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Senior Engineering Design Conference

College of Engineering and Applied Sciences

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12-1995

## 17th Conference on Senior Engineering Design Projects

College of Engineering and Applied Sciences

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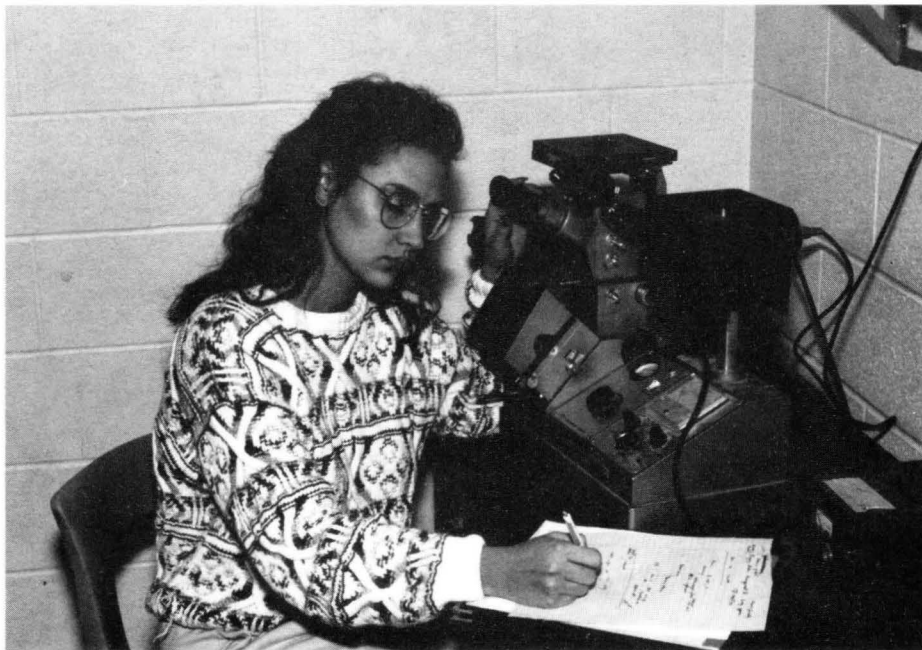
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# *Conference On Senior Engineering Design Projects*



Tuesday, December 5, 1995  
Bernhard Center  
8 a.m. to 5 p.m.

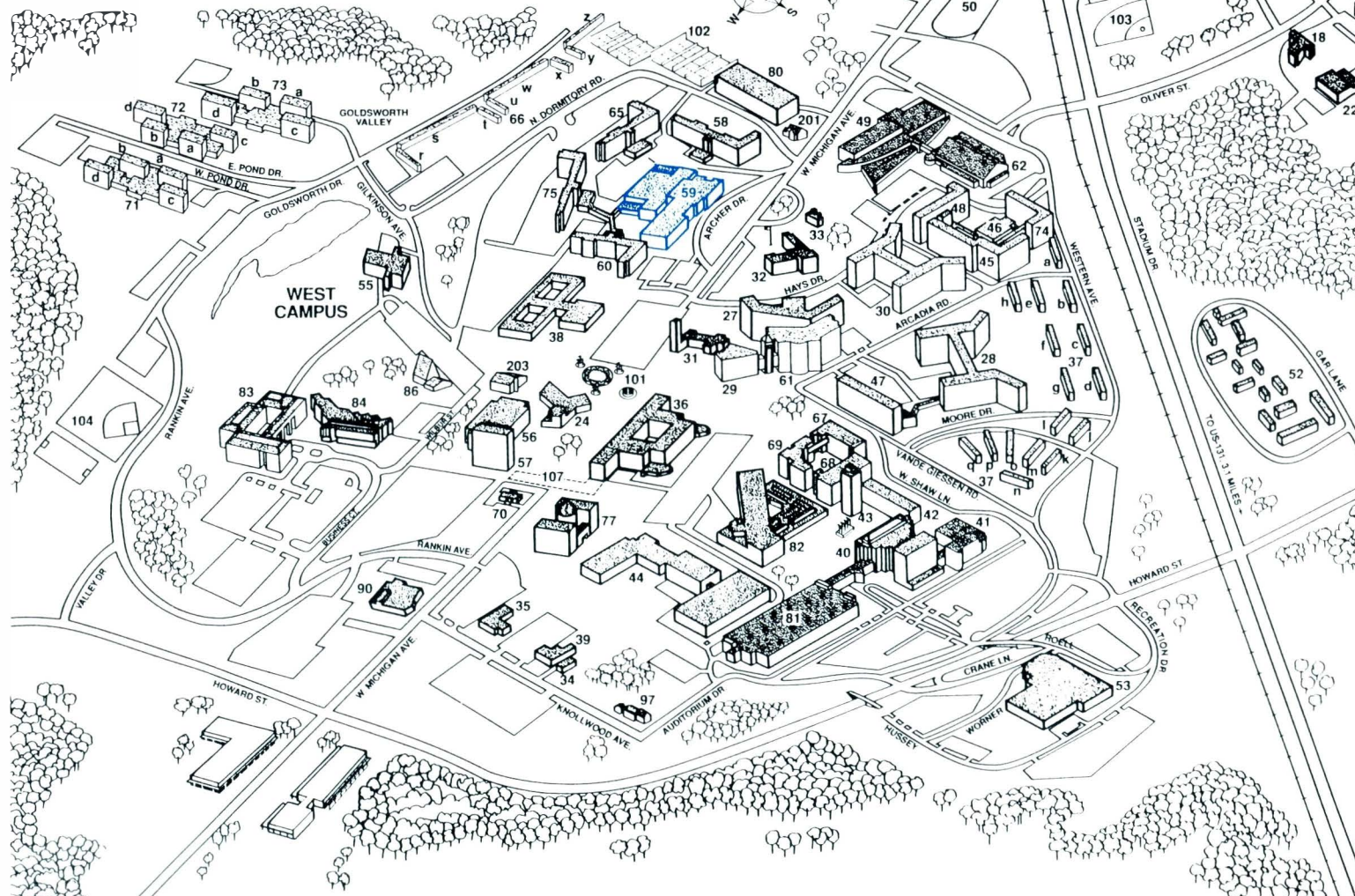
College of  
Engineering and  
Applied Sciences

WESTERN  
MICHIGAN  
UNIVERSITY



# WESTERN MICHIGAN UNIVERSITY

## *A Map of the Campus*



### Alphabetical guide to buildings

32 Administration Building	D3	03 North Hall	F
40 Auditorium, Miller	D4	06 Oakland Gymnasium	F
16 Baseball Field, Hyames	E2	09 Oakland Recital Hall	F
50 Bernhard Center	C1	33 Oakland, The	D
12 Brink Printing Services	E1	80 Parking Structure I	D
42 Brown Hall	D4	81 Parking Structure II	D
22 Campus Services Building	F2	21 Physical Plant Building	F
31 Chapel, Kanley	C3	12 Pooling Services, Brink	F
29 Computing Center	C3	101 Promenade and Kroglak	F
82 Dumbon Center	D4	101 Sundial	F
68 Dunbar Hall	D4	51 Public Safety	D
01 East Hall	F1	70 Public Safety Annex	F
101 Ebert Softball Field	E2	62 Red Fieldhouse	F
58 Elsworth Hall	C2	105 Repeating Tower	F
57 Everett Tower	C4	56 Ross Hall	D
77 Faunce Student Services Building	C4	86 St. Adonis Chapel	B
84 Fetter Center	D4	48 Sanborn Hall	C
62 Fieldhouse, Red	E2	97 Sara Stockard Preschool	C
67 Friedmann Hall	D4	83 Schneider Hall	A
85 Gilmore House	G2	107 Science Addition (Proposed)	C
18 H.O.I. Building	F2	42 Sobert Administration Building	D
55 Health Center, Sincouse	B3	11 Shaw Theatre	D
60 Henry Hall	C3	55 Sincouse Health Center	B
21 Honors College, Lee	C3	04 Soccer Field	A
16 Hyames Field	E2	104 Softball Hall	A
53 Ice Arena and Natatorium	E5	102 Sorenson Tennis Courts	F
104 Intramural Fields	A3	05 Speech and Hearing Center	F
31 Kanley Chapel	C3	13 Sprau Tower	D
50 Kanley Running Track	D2	10 Student Recreation Center	D
60 Kausus Hall	D4	77 Student Services Building	D
39 Knollwood Building	C5	101 Sundial	F
44 Knollwood Metal Building	C4	101 Sundial	F
101 Kroglak Sundial and Promenade	C3	11 Theatres, University	C5
53 Lawson Ice Arena and Gabel Natatorium	E5	106 Track Building	D
24 Lee Honors College	C3	15 Truett Building	D
61 Library, Waldo	D3	11 Upholstery Shop	F
27 McCracken Hall	D3	17 University Medical and Health Sciences Center	F
40 Miller Auditorium	D4	41 University Theatres	P
19 Montague House	F2	61 Waldo Library	F
47 Moore Hall	D3	13 Waldo Stadium	F
54 Natatorium and Ice Arena	E5	10 Walwood Hall	F
		90 Welborn Hall	F
		01 West Hall	F
		16 Wood Hall	F

### Residence Halls and Apartments

75 Bigelow Hall and Annex	C3	Goldsworth Valley Units 1 & 2	A
28 Burnham Halls	D3	708 Ackley Hall	A
45 Davis Hall	F3	716 Britton Hall	B
16 Davis Food Commons	D2	724 Fisher Hall	A
30 Draper Hall	D3	718 Eldridge Hall	A
17 Elmwood Apartments A & B	F3	714 Fox Hall	A
71 French Hall	F3	722 Gannon Hall	A
66 Goldsworth Valley Apartments	B2	734 Halley Hall	A
69 Henry Hall	C3	714 Harrison Hall	A
65 Hockie Hall	C2	728 Harvey Hall	A
30 Siedschlag Hall	C4	725 LeFevre Hall	A
8 Spindler Hall	E2	734 Shilling Hall	A
52 Stadium Drive Apartments	F3	716 Stinson Hall	A
7 Vandecreek Hall	F1		
48 Zimmerman Hall	D3		

### Private Property

201 Lutheran Student Center	D2
203 Weslee Foundation	B3

## Conference on Senior Engineering Design Projects

You are invited to attend the seventeenth Conference on Senior Engineering Design Projects. The conference will be held from 8 a.m. to 5 p.m. **Tuesday, December 5**, at the Bernhard Center on the campus of Western Michigan University.

The College of Engineering and Applied Sciences sponsors the conference to showcase the work of its graduating seniors, who are required to complete a capstone project that puts into practice what they have learned. Many of the projects are sponsored by business and industry.

The conference is **free** and open to the public. You are welcome to attend all or part of the day's events. Reservations are not necessary.

**High School and community college** teachers are encouraged to bring students to the conference. Buses can drop off passengers in the circular drive in front of the Bernhard Center and then park in the lot in front of Hoekje Hall. (See map; take North Dormitory Road. Hoekje is #65 on the map.)

Teachers who cannot accompany their students to the conference may ask their students to sign in and out at the information table in the lobby on the second floor of the Bernhard Center. Sign-in sheets will be mailed to teachers the day after the conference.

**Parking** is available in the ramp near the Bernhard Center.

**Presentations begin on the hour and half hour.** Please do not enter a room after a presentation has begun.

### Session locations, starting times, and page numbers for project titles:

Construction Engineering, Materials Engineering, and Industrial Design	209	3:30	p. 4
Electrical and Computer Engineering	210	8 to 4:30	p. 5
Industrial and Manufacturing Engineering-A	204	9:30 to 10:30	p. 7
Industrial and Manufacturing Engineering-B	209	9 to 2:30	p. 8
Mechanical and Aeronautical Engineering-A-I	208	9 to 11:30	p. 10
Mechanical and Aeronautical Engineering-A-II	208	1 to 2:30	p. 11
Mechanical and Aeronautical Engineering-B-I	213	9 to 11:30	p. 12
Mechanical and Aeronautical Engineering-B-II	213	11:30 to 3	p. 13
Paper and Printing Science and Engineering	211	9 to 3	p. 14

A **lunch** break is scheduled from noon to 1 p.m.

**For more information**, call Dace Copeland at (616) 387-4017.



CMD = Construction Engineering, Materials Engineering, and Industrial Design

ECE = Electrical and Computer Engineering

IME = Industrial and Manufacturing Engineering

MAE = Mechanical and Aeronautical Engineering

PSE = Paper Science and Engineering

Time	Room	Dept.	Topic
8	210	ECE	Automated Test Fixture for a Circuit Board Assembly
9	209	IME-B	Implementation and Installation of Design Expert: Auto Surf and Advanced Modeling Extension
	208	MAE-A-I	Design of a Theft-Deterring Door Stop
	213	MAE-B-I	Adjustable Wing Design for a Racecar Application
	211	PSE	Paper Testing Correlations for Print Quality
9:30	210	ECE	Speech Record and Playback Device for the Disabled
	204	IME-A	A Paperless Approach to Manufacturing
	209	IME-B	Quick Barrel Change on an 85 Ton Injection Molder
	208	MAE-A-I	Analysis and Redesign of a Torsional Vibration Absorber
	213	MAE-B-I	Frame Design for a Super Modified Race Car
	211	PSE	Parameter Optimization in Latex Coatings
10	210	ECE	Blind Zone Detector for School Buses
	204	IME-A	Work-in-Process Reduction Through Process Redesign
	209	IME-B	Car Top Carrier
	208	MAE-A-I	Design of a Flexible Arm System to Demonstrate Closed-Loop Control
	213	MAE-B-I	Design of a Test Fixture for Measurement of Truck Transmission Efficiency
	211	PSE	Brightening Agent Optimization in Latex Coatings
10:30	210	ECE	Conductivity and Temperature Meter
	204	IME-A	Cost Reduction in Cabinet Production
	209	IME-B	Foldable Sulky for Commercial Lawn Mowers
	208	MAE-A-I	Thermal-Hydraulic Design of Shell-and-Tube Heat Exchangers
	213	MAE-B-I	Design Optimization of a Piston for Reduced Emissions
	211	PSE	Thermo-Chem Conversion of Starch Using Ammonium Persulfate
11	210	ECE	Digital Pressure Gauge
	209	IME-B	Redesign of the Wire and Pin Collet
	208	MAE-A-I	Design of a Domestic Heat Recovery System
	213	MAE-B-I	Redesign of Forging Process for a Turbine Hub
	211	PSE	Effects of Surfactants on Semimechanical Pulping

11:30	210	ECE	Automated Electronic Test and Verification System
	209	IME-B	Human Powered Vehicle
	208	MAE-A-I	Measurements and Predictions of Heat Transfer Coefficients for Mechanical Seals
	213	MAE-B-I	Design of an O-Ring Drag Tester
	211	PSE	Bod and Cod Levels of Recycled Korean and American Boxboard

## NOON TO 1 - LUNCH BREAK

1	210	ECE	Navigational Aid for the Visually Impaired
	209	IME-B	Designing Revisions for Autocad Using Autolisp
	208	MAE-A-II	Redesign of Dishwasher Spray Wash for Reduced Sound
	213	MAE-B-II	Elevated Armrest Attachment for Wheelchair
	211	PSE	Bod and Cod Loading Effects of Repeatedly Recycled Paper Fibers
1:30	210	ECE	An "H-Bridge" Inverter to Control a Permanent Magnet D.C. Motor
	209	IME-B	The Importance of the Automobile Industry's Customer Satisfaction Index (CSI)
	208	MAE-A-II	Water Duct Design for Marine Power Boat Application
	213	MAE-B-II	Design of a Replacement for the Grumman A-6 Aircraft
	211	PSE	The Effect of Suspending Liquid Viscosity on Flocculation
2	210	ECE	Personal Medication Scheduling Device
	209	IME-B	The Development of a QS-9000 Quality System
	208	MAE-A-II	Analysis and Optimization of Dishwasher Energies
	213	MAE-B-II	Design of an Orthopedic Swimming Aid
	211	PSE	The Effect of Internally-Filled Pulp on Recycling
2:30	210	ECE	FPGA-Based Risc Processor Array
	209	IME-B	Glueline Shear Strength in Pre-Glued Dowel Joints
	208	MAE-A-II	Redesign of an Articulating Arm
	213	MAE-B-II	Adjustable Caster/Camber Plate for an Automobile
	211	PSE	Repulping Beverage Carrier Paperboard
3	209	CMD	Blister Resistance of Carbon/Graphite Materials
	210	ECE	PC Interfacing With an Analog Sonar Device (Lowerance X-16)
	213	MAE-B-II	Analysis and Optimization of Connector Lock Beams
	211	PSE	Repulping Beverage Carriers
3:30	210	ECE	Audio Signal Fourier Analyzer
4	210	ECE	Power Supply Transformer Design
4:30	210	ECE	National Time Standard Clock (WWV)

CONSTRUCTION ENGINEERING, MATERIALS ENGINEERING, AND  
INDUSTRIAL DESIGN

Session Chair - Roman Rabiej

Room 209

BLISTER RESISTANCE OF CARBON/GRAPHITE MATERIALS

by Tim Warren

Sponsor: Vince Pilletteri - Durametallic Corporation

Faculty Advisor: Vladimir Tsukruk

3:00 to 3:25 p.m., Room 209

## ELECTRICAL AND COMPUTER ENGINEERING

Session Chair - John Gesink  
Room 210

### AUTOMATED TEST FIXTURE FOR A CIRCUIT BOARD ASSEMBLY

by Gordon Grove, Allan Hoffman, and Regina Roiter

Sponsors: Michael L. Casey, Richard Markle, and Mickey Noonan - Stryker Instruments

Faculty Advisor: Frank Severance

8:00 to 8:25 a.m., Room 210

### SPEECH RECORD AND PLAYBACK DEVICE FOR THE DISABLED

by Nimalan Kanagasabai, Aravindan Rajoo, and Salam Zeidan

Faculty Advisor: Frank Severance

9:30 to 9:55 a.m., Room 210

### BLIND ZONE DETECTOR FOR SCHOOL BUSES

by Sallah Bensaleh, Pei Ling Cheng, Teong Aik Lim, and Chee Wee Ooi

Faculty Advisor: John Gesink

10:00 to 10:25 a.m., Room 210

### CONDUCTIVITY AND TEMPERATURE METER

by Ping Haur Chang, Wai Hoong Lim, and Woh Hon Siew

Faculty Advisor: Lambert VanderKooi

10:30 to 10:55 a.m., Room 210

### DIGITAL PRESSURE GAUGE

by Marc Miller and Joe Palid

Sponsor: Dan Housermaann - Ronningen-Petter

Faculty Advisor: Lambert VanderKooi

11:00 to 11:25 a.m., Room 210

### AUTOMATED ELECTRONIC TEST AND VERIFICATION SYSTEM

by Douglas Joel DeHaan, Micheal D. LaPerre, and Jeffrey R. Spitzner

Sponsor: Don Bolthouse Jr., Edward F. Handley, and Leo Kominek - Eaton Corporation, Truck Components Operations-North America

Faculty Advisor: Marek Nikodem

11:30 to 11:55 a.m., Room 210



## NAVIGATIONAL AID FOR THE VISUALLY IMPAIRED

by Chee Hiean Ooi, Thelge Pubudu Nuwan Peiris, and Tiew Yong (David) Toh

Sponsor: David Guth and Robert LaDuke, Department of Blind Rehabilitation, Western Michigan University

Faculty Advisor: John Gesink

1:00 to 1:25 p.m., Room 210

## AN "H-BRIDGE" INVERTER TO CONTROL A PERMANENT MAGNET D.C. MOTOR

by King Ho Lau, Yen Thong Lim, and Chee Hoe Teh

Faculty Advisor: Joseph Kelemen

1:30 to 1:55 p.m., Room 210

## PERSONAL MEDICATION SCHEDULING DEVICE

by Steven S. Beattie, Jeffrey W. Decker, and Paul R. Lieber

Faculty Advisor: John Mason

2:00 to 2:25 p.m., Room 210

## FPGA-BASED RISC PROCESSOR ARRAY

by Doug Johns and Brad Ree

Faculty Advisor: Sharon Hu

2:30 to 2:55 p.m., Room 210

## PC INTERFACING WITH AN ANALOG SONAR DEVICE (LOWRANCE X-16)

by S. Ahsan Alam, Soong Lin Teng, and Aik Khoon Yeoh

Sponsor: William A. Sauck, Department of Geology - Western Michigan University

Faculty Advisor: Sharon Hu

3:00 to 3:25 p.m., Room 210

## AUDIO SIGNAL FOURIER ANALYZER

by Shaw Wei (David) Chin, Kok Keong Lai, and Keng Ann Low

Sponsor: Joseph G. Reish and The WMU Undergraduate Research and Creative Activities Award Review Committee

Faculty Advisors: Janos Grantner and Frank Severance

3:30 to 3:55 p.m., Room 210

## POWER SUPPLY TRANSFORMER DESIGN

by Hasan Alwraikat, Alan Darlison and Abdul Nasser Kalban

Faculty Advisor: Joseph Kelemen

4:00 to 4:25 p.m., Room 210

## NATIONAL TIME STANDARD CLOCK (WWV)

by Allen Eichenberg, Nathan Felt, Timothy Trang, and Mike Wallace

Faculty Advisor: John Mason

4:30 to 4:55 p.m., Room 210

## INDUSTRIAL AND MANUFACTURING ENGINEERING - A

Session Chair - Larry Mallak  
Room 204

### A PAPERLESS APPROACH TO MANUFACTURING

by Rob Dial, Marvin Wilkins, and Jennifer Woodard

Sponsor: Verna Kober and Jim Zawacki - GR Spring & Stamping, Inc.

Faculty Advisor: Larry Mallak

9:30 to 9:55 a.m., Room 204

### WORK-IN-PROCESS REDUCTION THROUGH PROCESS REDESIGN

by Chris Chojnowski, Eric Kelso, and Steve Olsen

Sponsors: Robert Gill and Bill Kellogg - Gill Industries, Inc.

Faculty Advisor: Larry Mallak

10:00 to 10:25 a.m., Room 204

### COST REDUCTION IN CABINET PRODUCTION

by Joseph T. Gravlin and Christian M. Nix

Sponsor: David Postma - AM Fab Inc.

Faculty Advisor: Larry Mallak

10:30 to 11:00 a.m., Room 204

## INDUSTRIAL AND MANUFACTURING ENGINEERING - B

Session Chair - Ralph Tanner  
Room 209

### IMPLEMENTATION AND INSTALLATION OF DESIGN EXPERT: AUTO SURF AND ADVANCED MODELING EXTENSION

by Thomas M. Brian Jr., Christopher Cotting, and Joseph Rewa Jr.

Faculty Advisor: Michael Atkins and Ralph Tanner

9:00 to 9:25 a.m., Room 209

### QUICK BARREL CHANGE ON AN 85 TON INJECTION MOLDER

by Brian Dorman, Mark Lazor, and Troy LeRoux

Faculty Advisor: Paul Engelmann

9:30 to 9:55 a.m., Room 209

### CAR TOP CARRIER

by Scott Berg, Joanna Berreth, Alicia Drost, and Suzanne Hawes

Sponsor: Cindy Allen - Falcon Foam and Kenneth J. Harris - KL Industries

Faculty Advisor: Dmitry Azrikan and Charles Woodward

10:00 to 10:25 a.m., Room 209

### FOLDABLE SULKY FOR COMMERCIAL LAWN MOWERS

by Steve Cochrane, Todd Harroun, Leslie Larson, and Matt Zielke

Faculty Advisor: Dmitry Azrikan and Charles Woodward

10:30 to 10:55 a.m., Room 209

### REDESIGN OF THE WIRE AND PIN COLLET

by Sevetra Hodge, William Peless, TraShawn Pruitt, and David VanderKolk

Faculty Advisor: Fred Sitkins and Charles Woodward

11:00 to 11:25 a.m., Room 209

### HUMAN POWERED VEHICLE

by Scott Gourlay, Chris Holmes, Russ Melchert and Dan Tatman

Faculty Advisor: Charles Woodward

11:30 to 12:00 p.m., Room 209

### DESIGNING REVISIONS FOR AUTOCAD USING AUTOLISP

by John Frei and Steven J. Parker

Faculty Advisor: Charles Woodward

1:00 to 1:25 p.m., Room 209



## THE IMPORTANCE OF THE AUTOMOBILE INDUSTRY'S CUSTOMER SATISFACTION INDEX (CSI)

by Peter Langsdorf and D. Robert MacLeod

Faculty Advisor: James VanDePolder

1:30 to 1:55 p.m., Room 209

## THE DEVELOPMENT OF A QS-9000 QUALITY SYSTEM

by Kenneth T. Bennick and Patrick Kevin Murphy

Faculty Advisor: Fred Sitkins

2:00 to 2:25 p.m., Room 209

## GLUELINE SHEAR STRENGTH IN PRE-GLUED DOWEL JOINTS

by Michael D. Carlson, John Howley, and Robert Ruthven

Sponsors: Jeff Oliverson - Mountain View Marketing

Faculty Advisor: Roman Rabiej

2:30 to 2:55 p.m., Room 209

## MECHANICAL AND AERONAUTICAL ENGINEERING - A-I

Session Chair - James Kamman  
Room 208

### DESIGN OF A THEFT-DETERRING DOOR STOP

by Jay Andrews and Marc Mitchell

Sponsor: Todd Sutton - QUEST Engineering, Ltd.

Advisor: James Kamman

9:00 to 9:25 a.m., Room 208

### ANALYSIS AND REDESIGN OF A TORSIONAL VIBRATION ABSORBER

by Richard Lapinski and Chong-Ming Lim

Faculty Advisor: James Kamman

9:30 to 9:55 a.m., Room 208

### DESIGN OF A FLEXIBLE ARM SYSTEM TO DEMONSTRATE CLOSED-LOOP CONTROL

by Pei Cheng Kwa and Chin Heong Yeoh

Faculty Advisor: James Kamman

10:00 to 10:25 a.m., Room 208

### THERMAL-HYDRAULIC DESIGN OF SHELL-AND-TUBE HEAT EXCHANGERS

by Soon Chin Dennis Lim and Jeremy Yip Chian Tan

Sponsor: Douglas Mathews - Koolant Coolers, Inc.

Faculty Advisor: Srinivas Garimella

10:30 to 10:55 a.m., Room 208

### DESIGN OF A DOMESTIC HEAT RECOVERY SYSTEM

by Waleed Al-Wafi and Zulkiflee Ismail

Faculty Advisor: Srinivas Garimella

11:00 to 11:25 a.m., Room 208

### MEASUREMENTS AND PREDICTIONS OF HEAT TRANSFER COEFFICIENTS FOR MECHANICAL SEALS

by Mohd Azlan Abas and Hin Loon Khoo

Faculty Advisor: Parviz Merati

11:30 to 11:55 a.m., Room 208

## MECHANICAL AND AERONAUTICAL ENGINEERING - A-II

Session Chair - Iskender Sahin

Room 208

### REDESIGN OF DISHWASHER SPRAY WASH FOR REDUCED SOUND

by Tom Goffas and Everett Kettle

Sponsor: Victor Vukorpa - Whirlpool Corporation

Faculty Advisor: Iskender Sahin

1:00 to 1:25 p.m., Room 208

### WATER DUCT DESIGN FOR MARINE POWER BOAT APPLICATION

by Kevin J. Beber and Jeff D. Gary

Sponsor: Glenn Hall - Torque Engineering Corporation

Faculty Advisor: Iskender Sahin

1:30 to 1:55 p.m., Room 208

### ANALYSIS AND OPTIMIZATION OF DISHWASHER ENERGIES

by Michael Brown II and Nathan Hunt

Sponsor: Todd Jozwiak - Whirlpool Corporation

Faculty Advisor: Jerry Hamelink

2:00 to 2:25 p.m., Room 208

### REDESIGN OF AN ARTICULATING ARM

by John Drust and Julie Ann Dubiel

Sponsors: Gary Speet, Sintel Incorporated and Ronald Santoro, Aero-Motive Company

Faculty Advisor: Jerry Hamelink

2:30 to 2:55 p.m., Room 208

## MECHANICAL AND AERONAUTICAL ENGINEERING - B-I

Session Chair - Koorosh Naghshineh

Room 213

### ADJUSTABLE WING DESIGN FOR A RACECAR APPLICATION

by James Brewer and Eric Lesher

Sponsor: Willard Stutzman - Stutzman Racing

Faculty Advisor: Richard Hathaway

9:00 to 9:25 a.m., Room 213

### FRAME DESIGN FOR A SUPER MODIFIED RACE CAR

by Brian Crum and Robert Knepple

Sponsor: Willard Stutzman - Stutzman Racing

Faculty Advisor: Richard Hathaway

9:30 to 9:55 a.m., Room 213

### DESIGN OF A TEST FIXTURE FOR MEASUREMENT OF TRUCK TRANSMISSION EFFICIENCY

by Ron Duis and Paul Kinney

Sponsor: Michael Lempke and Larry Loedeman - Eaton Corporation, Truck Components Operations - North America

Faculty Advisor: Koorosh Naghshineh

10:00 to 10:25 a.m., Room 213

### DESIGN OPTIMIZATION OF A PISTON FOR REDUCED EMISSIONS

by Scott Ferriell and Kevin Ullrey

Sponsor: Andreas Bahr and Darryll Boos - Karl Schmidt Unisia, Inc.

Faculty Advisor: Koorosh Naghshineh

10:30 to 10:55 a.m., Room 213

### REDESIGN OF FORGING PROCESS FOR A TURBINE HUB

by Elizabeth Beecham and Brian Engel

Sponsors: J. W. (Bill) Giffune and Robert T. Scislowski - Jernberg Industries, Inc.

Faculty Advisor: Phillip Guichelaar

11:00 to 11:25 a.m., Room 213

### DESIGN OF AN O-RING DRAG TESTER

by Todd Adams and Brent Brower

Sponsor: Joseph C. Parker - Durametallic

Advisors: Phillip Guichelaar

11:30 to 11:55 a.m., Room 213



## MECHANICAL AND AERONAUTICAL ENGINEERING - B-II

Session Chair - John Valasek

Room 213

### ELEVATED ARMREST ATTACHMENT FOR WHEELCHAIR

by Todd Greve and Kim Schell

Faculty Advisor: Judah Ari-Gur

1:00 to 1:25 p.m., Room 213

### DESIGN OF A REPLACEMENT FOR THE GRUMMAN A-6 AIRCRAFT

by Michael Schierbeek

Faculty Advisors: Judah Ari-Gur and John Valasek

1:30 to 1:55 p.m., Room 213

### DESIGN OF AN ORTHOPEDIC SWIMMING AID

by Jeff Bither and Robert Geneseo

Faculty Advisors: Judah Ari-Gur and John Gesink

2:00 to 2:25 p.m., Room 213

### ADJUSTABLE CASTER/CAMBER PLATE FOR AN AUTOMOBILE

by Russ Ferguson and Tom Pate

Sponsor: Dave Stone - Performance Machine Works Ltd.

Faculty Advisor: Dennis VandenBrink

2:30 to 2:55 p.m., Room 213

### ANALYSIS AND OPTIMIZATION OF CONNECTOR LOCK BEAMS

by Scott Finstrom and Chee Cheong Loo

Sponsors: Bruce N. Sech and Dean Weurding - Mol-Son Inc.

Faculty Advisor: Dennis VandenBrink

3:00 to 3:25 p.m., Room 213

## PAPER AND PRINTING SCIENCE AND ENGINEERING

Session Chair - Ellsworth Shriver

Room 211

### PAPER TESTING CORRELATIONS FOR PRINT QUALITY

by Michelle Reno

Faculty Advisor: Brian Scheller

9:00 to 9:25 a.m., Room 211

### PARAMETER OPTIMIZATION FOR SOFTNIP CALENDERING

by Jung-Kyu Yang

Faculty Advisor: Brian Scheller

9:30 to 9:55 a.m., Room 211

### BRIGHTENING AGENT OPTIMIZATION IN LATEX COATINGS

by Mark P. Comensoli

Faculty Advisor: Brian Scheller

10:00 to 10:25 a.m., Room 211

### THERMO-CHEM CONVERSION OF STARCH USING AMMONIUM PERSULFATE

by Ronn Englehart

Faculty Advisor: Ray Janes

10:30 to 10:55 a.m., Room 211

### EFFECTS OF SURFACTANTS ON SEMIMECHANICAL PULPING

by Timothy Schemanski

Faculty Advisor: Ray Janes

11:00 to 11:25 a.m., Room 211

### BOD AND COD LEVELS OF RECYCLED KOREAN AND AMERICAN BOXBOARD

by Craig Mefford

Faculty Advisor: Van Maltby

11:30 to 11:55 a.m., Room 211

### BOD AND COD LOADING EFFECTS OF REPEATEDLY RECYCLED PAPER FIBERS

by Ken Stager

Faculty Advisor: Van Maltby

1:00 to 1:25 p.m., Room 211

## THE EFFECT OF SUSPENDING LIQUID VISCOSITY ON FLOCCULATION

by Heather Groat

Faculty Advisor: David Peterson

1:30 to 1:55 p.m., Room 211

## THE EFFECT OF INTERNALLY-FILLED PULP ON RECYCLING

by Anne Spruit

Faculty Advisor: David Peterson

2:00 to 2:25 p.m., Room 211

## REPULPING BEVERAGE CARRIER PAPERBOARD

by Jennifer A. Giver

Faculty Advisor: Ellsworth Shriver

2:30 to 2:55 p.m., Room 211

## REPULPING BEVERAGE CARRIERS

by Mahsa Khosravani

Faculty Advisor: Ellsworth Shriver

3:00 to 3:25 p.m., Room 211

## THANK YOU

The College of Engineering and Applied Sciences is grateful to these firms, which have provided or cooperated in Senior Engineering Design Projects being presented in December 1995. If you have a project for our students or if you would like more information, please call Dace Copeland at (616) 387-4017.

Aero-Motive Company  
AM Fab, Inc.  
Durametallic Corporation  
Eaton Corporation TCONA  
Falcon Foam  
Gill Industries, Inc.  
GR Spring & Stamping, Inc.  
Jernberg Industries, Inc.  
Karl Schmidt Unisia, Inc.  
KL Industries  
Koolant Koolers, Inc.  
Mol-Son Inc.  
Mountain View Marketing  
Quest Engineering, Ltd.  
Performance Machine Works Ltd.  
Ronningen-Petter  
Sintel Inc.  
Stryker Instruments  
Stutzman Racing  
Torque Engineering Corporation  
Whirlpool Corporation



The College of Engineering and Applied Sciences offers a wide variety of programs.

**School of Aviation Sciences**

- Aircraft maintenance engineering technology
- Aviation flight science
- Aviation technology and operations

**Construction Engineering, Materials Engineering, and Industrial Design**

- Construction engineering and management
- Industrial design
- Materials engineering

**Electrical and Computer Engineering**

- Computer Engineering
- Electrical Engineering

**Industrial and Manufacturing Engineering**

- Automotive engineering technology
- Engineering graphics and design technology
- Engineering management
- Industrial engineering
- Industrial management
- Manufacturing engineering technology

**Mechanical and Aeronautical Engineering**

- Aeronautical engineering
- Mechanical engineering

**Paper and Printing Science and Engineering**

- Paper engineering
- Paper science
- Printing

The **master of science in engineering** is offered in computer, electrical, mechanical, and industrial engineering.

The **master of science** is offered in engineering management, manufacturing science, materials science, operations research, and paper science and engineering.

The **Ph.D.** is offered in industrial and in mechanical engineering.

## NOTES

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