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Carl Levin
Michigan



United States Senate

WASHINGTON, D. C.

April 24, 2008

Dear Students:

It is my distinct honor to welcome you to Michigan State University's College of Engineering Design Day. This is a wonderful opportunity for you to explore the many educational opportunities that will be on display, and I am pleased that you are able to participate in today's events.

Michigan has a wonderfully rich history of technological innovation and engineering excellence, and Michigan State University has done an excellent job of nurturing a well developed pool of talent. It is important that we continue to invest in the future of our workforce, and today's display of engineering prowess by the students of the College of Engineering is a perfect example of the wide variety of resources and expert instruction available at Michigan State University.

I am delighted to know that so many bright young Michiganders share an interest in the field of engineering, and I applaud each one of you for your participation in this spring's Design Day at MSU.

Sincerely,

A handwritten signature in blue ink that reads "Carl Levin".

Carl Levin



Design Day Events Schedule: Thursday, April 24, 2008

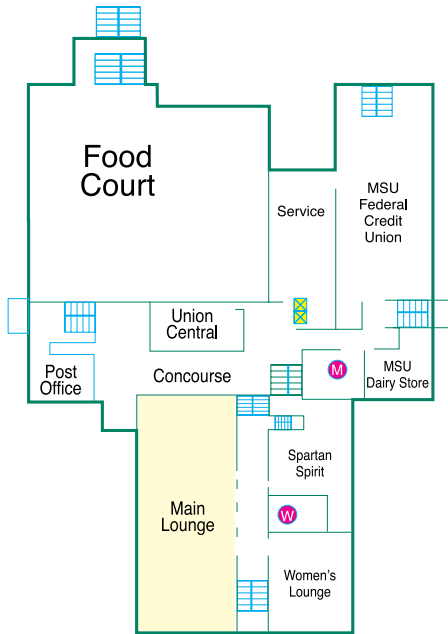
EVENTS	8 a.m.	9 a.m.	10 a.m.	11 a.m.	Noon	1 p.m.	2 p.m.
EGR 100 Cornerstone Poster Session		Ballroom (Front) 9 a.m. – noon					
Audio Enthusiasts and Engineers		Billiard Room 9 a.m. – noon					
Engineering Student Organizations		2nd Floor Concourse 9 a.m. – noon					

Design Day Events Schedule: Friday, April 25, 2008

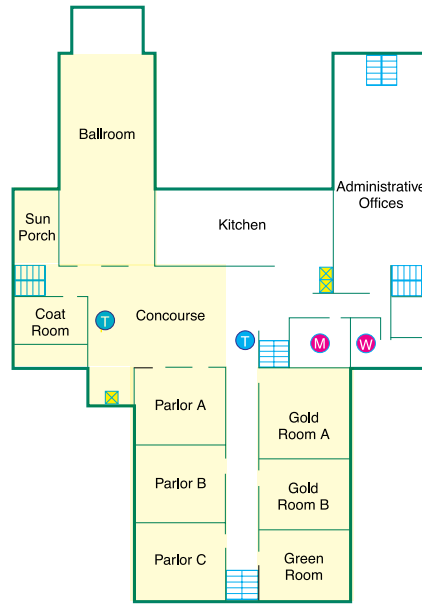
EVENTS	8 a.m.	9 a.m.	10 a.m.	11 a.m.	Noon	1 p.m.	2 p.m.
Audio Enthusiasts and Engineers		Billiard Room 9 a.m. – noon					
Engineering Student Organizations		2nd Floor Concourse 9 a.m. – noon					
EGR 291 Robot Competition				2nd Floor Concourse 10:30 a.m. - noon			
ME 371 Demonstrations		Gold A&B 9 a.m. - noon					
ME 412 Competition		Parlor A 8:50 a.m. - noon					
ME 471 Competition		Ballroom (front) 8 a.m. - noon					
Capstone Posters	1st Floor Main Lounge 8:00 a.m. - noon						
EGR 410 Project Presentations	Lake Ontario Room 8:00 a.m.- 8:30 a.m. & 10 a.m. - noon						
ME 481 Project Presentations	Lake Huron Room 8:00 a.m. - 12:30 p.m.						
ECE 480/ME 481 Project Presentations	Lake Superior Room 8:00 a.m. - 12:30 p.m.						
CSE 498 Project Presentations	Lake Erie Room 7:35 a.m. - 12:30 p.m. NOTE: Starts before 8 a.m.						
ECE 480 Project Presentations	Tower Room 8:00 a.m. - 10:50 a.m.						
CE 495 Project Presentations	Lake Michigan Room 8:20- - 11:30 a.m.						
CE 495 Project Presentations	MSU Room 8:20- - 11:30 a.m.						
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 1:30 p.m.-2:15 p.m.		
High School Lunch			Parlor C Noon - 12:30 p.m.				
High School Awards			Ballroom 12:30p.m. - 1 p.m.				

KEY: ■ CE event ■ CSE event ■ ECE event ■ EGR event ■ ME event ■ High School event

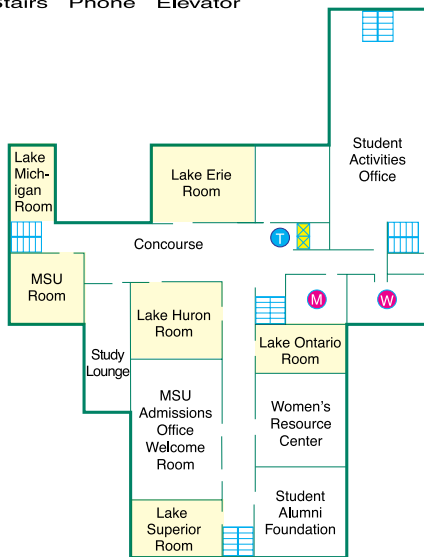
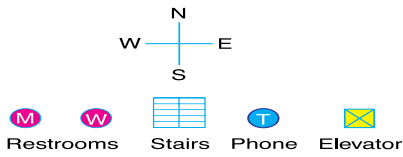
Conference Events Schedule: Floor Maps



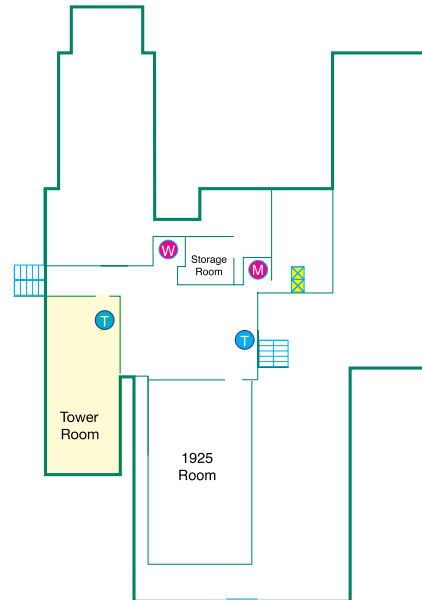
First Floor



Second Floor



Third Floor



Fourth Floor

MSU Union Floor Plan

College of Engineering Design Day: Spring 2007

STAFF ACKNOWLEDGEMENTS



Maureen Blazer-Adams
Design Day Coordinator



Roy Bailiff



Jill Bielawski



Bob Clifford



Linda Clifford



Kelly Climer



Cathy Davison



Craig Gunn



Debbie Kruch



Matt Luciw



Vanessa Mitchner



Garth
Motschenbacher



Mary Mroz



Gregg Mulder



Basak Oguz



Roxanne Peacock



Adam Pitcher



Eva Reiter



Norma Teague



Teresa VanderSloot



Michael Varney



Brian Wright

MACHINE SHOP AND DESIGN LAB STAFF:

Ken Barlage
Nate Elis
Dan Klein
Elliott Radcliffe



DESIGN OF PRODUCTS FOR COLLEGE DORM ROOMS

INSTRUCTIONAL TEAM: Dr. David Grummon, Dr. Frank Hatfield, Mr. Timothy Hinds, Dr. Leslie Leone, Dr. Bradley Marks, Dr. George Stockman, Dr. Xiaobo Tan, Dr. S. Patrick Walton, Dr. Thomas Wolff

TA STAFF: Troy Hendricks, Adam Rogensues

UNDERGRADUATE MENTORS: Amy Bittinger, Jamie Jacobs, Jim Piasecki, Kamela Webster

PROBLEM STATEMENT

EGR 100 is a new, college-level course being piloted for a second semester. It is an integral part of the Cornerstone Experience/Spartan Engineering program. The course is intended to introduce students to the engineering profession and the engineering design process through team-based, interdisciplinary design projects. EGR 100 will be taken by all incoming engineering freshmen starting fall semester 2008.

The final course project had teams of EGR 100 students design a new device or product with a retail cost of less than \$50 to be used in a dorm room by US college freshmen. The teams built prototypes of their products not exceeding a total material cost of \$20. The teams will display their prototypes at Design Day along with a poster detailing their product designs.

Section 1 Teams

Team 1	Team 3	Team 5
Nathan Danforth Hayes Heimbaugh James Silvers	Michael Cartwright Philip Porter Bindu Sancho	Daniel Hissock Alex Jakstys Richard Lane Tyler Smith
Team 2	Team 4	Team 6
Dane Marsack Austin Melcher Kalli Pervolarakis	Amy Coronado Joshua DeWalt Calan Underwood Qilong Wu	Brittney Brown Kelly Burke David Marsh Steven Soave

Section 2 Teams

Team 1	Team 3	Team 5
Andrew Chiesa Jay Cuda Sarah Deighan Ebrahim Husain	Brian Arickx Austin Fletcher Zachary Keniston	Austin Crawley Zane Grennell Chinonye Madu Samantha Sprunger
Team 2	Team 4	Team 6
Marcus Cannon Kenneth Hsu David Sparks Jessica Yu	Nitin Arora Stevie Baldwin Ashleigh Bonner Jason Schneemann	Joseph Covington Nicholas Janicke Matthew McAlpine Benjamin Thompson



EGR 291

10:30 - 12:00
Second Floor
Concourse



FRESHMAN/SOPHOMORE ELECTRICAL AND COMPUTER ENGINEERING ROBOT COMPETITION

INSTRUCTOR: Prof. Robert J. McGough

PROBLEM STATEMENT

EGR 291 is an elective course that introduces freshman and sophomore students to Electrical and Computer Engineering through a series of guest lectures and hands-on laboratory assignments. Some of the guest lecturers during the Spring 2008 semester include: Jennifer Jennings (MSU Center for Experiential Education and Career Exploration), Sean Fochtman (Dept. of Electrical and Computer Engineering), Ron Slocum (Blesco, Inc.), Glenn Keates (Dymax), Dr. Tim Hogan (Dept. of Electrical and Computer Engineering), Dave Agnew (Dynamic Control Systems), Tony Skarich (Dow), and Nick Stark (General Dynamics).

In addition to the lectures, a weekly experimental laboratory exposes students to some of the basics of electrical and computer engineering. The hands-on experience in EGR 291 involves microcontroller-based assignments that utilize the Parallax® Basic Stamp Board of Education. Programs based on the Basic Stamp are integrated with electrical components ranging from capacitors to ultrasonic range finders in the weekly lab assignments. Once the assignments have been completed, the students form small groups for the final project. On design day, the groups participate in a competition. For this semester, the teams program robots to navigate a course filled with various obstacles that must be navigated. SONAR, Line Sensors, and Radio Frequency Identification must be efficiently programmed to successfully overcome roadblocks, a bridge, and a winding road course.



Students upload code to the robot's onboard chip.



Two students test their robots to see if they are functioning correctly.

Team 1

Derek Brower
Thomas Volinski

Team 2

Peter Deacon
Lorenzo Rice

Team 3

Stephen Kumm
Ryan Paul

Team 4

ClasSara Morris
Ahsan Naeem

Team 5

Andreas Dixon
Robert Fenton

Team 6

Sung Lee
Khubaib Razzaq
Ryan Tibbetts

Team 7

Jae Lee
Chi Peng

Team 8

William Chye
Po-Chin Huang

Team 9

Chris Finley
Andrew Hickel

Team 10

Adam Evans
Justin Schefka

Team 11

Thamer Alajlan
Jacob Sawicki



PROTOTYPES OF INNOVATIVE MACHINES AND MECHANISMS

INSTRUCTOR: Professor Farhang Pourboghrat

PROBLEM STATEMENT

Teams of 3-4 students were required to design and manufacture simple mechanisms comprised of fourbar linkages, cams and gears that would fit inside a 2'x2'x2' space to accomplish repetitive tasks selected by each team. These mechanical systems are displayed in conjunction with a poster where students demonstrate their prototypes. Pre-college students will select the best designs by interviewing the ME 371 students. Subsequently, the winning team will be presented with the *Spartan Plaque* that was designed and built by students at Holt Junior High School.

Teams and members

Team 1

Drew Darling
Lauren Heitzer
Ben Llewellyn
Andrew Rogers

Team 2

Paul Allen
Chris Miller
Mackenzie Schmidt

Team 3

Louis Cervone
Jacob Haf
Daniel Masterson
Matthew Perelli

Team 4

Cliff Carlson
Craig Helewski
Michelle Raetz
Eric Vine

Team 5

Imoh S. Enoidem
Tim Francisco
Brandon Hengesbach
Steve Hukill

Team 6

Muhammed Aslam
Chris Gandy
Kayton Lenhart
Krishna Vistarakula

Team 7

Amber Bebee
Marcus Peters
Beverly Starrack
Andrea Turkiewicz

Team 8

Bryant Ennis
Ashley Kulczycki
Andrea Vivian
Marissa Wiltz

Team 9

Dave Cain
Thomas Theisen
Josh Samp
Ryan Wood

Team 10

Josh Davis
Allen Eyler
Jeff LaForge
Phillip Marino

Team 11

Michikazu Aono
Andrew Cawood
Ryan Lindeman
Greg Moy

Team 12

Brent Augustine
Joe Brent
Christopher Ezop
Ryan Kelly

Team 13

Kevin Mcphail
Eva Reiter
John Sachs
Dan Schleh

Team 14

Jenikumar Bhanvadia
Matt Burdick
Kaitlin Donoughe
Ryan Smith



ME 412

8:50 – Noon
Parlor A



PASSIVE ICE MELTER

INSTRUCTOR: Dr. Laura J. Genik

TA STAFF: Alan Katz, Anirban Lahiri, Takesha Sattiewhite

Special thanks to Matt Brzezinski, ME 412 Lab Manager

You have seen them on television, the Miracle Thaw or Super D Frost Wonder where hamburger patties are defrosted in less than ten minutes and ice cubes melt as though they were on a hot griddle, but these devices are cool to the touch. Is this some sham, or could it be real heat transfer at work? Only a Heat Transfer Lab student will know for sure.

PROBLEM STATEMENT

The project team is to design, analyze, build and test a “passive” heat transfer device to enhance the defrost process as realized by the melting of ice. Passive means no energy input is to be utilized during the operation of the device. To remain in context with the above described devices, the ice may not be modified in any manner and the device must begin the 2-minute testing time at room temperature. The device will be judged on the basis of the ice melting rate produced, the mass of the device, and its cost. The device must fit inside a box of dimension 14” x 14” x 12”.

TIME	STATION	DESIGN TEAM
8:50 am	A	Michael Booth, John Tysman
8:55 am	B	Eric Krajewski, Steven Poon, Boon Yong
9:00 am	A	Justin Bradford, Paul Crockett, Neal Spitzley
9:05 am	B	Lisa Chapman, Kyle Koepf, Jonathan Luckhardt
9:10 am	B	Brandon Bouchard, Tiffany DiPetta, Keith Tenbusch
9:15 am	A	Luis Goncalves, Gerald Landry, Erik Marshall
9:20 am	B	Cody Priess, Brian Smith, Bryan Wagenknecht
9:25 am	A	Kalpen Gandhi, Alexander Kerstein, Hani Kobty
9:30 am	B	Marcos Colon, George Mullonkal, Ryan Rieck
9:35 am	A	Pinal Desai, Brett Hollier, Alexander Wright
9:40 am	B	Jason Franklin, Chad Glinsky, Brian Powell
9:45 am	A	Timothy DeGraff, Justin Rumao, Wayne Williams
9:50 am	B	Sarthak Goel, Adam Grisdale, Justin Webster
10:00 am	A	Erin Johnson, Daniel Little, Jacob Wagner
10:10 am	B	Carl Coppola, Johannes Hertrich, Chris Hunley
10:20 am	A	Michael Cooper, Kyle Szykiel, Scott Wiltz



The CLIMBER

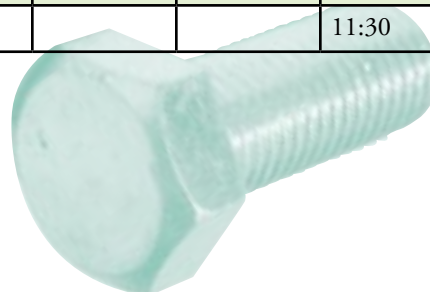
INSTRUCTOR: Professor Alan Hadow

TA Staff: Sayyed Jafari Tafti

PROBLEM STATEMENT

Student groups have to design and build a device that will ascend a two-meter vertical wooden pole, trigger a switch at the top and then return to the bottom, in the shortest possible time. To encourage creativity, there are only a limited number of rules. For example, the device size is limited, it must run autonomously when started, and can only be powered by batteries.

DBT Team	Student Name	Test Run #1 Start Time		Test Run #2 Start Time	
		Pole A	Pole B	Pole A	Pole B
1	Kyle Elliott, Richard Hollern, John Tysman	9:00			10:30
2	Justin Bauer, Anthony Carlo, Tyler Grab		9:05	10:35	
3	Bradley Rutledge, Zachary Steffes, Ryan Stull	9:10			10:40
4	Daniel Barlach, Tony Davis, Allison Freeman		9:15	10:45	
5	Jacob Kloss, Lauren Sharp, Christopher Sweeney, Richard Walh	9:20			10:50
6	Kevin Derrick, Patrick Hammer, Brent Rowland		9:25	10:55	
7	Zef Ivanovic, Bryce Thelen, Kevin Wright	9:30			11:00
8	Christopher Cater, Derek Riparip, Vivek Sarasam		9:35	11:05	
9	Matthew Berger, Ryan Boak, Tyler Curtis	9:40			11:10
10	William Hurles, Brian Kunkel, Brian Steffes		9:45	11:15	
11	Miguel Martinez-Brambila, Luan Huynh, Eric Jackson	9:50			11:20
12	Joshua Kowalski, Arun Mahapatra, Robert Morris		9:55	11:25	
13	Sara Murawa, Michael Priebe	10:00			11:30



Summarized descriptions of the five Senior Capstone Courses for the 2008 Spring Semester:

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 work place 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; C2AE; Fishbeck, Thompson, Carr & Huber; Lansing Board of Water and Light; Soil & Materials Engineers; Tetra Tech MPS; URS Corporation; Wetland and Coastal Resources; and Wilcox Professional Services. We gratefully acknowledge their generous contribution.

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, GM, IBM, Microsoft, Motorola, Sircon, TechSmith, the Toro Company and the Union Pacific Railroad.

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.

Team sponsors are local and national, including NASA Goddard Space Flight Center, Bosch, Lear, Norfolk Southern, USAFRL, MSU Intercollegiate Athletics, Gormley Systems Engineering, Lenovo, the Chrysler Foundation, and MSU's Resource Center for Persons with Disabilities and its supporters the Wochholz Endowment and Marathon Oil.

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 Michigan Seamless Tube, General Motors, Lear, Kraft Global Packaging R&D, MSU CHEMS Department, Motorola, Whirlpool, Tecumseh Products Company, BorgWarner Thermal Systems, Shell, MACSTEEL Jackson Division, and Padnos Iron & Metal Company.

**Shell is a proud
sponsor of MSU's
Senior Design Program.**

**Congratulations
Seniors!**

With the wind behind you and open space ahead, there's no limit to the possible directions your career could take. And at Shell, we'll support you all the way.

Our approach is collaborative – matching our business needs with your training needs, our global opportunities with your career aspirations. We aim to build a win-win partnership between you and Shell.

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Explore it

There's a wider world
out there



Achieving more together



EGR 410: SYSTEMS METHODOLOGY SENIOR CAPSTONE COURSE

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. Student use this course to explore societal issues and arrive at an optimal choice using various decision processes.

Team 1: Jeffery Deans, Joe Ludlow, Kirk Priem, Ebony Thomas, Adam Tyler

Topic: Childhood Obesity

Team 2: Jillian Ashburn, Patrick Eding, Rahul Menon, Nick Smith, Kamela Webster

Topic: Children's Healthcare in the U.S.

Team 3: Troy Bigham, Zach Domitrz, Demetrius Fisher, Joe Larkin, Aki Tanaka

Topic: Scrap Tire Recycling

Team 4: Eric Dragicevic, Michelle Murphy, Bret Pelavin, Ashley Seidl, Phil Tambouridis

Topic: Future of Automotive Recycling

Team 5: Jeff Gauthier, Dan Pabst, Danielle Smith, Pamela Wickersham, Mike Thornton (*missing from picture*)

Topic: Revamping the Applied Engineering Science Degree



Mr. Chalou



Team 1



Team 3



Team 5



Team 2



Team 4

Team one presents between 8:00 a.m. and 8:30 a.m. There will then be an hour and a half hiatus and the remaining teams will present at half-hour intervals resuming at 10:00 a.m. and concluding at noon.

MECHANICAL ENGINEERING DESIGN PROJECTS

PRESENTATION SCHEDULE —Lake Huron Room

Course Coordinator: Dr. Craig Somerton

Faculty Advisors: Professors Averill, Chalou, Diaz, Hughes, Müller, Patterson, and Somerton

Time	Project Sponsor(s)	Sponsor Contact(s)	Faculty Advisor(s)	Project Title
8:00 ME 481	Michigan Seamless Tube	C. Lu	R. Averill	Forty-Degree Rib in Cold Drawn Seamless Tubing
8:25 ME 481	Motorola	J. Wojack	E. Patterson	Keypad-Enabled Product Design for a Mobile Device
8:50 ME 481	Kraft's Global Packaging R&D	P. Zerfas S. Bodett	R. Chalou H. Hughes	New Resealable Package
10:00 ME 481	Department of Chemical Engineering and Materials Science	T. Bieler M. Crimp	N. Müller	Electron Microscope In-Situ 4-Point Bend Apparatus
10:25 ME 481	Lear Corporation	W. Maue J. Nathan	N. Müller	A Lightweight and Electromechanical Desk Chair for Children with Cerebral Palsy
10:50 ME 481	General Motors Corporation	D. Moore J. Bahm	A. Diaz	Low Noise Exhaust Tips
11:15 ME 481	General Motors North American Engineering	A. Butlin C. Leach	C. Somerton	Best Execution of a Zero Drag Automotive Brake System
11:40 ME 481	WoodCreek Magnet Elementary School & Motorola	D. Graham K. Meis S. Raymer	C. Somerton	Global Warming Demonstrator for Woodcreek Elementary
12:05 ME 481	Mid-Michigan Medical Center	P. Essex	C. Somerton	Redesign of Recumbent Cycle for MidMichigan Medical Center

MICHIGAN SEAMLESS TUBE: FORTY-DEGREE RIB IN COLD DRAWN SEAMLESS TUBING

Michigan Seamless Tube has been a leading manufacturer of carbon and alloy seamless cold drawn pipe and tube for over 80 years. Located in South Lyon, Michigan, the modernization of Michigan Seamless Tube ensures fast set-up and flexibility for the shortest lead times worldwide. Common markets served include Energy Generation, Refinery, Petro-Chemical, Transportation, Heavy Equipment/Agriculture, Automotive, Aircraft/Aerospace, and Mining and Exploration.

In the interest of higher efficiency, energy industries are now seeking to operate boilers with internally ribbed tubing, which promotes better heat transfer. Michigan Seamless Tube aims to supply tubes with a rib angle of 40 degrees, but current tooling and processes are capable of achieving only a 30-degree angle. So a robust process capable of 40-degree ribbing would place Michigan Seamless Tube in a position to supply specialized tubing that is currently unavailable in the United States.

The goal of the current project is to develop techniques that will enable Michigan Seamless Tube to produce rib angles of greater than 30 degrees while optimizing the draw speed and quality.

To complete this task, process research was conducted and models were developed to predict the stresses incurred by ribbing tools during the cold drawing process. Inspections of failed test tools were used to determine the failure mode. The collected data and combined knowledge of Michigan Seamless Tube and the student design team determined that torsion stress relief had to be implemented in the suggested design.

...The Michigan Seamless Tube Student Design Team



MICHIGAN
seamless tube



Mr. Lu

The ability to produce ribbed cold drawn seamless tubing at Michigan Seamless Tube has in the past been limited to angles less than 40 degrees. Advances in boiler technology and customer demands now require rib angles 40 degrees and greater. The success of the project will open up a niche market to Michigan Seamless Tube, both domestic and internationally.

Cyrus Lu
Michigan Seamless Tube

Project Sponsor
Michigan Seamless Tube
South Lyon, Michigan

Professional Advisor
Mr. Cyrus Lu

Faculty Advisor
Prof. Ron Averill

Team Members and Home Towns
Tim DeGraff
Bloomfield Hills, Michigan

Sarthak Goel
Delhi, India

Justin Webster
Metamora, Michigan

Wayne Williams
Addison, Michigan



Prof. Averill

MOTOROLA: KEYPAD-ENABLED PRODUCT DESIGN FOR A MOBILE DEVICE

Motorola is a multi-national communications company that provides products for government, businesses, and the general public. Its products include cellular phones, laptop computers, computer processors, and radio communication devices. As technology advances, so do the products *Motorola* produces. Today, mobile devices from laptops to MP3 players to cell phones have completely converged. During this convergence one of the issues that has not been fully solved is the implementation of a full keyboard. *Motorola* has products in its portfolio with full QWERTY keyboards but is looking for a better way to implement the keyboard on its phones.

The new design should be unique and different in a way that attracts the consumer but is still user friendly. A few of the key issues in developing a user friendly design are large display size, easy access to all buttons on the keyboard, and keeping the thickness to a minimum. Not only must the new design be user friendly, but it must also be capable of further development in order to pass the battery of reliability tests *Motorola* performs on its phones.

...*The Motorola Student Design Team*



MOTOROLA



Mr. Wojack

The development of a new or improved keypad-enabled product aligns with *Motorola's* ambition to develop compelling mobile devices that allow consumers to be more productive. The goal of this project will be to create a new paradigm for how a keypad enabled product is designed.

Jason Wojack
Principal Staff Mechanical Engineer
Motorola

Project Sponsor

Motorola
Libertyville, Illinois

Professional

Advisor
Mr. Jason Wojack

Faculty Advisor

Prof. Eann Patterson

Team Members and Home Towns

Christopher Caffee
Big Rapids, Michigan

Erin Johnson
Midland, Michigan

Keith Srebinski
Midland, Michigan

Jacob Wagner
Crystal Falls, Michigan



Prof. Patterson

KRAFT'S GLOBAL PACKAGING R&D: NEW RESEALABLE PACKAGE

Kraft's Global Packaging R&D is interested in identifying a package solution that would provide resealability/recloseability for flexible package structures typically used for Kraft's dry food products such as cereals, crackers, coffee, powder drink mixes, and nut snacks. Current package structures do not always provide an integrated or ideal reseal feature.

There are many different types of packaging methods; some examples including slider zippers, press-to-seal zippers, and reusable adhesive tapes or labels are the seal and reseal solutions that currently exist in the market. These current solutions are limited in several respects: they are not always cost effective; they fail during repeated use due to product contamination; they can result in imperfect reseals, which compromise product freshness; they do not allow full hand access from the top of the bag; and they are not always intuitive for the consumer to use.

The goal for the design team was to try to identify nature-derived solutions and create prototypes that could form the basis for a commercial solution for flexible packaging resealability. The new design also should have the potential to earn a patent for Kraft's Global Packaging R&D Student Design Team.

...The Kraft's Global Packaging R&D Student Design Team



Ms. Bodett



Mr. Zervas



Mr. Chalou



Prof. Hughes

Packaging is arguably a consumer product manufacturer's most important tool for creating new growth opportunities. An innovative new package that delivers on an unmet consumer need can set your company's product apart from the competition and provide a sustainable competitive advantage in the marketplace. An effective, air-tight package reclose feature, which can prolong product freshness after opening, is a need that Kraft's consumers assert over and over. Kraft believes that inspiration for an innovative new approach to the age old problem of package reclosability may be found by studying examples from nature. I am confident that this creative team of students will develop a novel nature-inspired concept that is commercially viable and superior in cost and performance compared to existing technologies.

Paul Zervas
Principal Engineer, Packaging Strategic Research
Kraft Foods

Project Sponsor
Kraft's Global Packaging R&D
Glenview, Illinois

Professional Advisors
Ms. Susan Bodett
Mr. Paul Zervas

Faculty Advisors
Mr. Robert Chalou
Prof. Harold Hughes

Team Members and Home Towns
Pete Foltz
Petoskey, Michigan

Daniel Little
St. Louis, Michigan

Ryon Lockhart
LeRoy, Michigan

Lane Taber
West Branch, Michigan

Jin Zhang Tam
Kowloon, Hong Kong

Scott Wiltz
Milford, Michigan



MSU DEPARTMENT OF CHEMICAL ENGINEERING AND MATERIALS SCIENCE: ELECTRON MICROSCOPE IN-SITU 4-POINT BEND APPARATUS

The Michigan State University Chemical Engineering and Materials Science (ChEMS) Department, in cooperation with the Max Planck Institute, is investigating the relationship between grain boundaries and failure in commercial purity titanium. Dr. Bieler and Dr. Crimp have developed probability-based hypotheses capable of predicting grain boundary failures under tensile stresses. The department now seeks to develop a deterministic method for predicting failure by analyzing loaded specimens with a scanning electron microscope (SEM).

The SEM allows a detailed view of the effects of strain on grain boundaries as loading occurs. The ChEMS Department needed an apparatus to bend the titanium in order to look for the beginnings of failure using the SEM. The four-point bending apparatus had to fit inside a loading stage, which is a mechanical vice-like device capable only of pure compression or tension loading. This apparatus enables them to further their studies and achieve a primary goal of their Materials World Network NSF-DFG research program.

The objective of the project was to develop a four-point bending apparatus that allows the viewing of an in-situ tensile surface in an SEM. The final product translates the current microscope stage's horizontal loading capabilities into a 10% specimen strain and is able to maintain that strained specimen once the apparatus has been removed from the SEM. The final product was required to be a fully functional apparatus that could be manufactured again in the future.

Accomplishing this goal required a finite element analysis (FEA) of both the specimen and the apparatus. The FEA results were then processed using optimization software and a prototype was built. The final fabrication was performed by the MSU Physics Machine Shop using electron discharge machining. Validation testing was the final step in completing the project.

...The MSU ChEMS Student Design Team



Prof. Crimp



Prof. Bieler



Prof. Müller

This apparatus will allow us to bend specially prepared specimens for investigation of damage nucleation, without unloading them. As we wish to find the places where cracks first form, and unloading would possibly allow crack closure that would make them invisible, keeping the specimen loaded will ensure our ability to find cracks. This apparatus will enable us to achieve one of the primary goals of our Materials World Network NSF-DFG research program (collaboration with Max-Planck-Institut für Eisenforschung, in Düsseldorf, Germany).

Thomas Bieler
Professor
ChEMS Department, Michigan State University

Project Sponsor

Michigan State University, ChEMS Department
East Lansing, Michigan

Professional Advisors

Prof. Thomas Bieler
Prof. Martin Crimp

Faculty Advisor

Prof. Norbert Müller

Team Members and Home Towns

Darius Libiran
Okemos, Michigan

Steven Poon
Canton, Michigan

Kyle Szykiel
Lansing, Michigan

Bryan Wagenknecht
Haslett, Michigan

LEAR CORPORATION: A LIGHTWEIGHT AND ELECTROMECHANICAL DESK CHAIR FOR CHILDREN WITH CEREBRAL PALSY

Lear Corporation is one of the world's largest suppliers of automotive interior systems and components, operating in 33 countries and employing 90,000 people. Lear provides the optimum quality for automotive interior standards.

Cerebral Palsy is a neural disorder that is generally developed during or shortly after birth. While not progressive, the disability limits the normal function of muscle movement.

Zak and Izabel from *Henry North Henry Elementary School* in Lansing, Michigan have assisted in finding modifications that can be made to the existing desk chair. With these ideas in mind, more changes can be made to further improve the quality of each child's learning experience.

The current system includes two levers that lock the rotation of the chair as well as the translational movement to and from the desk. Lateral supports attached to the back of the chair provide postural support.

There were several goals for this project, all revolving around creating a finalized product: optimizing fabrication costs, designing a release system for lateral supports, and creating safety-focused ISO symbols.

...*The Lear Corporation Student Design Team*



Mr. Maue



Mr. Nathan

Lear Corporation is interested in facilitating a higher level of independence for students with physical disabilities by integrating special features and mechanisms into "standard" classroom furniture, making it more ergonomically usable by the students. This in turn contributes towards the students being able to achieve a higher level of academic success.

John F. Nathan
Director—Advanced Technology
Lear Corporation

Project Sponsor

Lear Corporation
Southfield, Michigan

Professional Advisors

Mr. Winston Maue
Mr. John Nathan

Faculty Advisor

Prof. Norbert Müller

Team Members and Home Towns

Jason Franklin
Chicago, Illinois

Chad Glinsky
Jackson, Michigan

Evan Marks
Saline, Michigan

Brian Powell
Mt. Pleasant, Michigan



Prof. Müller

GENERAL MOTORS CORPORATION: LOW NOISE EXHAUST TIPS

General Motors Corporation is currently the world's largest automobile manufacturer. With headquarters based in the Renaissance Center in Detroit, Michigan, General Motors employs approximately 284,000 people in 33 countries. With 12 different subsidiaries to promote (such as Chevrolet, Cadillac, and Pontiac), product image is a vital part of the company's success.

The sound of an exhaust system is a significant factor in the image of a vehicle. Some vehicles (and their customers) want (maybe require) a quiet, refined sound; some vehicles want (maybe require) a powerful and expressive sound. In either case, sound from flow noise is unwanted by all customers. In addition, vehicle manufacturers are subject to noise emission regulations in all global markets that limit the total vehicle sound emission under a prescribed test. Therefore, exhaust tip design to minimize flow noise is desirable for all vehicles.

The goal of this project was to find alternative design concepts for exhaust tips that reduce flow noise, maintain or improve (reduce) flow restriction, conform to allowable packaging space, and are visually pleasing.

The testing and experimentation involved two different theories pertaining to fluid dynamics. The first theory included slowing the flow exit speed, which reduces turbulence. The second theory was to "mix" the exhaust gasses to effectively dampen the sound produced. The optimal design was found by incorporating both of these concepts. Analytic and hardware design/testing was employed to attain the final design which improved exhaust tip models currently manufactured for General Motors.

...The General Motors Student Design Team



Mr. Bahm



Mr. Moore



Prof. Diaz

The Exhaust Tip Flow Noise Project will benefit General Motors by contributing data and analysis from Michigan State University to provide design ideas and design guidance to allow exhaust system and full vehicle designers the ability to provide systems that meet customer expectations while simultaneously meeting regulatory requirements.

Doug Moore
Exterior Noise Lead Engineer
General Motors Corporation

Project Sponsor

General Motors Corporation
Milford, Michigan

Professional Advisors

Mr. Jack Bahm
Mr. Doug Moore

Faculty Advisor

Prof. Alejandro Diaz

Team Members and Home Towns

Marcos Colón
Pontiac, Michigan

George Mullonkal
Fraser, Michigan

Ryan Rieck
Traverse City, Michigan

Nicholas Rowe
Plymouth, Michigan

GENERAL MOTORS NORTH AMERICAN ENGINEERING: BEST EXECUTION OF A ZERO DRAG AUTOMOTIVE BRAKE SYSTEM

In recent years the efficiency of automobiles has been a primary focus in the automobile industry. *General Motors Corporation* is dedicated to improving the efficiency of its fleet of vehicles by improving almost every system incorporated into today's automobiles. Current braking systems in most automobiles are designed for performance rather than improving efficiency of the vehicle. To ensure the least possible delay when a vehicle's brakes are applied, the brake pads are always contacting the rotor, even when the brakes are released.

To improve the overall efficiency of the vehicle, the Michigan State University team developed a mechanical system that would ensure the brake pads were retracted from the rotor only far enough to eliminate drag when the brakes were not in use, but no further to minimize delay when the brakes are applied.

In addition to designing the mechanical system to limit brake pad retraction, the team also executed a tolerance stack-up study for *General Motors* to determine the optimal spacing between the brake pads and the rotor. This study was designed to determine the components of the automobile that will affect the spacing of the pad, assumed to be less than .5mm, when in real world situations. Using this information *General Motors* will conduct studies to optimize the spacing to ensure there is zero drag when brakes are not in use and safe response time when the brakes are applied.

...The General Motors Student Design Team



Mr. Leach



Mr. Butlin

To meet future energy and environmental needs, the automotive industry is striving to improve vehicle efficiency. The Zero Drag Brake System would support the need to decrease lost energy and improve driveline efficiency. This system is applicable to all vehicle product lines regardless of vehicle and powertrain type; thus, it can make a full product line impact, enabling a more energy efficient product line.

Albert Butlin
General Motors Corporation



Prof. Somerton

Project Sponsor
General Motors North American Engineering
Warren, Michigan

Professional Advisors
Mr. Albert Butlin Jr.
Mr. Chris Leach

Faculty Advisor
Prof. Craig Somerton

Team Members and Home Towns
David Klipfel
Clawson, Michigan

Martin Priess
Charlevoix, Michigan

Brian Smith
White Cloud, Michigan

Joshua Thomet
Grand Rapids, Michigan

THE MOTOROLA FOUNDATION YOUTH IN ENERGY AND ENVIRONMENT HUMANITARIAN PROJECT: GLOBAL WARMING DEMONSTRATOR FOR WOODCREEK ELEMENTARY SCHOOL

Woodcreek Magnet Elementary School is an exceptional primary school within the Lansing School District that requires special admissions and focuses its curriculum on math, science, and engineering. Teachers consistently incorporate hands-on materials and activities to assist students in grasping technical concepts. This project is a complementary addition and key component to the fifth grade curriculum at Woodcreek. Part of the fifth grade curriculum includes a unit on the atmosphere, weather, and climate. It is well known that a hands-on experience greatly facilitates student learning and has been proven useful with complex topics.

Today, a growing concern is global warming. As a newer topic and issue, it is important to inform and educate people about this problem and how to help reduce the negative effects of it. A specialized curriculum designed and taught by the Michigan State University student design team introduced the concerns of global warming and greenhouse gases along with how and why they affect our environment. To reinforce the concepts, many hands-on and interactive activities, web based learning and in-class demonstrations were utilized.

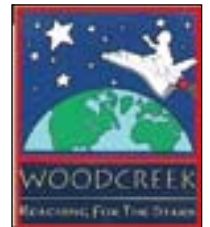
The Michigan State University student design team was responsible for introducing the engineering design method and allowing students at Woodcreek to practice working as a research and design engineers. Throughout the semester, the Michigan State University student design team worked closely with students at Woodcreek allowing them to give input and insight on the development, design, and construction of the global warming demonstration system.

This project is generously sponsored by the *Motorola Foundation*, whose main goal is to spark the interest of math and science in children allowing them to “[enhance] the vitality of the communities where [they] do business.”

...The Motorola & Woodcreek Elementary School Student Design Team



MOTOROLA



Ms. Graham



Mr. Meis



Ms. Raymer



Prof. Somerton

Our partnership with the MSU College of Engineering has proved indispensable for our fifth grade students and teachers, and we recognize it as a unique and valuable experience. It provided an interactive project that was exciting for several reasons. As an educational piece for our science and engineering curriculum, we learned current and important environmental facts that have altered how we think and interact with our surroundings. We also worked alongside and participated in the design process that ‘real’ engineers use. The Global Warming Demonstrator will serve to educate many other students and adults in an engaging and interactive way.

Diane Graham
Teacher
Woodcreek Magnet Elementary School

Project Sponsor
Woodcreek Elementary
Lansing, Michigan
Motorola Foundation
Schaumburg, Illinois

Professional Advisors
Ms. Diane Graham
Mr. Kurt Meis
Ms. Sandy Raymer

Faculty Advisor
Prof. Craig Somerton

Team Members and Home Towns
Michael J. Booth
Birmingham, Michigan

Brent Snyder
St. Clair, Michigan

Nicole V. Vidro
Lake Tahoe, California

John N. Woodruff
Troy, Michigan



A SHELL OIL COMPANY HUMANITARIAN PROJECT FOR PEOPLE WITH DISABILITIES: REDESIGN OF RECUMBENT CYCLE FOR MIDMICHIGAN MEDICAL CENTER

People diagnosed with neuromuscular diseases, as well as post-stroke patients, are fully capable of critical thinking, yet they lead extremely hindered lives with a high rate of dependence on others. The common thread in these disorders is the patient's lack of control over their muscular tone, thus causing muscles to become too rigid or loose. However, the dedicated physical therapy staff at the *MidMichigan Medical Center* has noticed that when their patients exercise on a stationary push-pull recumbent bicycle, there is a drastic advancement of muscular movement and coordination. They further noted that there currently is no mobile recumbent bicycle designed for such patients. Therefore, the ambition of this design team was to produce a mobile recumbent cycle, which patients might use to ride outside during pleasant weather. Accomplishing this task greatly promotes the desire to exercise and become one step closer to a normal lifestyle.

This task was first attempted by the ME 481 design team in spring 2006. Our team's aim was to enhance the adjustability and to design it to accommodate people of all ages, ranging from adolescents to the elderly. Moreover, we reduced the overall weight and increased the efficiency of the machine so that it is easily transportable. However, the most distinguishable trait is that we have given the steering control to the rider rather than a physical therapist. With the capability of self-steering, the patient may feel a sense of freedom to achieve a task independently. This liberation may hold the key to a higher level of self-confidence and a greater quality of life through the benefits of exercise.

With the collaborative efforts of the Rehabilitative Clinic at the *MidMichigan Medical Center* located in Midland, Michigan; *Shell Oil Company*; and this engineering design team, this innovative machine will address the unmet need of patients obtaining treatments at the physical therapy clinic by riding a bike through one's neighborhood.

...*The MidMichigan Medical Center Student Design Team*



MidMichigan
Medical Center
Midland



Ms. Essex



Prof. Somerton

The current stationary bike provides cardiovascular strengthening and range of motion for patients of all ages. By making it mobile, the patients will be able to engage in the community, independently or along with family members, and enjoy the bike as a recreational exercise. Moreover, this activity would provide them with the necessary therapeutic benefits.

Peggy Essex
Physical Therapy Assistant
MidMichigan Medical Center

Project Sponsor
MidMichigan Medical Center
Midland, Michigan

Professional Advisor
Ms. Peggy Essex

Faculty Advisor
Prof. Craig Somerton

Team Members and Home Towns
Pinal Desai
Sterling Heights, Michigan

Kalpen Shailesh Gandhi
Dubai, United Arab Emirates

Brett Hollier
Flushing, Michigan

Jerry Landry
Tawas City, Michigan

ELECTRICAL AND COMPUTER ENGINEERING AND MECHANICAL ENGINEERING PROJECTS

PRESENTATION SCHEDULE —Lake Superior Room

Course Coordinators: Professors Erik Goodman and Craig W. Somerton

Faculty Advisors: Professors Aslam, Balasubramaniam, Bénard, Deller, Engeda, Ki, Salem, Thompson and Wright

Time	Project Sponsor(s)	Sponsor Contact(s)	Faculty Advisor	Project Title
8:00 ECE 480	MSU RCPD, Midland Rotary, Chrysler Foundation	S. Blosser	J. Deller	Beep Baseball Base Controller
8:25 ECE 480	MSU RCPD, Chrysler Foundation	S. Blosser	J. Deller	Sip and Puff Interface to an All-In-One Controller
8:50 ECE 480	Lenovo Corporation	K. DeMaagd	D. Aslam	Solar-Powered Laptop/ Satellite Link for Rural African Use
9:15 ECE 480	Norfolk Southern	J. Hughes	F. Salem	Electrical Conductivity Tester for Railroad Ties
10:00 ECE 480	Air Force Research Laboratory	B. Kent	S. Balasubramaniam	Speed & Distance Sensor for Skiers and Snowboarders
10:25 ME 481	Whirlpool Corporation	J. Martin, B. Brown-West	A. Bénard	Eco-Efficiency Components for a Clothes Dryer
10:50 ME 481	Tecumseh Products Company	R. Bunch, J. O'Leary, M. Misiak	A. Engeda	Optimized Tooling for Scroll Wraps
11:15 ME 481	BorgWarner Thermal Systems	D. Buckley, D. Pickleman, T. Trembull	N. Wright	Forced Conduction Clutch Base Design
11:40 ME 481	Louis Padnos Iron & Metal Company	M. Przekadzinski	B. Thompson	Plastic Shredding System
12:05 ME 481	MACSTEEL Jackson Division	J. Root	D. Ki	Best Practice Calculator for Straightening and Multi-Cutting

MSU RCPD, MIDLAND ROTARY AND CHRYSLER FOUNDATION: BEEP BASEBALL BASE CONTROLLER

Our design team is redesigning the base beep controller for use in the game of beep baseball, a variation of baseball played by the visually impaired. The current bases used in tournaments across the country use a controller that is physically wired to the bases, activating at random, at the command of a sighted official, one of the bases to beep after the ball has been hit. The new controller will communicate with the bases through low-power wireless technology, thus reducing the setup time of the equipment and reducing the wear and tear on the base/controller system due to physical damage of the wiring.

The fall, 2007, capstone design team created a prototype wireless controller for the inflatable bases they designed, but this device was mechanically unreliable, bulky, and packaged in a manner that was difficult to mass produce. Our controller will operate in two different modes, one for testing the equipment and another for regular game play. In test mode, signals are sent to each base on command. In game mode, the controller operator can only issue the command for a random base to start beeping, preventing a bias in base selection. The power supply of the controller includes the convenient features of an integrated battery charging port and an LED battery status indicator.

Our team seeks to design a controller that is compact, easy to use, has a long battery life, and introduces additional functionality. A key concern for the controller is to reduce unit cost and generate a design that meets professional standards for aesthetic appearance and reliable, inexpensive manufacture.

Participation of the Resource Center for Persons with Disabilities is supported under grants from the Wochholz Endowment and Marathon Oil.

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



P. Suchyta
Computer Eng



J. Yancy
Computer Eng



K. Booker
Electrical Eng



K. Fells
Electrical Eng



K. M. Saufee
Electrical Eng

The Chrysler Foundation



Resource Center for
Persons with Disabilities



Mr. Blosser



Prof. Deller



Project Sponsor
Midland Michigan
Rotary Club and MSU
Resource Center
for Persons with
Disabilities

**Sponsor
Representative**
Mr. Stephen Blosser

Faculty Facilitator
Prof. John Deller

**Team Members
Non-Technical Roles**
Jerome Yancy
Manager

Khalid Mohd Saufee
Webmaster

Kenneth Booker
Documentation Prep

Kevin Fells
Presentation Prep

Paul Suchyta
Lab Coordinator

MSU RCPD AND CHRYSLER FOUNDATION: SIP AND PUFF INTERFACE TO AN ALL-IN-ONE CONTROLLER

Every day, people with limited mobility are left feeling stranded. Many of them lack the means to control even their household devices, and they have to rely on others to perform such tasks. The goal of this project is to develop a device that will help give additional independence to those who have a very restricted movement repertoire. This device, which is known as an environmental control unit, allows a person with limited mobility to control wirelessly several of their household appliances and other electronic devices. These include devices such as televisions, radios, lamps, thermostats, door locks, and many more. The unit is controlled by a sip and puff interface, which allows a user to simply sip or puff into a straw in order to make various selections on an LCD screen.

The unit is fully programmable, and therefore it is not restricted to control of only certain brands of devices. This project, sponsored by the *MSU Resource Center for Persons with Disabilities* and supported under grants from its Wochholz Endowment, the *Chrysler Foundation* and *Marathon Oil*, offers a person with limited mobility the power to regain some physical freedom at a very reasonable price. As a result of such technology, fewer people will be constrained by physical limitations due to the high cost of accommodation technology. In short, this device offers the functionality to allow a person with limited mobility to control various household electronics, at a cost that makes it affordable for many.

<http://www.egr.msu.edu/classes/ece480/goodman/spring08/group02/>



R. Cantor
Computer Eng



P. Jovanoski
Computer Eng



K. Kleszcz
Electrical Eng



B. Dilevski
Electrical Eng



K. Kryskowski
Electrical Eng

The Chrysler Foundation



Resource Center for
Persons with Disabilities



Mr. Blosser



Prof. Deller



Project Sponsor
*MSU Resource Center
for Persons with
Disabilities*

**Sponsor
Representative**
Stephen Blosser

Faculty Facilitator
Dr. John Deller

**Team Members
Non-Technical Roles**
Borce Dilevski
Manager

Richard Cantor
Webmaster

Kelly Kryskowski
Documentation Prep

Ken Kleszcz
Presentation Prep

Petar Jovanoski
Lab Coordinator

LENOVO CORPORATION: SOLAR-POWERED LAPTOP/ SATELLITE LINK FOR RURAL AFRICAN USE

Our project, sponsored by *Lenovo Corporation*, is to develop a rugged and low-cost power system using energy generated from solar panels to provide power for a satellite communications system and laptop for use in areas of rural Africa with limited or nonexistent electrical or network infrastructure.

Working in conjunction with a student team from MSU's Department of Telecommunication, Information Studies and Media who will design the satellite access, we aim to provide people in rural Africa with computer and internet access in order to improve their quality of life by opening up new commercial, educational, health, and social opportunities. This project is consistent with MSU's mission to convey knowledge and apply research for the benefit of the public, as well as *Lenovo Corporation's* social responsibility goals.

We have developed a power delivery system that is a fraction of the cost of commercially available systems while still maintaining functionality, safety, robustness, and usability of these more expensive systems. The system will be able to be operated with minimal training and user intervention and will allow the use of the laptop and a satellite communications link for an adequate portion of each 24-hour period.

The potential implications of this project are enormous, as it provides a base for additional research and development to provide internet access in developing nations.

<http://www.egr.msu.edu/classes/ece480/goodman/spring08/group03>



M. Jastrzebski
Computer Eng



M. Abbey
Electrical Eng



I. McLaurin
Electrical Eng



A. Mujkic
Electrical Eng



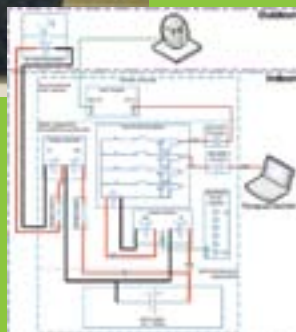
N. Tram
Electrical Eng



Dr. DeMaagd



Prof. Aslam



Project Sponsor
Lenovo Corporation

Faculty-Sponsor Representative
Dr. Kurt DeMaagd

Faculty Facilitator
Dr. Dean Aslam

Team Members Non-Technical Roles

Almir Mujkic
Manager

Marquise Abbey
Webmaster

Ian McLaurin
Documentation Prep

Matt Jastrzebski
Presentation Prep

Nick Tram
Lab Coordinator

NORFOLK SOUTHERN: ELECTRICAL CONDUCTIVITY TESTER FOR RAILROAD TIES

Norfolk Southern Corp. is currently researching and testing the conductivity of wooden railroad crossties. If crossties are too conductive, they can cause spurious activation of railroad crossing signals, for example. The sponsor wants a smaller, more accurate instrument that will allow for faster testing. Dry wood normally acts as a good insulator, but as the moisture content increases, so does the electrical conductivity. The chemical preservatives used to treat wood ties also change the conductivity. Therefore, the conductivity is nonlinear and cannot be determined by the moisture content alone. The proposed conductivity measuring instrument for railroad crossties must be reliable, accurate, and portable, but must also function in a variety of environments. Analysis of the data can indicate the effects of crossties with different chemical and moisture contents on signal operation. Our device will feature the following:

- Conductance Measurement
- Temperature Sensor
- Humidity Sensor
- Moisture Content Calculation
- Real-Time Clock
- Data Storage and Computer Transfer

<http://www.egr.msu.edu/classes/ece480/goodman/spring08/group09/>



P. Anselmi
Electrical Eng



B. Graca
Electrical Eng



A. Nashriq
Electrical Eng



J. Quick
Electrical Eng



V. Singh
Electrical Eng



Mr. Hughes



Prof. Salem



Project Sponsor
Norfolk Southern Corp.

Sponsor Representative
Mr. Jack Hughes

Faculty Facilitator
Dr. Fathi Salem

Team Members
Non-Technical Roles

Julian Quick
Manager

Ahmad Nashriq Mutalib
Webmaster

Bradley Graca
Documentation Prep

Vikram Singh
Presentation Prep

Paul Anselmi
Lab Coordinator

USAF RESEARCH LAB: SPEED & DISTANCE SENSOR FOR SKIERS AND SNOWBOARDERS

Sponsored by the *US Air Force Research Laboratory*, Sensors Directorate located in Dayton, Ohio, Team Ten proposes a GPS-based solution to acquire and store a snowboarder or skier's distance traveled and speed during a run. The user will have access to stored data via an LCD display that will be disabled during motion as a safety feature. A user-definable inactivity period will power down the device to conserve power. The device will be a small, lightweight and reliable system that will not interfere with the user's activity.

Despite below-average snowfall and abnormally warm weather, 55.1 million people visited the ski slopes during the 2006/2007 season in North America alone. Skiing and snowboarding are popular as recreational activities and competitive sports, yet it is very difficult for participants to monitor their performance. Slope distances are seldom marked out, which leaves the skier or snowboarder unaware as to how far and at what speed they have traveled during a run. This information would be useful in performance tracking for the competitive participant or as an incidental reference to the recreational skier or snowboarder. At the same time, it is important that the participant not be distracted by this potentially attractive nuisance during a run, which makes many existing devices unsafe to use.



M. Blair
Computer Eng
G. Cropsey
Computer Eng
M. Lambert
Computer Eng



A. McCloy
Electrical Eng
R. Vermurlen
Electrical Eng



<http://www.egr.msu.edu/classes/ece480/goodman/spring08/group10/>



Dr. Kent



Prof. Balasubramaniam



Project Sponsor
Air Force Research Laboratory

Sponsor Representative
Dr. Brian Kent

Faculty Facilitator
Dr. Shanker Balasubramaniam

Team Members Non-Technical Roles

Mark Blair
Manager

Gabriel Cropsey
Webmaster

Matthew Lambert
Documentation Prep

Robert Vermurlen
Presentation Prep

Aaron McCloy
Lab Coordinator

WHIRLPOOL CORPORATION: ECO-EFFICIENCY COMPONENTS FOR A CLOTHES DRYER

Whirlpool Corporation is the world's leading corporation in the manufacturing and marketing of home appliances. It was founded in 1911 in St. Joseph, Michigan. Today it employs 73,000 people in more than 70 offices and manufacturing plants around the world. Whirlpool is committed to making appliances that are more energy efficient and better for the environment. Its main goal in this project was for us to implement energy saving devices into its product to reduce energy costs for the consumer.

In today's world, people are more concerned with the environment and energy savings. The laundry cycle is one area that has room for a lot of improvement. Clothes dryers use a large amount of energy during the cycle and have had little research done to improve their efficiency. By improving the efficiency of the clothes dryer it will save the consumer money and reduce the impact dryers have on the environment.

This project was a continuation of the project from the fall semester. Using their research and suggestions, an air-air heat exchanger was decided as the most viable option to increase the efficiency of the clothes dryer. The air-air heat exchanger will use the exhaust air to pre-heat the intake air of the dryer to reduce the energy used to heat the air.

Many air-air heat exchangers were researched using NTU and efficiency calculations. Based on these calculations a flat plate heat exchanger was chosen, and it was implemented using an existing pedestal design from Whirlpool. Actual efficiency and temperature values were found after the heat exchanger had been installed. The design showed great promise and could prove to be the future of energy savings in household clothes dryers.

...The Whirlpool Corporation Student Design Team



Ms. Martin



Ms. Brown-West

Water and energy efficiency are quickly emerging as top drivers for consumer value. In order to maintain competitive advantage and support the needs of consumers, Whirlpool is looking to develop innovative products that apply new technologies and design to the washer and dryer for drastically improved water and energy efficiency.

Julie Martin,
Whirlpool Corporation



Prof. B nard

Project Sponsor
Whirlpool Corporation
Benton Harbor, Michigan

Professional Advisors
Ms. Julie Martin
Ms. Boma Brown-West

Faculty Advisor
Prof. Andre B nard

Team Members and Home Towns
Andrew Abramowski
Dearborn, Michigan

Aaron Butler
Applegate, Michigan

Patrick Cadigan
Lincoln Park, Michigan

Aaron Hall
Sturgis, Michigan

TECUMSEH PRODUCTS COMPANY: OPTIMIZED TOOLING FOR SCROLL WRAPS

Tecumseh Products Company is an independent global manufacturer that provides a wide range of products and services. Its products are sold in over 110 countries throughout the world and are manufactured in 15 factories in the following continents: North America, South America, Europe, and Asia.

Tecumseh Products Company is comprised of subsidiary businesses such as the Tecumseh Compressor Company. The Tecumseh Compressor Company is based in Tecumseh, Michigan and is one of the largest manufactures of hermetic compressors for air conditioning and refrigeration products. Its compressors can be found in household products as well as in commercial uses such as large scale coolers in supermarkets and restaurants.

Our project focused on the tooling used to manufacture a scroll wrap compressor, which is one of the three types of compressors produced by the Tecumseh Compressor Company. During the manufacturing of the scroll wrap compressors, end mill cutters used in this process become dull, chipped, or broken. These old cutters can be used to create new cutters by regrinding and sharpening the old ones. By reusing the old cutter the company can generate a huge savings in its manufacturing cost. The Tecumseh Products Company wants to maximize its savings by maximizing the use of its cutters. Our goal was to find a process to extend the use of each cutter as much as possible.

In order to achieve this goal, technical data on the cutters and the scroll wrap compressors was collected and analyzed. This information was used to plan the use of end mill cutters through their multiple stages of application during the manufacturing process. The main restriction in the project was the geometric properties of the cutters and the scroll wrap compressors. The cutters were divided into different classes according to their function, which constrains how the cutter can be reground.

...The Tecumseh Products Company Student Design Team



Tecumseh



Mr. Misiak



Mr. Bunch

The manufacturing of scroll involutes require the geometry of a cutting tool to be very accurate and usually results in a high perishable tool cost. To compete in today's economy, we must maximize the use of our cutting tools and keep the cost as low as possible. By making design changes to the end mill and establishing a regrind criteria, we have been able to maximize the utilization of the cutters. This maximization has resulted in a significant reduction in our perishable tool cost/piece and in turn allows us to better compete in today's economy.

Project Sponsor
Tecumseh Products Company
 Tecumseh, Michigan

Professional Advisors
 Mr. Rick Bunch
 Mr. Mike Misiak
 Mr. Jack O'Leary

Faculty Advisor
 Prof. Abraham Engeda

Team Members and Home Towns
 Tiffany Di Petta
 Rochester, Michigan

Shuhaimi Mokhtar
 Kuala Lumpur

Hadri Salim
 Seremban, Malaysia

Boon Tiing Yong
 Singapore, Singapore



Mr. O'Leary



Prof. Engeda

Mike Misiak
 Manufacturing Engineer Manager
 Tecumseh Products Company

BORGWARNER THERMAL SYSTEMS: FORCED CONDUCTION CLUTCH BASE DESIGN

BorgWarner is an international company that specializes in automotive thermal systems, engines, and drivetrains. *BorgWarner Thermal Systems* is located in Marshall, MI and is the leading designer and supplier of engine thermal management components for global vehicle manufacturers and aftermarket applications.

Within *BorgWarner Thermal Systems* is a revolutionary new product called Cool Logic™. This product has recently been introduced to the commercial truck and off-road industry. The Cool Logic™ fan drive is electronically controlled and maintenance-free. Not only does it provide improved fuel economy, it also meets the needs of the tough North American heavy-duty-truck emissions requirements. The Cool Logic™ fan also provides extended life for the entire cooling system, including the radiator and charge air cooler, thus reducing operating costs.

Currently, the Cool Logic™ product uses an unnecessary amount of energy when the fan clutch is fully engaged. Our task was to enhance slip heat capacity while minimizing installation complexity. This design requires the management of product variables that include coolant flow rate, heat transfer, and pressure losses.

...*The BorgWarner Thermal Systems Student Design Team*



Mr. Buckley



Mr. Pickleman

The heat dissipation modification will be the first major value-added improvement to a new engine cooling module design recently introduced to and well received by the commercial truck and off-road industry.

Don Buckley
Senior Product Engineer
BorgWarner Thermal Systems



Mr. Trembreull



Prof. Wright

Project Sponsor
BorgWarner Thermal Systems
Marshall, Michigan

Professional Advisors
Mr. Don Buckley
Mr. Dale Pickleman
Mr. Tom Trembreull

Faculty Advisor
Prof. Neil Wright

Team Members and Home Towns
Michael Cooper
Troy, Michigan

Paul Crockett
Holt, Michigan

Michael Hagedorn
Northville, Michigan

Justin Rumao
Canton, Michigan

LOUIS PADNOS IRON & METAL COMPANY: PLASTIC SHREDDING SYSTEM

The *Louis Padnos Iron & Metal Company* is a family owned and operated company whose headquarters are situated in Holland, Michigan. It specializes in recycling scrap metal and has recently ventured into plastics recycling. This highly successful enterprise is on the verge of greatly expanding its plastics division with the increased demand for recycling. The primary plastic processing plant, located in Grandville, receives a large variety of plastic products ranging in size, shape, and type. Its current plastic recycling process requires embedded metal to be manually removed, when possible, before shredding and granulating. This process is labor intensive and has motivated the need for a shredding and sorting system capable of separating the plastic pieces from embedded non-plastic materials.

Louis Padnos Iron & Metal Company asked the Design Team to identify a shredding system that can efficiently shred plastic parts that have embedded metal pieces. After shredding, the non-plastic pieces must be removed from the stream without the use of personnel.

To accomplish this goal the Design Team researched various systems that are commercially available and qualitatively weighed them against the design specifications. In addition, a line was designed that loaded the shredder with materials, sorting them into a 100% pure output of shredded plastic.

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



Mr. Przekadzinski



Prof. Thompson

A successful shredding system will increase production and decrease operating cost by reducing labor required to remove non-plastic material from the input stream.

Mr. Martin Przekadzinski
Operations Coordinator
Louis Padnos Iron & Metal Company

Project Sponsor
Louis Padnos Iron & Metal Company
Holland, Michigan

Professional Advisor
Mr. Martin Przekadzinski

Faculty Advisor
Prof. Brian Thompson

Team Members and Home Towns
Alex Bellinson
Ann Arbor, Michigan

Brandon Bouchard
Trenton, Michigan

Justin Bradford
Bloomfield Hills, Michigan

Mike Gyetvai
Oldcastle, Ontario

MACSTEEL JACKSON DIVISION: BEST PRACTICE CALCULATOR FOR STRAIGHTENING AND MULTI-CUTTING

MACSTEEL is a world class steel bar producer in North America. Located in Jackson, Michigan, MACSTEEL is one of the only companies that implements an advanced rotary continuous casting process to produce steel bars. After the casting, MACSTEEL quenches and heat treats the steel to meet a variety of customer specifications. MACSTEEL supplies steel to a host of international clients, including General Dynamics, Honda, General Motors, Remington, and Bharat.

The focus of our project was working on the development of a best practice calculator for the bar straightening process. This is an important key to developing standards for the operators, along with giving a basis for new operators to work from.

To perform these tasks we needed to find linear trends between the feed speed of the straightener machine and the diameter of the bar. By making an Excel file sheet that is adaptable to changes in equipment and able to be updated, we were able to provide a guide for new workers without losing productivity.

Our project also included a related task on the multi-cutting machine. This involved researching speeds, tooling, and machine guidelines to increase productivity and streamline the cutting process.

For the multi-cutting machine, research had to be done on the tooling and capabilities of the machines. This enabled us to set up a proper guideline for total cut time of each component.

... *The MACSTEEL Student Design Team*



Mr. Root



Prof. Ki

The best practice calculator for the bar straightener will provide a useful guide for our newly hired operators. Providing the proper power output and bar speed for these operators will help keep our production levels during the training process. The calculator for the multi-cutter will help find acceptable operating limits for this device, preventing damage, increasing productivity, and ensuring product longevity.

Jim Root
General Foreman
MACSTEEL Jackson Division

Project Sponsor

MACSTEEL
Jackson, Michigan

Professional

Advisor
Mr. Jim Root

Faculty Advisor

Prof. David Ki

Team Members and Home Towns

Mark Benton
East Lansing, Michigan

Eric Krajewski
West Bloomfield,
Michigan

Erik Marshall
Edwardsburg, 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.



<http://delphi.com/>

DELPHI

**Brake Systems
Automotive Holdings Group**

Audio Enthusiasts and Engineers

**Design Days:
Thursday 24th April &
Friday 25th April
9 a.m. 'til noon**

**Come and HEAR us in the
Billiard Room**

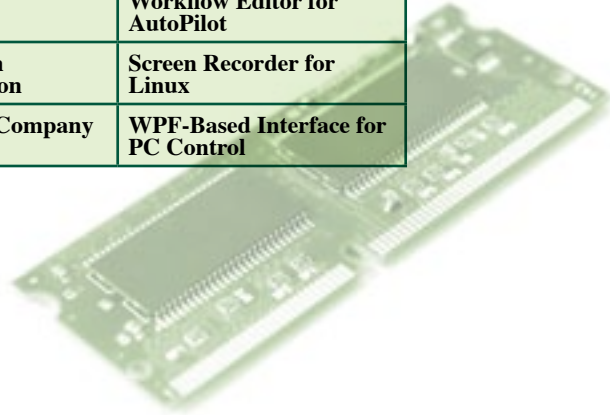


COMPUTER SCIENCE AND ENGINEERING DESIGN PROJECTS

PRESENTATION SCHEDULE – Lake Erie Room

Prof. Wayne Dyksen

Time	Company	Project Title
7:35 CSE 498	Auto-Owners Insurance Company	Vendor Tracking System
8:00 CSE 498	The Boeing Company	Poseidon Executor 2008
8:25 CSE 498	Ford Motor Company	Ford Sensor Showroom
8:50 CSE 498	IBM	Power Hypervisor Testing Suite
9:15 CSE 498	MATRIX	Distributed Checksum Calculation for KORA
9:40 CSE 498	Microsoft	MUD: A Web-Based Multi-User Drawing Surface
10:05 CSE 498	Motorola	Advanced Network Fault Management
10:30 CSE 498	Sircon	Workflow Editor for AutoPilot
10:55 CSE 498	TechSmith Corporation	Screen Recorder for Linux
11:20 CSE 498	The Toro Company	WPF-Based Interface for PC Control



AUTO-OWNERS INSURANCE COMPANY VENDOR TRACKING SYSTEM

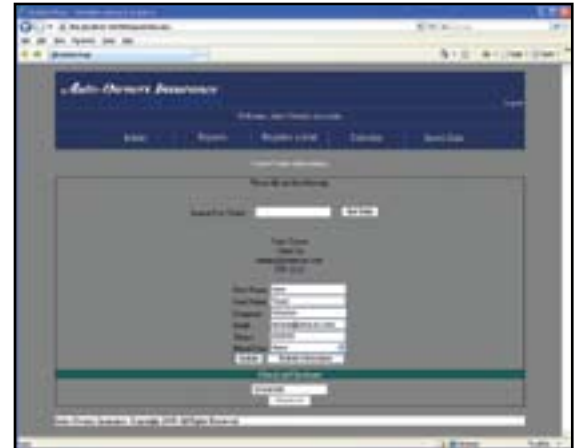
Imagine that every time you went to a store, before you could shop at the store, you had to stop and write down your name, what you were there to buy, the time of day, and other information. The time that this process takes could be time that you could be shopping in the store. The Vendor Tracking System we have developed will help minimize the time requirements of this process.

Once our system is implemented at *Auto-Owners'* facility, it will greatly streamline visitor management. When a visitor arrives at *Auto-Owners*, instead of writing down all their information, they will instead type their information into a computer. Following that, they will be given a visitor tag to wear while they are in the building. The visitor tag will be equipped with a bar code which will be assigned to the visitor for the duration of their visit.

When the visitor wants to leave, all they need to do is hand their tag to the administrative assistant, who can just scan the barcode as the visitor walks out the door to tell the system that the visitor is no longer in the building.

Since they are entering their information on a computer instead of on paper, the next time a visitor comes, all their information is already in the system and they just have to give their name.

Auto-Owners employees are also able to register a visit for the future and to have an email sent when that person arrives. The Vendor Tracking System even allows you to run reports of all visits in the system, past, present and future.



Michigan State University Team Members (left to right)

Nicholas Frattaroli
Sterling Heights, Michigan

Ken Davidson
White Lake, Michigan

Clayton Boylan
East Grand Rapids, Michigan

Auto-Owners Insurance Corporate Sponsors

Robert Buchanan
Lansing, Michigan

Scott Lake
Lansing, Michigan

Doug Pohl
Lansing, Michigan

THE BOEING COMPANY

POSEIDON EXECUTOR 2008

The Poseidon Executor 2008 is a flight simulator for *Boeing's* new P-8A Poseidon, a long-range, submarine-hunting aircraft.

The Poseidon airframe is based on the Boeing 737, one of the most successful commercial airliners. The Poseidon is being equipped with advanced electronics systems that will give it unmatched capabilities for intelligence, surveillance, and reconnaissance missions.

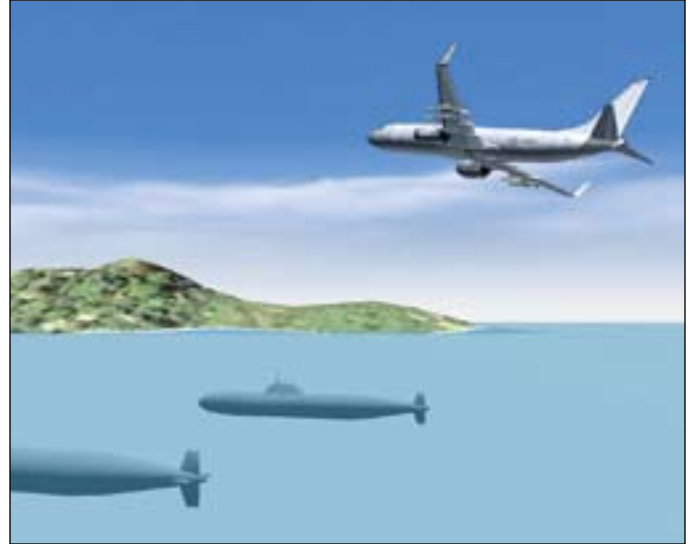
The Poseidon Executor 2008 includes an all-purpose user interface, which is responsible for launching and managing all of the components required by the flight simulator.

Our simulator allows for several methods of flight control, including auto-pilot from a computer file as well as manual control via a keyboard, mouse, or joystick.

Along with controlling flight, a user can customize the simulator to create and run scenarios. Configurable aspects include camera views, weapon systems, terrain, environment, other aircraft, and enemy submarines.

Components of the simulator communicate with each other using a computer network. Much like online multiplayer gaming, users in separate physical locations are able to actively participate in the same simulation.

CIGI, the Common Image Generator Interface, is the basis for the Poseidon Executor 2008. CIGI is an open source project currently under development by *Boeing*. This project is a Microsoft MFC application written in C# and C++.



Michigan State University

Team Members (left to right)

Steve Emelander
Grand Rapids, Michigan

Tom Stark
Rockford, Michigan

Scott Walenty
Harrison, Michigan

Nick Thrower
Portage, Michigan

The Boeing Company

Corporate Sponsors

Bob Feldmann
Renton, Washington

Jayson Vincent
St. Louis, Missouri

Steve Yallaly
St. Louis, Missouri

FORD MOTOR COMPANY

FORD SENSOR SHOWROOM

The Ford Motor Company will remodel or refresh 70% of its vehicles by year end 2008. With new cars comes the need to develop an innovative technological solution to track the popularity of new launches and concepts.

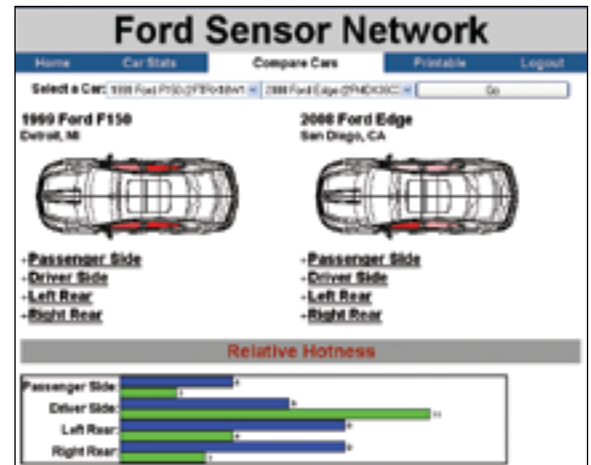
Wireless sensors are becoming increasingly more intelligent with the ability to obtain several types of data including, but not limited to, light, temperature, humidity, and movement.

The Ford Sensor Showroom takes advantage of the capabilities of wireless sensors and integrates them with a graphical web application to provide useful representations of the data collected through the sensor network.

Information from actions such as a door being opened or seat being occupied is interpreted and reported by the sensors to a central database. From there, the data is displayed as colored wireframes, bar graphs, and simple text.

In order to be usable on a large scale, the Showroom is designed to support the addition and configuration of any number of vehicles and sensors to the system which can be configured through the web interface.

The system uses the Crossbow Imote2 wireless sensors in a network that allows the sensors to communicate with a base station or to other sensors if the base is out of range. The sensors are programmed using C# and transmit data from the base station through a mini-USB port to a MySQL database.



Michigan State University Team Members (left to right)

Nathan Crosty
Hamilton, Ontario

Austin Drouare
East Lansing, Michigan

Colin Nemchik
Clinton Township, Michigan

Devin Schnepf
DeWitt, Michigan

Ford Motor Company Corporate Sponsors

Michael Volk
Dearborn, Michigan

Matthew Whitaker
Dearborn, Michigan

IBM POWER HYPERVISOR TESTING SUITE

On most systems the CPU is vastly under-utilized. In fact often 85-95% of any given CPU's time is time spent idle.

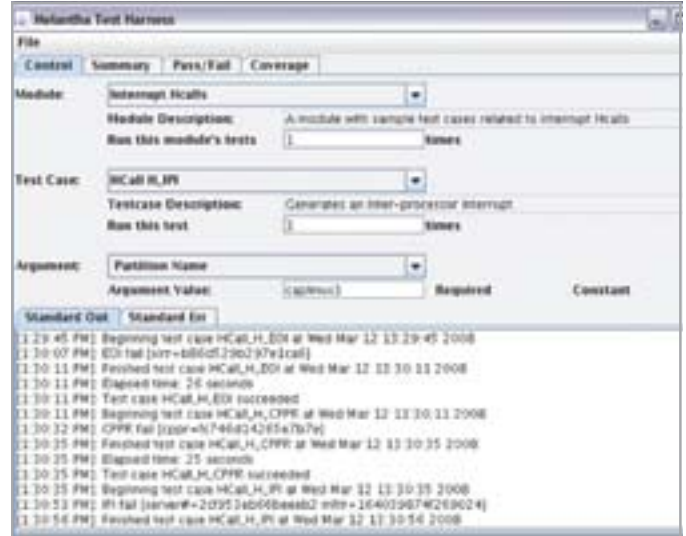
The POWER Hypervisor, developed by *IBM*, can help to combat this inefficiency. This system allows many separate operating system images to share a single physical system and it's resources, keeping the performance of each image as near as possible as running the bare hardware.

However, any errors in the POWER Hypervisor layer could not only cause one partition to fail but also could compromise system integrity and crash the entire system along with all the partitions that may be running. In order to rigorously test for this possibility, we have created a Test Suite with intelligent Test Cases, using commands to the Hypervisor called 'hcalls'.

Test Modules, composed of separate hcall Test Cases are loaded into Sessions, which allows for the quick retrieval of parameters and values. All the parameters needed to run the Test Modules can be read from a separate file, or they can be defined manually in the Settings tab.

When the a Session is started, it will proceed to test the Hypervisor layer with the provided Test Modules. The immediate results of the Test Cases are displayed in the Standard Out tab, and a more detailed analysis can be found in the Summary, Pass/Fail, and Coverage Tabs.

The Test Harness Interface is written in Java. The Test Modules are written using Perl.



Michigan State University
Team Members (left to right)

Joshua Roys
West Bloomfield, Michigan

Jordan Fish
Grosse Pointe, Michigan

Scott Judd
Mason, Michigan

IBM
Corporate Sponsors

Jim Effle
Rochester, Minnesota

Dave Engebretsen
Rochester, Minnesota

Nathan Fontenot
Austin, Texas

Andres Gonzales
Rochester, Minnesota

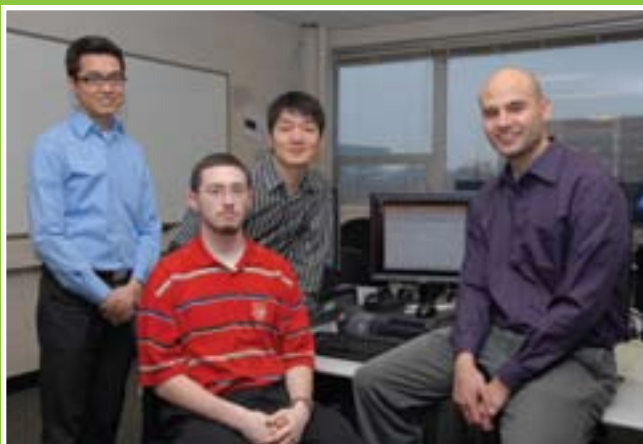
MATRIX: The Center for Humane Arts, Letters & Social Sciences Online DISTRIBUTED CHECKSUM CALCULATION FOR KORA

Ever wonder how to detect errors in your data? At MSU's *MATRIX Center for Humane, Arts, and Sciences* this is a critical issue as they are building a digital archive called Kora that stores a large amount of multimedia data. By performing some simple logical arithmetic on a file you can obtain a unique value called a checksum to use in checking for errors.

What happens if we have lots of data? This is where the power of distributed computing comes in. Distributed computing is just another name for using multiple computers to work on different parts of a problem. Each file is a different part of the whole problem: detecting errors in the Kora archive.

How does this work? The system consists of 2 main software components: a server program which retrieves a list of the files that make up the Kora archive and assigns these files one by one to client programs. Each client program will retrieve the file that it's currently been assigned, perform the checksum computation, and return this checksum to the server. This is repeated until all the files in the archive have been checksummed. The server will then match the recently computed checksum for each file against a database of checksums. If the checksums don't match, the data has changed, which indicates an error.

The system was written in Python using the Parallel Python library and is designed to interface with a MySQL database.



Michigan State University
Team Members (left to right)

Dustin Manning
Sterling Heights, Michigan

Jared Wein
East Lansing, Michigan

Chung-Hi Kim
Seoul, South Korea

Chris Samiadji-Benthin
Grand Rapids, Michigan

MATRIX
Corporate Sponsor

Matthew Geimer
East Lansing, Michigan

Mark Kornbluh
East Lansing, Michigan

Dean Rehberger
East Lansing, Michigan

MICROSOFT

MUD: A WEB-BASED MULTI-USER DRAWING SURFACE

Engineers are often required to coordinate with colleagues located in other cities and countries. While phone calls and video conferences help facilitate communication between remote locations, there are certain forms of communication which are currently only possible in a face-to-face setting.

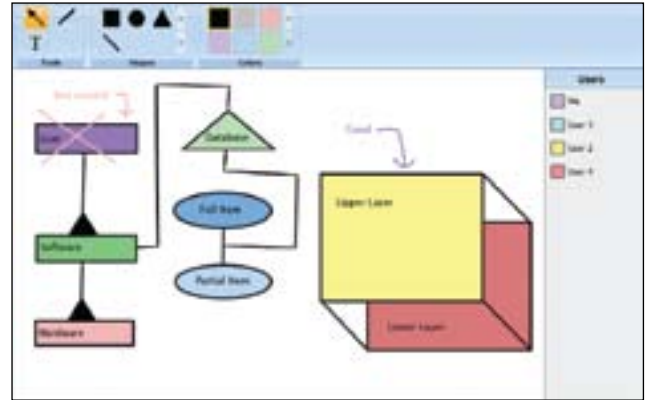
One such example is the usage of whiteboards for brainstorming ideas. Whiteboards are commonly used by engineers to quickly promote development and refinement of complex ideas in a collaborative fashion.

We have developed, for *Microsoft*, a web-based application which replicates this brainstorming process. The application that we have developed allows users to communicate ideas visually, regardless of physical location.

A user has the ability to quickly and easily create shapes, draw using the pen tool, or add text—all of which is instantly visible to all other participants. Anything on the canvas can be resized, moved, deleted, and have its color changed by any participant.

This real-time interaction over the web gives users a way to brainstorm like they do on a whiteboard, but with the added conveniences of modern technology. It is easier to reorganize or change a drawing, and allows users to collaborate instantly.

The Multi-User Drawing (MUD) Surface software was written in the *C#* programming language and uses *Microsoft's* new Silverlight technology. The application can be run on both Windows and Macintosh operating systems.



Michigan State University Team Members (left to right)

Charles Otto
Lansing, Michigan

Kirsten Partyka
Clarkston, Michigan

Sean Murphy
Royal Oak, Michigan

Rob Meyer
Ann Arbor, Michigan

Microsoft Corporate Sponsors

Shailesh Saini
Redmond, Washington

Maciej "Ski" Skierkowski
Redmond, Washington

MOTOROLA

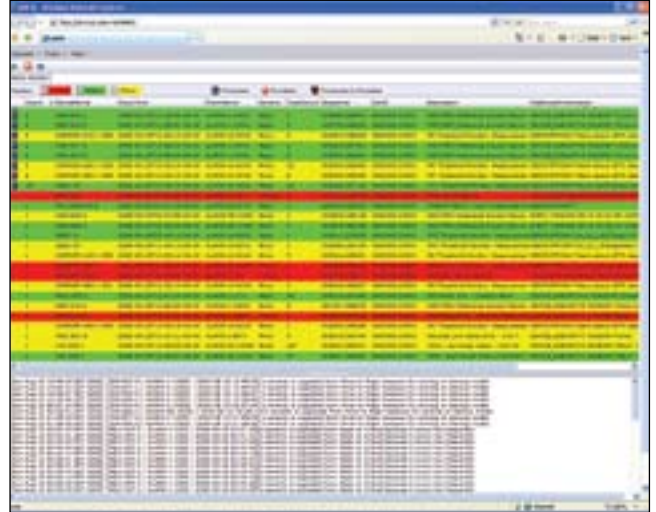
ADVANCED NETWORK FAULT MANAGEMENT

As networks become more important in our daily lives, the reliability of these networks becomes increasingly important. But all networks have problems, or faults. A major problem that network operators face is the immense volume of faults that occur. The goal of Advanced Network Fault Management is to improve a network administrator's experience by analyzing and organizing related network faults.

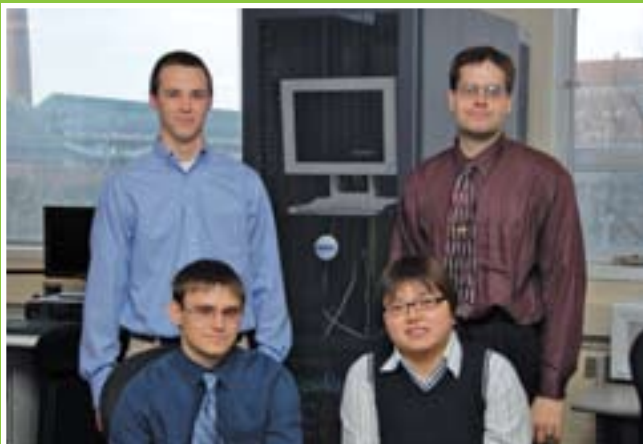
When a new fault occurs, it is compared to faults that have already occurred and analyzed by a set of rules in order to determine a severity level. These rules can be defined by the user, or they can be discovered automatically from past events.

If the same fault occurs multiple times, it will automatically be compressed into a single event and its severity level will be reevaluated based on the number of times it has happened. Likewise, if a fault is discovered to cause a chain reaction of faults all of the related faults will be correlated into a single event to help the network administrator focus on fixing the root of the problem.

A major advantage of Advanced Network Fault Management over other similar applications is that it is a distributed application that is accessed over a network from a standard web browser. This client-server architecture makes it far easier for network operators to deploy and manage the software. It also makes it feasible for many administrators in geographically diverse locations to work together to improve the reliability of both large and small networks.



MOTOROLA



Michigan State University
Team Members (left to right)

Matt Filipiak
Saginaw, Michigan

Dan Savoie
Brighton, Michigan

Tamy Liang
Okemos, Michigan

Kyle Shumaker
Lansing, Michigan

Motorola
Corporate Sponsor

Kabe VanderBaan
Schaumburg, Illinois

SIRCON

WORKFLOW EDITOR FOR AUTOPILOT

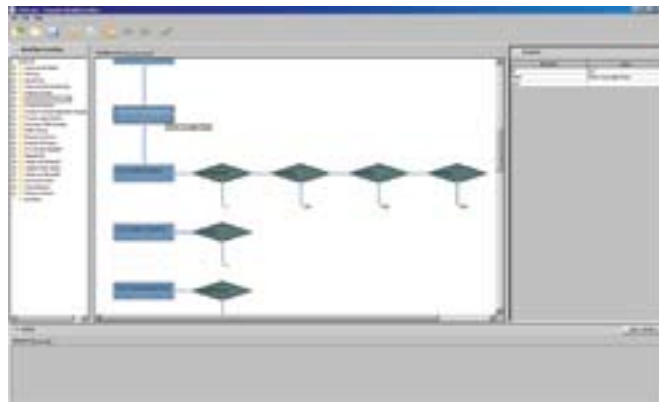
Sircon Corporation is one of the leading providers of software and services to the insurance industry. Sircon's software helps insurance carriers and state insurance regulators streamline their processes and improve efficiency.

Producer Express (PX) is a web-based application that automates the process of signing up to sell insurance for a given carrier. People who sell insurance are called producers. One of the central features of PX is AutoPilot, which automatically collects and processes producer information from a variety of sources. For this project, we focused on reducing the difficulty of setting up AutoPilot for a new PX customer.

Currently, Sircon's customers submit their process requirements to Sircon. A trained analyst configures AutoPilot to meet the requirements manually using Extensible Markup Language (XML), and PX reads and follows the configuration automatically.

To increase Sircon's productivity, we have created the AutoPilot Workflow Editor (AWE). Instead of writing in XML, Sircon's analysts will use AWE's graphical flowchart interface which makes the process much more intuitive.

This application was written using the Java programming language in the NetBeans development environment, and will run on the Windows XP operating system. AWE application generates the Extensible Markup Language (XML) files required to configure AutoPilot.



Michigan State University

Team Members (left to right)

Mark Aikman
Davison, Michigan

Akif Catal
Ankara, Turkey

Andrew Blossom
Rockford, Michigan

Matt Newman
Traverse City, Michigan

Sircon

Corporate Sponsors

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Jake Robb
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TECHSMITH CORPORATION SCREEN RECORDER FOR LINUX

When learning to do something new on your computer, have you ever thought, “Can’t I just watch an instructional movie of this with *video* of a computer screen?” *TechSmith*, based in Okemos, Michigan, is known around the world for software that creates such videos.

TechSmith has recently released a software project that allows, for the first time, a fully-automated suite of screen recording and publishing tools. It provides educators with a lightweight tool for capturing audio/video recordings of their Windows or Mac OS desktops, and discrete connectivity with a server computer set up with *TechSmith’s* software. This server computer publishes screen recordings, making them available as podcasts, on FTP servers, or on screencast.com.

Team *TechSmith’s* project is to investigate the feasibility of a Linux platform client. Thus, it will be functionally and visually the same as the Windows and Mac clients, which *TechSmith* has already developed. It will use an invisible uploader program to communicate with the server software. Screen recording on Linux platforms is accomplished in a much different way than for the Windows or Mac OS. Furthermore, the open-source community has already developed several methods of accomplishing task, which the team will utilize, improve, and encapsulate into an intuitive SDK (software developer kit).

Notable technologies implemented in this project will include C++, Qt, FFMPEG, XML, HTTPS, and Windows Server 2003.



Michigan State University
Team Members (left to right)

Ian Taylor
Mount Pleasant, MI

Mike Ezzo
Haslett, MI

Keith Barnes
Detroit, MI

Mike Harriman
Muskegon, MI

TechSmith Corporation
Corporate Sponsor

Dean Craven
Okemos, Michigan

Tony Lambert
Okemos, Michigan

Randy Schott
Okemos, Michigan

THE TORO COMPANY

WPF-BASED INTERFACE FOR PC CONTROL

Toro and a sister company, *Irritrol*, have designed a system for irrigation and lighting of residential and commercial properties where multiple watering and lighting zones can be controlled from one application on the user's PC.

Toro was actively looking for ways of enhancing the application to better reflect visual and system features of the Windows operating system. The application our team developed in response to this request is called PC Control.

The *Irritrol* system is comprised of a Controller that is mounted on location, a USB Remote, and the PC Control software. Each component requires a synchronized PIN number to ensure communication between all three components.

The areas of improvement that *Toro* is looking to explore in the existing software are the following: the interface is not very user friendly, the application runs slowly and communication with the remote is unreliable at best.

The new application is targeted specifically for Windows, both XP and Vista. The new application will take advantage of graphical tools newly available with Windows Vista. To improve communication with the remote, the software will directly interact with the operating system.

The new software is developed using Microsoft's .NET Framework, and is written in C#. The user interface is created using Windows Presentation Foundation, with Microsoft Expression Blend facilitating the development process.



Michigan State University Team Members (left to right)

Daniel Fiordalis
Kalamazoo, Michigan

Thomas Castellani Jr.
Clinton Township, Michigan

Matt Grabow
Troy, Michigan

Stephanie Cook
Midland, Michigan

The Toro Company Corporate Sponsors

Nathan Fujimoto
Riverside, California

Randy Pearson
Riverside, California

thank YOU

Computer Science Capstone Course Sponsors...

We thank the following companies for their generous support of the Department of Computer Science and Engineering and our senior capstone course lab:

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IBM Corporation
Rochester, Minnesota



Sircon
Okemos, Michigan



TechSmith Corporation
Okemos, Michigan



Tower

8:00 –10:45
Fourth Floor
Tower Room

ELECTRICAL AND COMPUTER ENGINEERING AND MECHANICAL ENGINEERING PROJECTS

PRESENTATION SCHEDULE —Tower Room

Course Coordinator: Prof. Erik Goodman

Faculty Advisors: Professors Salem, Aslam, Li, Gokcek

Time	Sponsor(s)	Project Contact(s)	Faculty Advisor	Project Title
8:00 ECE 480	NASA Goddard Space Flight Center	M. Comberiate	F. Salem	Ladar-Guided Control of Simple Robots From a "Mothership"
8:25 ECE 480	Robert Bosch LLC	C. Rostamzadeh	D. Aslam	A Low-Cost, Portable Electrostatic Discharge Gun
8:50 ECE 480	Gormley Systems Engineering	J. Gormley	T. Li	DigiDriveIV™ Platform Development
9:15 ECE 480	Lear Corporation	W. Maue J. Nathan	C. Gokcek	Motor and Geartrain Selection Software
10:00 ECE 480 & ME 481	MSU College of Engineering, MSU Office of the President	R. Church	C. Gokcek	Sparty Tank T-Shirt Shooter

NASA GODDARD: LADAR-GUIDED CONTROL OF SIMPLE ROBOTS FROM A "MOTHERSHIP"

Under sponsorship of *NASA Goddard Space Flight Center*, teams from Michigan State University and University of Maryland-College Park are working together on developing LADAR-guided control of simple robots from a "Mothership." *NASA* will receive the combined deliverables on May 30, 2008.

Our partners, a team of two electrical engineers and two computer engineers at University of Maryland-College Park, are working with us to develop a set of semi-autonomous simple worker bots with dead reckoning internal navigation, and a 3D scanning capability with image stitching for the controlling Mothership.

The team has refined and upgraded several components previously developed. These components include replacing a continuous motion, cyclical LADAR elevation mechanism with one based on a stepper motor to provide superior images, refining the 3D stitching and graphical user interface (GUI), reducing the speed of the robots without compromising torque, installing ultrasonic sensors on the simple robots, and enabling Wi-Fi communication between the Mothership command center and the peripheral worker bots. Replacing the LADAR's motor with a stepper motor will effectively resolve the distortion present in the previous image stitching. Upgrading the motor will result in a need to refine the GUI and 3D stitching from the development of spring, 2007. The speed of the robots interferes with accurate arrival to the commanded destination, so the voltage supplied needs to be reduced without compromising the ability to move correctly. Finally, in order to keep the robots from colliding with objects, ultrasonic sensors will be installed and included in the programming of the worker bots.



W. Chang
Electrical Eng



R. Dsouza
Electrical Eng



D. Jakeway
Electrical Eng



Q. Luo
Electrical Eng



D. Martin
Electrical Eng



<http://www.egr.msu.edu/classes/ece480/goodman/spring08/group08/>



Mr. Comberiate



Prof. Salem



Project Sponsor
NASA Goddard Space Flight Center

Sponsor Representative
Mr. Michael Comberiate

Faculty Facilitator
Dr. Fathi Salem

Team Members Non-Technical Roles
Daniel Martin
Manager

Weining Chang
Webmaster

Dan Jakeway
Documentation Prep

Raylene Dsouza
Presentation Prep

Qingxian Luo
Lab Coordinator

ROBERT BOSCH LLC: A LOW-COST, PORTABLE ELECTROSTATIC DISCHARGE GUN

Just by walking across the room, we can charge our bodies to over 35,000 volts. If we move near a metallic conductor, our stored charge can create a high-current, very brief spark between the conductor and the nearest part of our body. Such an event is called an electrostatic discharge. The discharge can be particularly intense if the relative humidity is below 20%. If the metallic conductor is connected to an electronic module, the high-current event can travel into the module and cause significant damage.

ESD is especially pervasive in the automotive industry, where humans are constantly in the vicinity of an automobile's electronics. In light of this, *Robert Bosch LLC* has asked us to design and build an ESD gun to test their electronic modules for ESD susceptibility.

An ESD gun works as follows: First, the gun is charged to a high voltage. Then a switch inside the gun quickly opens and close, allowing the stored charge to move onto the tip of the ESD gun. If the ESD gun is moved into the vicinity of a module with an exposed conductor, the charge will flow in a high-current spark from the tip of the ESD gun to the conductor. Now the ESD event is on the module. Later, the consequences of this ESD event can be evaluated.

Prices of ESD guns typically range from \$35,000 - \$50,000. They also require AC power. Our goal is to create a more cost-effective, more portable ESD gun, while maintaining the ability to accurately create an ESD event in accordance with the human body model.

<http://www.egr.msu.edu/classes/ece480/goodman/spring08/group05/>



M. Cloutier
Electrical Eng



S. Hatch
Electrical Eng



K. Swartz
Electrical Eng



C. Koliba
Computer Eng



N. Nalla
Computer Eng



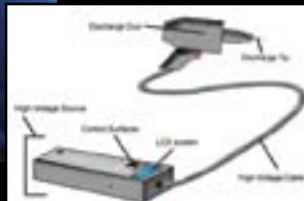
BOSCH
Invented for life



Mr. Rostamzadeh



Prof. Aslam



Project Sponsor
Robert Bosch LLC

Sponsor Representative
Mr. Cyrus Rostamzadeh

Faculty Facilitator
Dr. Dean Aslam

Team Members
Non-Technical Roles

Namruth Nalla
Manager

Chris Koliba
Webmaster

Kyle Swartz
Documentation Prep

Sean Hatch
Presentation Prep

Matt Cloutier
Lab Coordinator



GORMLEY SYSTEMS ENGINEERING: DigiDriveIV™ PLATFORM DEVELOPMENT

Our design team is designing and developing prototype implementations of the DigiDriveIV™ Platform, which integrates many options available to drivers. These options include GPS navigation, Bluetooth remote starting and unlocking of car doors, garage door opening, sending of emergency alert messages, streaming music, and getting diagnostic information on how your car is performing. The DigiDriveIV™ system will be realized on two different hardware platforms for different segments of the market: the first, a lower-cost solution, is based on a smart phone, and the second, more capable unit, is based on an embedded system within the car. Both systems will feature a touch screen displaying an easy-to-use and intuitive graphical user interface with controls for accessing various functions.

We are working with *Gormley Systems Engineering* to create the DigiDriveIV™ Platform. This platform will compete with current in-car platforms such as General Motors' OnStar and Ford/Microsoft's Sync. A successful project will be a solid proof of concept that will entice investment in DigiDrive IV™ to enable further development by *Gormley Systems Engineering* with the goal of bringing DigiDrive IV™ to market.

<http://www.egr.msu.edu/classes/ece480/goodman/spring08/group06/>



D. Looney
Electrical Eng N. Patino
Electrical Eng K. Raeb
Electrical Eng



F. M. Fishbeck
Computer Eng B. Urban
Computer Eng

DigiDrive IV™



Mr. Gormley



Prof. Li



Project Sponsor
Gormley Systems Engineering

Sponsor Representatives
Mr. Joe Gormley

Faculty Facilitator
Dr. Tongtong Li

Team Members
Non-Technical Roles
Benjamin Urban
Manager

F. Murray Fishbeck
Documentation Prep

Nicholas Patino
Presentation Prep

Kyle Raeb
Lab Coordinator

Devin Looney
Webmaster

LEAR CORPORATION: MOTOR AND GEARTRAIN SELECTION SOFTWARE

The automotive industry uses many electrical drive systems for applications including power windows, locks and seat systems. Motors are components of these electrical drive systems, but motors themselves do not usually provide the torques or speeds required. In order to solve this problem, these motors are often coupled with gear trains in order to trade off torque and speed, typically reducing speed and increasing torque.

Selecting suitable geartrain/motor combinations can be daunting, as many variables in the design must be considered in order to fulfill the application. Frictional losses in the geartrains and reduced motor speeds as a function of applied load must be taken into account.

The project includes designing a program to find first the important operating characteristics of a motor, and then to couple it with an appropriate gear train to produce a system that fits the application. Once the algorithm is developed, a program will be able to automate this process for a user for a specific application.

<http://www.egr.msu.edu/classes/ece480/goodman/spring08/group07>



A. Babel
Electrical Eng



M. Mullinger
Electrical Eng



K. Pace
Electrical Eng



O. Palazzolo
Electrical Eng



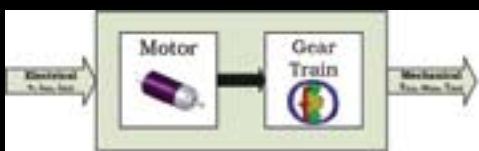
L. Wong
Electrical Eng



Mr. Maue



Prof. Gokcek



Project Sponsor
Lear Corporation

Sponsor Representatives
Mr. Winston Maue
Mr. John Nathan

Faculty Facilitator
Prof. Cevat Gokcek

Team Members
Non-Technical Roles

Kristen Pace
Manager

Andrew Babel
Webmaster

Michael Mullinger
Documentation Prep

Ottavio Palazzolo
Presentation Prep

Long Yi Wong
Lab Coordinator



MSU INTERCOLLEGIATE ATHLETICS: SPARTY TANK T-SHIRT SHOOTER

In the spring of 2007, an interdepartmental design team of seniors from both Electrical and Computer Engineering and Mechanical Engineering developed a tank capable of shooting T-Shirts into the crowd at Michigan State University sporting events. The popularity of this idea led MSU President Lou Anna Simon and Dean of Engineering Satish Udpa to suggest that a new and improved, larger Sparty Tank be designed to promote school spirit at home sporting events and possibly to advertise Michigan State University at professional sporting events. The original tank featured very limited mobility and firing capacity, and as such, the major objectives for this semester's work are to correct these shortcomings. The new design will also be larger to enhance the tank's visibility from the stands, but the weight will be kept to a minimum in order to maintain ease of transport for the tank.

To accomplish this task, a new design team has been formed consisting of four seniors each from Mechanical Engineering and Electrical and Computer Engineering. There are no initial specifications except for suggestions for improvement over the original design, made by Rick Church of Michigan State University's Sports Broadcasting, which operates the original tank. Among upgrades being considered are a wireless camera capable of supplying a live feed to the large screen display at sporting arenas. Costs incurred in the development of the new tank design will be borne by Michigan State University.

<http://www.egr.msu.edu/classes/ece480/goodman/spring08/group04/>



C. Ballard Computer Eng A. Lai Electrical Eng D. Tran Electrical Eng T. Tran Electrical Eng



B. Gower Mechanical Eng B. Grinnell Mechanical Eng K. Koepf Mechanical Eng A. Sneller Mechanical Eng



Mr. Church



Prof. Gokcek



Project Sponsors
 MSU College of Engineering
 MSU Office of the President

Sponsor Representative
 Mr. Rick Church

Faculty Facilitator
 Dr. Cevat Gokcek

Team Members Non-Technical Roles
 Alex Lai
 Manager

Chris Ballard
 Bryan Grinnell
 Co-Webmasters

Tim Tran
 Adam Sneller
 Documentation Prep

Kyle Koepf
 Presentation Prep

Danny Tran
 Blake Gower
 Lab Coordinators



CE 495 SENIOR DESIGN IN CIVIL ENGINEERING

INSTRUCTORS: Professors Baladi, Hatfield (emeritus) Khire, Maleck, Wallace

RESEARCH ASSOCIATE: Haider



Baladi



Hatfield



Khire



Maleck



Wallace



Haider

PROBLEM STATEMENT

In this one semester, required course, six teams of students have developed preliminary designs for MSU's new Farm Lane entrance to main campus. This new south entrance, running from Mt. Hope to near Trowbridge Rd., must meet government design requirements, protect Baker Woodlot, minimize the impact on the wetlands that lie to either side of Farm Lane just south of Trowbridge Rd., and provide an esthetically pleasing entrance to campus. Among other things, each team must consider the geometry of Farm Lane and the railroad bridge required just south of Trowbridge Rd., any modifications to the existing wetlands, the foundations for the bridge, the railroad and Farm Lane itself, a new paved parking area at Mt. Hope, storm-water drainage for the site, as well as, the total cost of the project. Each student writes a technical report covering their area of responsibility and each team writes a comprehensive final non-technical report describing their approach to the overall project. The presentations today are directed to a nontechnical audience and will be judged by a group of professionals with experience in this type of design.

PROFESSIONAL EVALUATORS

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

Daniel Christian, PE
Tetra Tech MPS
Lansing, MI

Gary Croskey, PE
MDOT (retired)
Lansing, MI

Dave Feher
C2AE
Lansing, MI

Gregory P. Garrett, PE
URS Corporation
Grand Rapids, MI

Jeremy Hedden, PE
Bergmann Associates, Inc.
Lansing, MI

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

Stu Kogge, PWS
Wetland and Coastal Res, Inc.

John LeFevre, PE
Fishbeck, Thompson, Carr &
Huber, Inc.
Lansing, MI

Tom Myers, PE
Wilcox Prof. Services, LLC
Lansing, MI

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

Michael R. Schorsch
Lansing Board of Water and Light
Lansing, MI

Michael J. Thelen, PE
Soil & Materials Engineers, Inc.
Lansing, MI

Phil Vogelsang, PE
URS Corporation
Grand Rapids, MI

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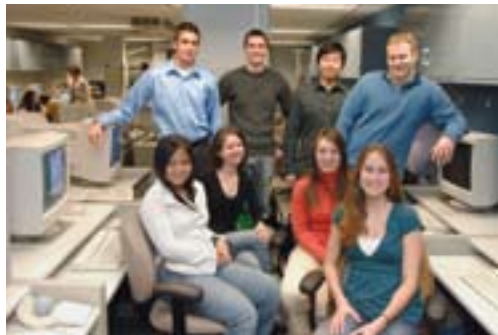
CE 495 SENIOR DESIGN IN CIVIL ENGINEERING



Team 1: Ana Petrovic, Brandon Elegert, Megan Nickell, Matthew Czapiga, Jenna Thelen, Joel Tichenor, Patrick Post (not pictured).



Team 2: Back: James Piasecki, Justin Schenkel, Michael Vought. Front: Amanda Westmoreland, Garrett Dees, Garett Urban, John Morse, Ethan McCarty.



Team 3: Back: Nikhil Singh, David Coger, Ting Wong, Chris Brookes. Front: Putri Jati, Michelle Wessely, Staci Deregnacourt, Stephanie Fox.



Team 4: Back: Whitney Carter, Andrew Ziegler. Front: Heather Thurston, Melissa Thompson, Therese Pasichnyk, Ryan Donaghy, Daniel Williams.



Team 5: Back: Zachary LaCroix, Bradley Fase, Leetal Levran. Front: Kristie Meserve, Peter Dunning, Christopher Bowker.



Team 6: Back: Kurt Kivisto, Andrew Minshall, Michael Hass. Front: Erik Ventura, Alexander Lundy, Razif Husin, Paul Izzo (not pictured).

TEAM	TIME	ROOM
1	8:20 a.m.	Lake Michigan Room
2	8:20 a.m.	MSU Room
3	9:40 a.m.	Lake Michigan Room
4	9:40 a.m.	MSU Room
5	11:00 a.m.	Lake Michigan Room
6	11:00 a.m.	MSU Room



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. On Design Day, the winners are selected by a panel of judges including CSE corporate partners and the department chairperson.



Chrysler Praxis Award: Team 3 IBM—Processor Folding for Linux on POWER *l-r: Mark Bernum, Josh Detwiler, Rick Rose (Chrysler), Ian De Silva (not pictured)*



Auto Owners Insurance Exposition Award: Team 6 TechSmith—Rich Media Collaboration *l-r: Tom Lavoy, Brandon Turner, Jason Conley, Chris Harter, Bob Buchanan (Auto Owners Insurance)*



TechSmith Screencast Award: Team 5 Sircon—GUI Configuration Tool for Interviews *l-r: Dean Craven (TechSmith), Ryan Abbott, Nicholas VanHowe, Ben Split, Mike Gracik*



Crowe Sigma Award: Team 4 Motorola—Management Console for the Agent Framework *l-r: Kevin Ohl (Crowe), David Dylegowski, Drew Breider, David Robishaw, Calvin Pinsuwan*



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 who engineers the most technically challenging software system will be recognized with the Chrysler Praxis Award, which is sponsored by Chrysler LLC of Auburn Hills, Michigan.



TechSmith Screencast Award

Each CSE 498 capstone team produces a video that describes and demonstrates their 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.



Auto-Owners Exposition Award

CS 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 from Design Day attendees. Each team will play their project videos and answer questions for a panel of judges. The CSE capstone team with the best overall Design Day performance will be honored with the Auto-Owners Exposition Award, which is sponsored by Auto-Owners Insurance Company of Lansing, Michigan.



Crowe 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 will be recognized with the Crowe Sigma Award, which is sponsored by Crowe Chizek and Company LLC, one of the nation's largest public accounting and consulting firms with twenty-two offices in nine states.

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: Lindsay Kredo, Andrew Coleman, Alan Katz, Jessica Theis

FALL 2007 ME 481 EDISON UNDERGRADUATE DESIGN AWARDS

First Place

The Appropriate Technology Design Collaborative: Vaccine Cooling for Remote Regions
Andrew Coleman
Alan Katz
Lindsay Kredo
Jessica Theis

Second Place

Motorola: Design and Development of a New Slider Mechanism for Cell Phones
Bryan Cooper
Julie Crane
Michael Hundt
Uday Mathur

Third Place

The Motorola Youth in Energy and Environment Humanitarian Project: Solar Powered Worm Compost Bin for Woodcreek Elementary School
Jillian Joliat
Caitlen Douthitt
Matheww Langenderfer
Bradley Wackerle

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: Michael Hundt, Uday Mathur, Julie Crane, Bryan Cooper

FALL 2007 ME 481 ORAL PRESENTATION AWARDS

First Place

Motorola: Design and Development of a New Slider Mechanism for Cell Phones
Bryce Cooper
Julie Crane
Michael Hundt
Uday Mathur

Second Place

The Appropriate Technology Design Collaborative: Vaccine Cooling for Remote Regions
Andrew Coleman
Alan Katz
Lindsay Kredo
Jessica Theis

Third Place

A Shell Oil Company Children's Humanitarian Project: Floor Hockey Walker for Joseph Wise
Patrick Eathorne
Brandon Goad
Patrick Grondin
Josh Maniago
Michael MacCallum

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: Benjamin Dreher, Jordan Hauser, Scott Stieber, Evan Detrone

FALL 2007 ME 481 OUTSTANDING POSTER AWARDS

First Place

Cummins & Barnard: Mercury Reduction Alternatives for the Alcoa Warrick Power Plant
Evan Detrone
Benjamin Dreher
Jordan Hauser
Scott Stieber

Second Place

The Appropriate Technology Design Collaborative: Vaccine Cooling for Remote Regions
Andrew Coleman
Alan Katz
Lindsay Kredo
Jessica Theis

Third Place

OG Services: Value Cap
Joshua Ewing
Andrew Kosinski
Jonathon Ostroski
David Ruddock

MSU Civil Engineering Infrastructure Laboratory: Mobile Impact Device for Bridge Inspections
Michael Fong
Arjang Gounelili
Benjamin Greyerbiehl
Sylvia Poplawska

Design Day Awards:

MICHIGAN STATE COLLEGE OF ENGINEERING

ME 471 Leonardo DaVinci Scholars

The student team members winning the ME 471 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.

FALL 2007 ME 471 LEONARDO DAVINCI SCHOLARS



First Place

Andrew Gryczan
Johannes Hertrich
Martin Priess

Second Place

Chris Caffee
Brian Smith
Bryan Wagenknecht

Third Place

Emily Duszynski
Kyle Koepf
Jonathon Luckhardt
Josh Thomet

l-r: Andrew Gryczan, Johannes Hertich, Martin Priess

Fall 2007 ME 412: 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.



First Place

Mark Benton
Adam Sneller
Paul Strefling

Second Place

Blake Gower
Andrew Howald
Evan Marks

Most Energy Transferred

Adam Brzycki
Justin McIver
Kevin Miller

l-r: Mark Benton, Paul Strefling, Adam Sneller

Mechanical Engineering: Fall 2007 ME 371 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 Kid's 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.



First Place

Logan Beam
Michael Maurer
Kunjan Patel
Kelly Peterson

Second Place

Steve Hammack
Mike Hines
Kevin McAlpine
Derek Riparip

Third Place

Ken Maisonville
Amanda Ruhno
Jenna Sandel
Matt Werner

l-r: Logan Beam, Kelly Peterson, Kunjan Patel, Michael Maurer

Fall 2007 ME 371 Mechanical Contraption Award Award

The best ME 371 project as determined by the faculty and students of the course receive the Mechanical Contraption Award.



First Place

Logan Beam
Michael Maurer
Kunjan Patel
Kelly Peterson

Second Place

Steve Hammack
Mike Hines
Kevin McAlpine
Derek Riparip

Third Place

Andrew Armstrong
Daniel Barlack
Tony Davis
Fadi Yousif

l-r: Logan Beam, Kelly Peterson, Kunjan Patel, Michael Maurer

EGR 410 Systems Methodology Best Presentation Award

Groups and visitors will choose the best presentation with the instructor acting as a tie-breaker. Groups will be judged on: Content, Breadth of Study, Presentation Skills, Relevance of Problem Chosen, and Presentation Quality

Design Day Awards:

MICHIGAN STATE COLLEGE OF ENGINEERING

Electrical and Computer Engineering Prism VentureWorks Prize: Fall 2007

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, computer science) 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 #3 – Trace Gas Sample Introduction System – (*Sponsor: MSU Department of Zoology*)



LEFT TO RIGHT:

David Lee Biegas, Paul Christian Streffling, Adam Mark Brannan, Benjamin James LeVesque, Matt Jennings, Joseph Trzemzalski, Don Restauri, Darren Andrew Ghiso, Dr. Erik Goodman

Second Place: Team #10 – Caught in the Dark
(*Sponsor: Dymax Engineering*)



LEFT TO RIGHT:

Mark Seal, Gerald McCann, Matthew D. Wesley, Kyle T. Proctor, Eric Kubacki, Dr. Erik Goodman

Third Place: Team #6 – Obstacle Avoiding Wall Climbing Robot – (*Sponsor: NSF/WIMS ERC*)



LEFT TO RIGHT:

Taylor Young, Christopher Zsenyuk, Tyler Furtwangler, Dan Guyon, Paul Nuss, Ryan Wahula, Dr. Erik Goodman

Design Day Awards:

MICHIGAN STATE COLLEGE OF ENGINEERING

Professor's Choice Award: Fall 2007

The Professor's Choice Award (\$1,500 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 #2 – Portable Audio- Visual Book Reader– (Sponsor: MSU Resource Center for Persons with Disabilities/Chrysler/Midland Michigan Rotary)



LEFT TO RIGHT:
Art Hallman, Francis Ifeanyi Okonkwo, James Yang, Jason Cooper, Jaeseung Shim, Dr. Erik Goodman

Electrical Engineering Capstone Poster Award

Each team in ECE 480, Senior Capstone Design, will be exhibiting a poster and items they have built during the semester and answering questions in the First Floor Lounge of the Union. Judging of the best poster/demo will be done by the groups of high school students participating in Design Days, based on their appeal and effectiveness in communicating the project goals and achievements. A prize of \$1000 will be awarded to the most outstanding team.

EGR 291 Freshman/Sophomore Winners—Team 16



LEFT TO RIGHT:
Christina Palm (Lab consultant and former EGR 291 winner – Spring 2005), Dr. Robert McGough (Course instructor), Russ Zarras (Lab consultant), Dave Seaton, Leon Voskov

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.





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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.

- Aeronautical Engineering
- Aerospace Engineering
- Business/Finance
- Chemical Engineering
- Civil Engineering
- Electrical Engineering
- Electromagnetic Engineering
- Embedded Software Engineering
- Industrial Engineering
- Manufacturing Engineering
- Material Science Engineering
- Mechanical Engineering
- Optics
- Payloads
- Physics/Math
- Propulsion
- Reliability Maintainability Testability Engineering
- Software Engineering
- Structures
- Systems Engineering

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"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.

SPRING 2008 PROGRAM

Thursday, April 24, 2008 Middle School Events Schedule

EVENTS	8 a.m.	9 a.m.	10 a.m.	11 a.m.	Noon
EGR 100 Cornerstone Poster Session		Ballroom (Front) 9:00 a.m. - noon			
Audio Enthusiasts & Engineers		Billard Room 9:00 a.m. - noon			
Engineering Student Organizations		2nd Floor Concourse 9:00 a.m. - noon			
Schools View Activities from SAE		2nd Floor Concourse 8:30 - 8:45 a.m.			
Middle School Digital Thermometer Build		Parlor B 8:45 a.m. - 12:30 p.m.			
Science & Engineering for a New Energy Infrastructure Presentation		Parlor C 8:45 a.m. - 12:30 p.m.			
NXT Robotics		Ballroom (Back) 8:45 a.m. - 12:30 p.m.			
Lunch for all participants			Ballroom (Back) 12:30 p.m. - 1:00 p.m.		

KEY: All Participants Middle School Event

Middle Schools

Rich Magnet Eaton Rapids
Holland Woods Fort Gratiot
Highlander Way Grand Rapids Area Middle Schools

8:45 a.m.-12:30 p.m. Second 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 you will have a classroom set of thermometers that will transmit data to your computer via a base-station.

8:45 a.m.-12:30 p.m. Second Floor, Ballroom (Back)

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 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.

Thursday (8:45–12:30) and Friday (9:00–11:55) Second Floor, Parlor C SCIENCE AND ENGINEERING FOR A NEW ENERGY INFRASTRUCTURE



Tonghun Lee
Energy and Automotive Research Laboratory
Department of Mechanical Engineering

As demand for fossil fuels increase 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.

SPRING 2008 PROGRAM

9:00 a.m.-11:55 p.m. Second Floor, Parlor B
WIRELESS INTEGRATED MICROSYSTEMS (WIMS)
DIGITAL THERMOMETER BUILD

See explanation of event on opposite page (page 66)

9:00 a.m.-11:55 p.m. Second Floor, Parlor C
SCIENCE AND ENGINEERING FOR A NEW ENERGY
INFRASTRUCTURE PRESENTATION

See explanation of event at the bottom of the opposite page (page 66)

9:00 a.m.-11:55 p.m. Second Floor, Ballroom
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 Mackinaw 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!

9:00 a.m.-11:55 p.m. Second 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 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, April 25, 2008
High School Events Schedule

EVENTS	8 a.m.	9 a.m.	10 a.m.	11 a.m.	Noon
Audio Enthusiasts & Engineers		Billard Room 9:00 a.m. - noon			
Engineering Student Organizations		2nd Floor Concourse 9:00 a.m. - noon			
Schools View Activities		2nd Floor Concourse 8:45 - noon			
View CSE and ECE Presentations		1st Floor 8:45 - noon			
Wireless (WIMS) Thermometer Build		Parlor B 9 a.m. - 11:55			
Science & Engineering for a New Energy Infrastructure Presentation		Parlor C 9 a.m. - 11:55			
Civil Engineer Tower Build		Ballroom 9 a.m. - 11:55			
NXT Robotics		Green Room 9 a.m. - 11:55			
Student Voting Awards		Ballroom 11:55 a.m. - 12:05 p.m.			
Lunch for all participants			2nd Floor Concourse 12:10 - 1:00 p.m.		

KEY: All Participants High School Event

MEMBERS OF THE ORGANIZING COMMITTEE:



Linda Clifford
Michigan State University



Drew Kim
Michigan State University



Russ Pline
Okemos High School



Andrew Siefert
Michigan State University



John Thon
Holt Junior High School

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

The opportunity for teams of electrical and computer engineering students to work on humanitarian projects that assist persons with disabilities has been enabled by a generous grant from the Chrysler Foundation. This semester's projects include 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. Last semester, students 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

