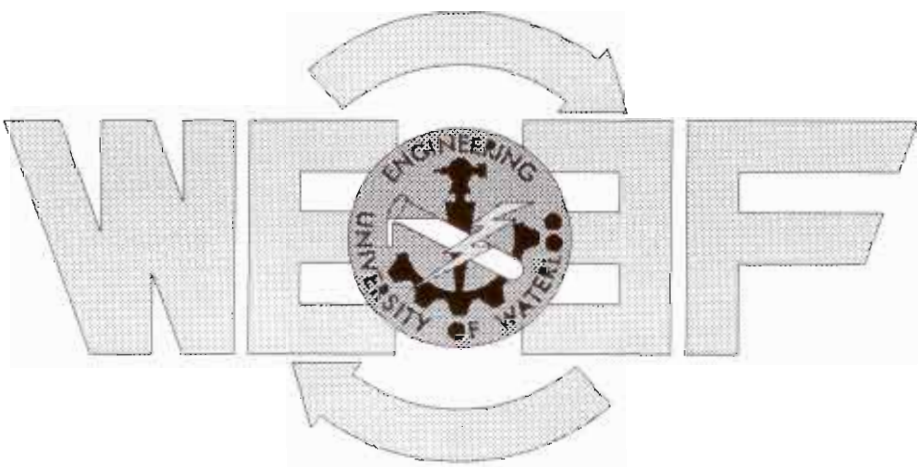
Paul Cesana

WATERLOO ENGINEERING ENDOWMENT FUND



Fall 1997 Proposals

Preliminary Funding Decision
Fall 1997

Funding Completed

Chem	1. Laboratory Equipment For Environmental Engineering Laboratory	$3,627
	2. Undergraduate Laboratory Equipment Upgrade	$8,438
Civ	3. Monitor Upgrades	$2,274
	~~4. Hardware for ME/CE Design Studio I~~	~~$0~~
	5. Hardware for ME/CE Design Studio II	$6,950
E&CE	6. E&CE 318 Communications Laboratory - Oscilloscopes	$12,300
	7. E&CE 463/481 Power & Control Systems Laboratory - Oscilloscope	$3,200
	~~8. Function Generators~~	~~0~~
	9. E&CE Dept. Watstar Memory Upgrade	$662
	~~10. E&CE Dept. Flux Vector AC Motor Drive~~	~~0~~
Env	11. Water Purification Equipment for Undergraduate Labs	$4,900
Mech	12. Laboratory Upgrade Me-262	$2,500
	13. Labview Software Package	$11,495
	14. Hardware For ME/CE Design Studio III	$5,917
	~~15. Work Stations For ME/CE Design Studio~~	~~0~~
	~~16. ME/CE Design Conference Room~~	~~0~~
Systems	17. DASL Watstar Terminals	$6,906
	~~18. Display Case for Educational Models of Machines~~	~~$0~~
	19. Systems Design Project Lab Digital Oscilloscope	$3,900
Other	~~21. Funding for AutoCAD License for the Faculty of Engineering~~	~~0~~
	22. Replacement Printers for Computing Labs	$8,656
	23. Equipment - Student Shop	$2,919
Student Projects	24. CSChE Conference at McMaster University	$900
	25. Concrete Toboggan Team	$4,350
	26. Intelligent Control Algorithms for Industrial Overhead Cranes	$1,500
	~~28. University of Waterloo Alternative Fuels Team, EVC~~	~~$0~~
	29. 1998 Formula SAE Race Team	$4,155
	30. Waterloo GNCTR Organizing Committee WEEF Proposal	$900
	31. HeliBot	$1,500
	32. IEEE McNaughton Center	$625
	33. Solar Array for Midnight SunV	$4,000
	34. The Aero Design Competition	$1,383
	35. SMA Materials for Research/Project Use in Systems Design Lab	$669
	36. UWAFT's Microchip PIC Microcontroller Proposal	4773
	37. UW Casi Free Flight Glider Team 1998	$800
	Total	**$110,200**

Table Of Contents

WEEF Proposal Summary

Dept.	*Project Title*	*Maximum Requested*	*Partial*
Chem	1. Laboratory Equipment For Environmental Engineering Laboratory	$3,627	
	2. Undergraduate Laboratory Equipment Upgrade	$11,438	●
Civ	3. Monitor Upgrades	$2,274	
	4. Hardware for ME/CE Design Studio I	$3,646	●
	5. Hardware for ME/CE Design Studio II	$6,950	
E&CE	6. E&CE 318 Communications Laboratory - Oscilloscopes	$4,100	●
	7. E&CE 463/481 Power & Control Systems Laboratory - Oscilloscope	$3,200	
	8. Function Generators	$6,160	
	9. E&CE Dept. Watstar Memory Upgrade	$662	●
	10. E&CE Dept. Flux Vector AC Motor Drive	$9,867	
Env	11. Water Purification Equipment for Undergraduate Labs	$4,900	●
Mech	12. Laboratory Upgrade Me-262	$2,500	●
	13. Labview Software Package	$11,495	●
	14. Hardware For ME/CE Design Studio	$5,917	●
	15. Work Stations For ME/CE Design Studio	$18,500	●
	16. ME/CE Design Conference Room	$5,100	
Systems	17. DASL Watstar Terminals	$6,906	●
	18. Display Case for Educational Models of Machines	$2,000	●
	19. Systems Design Project Lab Digital Oscilloscope	$4,927	
	20. Computer Aided Software Engineering (CASE) Tool for Polaris.	$5,866	
Other	21. Funding for AutoCAD License for the Faculty of Engineering	$12,000	
	22. Replacement Printers for Computing Labs	$9,828	
	23. Equipment - Student Shop	$2,919	
Student	24. CSChE Conference at McMaster University	$1,521	
Projects	25. Concrete Toboggan Team	$3,600	
2	26. Intelligent Control Algorithms for Industrial Overhead Cranes	$13,301	
	27. Environmental Engineering Project	$450	
	28. University of Waterloo Alternative Fuels Team, EVC	$1,300	
	29. 1998 Formula SAE Race Team	$7,350	●
	30. Waterloo GNCTR Organizing Committee WEEF Proposal	$2,500	
	31. HeliBot	$9,600	●
	32. IEEE McNaughton Center	$12,500	
	33. Solar Array for Midnight SunV	$12,000	
	34. The Aero Design Competition	$1,383	●
+ 1	35. SMA Materials for Research/Project Use in Systems Design Lab	$669	●
	36. UWAFT's Microchip PIC Microcontroller Proposal	$7,160	
	37. UW Casi Free Flight Glider Team 1998	$800	●
	Total Funds Requested	*$218,917*	
	Funds Available	*$110,000*	

1. Laboratory Equipment For Environmental Engineering Laboratory

Lillian Liao
LLiao@chemical X6161
Analytical Chemist

Presenter: Bill Anderson
wanderson@chemical

Description of Proposal:
To purchase COD reactors, Micropipettors and a Vacuum Manifold required for experiments to be carried out in the new undergraduate environmental engineering laboratory.

Proposal Benefits:
Approximately 100 environmental engineering students of both chemical and civil engineering would greatly benefit from this purchase each term. Enrollment of environmental engineering students has been increasing each term. Students would be exposed to standardized laboratory measurements for wastewater analysis (COD) and the alternative method to liquid/liquid extraction in the cleaning and concentrating of analytical samples (vacuum manifold). Both of these methods are vital components in the examination of water.

Cost Breakdown of Proposal:

	Item	Price	Use	Description
a)	2 COD reactors heating blocks	$1890.00	to estimate the amount of organic matter in wastewater	Hach COD reactor
b)	2 Micropipettors	$480.00	to aliquot set volumes of liquid consistently	Nichriyo Adjustable Pipettor, 100 – 1000 mL
c)	2 Micropipettors	$480.00	to aliquot set volumes of liquid consistently	Nichriyo Adjustable Pipettor, 1 – 5mL
d)	SPE Vacuum Manifold	$777.00	solid phase of extraction of analytical samples	Lida Chromosep SPE Vacuum Manifold
Total amount		**$3627.00**		

Implementation Schedule for Project:
Equipment will be used commencing Winter '98.

indefinite life span

Additional Information:
In decreasing priority: the COD reactors, item a), the Micropipettors, item b) and c), the Vacuum manifold, item d)
All prices are current and include taxes.

Summary
A COD reactor provides a measurement of the oxygen equivalent of the materials present in the wastewater that are subject to oxidation by a strong chemical oxidant. These measurements are required in treatment plants regarding process control adjustments.

Along with the COD reactor, Micropipettors are required to conduct the determination. Micropipettors allow repetitive measurements of volumes of liquid that are consistent and reproducible. This is vital in obtaining reliable data in reporting.

The COD reactor and the Micropipettors can be used interchangeably for both the determination of Total Persulphate Nitrogen and the USEPA approved Chemical Oxygen Demand method.

An SPE Vacuum Manifold is used for the filtration and extraction of analytes from multiple samples through solid phase extraction columns. It allows for rapid batch processing of samples simultaneously for GC or HPLC analysis, i.e. Extraction of phenols or PAHs from water or soil samples. The SPE system also significantly reduces the volume of organic solvents required for a typical sample preparation, which reduces waste generation and disposal costs.

2. Undergraduate Laboratory Equipment Upgrade

Submitted By:

Siva Ganeshalingam
Sganesh@engmail.Uwaterloo.ca
x6161
Senior Technician

Description Of Proposal:

(1) Upgrading existing water baths

. To replace controllers on six water baths in the Physical Chemistry Laboratory (Rm 1517). These water baths are old models for which spare parts are not available. Only the controllers need to be replaced. Other parts, such as the actual vessel, heater etc could still be used.

(2) Upgrading the Extraction Column experiment (ChE-040)

To replace variable area flow meters on the existing Extraction Column with more accurate electronic flow meters with digital readout.

(3) Upgrading the Kinetics experiment (ChE-023)

To replace chart recorders used in this experiment with computer data acquisition system.

Proposal Benefits:

Proposal-1

Better temperature control will be achieved by replacing the old controllers with modern ones. Parts for new controllers are easily available. Approximately 100 students will use these equiment each term.

Proposal-2

Easier and more accurate reading of flow rates. No need for any calibration charts. This equipment is used in ChE-040. Approximately 80 students will use it every year.

Proposal-3

Better control of data with less human error. This particular experiment is performed by both Chemical and Environmental students. About 200 students will perform this experiment every year.

Cost Breakdown:

Proposal-1

Temperature controller: $262.51 each
Relay: $26.48 each
Subtotal: $288.99 for one unit
For six units: 6*288.99 = $1733.94

Taxes, shipping @20%: $346.79

Total :$2080.73

Proposal-2

Digital meter: $311 each. Four units will cost: 4*311 = $1244
Flow cell: $582 each Four units will cost: 4*582 = $2328
Valves: $31.50 each Four units will cost: 4*31.50 = $126
Stirr-pak, 9-900rpm: $585 each (only one unit of this is required)
Speed controller: $289 each (only one unit of this is required)
Sub total: $4572
Taxes,shipping etc @20%: $914.40
Total: $5486.40

Proposal-3

Data acquisition: $585 each. Two units will cost: 2*585 = $1170
Expansion interface (CYSSH-08): $549 each. Two units will cost: 2*549 = $1098
Expansion interface (CYSTP-37): $59 each Two units will cost: 2*59 = $118
24 inches 37-pin cable: $25 each: Four units will cost: 4*25 = $100
Software (WIN95/3.x/DOS): $740 each (Only one unit of this is required)
Sub total: $3226
Taxes,shipping etc @20%: $645.20
Total: $3871.26

Total Cost: $ 11,438.39

Implementation Schedule:

As soon as possible.

Additional Information:

The Chairman of the Chemical Engineering Department has agreed to fund $3000 for these upgrading. The department has also agreed to provide the whatever the labour cost involved in the upgrading of all these equipment.

3. Monitor Upgrades

Submitted By:

Ralph Korchensky
rkorchensky@civoffice.watstar.uwaterloo.ca
x5045
Technician

Description Of Proposal:

This is a request for the procurement of six (6) new adi- 4p monitors, which would be installed as part of our continuing upgrade program in the civil engineering undergraduate watstar room, E2-2340. The monitors which would be replaced have been repaired numerous times in the past, and are now in a state where it is no longer cost effective to repair them.

Proposal Benefits:

These monitors are available to, and used by, every student in the civil, environmental, and geological engineering programs, as well as other undergraduate students.

Cost Breakdown:

monitors @ $379.00 each = $2274.00 plus any applicable taxes.

Implementation Schedule:

Will be installed as soon as available.

4. Hardware for ME/CE Design Studio I

Submitted By:

J. Sykes, Civil Engineering:
Sykesj@uwaterloo.ca:
Ext 3776:
Chair

M. Knight, Civil Engineering
maknight@uwaterloo.ca:
Ext 6919:
Assistant Professor

Description Of Proposal:

Civil and Mechanical Engineering are currently developing a CAD Design Studio in E3 1301. This studio is to support design courses and student projects by providing a controlled room with CAD facilities and a design environment. The Departments have completed renovations to the room and 10 AutoCad stations have been installed. In addition to the joint Civil/Mechanical requests, Civil Engineering would like to add specialized equipment to allow for the digitizing of large drawings and maps. This would require the purchase of a digitizing tablet (3 x 4 feet).

Proposal Benefits:

The design studio will provide a new facility that will promote the use of CAD systems in an environment amenable to student projects. That is, it will not be a teaching room but rather a room that students can be use for group projects and CAD activities. It will be available to specific courses in Civil and Mechanical Engineering and 4th year students in both Departments. Student projects such as the concrete toboggan and solar car my make use of the room.

Cost Breakdown:

Requirements:

Large format digitizer Microgrid Ultra 36X48	$4,504.50
16BTN CURSOR W/ 84 CORD FOR MICROGRID	$327.80
manual lift/manual tilt base	$613.80
Total	**$5446.10**

Contributions:

Civil Engineering	$1800.00
WEEF	$3646.10

Implementation Schedule:

The equipment will be installed in January 1998. The CAD studio will be open for use in January 1998.

5. Hardware for ME/CE Design Studio II

Submitted By:

J. Sykes, Civil Engineering:
Sykesj@uwaterloo.ca:
Ext 3776:
Chair

M. Knight, Civil Engineering
maknight@uwaterloo.ca:
Ext 6919:
Assistant Professor

Description of Proposal:

Civil and Mechanical Engineering are currently developing a CAD Design Studio in E3 1301. This studio is to support design courses and student projects by providing a controlled room with CAD facilities and a design environment. The Departments have completed renovations to the room and 10 AutoCad stations have been installed. In addition to the joint Civil/Mechanical requests, Civil Engineering would like to add a Polaris server to support the functionality of this lab. This will include a Pentium class machine complete with the networking hardware to support at least 12 machines.

Proposal Benefits:

The design studio will provide a new facility that will promote the use of CAD systems in an environment amenable to student projects. That is, it will not be a teaching room but rather a room that students can be use for group projects and CAD activities. It will be available to specific courses in Civil and Mechanical Engineering and 4th year students in both Departments. Student projects such as the concrete toboggan and solar car my make use of the room.

Cost Breakdown:

Michael Hendy will give breakdown

Requirements:

	Pentium II 300	$6,000
	Ethernet hub 100Mbps	$2,500
	Wire	$500
	UPS	$600
	Ethernet Cards 10 total	$750
	Total	**$10,350**
Contributions:	Civil Engineering	$3,400
	WEEF	$6,950

Implementation Schedule:

The equipment will be installed in January 1998. The CAD studio will be open for use in January 1998.

6. E&CE 318 Communications Laboratory - Oscilloscopes

Submitted By:

Kevin Luscott
kluscott@eestaff
x6881
Lab Technologist

Description of Proposal:

To purchase one, two or three additional digital oscilloscopes for the laboratory.

Proposal Benefits:

Having additional equipment will make it easier to facilitate growing class sizes and terms when there is a double class using the laboratory. It will provide more flexibility in scheduling which should benefit third year students carrying four lab courses.

Cost Breakdown:

Kenwood DCS-8200 digital oscilloscope: $4100 each + taxes

Implementation Schedule:

Winter 1998

7. E&CE 463/481 Power & Control Systems Laboratory - Oscilloscope

Submitted By:

Kevin Luscott
kluscott@eestaff
x6881
Lab Technologist

Description of Proposal:

To purchase an additional digital oscilloscope for the laboratory.

Proposal Benefits:

Having one more oscilloscope will provide each 481 bench with their own instrument.

Cost Breakdown:

Hewlett Packard HP54600/54650 digital oscilloscope: $3200 + taxes

Implementation Schedule:

Winter 1998

8. Function Generators

Submitted By:

Paul Hayes
phayes@eestaff.watstar.uwaterloo.ca
3969
Staff E&CE Dept.

Description of Proposal:

Replace older generators in E&CE labs.

Kikusui Function generator 110 Mhz Model KSG 4100 supplied by Interfax

Proposal Benefits:

The electrical and computer engineering students will use the generator(s) in the lab for ECE 438, 439. All our current units are at least 10 years old. (+ ECE 332)

Cost Breakdown:

Each: $ 2790 plus tax ($290) = $3080

One Generator:	$3080
Two Generators:	$6160

better + more functionality + memory + digital + industry standard

Implementation Schedule:

As soon as purchased.

9. E&CE Dept. Watstar Memory Upgrade

Submitted By:

Roger Sanderson
rsanders@ece.uwaterloo.ca
Ex 6184
Staff, Lab Technologist

Description of Proposal:

Purchase RAM memory to upgrade 10 Pentium Watstar stations in E2-2360. Currently it is the only Watstar Polaris room in E&CE that does not have 32 mb RAM Pentiums.

Proposal Benefits:

All E&CE students have access to the room for Watstar/ Waterloo Polaris. In addition, the room is open 24 hours, and students from other Departments use it as well.

Cost Breakdown:

Two 8 meg SIMMs at $30 each times 10 computers = $600 + taxes = $662.40

Implementation Schedule:

Memory would be installed during the December exam time.

10. E&CE Dept. Flux Vector AC Motor Drive

Submitted By:

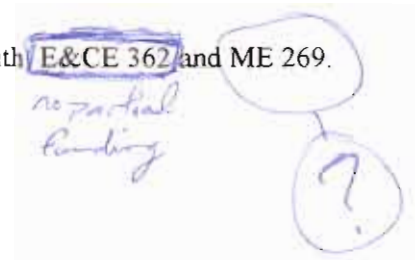
Wesley Reid
wreid@eestaff
x3815
E&CE Dept. Lab Technologist

Description of Proposal:

To purchase a flux vector AC motor drive unit for the Energy Conversion Laboratory.

Proposal Benefits:

The motor drive would be used by students labs associated with E&CE 362 and ME 269.



Cost Breakdown:

$9765.00 Canadian + Taxes = $9866.56

Implementation Schedule:

Winter 1998

Additional Information:

A standard in induction motor speed control has been he voltage source inverter. This type of control yields poor performance at low speeds and under dynamic conditions.

The modern approach to the problem is *vector* control. The proposed drive system has many applications, including: robotics, motion control, precise timing and many speed control applications.

11. Water Purification Equipment for Undergraduate Labs

Submitted By:
Prof. W.C. Lennox
wclennox@civoffice
x3274
Professor and Chair, Environmental Engineering Board

Description of Proposal:

Funds are requested for the purchase of a water purification system for use in the new undergraduate laboratory in CPH (CPH 1324) which is used for both Chemical and Civil Branch courses in the Environmental Engineering Program. **Of the total cost of the equipment ($9,760 including taxes), $4,900 is being requested from WEEF.**

The study of environmental phenomena requires, at times, access to pure water for the preparation of test solutions and calibration standards. The new undergraduate laboratory in CPH, in which most of the laboratory exercises will be held, is only supplied with tap water. While tap water is adequate for many purposes in the laboratory exercises proposed for that lab, several experiments require access to high purity water to either produce the proper result in the exercise, or to protect the lab instruments from chemical damage (fouling of chromatographic columns and detectors, etc.) and lengthen their lifetimes. The proposed equipment would provide the necessary grade of water to ensure the above. In the current situation, we must either use tap water, or transport containers of high purity water from research labs in E1. It is not viable to continue in this way once the labs are in full scale operation.

Proposal Benefits:

There is tremendous potential for students in many areas of Environmental (Civil and Chemical Branches) and Geological Engineering to benefit from the purchase of the proposed equipment. Courses in which this equipment would be of most direct benefit are those associated with the Environmental Engineering program, many of which have a significant laboratory component. The Environmental Engineering Program currently has 300 students, approximately equally distributed between the Civil Engineering and Chemical Engineering Branches. Geological Engineering has an additional 60 students who will be taking some of the Environmental Engineering courses. Enrollment in the Environmental Engineering program is increasing, and coming terms will see it reach approximately 400 students, all of whom would benefit from the proposed equipment at some point in their studies.

There is also a possibility that certain of the Environmental Engineering courses (e.g. Env.E. 330) will be opened to other departments within Engineering (interest has been expressed from students in Chemical Engineering and Systems Design).

The equipment could also be made available for use in project courses (e.g. Civ.E. 300, Civ.E. 400 and Ch.E. 043/048, Env.E. 480/481).

Cost Breakdown:

Cat.No.	Item	Cost
ROPREKIT2	RO Pretreatment	$617.40
ZROS6016Y	RiOs 16 120V/60Hz	2,788.50
PROG00002	PROGARD 2 alone (long) pack	226.95
TANKPE060	60 litre PE reservoir	487.50
ZWCL01F50	Sanitization tablets (50/pk)	40.50
ZMQS6000Y	Milli-Q Academic 120V/60Hz	3,705.00
QGARD00R1	Q-GARD 1	187.85
QTUM000IX	Quantum IX	226.95
MPGL04SK2	Millipack 40 (2/pk)	93.50
ZWAA54055	System installation/training	500.00
Subtotal		$ 8,874.15
Tax (GST, PST)		887.42
Total		$ 9,761.57
	Contribution (see below for explanation)	- 4,861.57
Total Requested from WEEF		$4,900.00

Implementation Schedule:

It is hoped that the equipment can be purchased and put in place before Env.E. 331 and Env.E. 275 are to be offered in the Winter term of 1998. Shipping, installation and conditioning may require approximately 1 - 2 months. Therefore, it would be ideal to receive this equipment as early as possible in the Fall term of 1997.

Additional Information:

Of the limited funds remaining in the Dean's Environmental Engineering Start-up Fund, a **contribution of $4,861.57 will be made towards this purchase,** which is approximately half of the total purchase price. These funds have been committed to this purchase by Prof. Lennox.

W.C. Lennox
Professor and Chair, Env. Eng. Board

The students, staff and faculty involved in the many courses that would benefit from the use of the proposed equipment would like to thank you for your consideration of this application.

12. Laboratory Upgrade Me-262

Submitted by:

M. Kaptein, Mechanical Engineering
Laboratory Director
rkap@surya.uwaterloo.ca

Description of Proposal:

Mechanical Engineering students are introduced to microprocessors and digital logic systems in the ME-262 course. Recent evaluations of the course material and laboratory experiments has shown the need for student hands-on experience with programmable logic devices and programs. To accomplish this we recently sourced and purchased a benchtop robot. It is apparent that these inexpensive demo-robots are not robust enough for student use. We want to develop a prototype, similar but more robust, and then build three (3) robots for hands-on student use. Students and the Engineering Machine Shop will work together on this project.

Benefits of Proposal

This project will benefit all 2nd year Mechanical Engineering students (approximately 90) and probably 4th year students in the near future.

3 of them → (controls) in design of robot design

Cost Breakdown of Proposal:

Drivers, DC motors, encoders, potentiometers, gears and metal fabrication

Total: $2,500.00

The Department of Mechanical Engineering is currently upgrading the computers which will be used as controllers for these robots.

Implementation Schedule for Project:

Fall and Winter 1997 - 1998

13. Labview Software Package

Submitted by:
R. Pick, Chair and Professor, Mechanical Engineering,
A. Khajepour, Professor, Mechanical Engineering
rkap@surya uwaterloo.ca

Description of Proposal:

A crucial component of many engineering courses are modern experiments equipped with sensors, actuators, computers and interfaces between the computers and the physical apparatus. The interfaces provide the communication links to gather the data in a form that lends itself for easier manipulation and analysis.

LabView from National Instruments is a graphical programming software that is used for data acquisition, analysis, and data presentation. With LabView one can quickly design his/her user interface and graphically assemble all components required for his/her experiment. LabView is now used more than any other PC-based instrumentation software in industry and has been recognized as the industry-standard software environment for data acquisition and control systems.

Currently, data acquisition and analysis in our teaching laboratories are based on in-house software which is hard to maintain and does not prepare a student for industry. The Departments of Mechanical Engineering and Systems Design Engineering will adopt LabView to support a number of undergraduate courses, for example ME 262. Faculty Members in Electrical and Computer Engineering have also indicated that they will make use of LabView.

Benefits of Proposal:

LabView will be placed on Watstar and Waterloo Polaris for all students to use. This will allow all laboratories to move to an industry standard in measurement, control and data presentation. Using standard software students can focus on results and concepts rather than wrestling with difficulties in gathering data.

site (license) purchase

Purchase for Engineering

Cost Breakdown of Proposal:

To purchase LabView for Waterloo Polaris there is a one time cost of $22,495. In addition there are a number of specialized add-ons such as PID, Fuzzy Logic, Image processing and Statistical Process Control that may be purchased at a later date.

$2000 ea pop (add-ons)

Contributions:	Department Contributions	$ 6,000
	Mechanical Engineering Alumni	$ 5,000
	WEEF	$11,495

Implementation Schedule for Project:

(partial → back next term

Fall , 1997 and Winter, 1998.
Purchase would be in Fall, 1997 and adoption into courses would begin in Winter, 1998.

other depts
EICE + Systems might chip in

($2500?) $1500 with

14. Hardware For ME/CE Design Studio

Submitted by:

R. Pick, Chair, Mechanical Engineering
J. Sykes, Chair, Civil Engineering
rkap@surya uwaterloo.ca

Description of Proposal:

Civil and Mechanical Engineering are currently developing a CAD Design Studio in E3 1101, This studio is to support design courses and student projects by providing a controlled room with CAD facilities and a design environment. Renovations to the room and 10 AutoCad stations have been completed by the Departments. We wish to add more specialized facilities to allow the creation and plotting of larger drawings.

There is a need for several AutoCad stations with large (20 inch) screens. In addition for the storing of large drawings Zip drives are required. A Scanner is required for scanning drawings and a plotter is required for printing the drawings. In all cases the maximum drawing size will be restricted to 11 by 17 inches. However this is adequate for most student projects.

Benefits of Proposal:

The design studio will provide a new facility that will promote the use of CAD systems in an environment amenable to student projects. That is, it will not be a teaching room but rather a room that students can use for group projects and CAD activities. It will be available to specific courses in Mechanical and Civil Engineering and all 4th year students in these Departments. Student projects such as the solar car, etc., can also make use of the room.

Cost Breakdown of Proposal:

Requirements:	HP 4MV 11" x 17" Laser Printer	$ 3668
	Newstack 11" x 17" Scanner	$ 1496
	Two 1Omega 100 Meg Zip Drives & Cartridges	$ 450
	Two Pentium II Workstations	$ 5882
	Two Sony 20" Colour Monitors	$ 4210
		$11,917
Contributions	Mechanical Engineering	$ 3000
	Civil Engineering	$ 3000
	WEEF	$ 5917

Implementation Schedule for Project:

Fall , 1997 and Winter, 1998
The equipment will be installed in December, 1997 and January, 1998. The CAD Studio will be open for use January, 1998.

15. Work Stations For ME/CE Design Studio

Submitted by:
R. Pick, Chair, Mechanical Engineering
J. Sykes, Chair, Civil Engineering
rkap@surya uwaterloo.ca

Description of Proposal:

Civil and Mechanical Engineering are currently developing a CAD Design Studio in E3 1101, This studio is to support design courses and student projects by providing a controlled room with CAD facilities and a design environment. Renovations to the room and 10 AutoCad stations have been completed by the Departments. A WEEF request has been submitted for 2 additional AutoCad Stations and 11x17 inch scanners and a plotter.

We would like to add two Work Stations to run some of the larger CAD packages, and other large software packages such as finite element codes. At the moment the codes have not been defined. Currently the faculty has facilities for IDEAS however ProEngineer, Solidworks and other packages would be useful.

Benefits of Proposal:

Currently students are restricted to use either AutoCad or IDEAS for CAD software. However other packages are being learned during work terms and it would be advantageous to these students if such packages were available on campus. This would provide more flexibility in the ME/CE CAD Design Studio which will be available to specific courses and all 4th year students in Mechanical and Civil Engineering.

Cost Breakdown of Proposal:

Cost of 2 Sun Work Stations	$ 18,500
50% of cost to be provided by WEEF and 50% by the Departments	

Implementation Schedule for Project:

Fall , 1997 and Winter, 1998
For implementation in the Winter, 1998 term.

16. ME/CE Design Conference Room

Submitted by:

R. Pick, Chair, Mechanical Engineering
J. Sykes, Chair, Civil Engineering
rkap@surya uwaterloo.ca

Description of Proposal:

Civil and Mechanical Engineering are currently developing a CAD Design Studio in E3 1101, This studio is to support design courses and student projects by providing a controlled room with CAD facilities and a design environment. Renovations to the room and 10 AutoCad stations have been completed by the Departments. Requests have been made to WEEF for two additional AutoCad stations and two Work Stations.

Adjacent to the CAD Studio is a smaller windowless room used by Mechanical Engineering graduate students. It is proposed to convert this to a conference room. The primary purpose would be for design meetings and meetings with industry. Accreditation will require a "senior design experience" in all departments. In Mechanical Engineering we hope to make greater use of design projects suggested by industry. This will necessitate meetings with industry and a conference room close to the CAD Design Studio and the laboratories would be beneficial.

Benefits of Proposal:

This would provide a conference room for design meetings and other meetings with industry. The conference room would be bookable and be available to all undergraduate students in the faculty. In the future we would hope to add teleconferencing facilities.

Cost Breakdown of Proposal:

The costs are estimated only since we will attempt to make use of used furniture.

Furniture		$3000
Audio Visual:	Overhead Projector	$ 800
	VCR and Monitor	$ 1300
		$5100

50% of costs to be supplied by the Departments. Room renovations to be undertaken by Mechanical Engineering.

Implementation Schedule for Project:

Fall , 1997 and Winter, 1998
The facilities to be implemented during the Winter, 1998 term.

17. DASL Watstar Terminals

Submitted By:

Keith Parker
bkparker@novice.uwaterloo.ca
746-8163
2B Systems Design Student

Description of Proposal:

This proposal is for 3 computers for the main Systems Design Undergraduate computer lab – DASL. If awarded the Systems Design Department will fund a fourth computer to be added to the Systems fourth year room (which currently has no computers).

Proposal Benefits:

The computing resources within the Systems Design undergraduate labs are becoming saturated. There are an insufficient number of computers with respect to the number of students using them. There are only 17 computers for the 160-240 students on stream. It is difficult to find a terminal not in use at most times during the day and many evenings as well.

If awarded, this proposal will add 4 terminals (3 from WEEF and 1 from the department), helping relieve the demand for these resources.

Cost Breakdown:

Funding Option 1

Three terminals as follows:
-Vault 5233MMXiP Pentium 233MMX WorkStation
-Housed in an EN-6407 Desktop Chassis w/ 2 FANS
-c/w 32 Meg EDO RAM (upgradeable)
-2 16550 Serial, w/ 1 parallel Ports, Quad-IDE Ports
-1.44 Meg Panasonic Floppy Drive
-Quantum 2.1g Fireball ST IDE Hard Disk Drive
-Panasonic 24x IDE CD-ROM Drive
-ATI Graphics Expression PCI Video Adapter w/ 2M RAM
-ADI 5P 17" FST Color Monitor
-NMB Precision's Hitek 104 Keyboard
-Microsoft/Logitech Mouse w/ Pad

Cost per terminal: $2302

TOTAL: $6906

Funding Option 2

Three Terminals as follows:

-Vault 5166MMXiP Pentium 166MMX WorkStation
-Housed in an EN-6407 Desktop Chassis w/ 2 FANS
-c/w 32 Meg EDO RAM (upgradeable)
-2 16550 Serial, w/ 1 parallel Ports, Quad-IDE Ports
-1.44 Meg Panasonic Floppy Drive
-Quantum 2.1g Fireball ST IDE Hard Disk Drive
-Panasonic 24x IDE CD-ROM Drive
-ATI Graphics Expression PCI Video Adapter w/ 2M RAM
-ADI 5P 17" FST Color Monitor
-NMB Precision's Hitek 104 Keyboard
-Microsoft/Logitech Mouse w/ Pad

just say "NO!" (– $100)

Cost per terminal: $2014

TOTAL: $6042

Funding Option 3

Two terminals as follows:
-Vault 5233MMXiP Pentium 233MMX WorkStation
-Housed in an EN-6407 Desktop Chassis w/ 2 FANS
-c/w 32 Meg EDO RAM (upgradeable)
-2 16550 Serial, w/ 1 parallel Ports, Quad-IDE Ports
-1.44 Meg Panasonic Floppy Drive
-Quantum 2.1g Fireball ST IDE Hard Disk Drive
-Panasonic 24x IDE CD-ROM Drive
-ATI Graphics Expression PCI Video Adapter w/ 2M RAM
-ADI 5P 17" FST Color Monitor
-NMB Precision's Hitek 104 Keyboard
-Microsoft/Logitech Mouse w/ Pad

Cost per terminal: $2302

TOTAL: $4604

Implementation Schedule:

Once approved the computers would be ordered and installed immediately.

Additional Information:

The students in Systems Design would like to thank WEEF for the funding it has provided in the past. We recognize its impact on the faculty and do everything possible to make sure it keeps growing.

18. Display Case for Educational Models of Machines

Submitted by:

Prof. John McPhee, Systems Design Eng.
DC-2629, ext.5341, mcphee@real

Prof. Gordon Andrews, Mechanical Eng.
E2-2354J, ext.3689, gandrews@watserv1

Jay Wylie, Systems Design Eng., 4th-year
jjjwylie@systems

Description of Proposal:

The departments of Mechanical and Systems Design Engineering have a large number of educational models of mechanisms and machine components, including gears, clutches, differentials, and simple suspensions. Our goal is to consolidate all of these models in one central location in E2, in a display case that will allow the models to be easily viewed by interested students. The Engineering Machine Shop can build a case that is both aesthetic and ergonomic; security is also a concern since some of these models are very expensive. It is anticipated that this display case will become a long-term part of the engineering faculty, with new models added and old models retired as technology advances.

Proposal Benefits:

By placing the display case in a central location, all students with an interest in machines will benefit. In particular, those students registered in kinematics, dynamics, and robotics courses (SD 182, ME 212, ME 321, SD 382, ECE 482, ME 524, ME 547, SD 553) will appreciate the models on display. It is proposed that the faculty teaching these courses be given a key to the display case, so that models can be brought to relevant lectures for in-class discussion.

Cost Breakdown:

$1500-2000, depending on the size of cabinets to be built by the machine shop. It may be possible to recycle some existing cabinets, in which case less money will be required.

Implementation:

Assuming the display case is in place by January 1998, the models can be viewed by students and used by instructors of the ME 321 and SD 382 courses, both of which are offered in the Winter'98 term.

19. Systems Design Project Lab Digital Oscilloscope

Submitted By:

Jay Wylie, Mike Peasgood, Joelle Pineau.
jjjwylie@systems
746-9406
Fourth Year Systems Design Class Rep.

Description of Proposal:

This proposal is for a digital oscilloscope for the Systems Design Project Lab. The Systems Design curriculum has a project course in 3A, a single term workshop in 3B, and an eight month workshop in 4A/B. There is lab space available to upper year systems students to facilitate their work shops. There are currently some archaic analog scopes in the lab area, but nothing nearly as powerful, or as usable, as the digital scopes in our teaching labs. Many workshops have an electronics aspect such as sensor design and implementation, robotics development, and digital control implementation.

Proposal Benefits:

Immediate benefits to two workshop groups that are continuing the development of a six legged walking robot. Many other workshops, such as fuzzy control systems, robotics, and Watflex related workshops involve electronic components and would benefit from a digital scope.

Another benefit is that students are used to the digital scopes introduced in the circuits courses offered in the Systems Teaching Lab. Thus a similar digital scope in the Systems Design Project Lab would be familiar to all workshop groups.

In each year three terms of systems classes have workshop or project courses that could feasibly utilize a digital scope. If the current fourth year class is indicative of other Systems classes, over ten students per term, or thirty students annually would benefit from ready access to a digital scope.

Cost Breakdown:

Digital Scopes Priced:

HP Oscilloscopes	HP 54600B (2 Channel, 100 MHz)	3677
	HP 54602B (2+2 Channel, 150 MHz)	4404
Tektronix	TDS 340A (2 Channel, 100 MHz)	4473
	TDS 360 (2 Channel, 200 MHz)	5173
	TDS 380 (2 Channel, 400 MHz)	6713

Digital Scope Selected:
TDS 340A:

$4473
+ $7 shipping
+ $447 tax (university 10% tax rate)
= $4927.

get new price

Implementation Schedule:

As soon as funding is available, the digital scope would be purchased. Two workshop groups would use it immediately. As well, its availability would be made known to other work shop groups.

In the winter a 3B class will be on campus that has a project course scheduled, they will be informed of the lab resources available to them.

Additional Information:

Kevin Krauel the Director of the Systems Design Labs supports this proposal. He is working towards making the Systems Design Project Lab more useful to workshop groups, and feels that a digital scope is a big step forward.

The TDS 340A is feature rich compared to the HP scopes investigated. Features making it more useful than the HP scopes include twenty one automatic measurements, a 3.5 inch DOS compatible floppy drive to store captured signals, and a superb interface. As well, the digital scopes in the scopes in the Systems Design Teaching Lab are Tektronix scopes.

20. Computer Aided Software Engineering (CASE) Tool for Polaris.

Submitted By:

K. Ponnambalam
ponnu@uwaterloo.ca
x 3282
Assistant Professor

Description of Proposal:

A Case tool for students working on projects involving software design (for example such a project is a requirement for SYDE 221 Software Design Students.

Proposal Benefits:

Saves a lot of time for students to design classes and it helps students in writing their report. And gives them an experience of using a case tool.

Cost Breakdown:

Assuming 20% utilization out of about 100 students in need of such tool we should order
20 copies costing about 20 X $ 199 = $3980(US)
3 tutorial manuals at a cost of $55 (US) total = $ 165 (US)
Shipping and Handling = $45(US)
Total = $ 4190 (US)

Implementation Schedule:

Can be bought and installed immediately for use in Jan '98

Additional Information:

E&CE has a much expensive and complete tool Object Partner but available restrictedly on Unix. Much of SYDE students use PC network for their projects and this would greatly facilitate their work.

21. Funding for AutoCAD License for the Faculty of Engineering

Submitted By:

Professor Beth Jewkes, Engineering Computing
Hazel Austin, Engineering Computing
emjewkes@mansci, martin@development
888-4601
Associate Dean for Engineering Computing

Description of Proposal:

Funding for Autocad License:

UW now has a site license for an unlimited copies of
AutoCAD release 12,13 and 14

Proposed Benefits:

The advantages of the AutoCad license:

- flagship courses in first year engineering (Civ E 125, Env E 100, Civ E 126) and Civ E 483)
- increased demand by students for courses, projects and personal development
- demand by industry for students with a working knowledge of AutoCAD
- leading design software
- internet-enabled CAD; CAD data can be published on the Web as Drawing Web Format (DWF) files for interactive viewing of your drawings

120 for the price of 30

Cost Breakdown:

Quantity	Description	Unit price	Total Cost
1	AutoCAD License	$12,000 (per year)	$12,000

List Price $3750

+695 upgrade from 12

Note: We have a license for 120 copies of the AutoCAD software.

Implementation Schedule:

AutoCAD Release 12 now exists on the servers in Engineering.

Additional Information:

If WEEF is unable to provide full funding for this project, partial funding would be welcome.

22. Replacement Printers for Computing Labs

Submitted By:

Professor Beth Jewkes, Engineering Computing
Martin MacLeod, Engineering Computing
emjewkes@mansci, martin@development
888-4601
Associate Dean for Engineering Computing

Description of Proposal:

The majority of undergraduate printing in Engineering is done using the five main Watstar printers:

Helix	EL 108
Wheel	E2 1308
Wedge & Shim	E2 1302B
Gaff	CPH 2367
Office	CPH 2367

The printers are HPIIISi, 300 DPI PostScript printers with duplex abilities. Two of the printers are 6 years old, the other three are 5.5 years old. These printers have a rated lifespan of one million pages, most of which have surpassed this number. Over the years these printers have proved very reliable and efficient, but they are getting to the point where their reliability is in question and operating costs are increasing. It was deemed important to replace these printers in the 1996/1997 year, but due to other upgrades and budget restraints, purchasing new printers was delayed for a year. They should be replaced this year.

Proposed Benefits:

The advantages of the newer printers will be:

- a newer version of Adobe Postscript printer software. This will increase processing speed by moving tasks into hardware
- a faster CPU that will speed time to process output
- higher dpi resolution, especially important when trying to get better quality output.
- more reliable, cost effective printers.

Cost Breakdown:

Quantity	Description	Unit Price	Total Cost
3	HP Laserjet 5M (6M, 12ppm, PS	2136	6408
3	HP 4M Memory upgrade	75	225
3	HP Duplex Unit for Laserjet 5M	654	1962
3	HP 500 sheet tray, to replace 250 tray	124	372
3	HP 500 Sheet Tray Assembly, to add an extra 500 sheets	287	861
	Total before taxes	3276	**9828**

Note: the proposal to WEEF is to replace two (2) printers and add a third for a total of six (6) printers. WEEF has already donated funds ($11K) for the purchase of 3 printers. The intention of Engineering Computing is to replace all the printers at once as soon as the total money is available. This procedure will eliminate the need to install different drivers in the public Waterloo Polaris labs and the confusion that may incur when different printers/drivers exist.

Implementation Schedule:

If approved, it is our plan to order the printers immediately for a Winter 1998 implementation.

Additional Information:

If WEEF is unable to provide full funding for this project, partial funding would be welcome. If partial funding is allocated, funding for 2 printers would be appreciated. The five printers in the Waterloo Polaris labs will be replaced and the sixth would be added at a later date.

Recognition of WEEF support will given by erecting signs beside the printer "hole-in-the-wall".

23. Equipment - Student Shop

Submitted by:

C. Wallace
x2301
Supervisor, Student Engineering Machine Shop

Description of Proposal:

The Student Machine Shop provides essential hands-on experience for all undergraduate students either for core class courses or special projects. We require some accessories to improve our lathe and milling machine operations. miscellaneous shop layout tools are also needed.

Benefits of Proposal

All Engineering students and Engineering Departments will benefit greatly from this upgrade.

Cost Breakdown:

1.	Snap Jaws for milling machine vises	$1,000.00
2.	Carbide milling and lathe cutters	748.67
3.	Collet system to fit Standard Modern lathe	666.06
4.	Miscellaneous shop layout tools	505.18
Total (includes all taxes and shipping)		**$2,919.91**

Implementation Schedule for Project:

Fall, 1997

Additional Information

The purchase of the above will help improve and upgrade standards in the existing Student Engineering Machine Shop. This funding would be very beneficial, since there are no extra funds available in the existing shop budget.

24. CSChE Conference at McMaster University

Submitted By:

Bryan Normandin, Jamie Novis, Brian Barclay, Robert Sims
bdnorman@engmail, brbarcla@engmail, rsims@novice,
725-2637 (Bryan)
Chemical Engineering Society Conference Coordinators (Bryan & Jamie)

Description of Proposal:

Partial funding to send B Soc Chemical and Environmental (Chem) students, as UW Chem Eng Soc representatives to the CSChE (Canadian Society of Chemical Engineers) conference at McMaster University from February 5th to 8th, 1998.

Proposal Benefits:

The CSChE is the Canadian student body of the CIC (Chemical Institute of Canada). These conferences provide Chemical Engineering students, from across Canada, with the opportunity to meet with each other, industry representatives and faculty members. The main purpose of the conference is to enhance discussion on issues that effect our education and the chemical industry in Canada. The conference theme this year is "Transfer of Momentum: From Theory to Practice". For this conference, because it is so close and it occurs on the work term, we are hoping to send a large delegation of students from B Soc.

Cost Breakdown:

The cost is quoted based on 15 students attending the conference

Registration cost: $60.00 / student × 15 students
= $900.00

Hotel cost: Ramada Hotel in downtown Hamilton - $69.00 / night (quad room) × 3 nights × 3 rooms
=$621.00

Total cost: $1521.00

Dean funding ?
$200 + DOW $400

Implementation Schedule:

Total Conference Fees due no later than February 5th, 1998.

Hotel bookings will be made once funding is allocated.

10 dolla

this only

25. Concrete Toboggan Team

Submitted By:

André Brisson
albrisso@civil
725-2637
Team Coordinator

Description of Proposal:

The 1999 Concrete Toboggan Team is asking WEEF to support the concrete toboggan entry in the 1999 Great Northern Concrete Toboggan Races. We are requesting financial support for a total of $3600. This value will cover costs we expect to incur in the near future including team uniforms, a technical display, and sponsorship brochures.

Proposal Benefits:

This contribution will benefit approximately 34 Civil Engineering students involved with the team, including students from both the 2A and 3B term. The team members will have the opportunity to gain hands on experience in areas such as finance, marketing, project management, design, build and team work. The University of Waterloo's attendance at the races will uphold the reputation of Waterloo Engineering excellence and promote the school internationally.

WEEF involvement will be proudly displayed on all promotional material including sponsorship brochures, team uniforms, and the technical display. WEEF sponsorship of the 1999 Concrete Toboggan Team will be recognizable to other corporate sponsors, schools across Canada and the United States, the general public in Waterloo, and the host city.

Cost Breakdown:

Team uniforms:	~~$2250 ($66 x 34 members)~~
Sponsorship Brochures:	$350
Technical Display:	$1000
TOTAL:	~~$3600~~

Implementation Schedule:

Fundraising began February 27, 1997.
Building of the toboggan will begin May, 1998.
Races will be held February, 1999.

26. Intelligent Control Algorithms for Industrial Overhead Cranes Data Acquisition Card & Conference Support

Submitted By:

Paul Bowles, Sheridan Ethier, Dan O'Connell, John O'Reilly
Paul Bowles
pdbowles@zeus.uwaterloo.ca
(519) 746-0226
4A Systems Design Engineering Student

Description of Proposal:

Purpose:

The purpose of this project is to investigate the use of intelligent control algorithms, namely fuzzy logic and neural networks, in the control of an industrial gantry-style (overhead) crane. A second focus of the project is to compare the performance of the intelligent control algorithms with a conventional PID controller.

We are asking WEEF for assistance in purchasing a new Data Acquisition Card for the project. The current one does not have the necessary output channels, nor does it accept encoder input. The proposed card ($1500) would fully meet our technical needs. Additionally, a paper based on the results of this project is being presented at the World Automation Conference in Anchorage, Alaska. We are asking for assistance to attend this conference ($2000) to cover conference fees and hotel.

Project Background:

This project is a continuation of the 3B workshop completed by the same, four team members entitled: "A Fuzzy Logic Controlled Flexible Crane". This past work saw the construction of a 2D (back & forth and up & down) Gantry crane prototype, as well as creation of the power circuitry and fuzzy logic software engine. This last element was implemented using the MATLAB real-time workshop and fuzzy logic tool kit. The project objective was to dampen any swinging of the payload in the direction of trolley motion.

The 3B workshop demonstrated that fuzzy logic can be used to effectively dampen swinging. The project also justified an in-depth investigation of the application of this technology to more complex crane control problems.

Project Duration:

The total project duration is expected to be 8 months (4A & 4B terms). All project members are expected to stay with the project for this period.

Expected Results:

The anticipated project results are:

- Construction of a new, more robust crane (2.5m x 2.5m x 2.0m) capable of 3D motion.
- Control of 2D payload swinging and 2D position using the intelligent control algorithms (implemented using software developed by the group):
  - Fuzzy logic;
  - Neural networks;
  - Various variants and hybrids of the above algorithms.

- Comparison of the intelligent control algorithms against one another as well as versus a standard PID controller.
- Implementation of the control algorithms on a microcontroller.

Proposal Benefits:

1. Construction of a **robust industrial overhead crane prototype capable of 3D motion control**.
2. Approximately **70 Systems Design students per year** to benefit from project being integrated into SYDE352 *Introduction to Control Systems*.
3. Approximately **15 SYDE/MECH/E&CE students per year** to benefit from project being used in new Mechatronics option course: *Introduction to Fuzzy Logic and Neural Networks*.
4. **Waterloo Undergraduate Engineering** to benefit from **raised profile** through:
   - Paper accepted for presentation at ***World Automation Conference*** *(Anchorage, Alaska, May '98)*
   - **Corporate recognition** of project by:
     - Computing Devices Canada Ltd. ($1000 grant received)
     - SkyJack (demo given)
     - Spar Aerospace Ltd. (demo given)
     - Mentor Dynamics (corporate contact)
   - Entry into **Ontario Engineering Competition**.
   - Good results will be published in the ***International Journal of Systems Modeling & Control*** as well as ***CESA '98*** *(Computation Engineering & System Automation)*
5. **4A/B Systems Design Workshop** project for 4 students.

Cost Breakdown:

See following project budget.

Advanced Control Algorithms for an Industrial Overhead Crane
Project Budget
Systems Design 4A/B Workshop Project - SYDE461/2
Members: P. Bowles, S. Ethier, D. O'Connell, J. O'Reilly

Expenditures				Income	
	$ U.S.	$ Cdn. (post tax)			$ Cdn.
Cost of Crane				Computing Devices Canada (grant)	$ 1,000.00
Frame		$ 95.00		MRCO "Connections" Program (grant)	$ 2,000.00
I-beam		$ 93.00		*WEEF Project Support (DAC)*	$ 1,500.00
Equipment (note 1)		$ 400.00		*WEEF Project Support (Conference)*	$ 2,000.00
Motors (x3)	$1,605.00	$2,565.59		Group Members' Personal Funds	$ 4,000.00
Power Supply	$ 350.00	$ 559.48		Professor Karray (grant)	$ 2,801.58
Power Amplifiers (x3)		$ 150.00			
Carriage Trolley (note 2)		$ 500.00			
Circuitry (note 3)		$ 200.00			
Subtotal			$ 4,563.07		
Future Work					
Micro-controller &					
Interface Software (est.)	$ 523.00	$ 836.02			
Data Acquisition Card		$1,500.00			
Hard Drive (est.)		$ 402.50			
Subtotal			$ 2,738.52		
World Automation Conference					
Flight		$4,000.00			
Conference Fees & Hotel		$2,000.00			
Subtotal			$ 6,000.00		
Total			$13,301.58		$13,301.58

(1) Bearings, sprockets, wheels, axle, drive shaft, chain, collars
(2) Materials and labor (estimated)
(3) Wiring, ICs, sensors (estimated)

Implementation Schedule:

The project is to be implemented over two terms (Fall '97 & Winter '98). Construction is nearly complete through funding already received (see cost breakdown). Real-time control starts after construction (mid-November). Already developed for the project is a fuzzy logic inference engine. A real-time operating system has been designed and may also be used for the project. Conference bookings will take place in January of 1998.

Additional Information:

Although we are asking for full funding, partial funding for either portion of the total (DAC or Conference Support) would also be greatly appreciated. Note that we are asking for funding of the conference fees this term because booking will likely take place in January of next year, before the next WEEF meeting.

Alternate funding possibilities include:

- Funding for Data Acquisition Card but not Conference Support ($1500).
- Funding for Conference Support but not the DAC ($2000).

27. Environmental Engineering Project

Submitted By:

Nikita Eriksen-Hamel
nserikse@engmail.uwaterloo
747-1452
environmental chemical engineering

Description of Proposal:

A long term environmental engineering project is being planned. The project will focus on an environmental problem or concern within campus or the community. Presently the project is in its beginning stages. Discussion in the form of an environmental forum will take place on November 19th. On this date project ideas will be discussed and debated. At the beginning of next term (Spring 1998) a project will be chosen and researched.

Proposal Benefits:

A fund is needed to help organize the beginning stages of the project. This will include the establishment of contacts with companies and other universities for the purpose of research and advice.

Cost Breakdown:

Long distance phone calls and faxes for communication with environmental specialists and companies	$100.00
Photocopying, printing expenses for posters, letters and a possible newsletter,	$100.00
Organizational beginning of term meeting for room booking, audio visual and food.	$100.00
Travel budget for travel to other Universities and an environmental conference in June.	$150.00
Total proposed budget :	$450.00

Implementation Schedule:

At the beginning of next term (Spring 1998) an organizational meeting will be held to discuss the proposed project. After this meeting a research group will research the feasibility of the project and forge contacts with relevant persons at Universities and companies. Once this is done we will approach companies and non-profit organizations about possible monetary support for further terms.

Additional Information:

The Environmental Chemical and Environmental Civil classes have been taking an active role to try to bring about this environmental project which will help tie together the two environmental programmes. A group of students are also in the beginning stages of forming an environmental society. This society will serve as a representative body and an administrative arm for the project. Contacts with several companies about the possibility of sponsorship have been made. There are many future possibilities for sponsorship and support from environmental companies.

28. University of Waterloo Alternative Fuels Team, EVC (Ethanol Vehicle Challenge)

Submitted By:

Michael Pelton
mcpelton@mechanical
885-0975
UWAFT Team Manager, 4th year Mech Eng student

Description of Proposal:

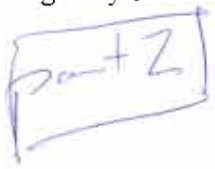
The University of Waterloo Alternative Fuels Team requires several pieces of equipment to assist in the conversion of a 1997 Chevrolet Malibu (to dedicated ethanol use) for competition at the 1998 Ethanol Vehicle Challenge. The items include various hand tools, a rotary fuel pump and equipment related to the development of the control system for the vehicle (the WEEF proposal for the control system equipment was prepared separately from this proposal by Joe Krajnc). Additionally, our team requires financial assistance for travel expenses incurred due to the long distances between UW and many of our technical partners (located in Kingston, Ottawa, Sarnia...). The total cost for the equipment (excluding the control system equipment) and travel expenses is $1300.

Proposal Benefits:

The scope of this project crosses into several departments: Mechanical, Systems Design, Electrical, and Chemical. The project is an integral part of the 4th year engineering curriculum for 13 students in Mechanical Engineering and Systems Design. However, students from all years and faculties are actively involved. The project provides practical engineering and management experience for the students in an area that is directly relevant to current industry issues.

It is anticipated that the project will continue in future years. Obtaining equipment and assistance leading to our success at the competition would benefit future students for years to come. The equipment required would be made available to other student projects as well, such as Formula SAE, MiniBaja, and Midnight Sun. All teams could greatly benefit from this equipment.

Cost Breakdown:



Travel Expenses:	$1000.00
Fuel Pump:	$100.00
Hand Tools:	$200.00

Implementation Schedule:

The Ethanol Vehicle Challenge will be held in Warren Michigan in May 1998. Extensive testing is required and it is the goal of the team to have the car running on ethanol by the end of the Fall term. The car will then be tested and optimized by April 1998. The travel expenses would be used throughout the months from now to April to bring the car to testing facilities in Ottawa, Kingston and possibly Sarnia. The equipment would be put to use immediately and will remain in use for years to come.

Additional Information:

The University of Waterloo Alternative Fuels Team (previously known as Team PROPeh?NE) is a relatively new student team at UW. However, we have had considerable success! Last years team finished FIRST PLACE OVERALL at the Propane Vehicle Challenge and we intend to continue this level of performance - showing on an international stage Waterloo's tradition of engineering excellence.

29. 1998 Formula SAE Race Team

Submitted By:

Doug Zister and Louis Houle
djzister@mechanical and lhoule@mechanical
ext. 5904
Team co-leaders

Description of Proposal:

As we are preparing the UW entry for the 1998 Formula SAE Design Competition, there are many required instruments which the team still does not own. The team wishes to submit the following list of components to WEEF: testing instruments, books, car components, tools and racing gear. A detailled list is provided in the cost breakdown, below.

Proposal Benefits:

This year's Formula SAE team is one of the largest ever seen at this University. It includes over thirty students from all disciplines of engineering. All items listed in this proposal are not only re-usable but also will be useful to future teams. Furthermore, they are durable and will last many years. This is important since the team has existed for over ten years and the recent success, it is very likely that it will remain very popular.

Cost Breakdown:

The following table lists every item included in this proposal with their cost. Although full funding would be most helpful, the team will accept partial funding. Any item listed below will be very beneficial to the team. They are therefore not listed in order of preference.

Item	*Qty*	*Unit Price*	*Total Cost*
1.0 Testing Instruments			
Linear Potentiometer	4	$250.00	$1000.00
Rotary Potentiometer	1	$50.00	$50.00
Multi-meter	1	$100.00	$100.00
Gauges (Tach., Oil Temp., Exhaust Temp.)	1	$550.00	$550.00
Water Wetter	12	$15.00	$180.00
TOTAL			**$1880.00**
2.0 Books			
Tire, Suspension & Handling	1	$85.00	$85.00
Car suspension and handling	1	$85.00	$85.00
Inside Racing Technology	1	$40.00	$40.00
Drive to Win	1	$40.00	$40.00
Design of Racing and High Performance Engines	1	$75.00	$75.00
Engine Testing: Theory and Practice	1	$105.00	$105.00
Data Power	1	$45.00	$45.00
TOTAL			**$475.00**
3.0 Car Components			

Shocks	4	$175.00	$700.00
Differential	1	$550.00	$550.00
Constant Velocity Joints	4	$175.00	$700.00
TOTAL			**$1950.00**
4.0 Tools			
Tool box	1	$325.00	$325.00
MIG Welder and Accessories	1	$2000.00	$2000.00
TOTAL			**$2325.00**
5.0 Racing Gear			
Driving Suit	1	$350.00	$350.00
Driving Gloves	1	$150.00	$150.00
Race & Helmet Bag	1	$200.00	$200.00
Helmet Restraint	1	$20.00	$20.00
TOTAL			**$720.00**
GRAND TOTAL			***$7350.00***

safety issue

Implementation Schedule:

The above listed items are all required for immediate implementation.

30. Waterloo GNCTR Organizing Committee WEEF Proposal

Submitted By:

Carrie Junker
crjunker@civil

25th yr
15yr + Waterloo involvement

Description of Proposal:

The 24th Annual Great Northern Concrete Toboggan Race (GNCTR) is to be held in Alberta on February 4-8, 1998. The University of Calgary Civil Engineers are hosting GNCTR, which welcomes students from Canadian, American, and International technical colleges and universities.

The location of the race switches between eastern and western Canada. Since the races will be held in Calgary in 1998, they will return east again in 1999.

The Great Northern Concrete Toboggan Race is an ideal opportunity for students to work on a project which challenges their knowledge, but in a fun and sportive manner. Students are able to meet students from all over North America and even from other countries.

Proposal Benefits:

We, the Waterloo GNCTR Organizing Committee feel that hosting such an event in Waterloo would be very beneficial. In order to attain the honour of hosting this event, we must prepare a proposal to be submitted at the 1998 Competition. The organizing committee would like to travel to Calgary to submit the bid and meet with the current organizers to discuss problems they encountered as well as possible ways to improve the competition.

Attending the competition will give the organizing committee a chance to view first hand the organization necessary to make such an event a success. A contribution from WEEF would show the Selection Committee that the Waterloo GNCTR Organizing Committee has support from their fellow Engineering Students. This would ensure our selection as the 1999 location for the Competition.

$500/person x 7 people

Cost Breakdown:

The purpose of this proposal is to request funding to cover the cost of registration and travel expenses. To help cover these costs we are requesting $2500.

↑
$100 registration
$350/person

Thank you,

Carrie Junker
Finance Director

31. HeliBot

Submitted By:

The University of Waterloo Aerial Robotics Team
Contact: Adriano Bertucci
ambertuc@novice.uwaterloo.ca
519-886-8581
Team member

Description of Proposal:

HeliBot will be the University of Waterloo's official entry for the Millennial International Aerial Robotics Competition held by the Association for Unmanned Vehicle Systems. The first qualifier for the Millennial Competition will be held during the summer of 1998, the second during the summer of 1999 and the competition itself during the summer of 2000.

The UW Aerial Robotics Team was formed this term by several students (approx. 12) in Computer Engineering. Since this is a new student project, we are applying for WEEF funding to help finance the setup of some basic facilities that will enable us to begin working on our design. We are requesting funding for a computer, design software, GST payment on loaned/donated goods, the entrance fee for the competition, and some other administrative expenses (detailed below).

Proposal Benefits:

Although this project is being run by students in the Dept. Of Electrical and Computer Engineering, the team welcomes students of all Engineering disciplines to join. A common communication systemis being designed to allow multiple robots to interface with it. This will allow many class teams to participate. We believe this is an exceptional opportunity for students to get involved in extracurricular activities, and to apply skills from both work and school on an exciting project.

Cost Breakdown:

In order to help finance some of the expenses involved in beginning a student project of this magnitude, we are requesting WEEF financing for the following items:

1. Pentium computer		$2000
2. Software (Labview, Watcom C++, ORCad)		$5000
3. GST on loaned/donated equipment		$ 500
4. Entrance fee		$1500
5. Phone calls/faxes/photocopies	$ 400	
6. Printing account		$ 200
TOTAL		$9600

The total amount requested is $9600. In the case that full funding is not possible for this project, the following partial funding cost estimates are provided (in order of preference):

* Items 1,2,3 (computer, software & GST) $7500
* Items 1,2 (computer & software) $7000
* Items 2,3 (software & GST) $5500
* Items 1,3 (computer & GST) $2500

Implementation Schedule:

All of the above items are a necessity for the operation of the team. As such, we request that the funding be provided ASAP (before the end of this term) so that we may begin working on the technical aspects of this project.

Additional Information:

The total cost of this project will exceed $100,000. As such, we are also seeking support from various companies in the form of a donation of specialized hardware and/or software. We currently have (on loan) a GPS, worth $50000, and a remote control helicopter, worth $2000.

32. IEEE McNaughton Center

Submitted By:

Karim S. Karim, Ben Lam
kkarim@novice, blam@calum
(519)888-4567 ext. 6955
IEEE Student Branch B Chairs

Description of Proposal:

The IEEE Student Branch operates the McNaughton Center of the University of Waterloo (E2 3359) as a service to IEEE student members as well as other students of the university, working closely with the E&CE department. The McNaughton Centre is in need of renovation and upgrading of various lab/computer equipment. A contribution from WEEF would go a long way to improving the condition of this room for the benefit of all E&CE students.

Proposal Benefits:

The McNaughton Centre is the main office of the IEEE Student Branch and is in need of renovation and upgrading of various lab/computer equipment. This equipement is for the use of the IEEE student members, but is not restricted to use by E&CE students who are not members.

The IEEE Student branch organizes and hosts events such as Grad Studies Nights (where E&CE students got to meet the profs and learn about Graduate studies at Waterloo), Speaker presentations (involving technical speakers from industry), Student Paper Night (hosting a student paper competition for local univesities), micromouse competition, robotics competition as well as other student projects where the use of the McNaughton Center is required. Students will be able to come in and do all this at any time once the new security features are installed. The IEEE student branch will also be the home of the UNIX ieee server (along the lines of calum). The IEEE McNaughton Center also provides a link for students to the Kitchener/Waterloo IEEE Section.

Cost Breakdown:

The following summarizes the equipment that needs to be upgraded/purchased along with the estimated costs. WEEF will of course, be formally recognized in the form of a plaque/stickers that will be placed in appropriate locations.

2 Intel based computers	$4000
1 Unix based server (a used Sparc 5/10)	$2500
keyless entry system (based on watcard)	$750
security camera system/VCR	$500
used scopes	$1000
DMM	$500
Various Components (ICs/GAL/PAL programmers)	$1000
IEEE Library (IEEE texts/ industry magazines)	$1000
~~Microwave~~	~~$250~~
~~Fridge~~	~~$500~~
~~Chairs/Stools~~	~~$500~~
Total	**$12 500**

3:1

$2500 = $10 000

Implementation Schedule:

Since we are the IEEE Student Branch B, depending on when the funding arrives, the proposal will start to be implemented in Fall 1997 and should be completely implemented by Spring 1998, our 4A term.

Additional Information:

IEEE Canada will match 3 to 1 on any amount that we can raise up to a reasonable upper limit.

33. Solar Array for Midnight Sun V

Submitted By:

Steve Burany
Team Leader - WSC
steve@midnightsun.uwaterloo.ca
x2978

Description of Proposal:

The team has just returned from Sunrayce 97 where we placed 7th in the overall competition. This is the best showing Waterloo has ever achieved, and we are currently ranked as the top Canadian team. The Midnight Sun team is currently planning to enter the 1998 World Solar Challenge (WSC) in Australia. This year's team consists of approximately 90 engineering students and 10 student from various other faculties across campus.

We are currently in the process of upgrading the existing car. By analyzing the data from the last race, we have determined several areas for improvement. Primarily, the present solar array is not producing enough power to make the car competitive in the next WSC.

We propose to remove the existing solar array from the car and replace it with an array that will increase our power by 30%. This increase in power will enable us to increase our average cruising speed during the race and to improve our final standings. The team would like to request partial funding for the purchase of the new solar cells.

Proposal Benefits:

The improved solar array will benefit not only the current team, but also the next solar car team at the school. We have chosen a make of solar cell that is allowed in both the WSC and Sunrayce 99. The solar array upgrade will involve both the design and implementation of a major and crucial system on the car. Students who are working on this project must develop manufacturing techniques and quality assurance systems in order to produce a winning design. Students will also benefit through working with our industry contacts as well as with other groups within the project.

Cost Breakdown:
The purchase of the solar cells from Siemens Solar is being partially subsidized by Siemens. Normally, one solar cell would retail for $50.00, but we have arranged for a discounted price of $10.00 per cell. The current design is calling for approximately 1200 cells to be used on the surface of the car.
We estimate the cost for the new solar array to be around $12 000. The Midnight Sun would like to request $6 000 (one half of the amount needed to purchase the array) from WEEF. If the full amount requested is not possible, the cells are sold in packs of 50, so we would request that any donation is made in multiples of $500.

Implementation Schedule:

The team plans to purchase two packs of solar cells this month to validate some of the manufacturing techniques that have been developed. In mid January, the bulk of the solar cells will be purchased.

Additional Information:

The World Solar Challenge is the largest and most prestigious solar race in the world. For the first time, the Midnight Sun will be competing against multinational corporations as well as other university teams. We are currently the only Canadian team planning to enter this race, and we hope to be able to represent The Faculty of Engineering, The University of Waterloo, and Canada in Australia.

34. The Aero Design Competition

(905) 639-7902

Submitted by:
University of Waterloo SAE Aero 98 Team
Leon Barbulovic-Nad
(519) 256-8617
lbarbulo@novice.uwaterloo.ca
Team Leader

Description of Proposal

The Aero Design competition is for engineering students to conceive, design, fabricate, and test an aircraft. The contest consists of designing and building a radio-controlled aircraft based on a prescribed engine and a maximum platform area. The competition tests each team's ability to predict the performance of their unique designs as well as determine which entry will carry the most weight aloft from a 61 m (200 ft) takeoff strip.

Due to the problems in the previous years during the test flights and the contest, a servo upgrade is absolutely necessary for the 1998 entry into the SAE Aero Design East competition. The low torque delivery of the previously used servos overturned a good design into an uncontrollable airborne monster. In some cases, the torque delivered to the control surface was only 30% of the required torque.

Therefore, the SAE Aero 98 Team is proposing a purchase of some essential components for the model control system.

Proposal Benefits:

The "most economical computer radios with Futaba quality" would provide us with some new features: adjustable travel volume (ATV), exponential rate, and mixing. It has been suggested by various model pilots that this 8 channel digital radio system could offer easier pilot training and more advanced control of the aircraft during flights. The radio would be of great benefit not only to the Aero 98 Team but also to the future teams as well.

The features of the basic digital transmitter include 4 model memory, alternate set-up, model naming, stopwatch/timer, servo end point, centering and reverse adjustments, dual rates and exponential rates. Pre-defined mixers include 2 aileron>rudder systems, flap>elevator, elevator>flap, and spoiler>elevator.

ATV will allow us to preset the maximum travel of a servo to either side of neutral; exponential rate will offers us a servo travel that is not directly proportional to stick travel. Channel mixing will allow simultaneous operation of two or more servos from a single control unit (i.e. ailerons and rudder, elevator and throttle).

Advanced Precision Composite (APC) propellers are computer designed blades with constant true pitch and provide greater thrust with reduced noise. These propellers will be tested and the best ones will be used during the competition. We have already tested Master Airscrew Windsor propellers as well as Tornado propellers.

HydriMax Nickel-Metal Hydride (NiMH) batteries are used with all radio systems for twice the rated capacity of NiCd batteries, with the same size and weight.

Cost Breakdown:

Futaba 8 Channel Radio

Stick #	System	Receiver	Price (US)
TG2094	8UAF	R148 DF	349.99

Futaba Servos

Stock #	Servo	Description	Weight/Torque/Transit Time	Use	Qty.	Price (US)
TG2139	S9402	coreless motor, brass gears	1.9 oz./111 oz.-in./0.10 sec @ 60 deg.	elevator control	1	99.99
TG2139	S9402	coreless motor, brass gears	1.9 oz./111 oz.-in./0.10 sec @ 60 deg.	left and right aileron control	1	99.99
TG2139	S9402	coreless motor, brass gears	1.9 oz./111 oz.-in./0.10 sec @ 60 deg.	left and right flap control	1	99.99
TG2139	S9402	coreless motor, brass gears	1.9 oz./111 oz.-in./0.10 sec @ 60 deg.	spare/possible use on the test aircraft	2	99.99
					Total	$499.95

Batteries

Stock #	Description	Price (US)	Quantity
TG1398	4.8V Rx Pack Flat-Futaba J	21.99	2
	Total:	43.98	

Reinforces Nylon Propellers

Stock #	Propeller Size	Price (US)
TG2528	12x6 Sport	3.79
TG2530	12x8 Sport	3.79
TG2532	12x10 Pattern	7.59
TG2534	12x12 Pattern	7.59
TG2538	13x6 Sport	4.29
TG2540	13x8 Sport	4.69
TG2542	13x10 Pattern	6.99
TG2544	13x13 Narrow Chord	7.59
TG2547	13.5x10 Pattern	11.99
TG2548	14x6 Pattern	11.99
TG2549	14x8 Pattern	11.99
TG2550	14x10 Pattern	11.99
	Total:	94.28

Cost Summary

Futaba Digital 8 Channel Radio	349.99 US
5 Futaba Servos	499.95 US
2 NiMH batteries	43.98 US
APC Propellers	94.29 US
Total:	988.20 US

Partial Funding Option

Futaba Digital 8 Channel Radio	349.99 US
5 Futaba Servos	499.95 US
2 NiMH batteries	43.98 US
Total:	893.92 US

35. SMA Materials for Research/Project Use in Systems Design Lab

Submitted By:
Jennifer Hunt jehunt@systems tel: 885-4818
Edward Chan edward@panda tel. 747-4834
Fourth Year Systems Design Engineering Students

Description of Proposal:

The proposal is to buy a variety of SMA materials for project use. SMAs, short for Shape Memory Alloys, are unique composite metals which exhibit similar behaviour to organic muscles. When heated, SMAs will undergo contraction and will return to its original state after cooling.

The Systems Design Engineering curriculum includes four senior design work-shops from 3A to 4B. There has been interest amongst some students in deploying SMAs in their work-shop projects, but these materials are not readily available and they are also very expensive for students alone to purchase.

Proposal Benefits:

There are currently two work-shop groups who are planning to use SMAs as robotic actuators in their projects. In addition, there also a growing interest in SMAs within the department. Though the technology encompassing SMA is still in its infancy, its possible applications already span many disciplines, including medicine, space exploration, and last, but not least, robotics. It is crucial for students to be able to experiment and explore the possibilities of such unique and potent technology. The quantity and variety proposed in the proceeding section will benefit at least 20 students a year.

Cost Breakdown:

The proponents of this proposal request the following resources:

Muscle Wires R & D Kit (Model 3-102)
A complete package designed for corporate and laboratory research and development work with shape memory alloys. It includes the following: Muscle Wires Project Book, five metres each of Flexinol 050, 100 and 150, one meter of Flexinol 250, crimps & instructions.

Elec. Piston Deluxe 5-Pack (Model 3-137)
Get extra savings when you buy in quantity. Includes five pistons, battery, leads and plans for four complete projects.

NiTi Ribbon, 2250 x 500 æm, 60°C (Model 3-210)
A ribbon of muscle wires made from flattened SMA wire. It is used to form coil springs, bending beam elements, release mechanics, active leaf springs, and more. It has a 60øC transition temperature. NiTi

Ribbon, 2250 x 500 µm, 60°C (Model 3-210)

A ribbon of muscle wires made from flattened SMA wire. It is used to form coil springs, bending beam elements, release mechanics, active leaf springs, and more. It has a 60øC transition temperature.

NiTi Wire 500µm, 55-75°C (Model 3-401)
Untrained, as-drawn Ni-Ti wire in various sizes & temperatures. It can be used to form springs, thermal actuators, memory wire devices, etc., which may be deployed in robotic actuator design.

The following is a summary of the cost break-down

Description	Model #	Unit Cost (US$)	Qty	Cost (US$)
Muscle Wires R & D Kit	3-102	249.00	1	249.00
Elec. Piston Deluxe (5-Pack)	3-137	39.95	1	39.95
NiTi Ribbon, 2250 x 500 µm, 60°C	3-210	37.00/metre	1 metre	37.00
NiTi Wire 500µm, 55-75°C	3-401	14.95/metre	1 metre	14.95

Sub-total	$ 340.90
PST 8%	$ 27.27
GST 2.3%	$7.841
S & H	10.50
Customs	15.00
Total Cost (Cdn$)	$401.511 $669.185

Implementation Schedule:

The specified parts will be ordered once funds have been granted. The laboratory director will be responsible for distributing these materials for use with student projects as requested. Currently, there are at least two groups which will benefit from these materials immediately.

Additional Information:

The cost is based on US distributor "Robot Store" prices as posted online. For further information, please visit its URL at
http://www.robotstore.com/SMAs.html. For a list of other students who support this proposal, or any questions please contact Jen Hunt 885-4818. Thanks.

36. UWAFT's Microchip PIC Microcontroller Proposal

Submitted By:

Joe Krajnc
jkrajnc@systems.watstar.uwaterloo.ca or hakrajnc@golden.net
(519) 748-1255
UWAFT Team Member and Systems Design 4A Student.

Description of Proposal:

This proposal defines the immediate needs of the University of Waterloo's Alternative Fuels Team. The required items constitute the team's need for designing and building an Engine Management System. This system will be based on the latest release of 8-bit microcontroller technology available from Microchip Technologies.

Proposal Benefits:

This proposal would benefit both the UWAFT and the Systems Design Department. The UWAFT would immediately benefit and the Systems Design Department would retain the resources for future use by Systems students.

Cost Breakdown:

Microchip PIC Master Emulator 17C756 with Promate II	$4610.00
Microchip PIC MPLAB-C	$957.71
Microchip Probes for Emulator	$585.65
Microchip PIC 17C756(OTP)	$24.25 x 3=72.75
	Sub-Total:$6226.11 + taxes
	Total:$7160.03

Implementation Schedule:

The order would be filled immediately, and work would begin during delivery time up to the end of April of 1998. The 1998 team would take over after the conclusion of the contest and build on this years work for 1999 competition.

Additional Comments:

Last year was the first year that University of Waterloo competed in an Alternative Fuels contest. Competing with one-fifth of the budget of the other schools, we accepted three (3) first place prizes including First Overall, beating the previous winners Texas A&M. We have proven ourselves capable of "bringing home the gold" and unlike other student run projects and competitive teams, the UWAFT does not ask for any official financial assistance from the University of Waterloo. Thus, our team is entirely dependent on sponsorship and donations from student programs and corporations. Consequently, proposals like these are crucial to our existence and successful competition.

The decision to use Microchip products is based on the successful history of its use in the Systems Design Department. Microchip's products are dependable, low cost and meet our needs. Thus, fulfillment of this proposal is not only a benefit to the UWAFT team but an addition to the DASL. In addition, this technology will be subsequently used in the future of the UWAFT as well as the future use other Systems Design students. Currently, the Systems Design Department does possess

a limited amount of Microchip technology. Microchip products have been successfully used by many Systems students in several workshops, including Hexotica (the six legged walking robot), and Formula SAE. However, these products are beginning to show their age with compatibility issues. As well the current set of equipment is highly incomplete. Ie. no emulator, no C++ and no probes.

The UWAFT team plans to use Microchip's products in a very complex implementation thus smarter tools are required. The use of an Emulator is invaluable given the fact that the Microchip latest product does not currently come in a windowed version. A windowed or re-programmable version would allow code to be written and programmed into the chip for testing. Later it could be erased and re-programmed with updated code. As stated, a widowed chip does not currently exist, and from contacting the company there appears to be little news about the arrival of such a version. Therefore full chip emulation, like that achieved through the Microchip emulator, is an imperative asset.

Due to the aforementioned complexity involved in building an Engine Management System, producing code written in C++ is a tremendous benefit in both speed and debugging capabilities over the current Assembler based tools. The Emulator probes prove invaluable for debugging purposes. This project has a very critical and tight timeline. Failure to produce a working vehicle at the contest will result in a $20,000 fine for the school, thus rapid development tools such and the Emulator, Probes and C++ are great assets.

37. UW Casi Free Flight Glider Team 1998

Submitted By:

Gregory Thompson
g2thomps@novice.uwaterloo ca
(519) 824-7285 or (416) 798-6868 x2843
Aerodynamics and Sponsorship

Description Of Proposal:

We are looking for WEEF to sponsor our 1998 team for our competition in May of 1998. We would like funds to allow us to continue to purchase materials for construction of a series of prototypes for the new 1998 glider design, plus some capital equipment which will allow us to make better gliders.

Proposal Benefits:

- The competition is a national competition against schools from Ontario, Quebec and the Western Provinces. We are currently the national champions. Our team won the 1997 competition in Ottawa with our flying wing glider. We would like to effectively defend our title.

- We are hosting the competition here in Waterloo in May.

- The project is a lead in to ME564 Aerodynamics, ME 533 Composite Materials, ME 482 Project

- We have in the past obtained sponsorship from many large aerospace companies including de Havilland, AlliedSignal Aerospace, plus DOW Chemical.

- The equipment we purchase can be used for other teams plus the equipment will be assets for future glider projects.

- We have expanded our core team to include students from both streams. We have a current core team consists of 11 (6 Eng, 5 faculties.)

Cost Breakdown:

We are looking for funding for:

Materials	
Fibreglass	$100
Epoxy	$150
Equipment	
Automatic Foam Cutter	$150
Wireless Headsets	$200
Fabric Roller cutter setup	$100
Hosting	
Information Package	$100
Total	$800

Partial Funding Option:

Materials and Automatic Foam Cutter $400

Implementation Schedule:

The competition is in May of 1998 so it is a long way off, however we are beginning development of the new glider now. Our preliminary schedule is:

First Series of Prototypes	November, 1997
Re-design	December, 1997
Final Series of Prototypes	January, 1998
Report Due	March 31, 1998
Competition Gliders Finished	April 15, 1998
Competition	May 9-11, 1998

Additional Information:

Background on the Team:

The UW CASI Free Flight Glider team is a group of students who are constructing a glider which will be entered in a National Competition in May of 1998, sponsored by the Canadian Aeronautics and Space Institute (CASI). This will be the third entry into the competition for the team.

In May of 1997 we traveled to Ottawa with a radical new design, a flying wing. Using this glider we won the competition after only the first day of flight trials. Our glider was very well suited for the competition, flying extremely well. The glider was able to carry the largest payload of the competition for the longest time, however previous designs had better capabilities to our glider. The intention for 1998 is to improve on the existing design by selecting new airfoils which are more optimized for higher lift and lower drag. Our hope is to build a glider which will far surpass the 1997 design.

Level of Development:

Flight Testing

We are currently performing flight testing on our first prototype. This prototype is being used to test the validity of our calculations. Just on the weekend we achieved a 90 second flight which is one of our best.

Windtunnel Testing

Off the field windtunnel testing is being carried out in the open channel windtunnel. This testing has currently verified some possible improvements which will be implemented into the final design of the glider, such as winglets.

Materials Testing

We are also performing materials testing, including bend and impact testing to allow us more impact resistance while keeping the wing rigid. We have received some heavy duty Kevlar from de Havilland which are showing some very promising results.

Hosting

We have found a flying field just near Listowel, which offers enough space to allow for our gliders to fly uncontrolled without hitting anything.