLLEGE OF ENGINEERING

Mechanical Engineering: Thomas Alva Edison Undergraduate Design Award

The Edison Scholars are recognized as the ME 481 Design Team that has produced the most outstanding project. A jury of experts from industry and academia evaluate the final reports, the posters, and the final oral presentations in determining the award winners. Teams operating under ME 481 that include members from other departments and colleges are also eligible for this award. The funding for this award is provided by the Shell Oil Company.



l-r: Alexander Wright, Johannes Hertrich, Nicole Arnold

FALL 2008 ME 481 EDISON UNDERGRADUATE DESIGN AWARDS

First Place

Motorola: Keypad-Enabled Product Design for a Mobile Device
Nicole Arnold
Johannes Hertich
Alexander Wright

Second Place

General Motors: LED Light Pipe Reuse Strategy
Christopher Erwin
Drew Mosner
Neal Spitzley
Richard Wahl

Third Place

MSU Kellogg Biological Station: Alternative Power System for the KBS Dairy Farm Extension
Justin Bauer
Emily Duszynski
Daejung Kim
Keith Tenbusch

ME 481 Oral Presentation Award

The best ME 481 oral presentation as determined by the ME 481 students is recognized with this award.



l-r: Lauren Sharp, Jacob Kloss, Christopher Sweeney

FALL 2008 ME 481 ORAL PRESENTATION AWARDS

First Place

The Dow Chemical Company: Novel Part Design Replacing Fiberglass with TPO
Jacob Kloss
Lauren Sharp
Christopher Sweeney

Second Place

Terex-Demag: Wheel Module Development for All-Terrain Crane
Andrew Gryczan
Richard Hollern
Johnathan Luckhardt

Third Place

General Motors: LED Light Pipe Reuse Strategy
Christopher Erwin
Drew Mosner
Neal Spitzley
Richard Wahl

ME 481 Outstanding Poster Award

The ME 481 Outstanding Poster Award recognizes the best poster presented by an ME 481 design project team as judged by a team of individuals from industry and academia. Judging is based on both technical content and aesthetic layout.



l-r: Luis Goncalves, Kevin Derrick, Patrick Hammer

FALL 2008 ME 481 POSTER PRESENTATION AWARD

First Place

A Shell Oil Company Children's Humanitarian Project: A School Supplies Carrier for McKenzie Robins
Kevin Derrick
Luis Goncalves
Patrick Hammer

Second Place

MSU Kellogg Biological Station: Alternative Energy Power System for the KBS Dairy Farm Expansion
Justin Bauer
Emily Duszynski
Daejung Kim
Keith Tenbusch

Third Place

Motorola: Keypad-Enabled Product Design for a Mobile Device
Nicole Arnold
Johannes Hertich
Alexander Wright

Design Day Awards:

MICHIGAN STATE COLLEGE OF ENGINEERING

Leonardo daVinci Scholars

The student team members winning the ME471 competition at Design Day are recognized as Leonardo DaVinci Scholars. The award winners are determined by the course instructors based on team scoring in the competition. The funding for this award is provided by the Shell Oil Company.

ME 412 Heat Transfer Laboratory Heat Transfer Design Award

The student team members winning the ME 412 competition at Design Day are recognized by the Heat Transfer Design Award. The award winners are determined by the course instructor based on team scoring in the competition.



l-r : Dr. Genik, Richard Wahl, Adam Alderman, Adam Smith

FALL 2008 ME 412 HEAT TRANSFER DESIGN AWARD

First Place

Adam Alderman
Adam Smith
Richard Wahl

Second Place

Justin Bauer
Anthony Carlo
Emily Duszynski
Tyler Grab

Third Place

Jeffery Elberling
Kyle Elliot
Brian Steffes

ME 371 Mechanical Design I Kids' Choice Award

The pre-college students participating in Design Day vote for the most outstanding ME 371 project. The winning team is designated as the Kids' Choice Award. This team is recognized with a plaque designed and manufactured by Mr. Jon Thon's 7th grade technology class at Holt Junior High School.



l-r : Eric Tauzer, David Schrock, Michael Douglass, Joao Paulo Goncalves

FALL 2008 ME 371 KIDS' CHOICE AWARD

First Place

Michael Douglass
Joao Goncalves
David Schrock
Eric Tauzer

Second Place

Brandon Kelly
John Stukel
Samuel Tkac
Jeremy Zalud

Third Place

Stephanie Bonner
Nathaniel Davis
Michael Karoub
Eric McElmurry

EGR 100 Outstanding Prototype and Poster Award

The EGR 100 Outstanding Poster and Prototype Award recognizes the best project presented by an EGR 100 design team as judged by area middle and high school students.

FALL 2008 EGR 100 OUTSTANDING PROTOTYPE AND POSTER AWARDS

First Place

Benjamin Ambrose
Kasra Dabiran
Kristen Miller
Vanessa Stuart

Second Place

Anas Aldasouqi
Timothy Belcher
William Juszczuk
Evan Kelly

Third Place

Marc Benjamin
Anthony Hang
Bradley Perry
Jeremiah Powers
Russell Tindall

Design Day Awards:

MICHIGAN STATE COLLEGE OF ENGINEERING

Electrical and Computer Engineering Prism VentureWorks Prize and Winners, Fall 2008

The Prism VentureWorks Prizes (\$1,500, \$1,000, and \$500, respectively) are awarded each semester to the most outstanding teams in the Electrical and Computer Engineering Senior Capstone Design Course, as judged by a panel of engineers from industry. A team with members from both ECE and another engineering major (mechanical engineering, for example) is also eligible, if the team's project is administered through ECE 480. The prizes are sponsored by Prism VentureWorks, a Boston-based venture capital firm, and Mr. William Seifert, an ECE alumnus, who is a partner in that firm. The faculty and students of Electrical and Computer Engineering are very grateful for this generous support.

First Place: Team #4 – Inexpensive Radar for Through-Object Viewing (Sponsor: Naval Research Lab)



LEFT TO RIGHT:
Michael Weingarten, Ali Aqel, Garrett Warnell, Scott Warren,
Michael Volz, Dr. Erik Goodman

Second Place: Team #3 – Quasi-Motion Ship Simulator (Sponsor: PI Engineering)



LEFT TO RIGHT:
Dr. Erik Goodman, Justin King, Rebecca Wahmhoff,
Mark Rogers, Bryan Witherspoon, Michael Priebe,
Daniel Raphael, Ryan Boak, Doug Gobeski

Third Place: Team #2 – Solar-Powered, Multi-User Internet Access for Schools in Developing Nations (Sponsor: Lenovo Corporation)



LEFT TO RIGHT:
Dr. Erik Goodman, Benjamin Kershner, Joshua Wong,
Eric Tarkleson, Jakub Mazur

Design Day Awards:

MICHIGAN STATE COLLEGE OF ENGINEERING

Professor's Choice Award and Winner, Fall 2008

The Professor's Choice Award (\$1,000 and a certificate) is given each semester by the faculty member teaching ECE 480, Senior Capstone Design, to the team judged to have done the most to achieve the objectives of the course and sponsor, particularly taking into account the varying levels of challenge of the projects assigned. Judging is based on reading of the teams' final reports, examination of their posters/prototypes, and communication with their faculty facilitators.

Team #7 - Automated Trace Gas Trapping System (Sponsor: Biogeochemistry Environmental Research Initiative)



LEFT TO RIGHT:
Alex Esbrook, Thomas Hancasky,
Daniel Cashen, Adam Grisdale,
Josh Kowalski, Chris Gliniecki,
Alex Kerstien, Dr. Erik Goodman

Electrical and Computer Engineering Capstone Poster Award and Winner, Fall 2008

Each team in ECE 480, Senior Capstone Design, exhibits a poster and the items they have built during the semester and answers questions, from 8:00am-noon in the Union Ballroom. Judging of the best poster/demo is done by the groups of high school students participating in Design Day, based on their appeal and effectiveness in communicating the project goals and achievements. A prize of \$1000 is awarded to the most outstanding team.

Team # 2 - Solar-Powered, Multi-User Internet Access for Schools in Developing Nations (Sponsor: Lenovo Corporation)



LEFT TO RIGHT:
Dr. Erik Goodman, Benjamin Kershner, Joshua Wong,
Eric Tarkleson, Jakub Mazur

Civil Engineering Senior Design Award

The Civil Engineering Senior Design Award (\$600 and plaques) is presented to the best team in CE 495 as judged by the faculty and a panel of practicing engineers.

Each student participates on a team which, as a collective unit, is responsible for preparing a project design. Individual student's responsibilities within the team are focused on one of the following technical-specialty areas: environmental, geotechnical, hydrological, pavements, transportation, or structures. Each student is responsible for preparation of a technical report. Midway through the semester, each student meets one-on-one with a practicing professional engineer to summarize his/her progress. The final technical reports are judged by faculty and the oral presentations of each team's overall design are judged by a board of six professional engineers.

The faculty and students of the Department of Civil and Environmental Engineering gratefully acknowledge the generous contributions from Fishbeck, Thompson, Carr & Huber, Inc. (FTC&H) and from Barr Engineering Co. These companies currently make this award possible. FTC&H is a professional civil engineering, environmental consulting, architectural/engineering, and construction management firm with clients in Michigan and throughout the nation. Barr is a professional engineering company providing engineering, environmental, and information technology services to clients across the nation and around the world.





*The Dart Foundation Day
7th-12th Grade Students*

Friday May 1st, 2009

**MIDDLE SCHOOL
EVENTS
SCHEDULE**

	Future Fuels Presentation	NXT Robotics	Digital Thermometer Build	Voting
	Parlor C	Green Room	Parlor B 2nd Floor	2nd Floor
9:00-9:40 a.m.	Middle School 3 Middle School 4	Middle School 1 Middle School 2		
9:45-10:25 a.m.		Middle School 3 Middle School 4	Middle School 1 Middle School 2	
10:30-11:10 a.m.			Middle School 3 Middle School 4	Middle School 1 Middle School 2
11:15 a.m.- Noon	Middle School 1 Middle School 2			Middle School 3 Middle School 4

2nd Floor, Parlor B

**WIRELESS INTEGRATED MICROSYSTEMS (WIMS)
DIGITAL THERMOMETER BUILD**



This build is specifically designed to help pre-college students gain understanding of introductory electronics theory and application. In this session students will get an introduction to basic electronics, learn to solder, and create a class set of thermometers for their school. They will be taught how to properly handle and place those components onto the Printed Circuit Board (PCB). Once the build is completed, students will have an opportunity to learn how to calibrate their thermometers. Throughout the build, MSU faculty and engineering students will help students test and trouble-shoot as needed. Upon successful completion of this session, each school will have a classroom set of thermometers to enhance mathematics and science activities in their school's curriculum.

2nd Floor, Green Room

NXT ROBOTICS

Our team of experts has designed a lab experience to give the middle school students an introduction to robots. Students will experience programming of their robot using the Lego NXT Mindstorm Robot.

Using the graphical software (NXT G), students will write programs to control their group's robot. Student teams will experiment with robotic programming. Application and discovery of how programming works will be similar to lessons presented in science and math classes. Each team will discover how to adjust their programs based upon the program inputs and actual output. During each phase, new challenges will be introduced to engage the student, reinforce new ideas and concepts and expose the teams to the newly emerging capabilities of student-controlled robotics programs.



Friday 2nd Floor, Parlor C

SCIENCE AND ENGINEERING FOR A NEW ENERGY INFRASTRUCTURE: FUTURE FUELS



Tonghun Lee
Energy and Automotive Research Laboratory
Department of Mechanical Engineering

As demand for fossil fuels increases in almost every corner of the world, and the environmental impact of combustion are more apparent, there is an unprecedented need for advanced technology which can provide energy from alternative sources and ultimately reduce our dependence on foreign oil. This presentation will show why today's energy issues are so important, provide insight into key problems and examine how science and engineering can bring profound changes.

The first part of the presentation will focus on the evolution of human civilization, technical innovations which have had great impact in our lives and the need for a revolutionary change in our energy infrastructure. The second part of the presentation will provide an in-depth perspective of the energy issue and why it is so important to our nation. The final part of the presentation will discuss potential solutions which can bring alternative and renewable energy into our everyday lives.



The Dart Foundation Day 7th-12th Grade Students

Friday May 1st, 2009 HIGH SCHOOL EVENTS SCHEDULE

	Future Fuels Presentation	Tower Civil Build	Digital Thermometer Build	Voting
	Parlor C	Green Room	Parlor B 2nd Floor	2nd Floor
9:00-9:40 a.m.			High School 3 High School 4	High School 1 High School 2
9:45-10:25 a.m.	High School 1 High School 2			High School 3 High School 4
10:30-11:10 a.m.	High School 3 High School 4	High School 1 High School 2		
11:15 a.m.- Noon		High School 3 High School 4	High School 1 High School 2	

2nd Floor, Parlor B WIRELESS INTEGRATED MICROSYSTEMS (WIMS) DIGITAL THERMOMETER BUILD



In this session students will get an introduction to basic electronics, learn to solder, and create a class set of thermometers for their school. The WIMS initiative integrates

science, math, and engineering through hands-on/ minds-on builds to instill excitement and curiosity about the fields of engineering. Students will learn to identify basic electronic components and discuss their functions. Additionally, they will be taught how to properly handle and solder those components onto the Printed Circuit Board (PCB). Once the thermometers are completed, we will test them and trouble-shoot as needed. At the end of this session they will have a classroom set of thermometers to enhance mathematics and science activities in their school's curriculum.

2nd Floor, Parlor C SCIENCE AND ENGINEERING FOR A NEW ENERGY INFRASTRUCTURE PRESENTATION

See explanation of event at the bottom of the opposite page (page 70)

PLUS: Students will have an opportunity to view and vote on engineering student design projects and interact with various engineering student organizations.

MEMBERS OF THE ORGANIZING COMMITTEE:



Jamie Lynn Marks
MSU
Engineering Recruitment and K-12 Outreach



Drew Kim
MSU
Engineering Asst. to Dean and Recruitment and K-12 Outreach



Russ Pline
Okemos High School and MSU
Design Day Coordinator



Bob Watson
MSU
Engineering K-12 Outreach
FIRST LEGO League Coordinator



John Thon
Holt Junior High School
MSU Design Day Coordinator

2nd Floor, Green Room CIVIL ENGINEER TOWER BUILDING



Humans have been building towers since we first started erecting structures thousands of years ago. Are the pyramids simply towers with wide bases necessary to support a structure of their tremendous height and weight? Towers also hold up bridges such as the Mackinac Bridge and the Golden Gate Bridge. Towers like the

Sears Tower in Chicago are capable of housing offices, businesses, or living spaces. We also use towers to project radio signals beyond the curvature of the earth. This is accomplished by broadcasting the signal from a great height. The higher the tower, the greater the distance of the broadcast without interference from the Earth. This brings us to our challenge today. Given limited amounts of space and material, how does an engineer design a tall tower that is able to support a load while remaining stable? You and your team will need to figure this out!

"Our future lies in some very precious hands..."

Our children are our future. Without the next generation of engineers, scientists and other professionals, the advances we enjoy today would quickly grind to a halt.

At the Dart Foundation, we are committed to developing scientifically literate students in Michigan. Therefore we are delighted to help fund the MSU Department of Mechanical Engineering's Design Day for pre-collegiate students.

An investment in our children's future will pay big dividends for this generation, and also generations yet unborn, in Michigan, America and ultimately the world.



THANKS TO NORFOLK SOUTHERN



The Department of Electrical and Computer Engineering thanks Norfolk Southern for its generous financial support of Design Day. This support was used for production of this program and for other costs associated with Design Day, and for the infrastructure that allows our ECE Senior Capstone Design teams to work effectively on their industry problems.

Norfolk Southern Railway has a proud history, and today's NS includes not only the Norfolk and Western Railway and Southern Railway from which its name arose, but also all or large parts of many other historic railroads, such as the Pennsylvania Railroad, Nickel Plate Road, and Conrail. We are proud to have Norfolk Southern as a sponsor of Design Day! They recruit engineers (not locomotive engineers, but electrical engineers, computer engineers, etc.) at Michigan State University.



The Future of Transportation

THANKS TO THE CHRYSLER FOUNDATION

Chrysler Foundation has made a generous grant allowing teams of electrical and computer engineering students to work on humanitarian projects that assist persons with disabilities. This semester's project was to design an automatic temperature-regulation garment to keep the "core" temperature of a user within a specified range. It is needed by some para- and quadriplegic persons whose temperature control mechanisms cannot do that, allowing them to be comfortable in a far greater range of environments. Previous semesters' projects have included design of manufacturing equipment for use by persons with disabilities, enhancements to the electronics used in the game of Beep Baseball, played by people with visual impairments, and development of an inexpensive but powerful device for control of household appliances and electronic devices, designed for activation by sipping and puffing on a straw, for users without the use of hand/foot muscles. Previously, students have developed other new hardware for Beep Baseball and also developed a portable audio-visual book reader based on an MP-3 player.

The students' experiences prepare them for a life of engineering with a new perspective on universal design, and an appreciation of the personal satisfaction arising from working with enabling technology. We thank the Chrysler Foundation for their generous support of these teams and of the Design Day activities!



The Chrysler Foundation





PADNOS

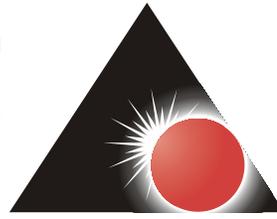


SINCE 1905

The Chrysler Foundation



Jeep



Altair Engineering



URBAN SCIENCE



lenovo 联想



AIChE



CHRYSLER



BorgWarner Thermal Systems



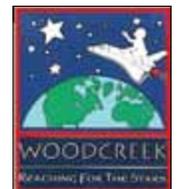
The Appropriate Technology Design Collaborative



Resource Center for Persons with Disabilities



Somerton Family Trust



MOTOROLA



Count on it.

