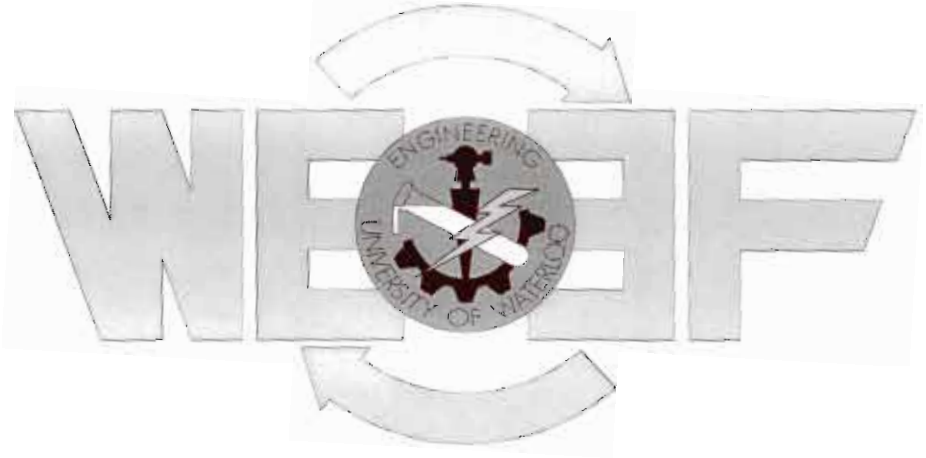
WEEF Proposals & Allocations	Fall 2000	
Chemical and Environmental Chemical	Requested	Allocated
Spectrophotometer	$ 7,960.00	$ 4,000.00
Chem 4th Year Room Computer Upgrade	$ 9,000.00	$ 2,500.00
		$ 6,500.00
Civil, Environmental Civil, Geological		
Rehabilitation of reinforced concrete with fibre reinforced polymer sheets	$ 2,500.00	$ -
Peristaltic Pump	$ 1,150.00	$ -
Sartorius Balance	$ 2,355.00	$ 1,570.00
Compressometer-Extensometer	$ 2,680.00	$ 2,180.00
Dedicated Undergraduate Data-Acquisition system	$ 3,733.00	$ 2,000.00
Computer Controlled Data Acquisition System	$ 10,300.00	$ 3,500.00
		$ 9,250.00
Electrical and Computer		
E&CE 30 Series 'Projects in Semiconductors and Electronic Circuits'	$ 8,000.00	$ 4,000.00
WebObjects Development Server	$ 2,910.00	$ 2,400.00
E&CE Digital Lab Pentium Upgrade	$ 28,750.00	$ -
E&CE 223 Xilinx FPGA Upgrade - Part 2	$ 3,480.00	$ 3,000.00
E&CE 4th Year Room - Computer Upgrade	$ 2,300.00	$ -
		$ 9,400.00
Environmental		
Dionex AS 11 Column	$ 1,400.00	$ -
		$ -
Mechanical		
High Resolution Image Analysis System	$ 25,000.00	$ 2,500.00
Fluid Dynamics Media Presentation	$ 1,446.00	$ -
Materials Lab Upgrade	$ 4,686.00	$ 2,000.00
ME 447 Robot Equipment Upgrade	$ 6,100.00	$ 5,500.00
Hydraulic Transport Components for ME 561 Lab	$ 3,612.00	$ -
		$ 10,000.00
Systems Design		
Systems Design Oscilloscope FFT Upgrade	$ 800.00	$ 400.00
Systems Design Student Laptop	$ 4,000.00	$ 1,500.00
Systems Design Mezzanine Computers	$ 2,500.00	$ 1,250.00
Systems Design Work Shop Electronics Soldering Station Proposal	$ 4,750.00	$ 2,375.00
		$ 5,525.00
Misc		
Bandsaw for Student Shop	$ 4,485.00	$ 3,500.00
Electronic White Board for the WEEF Lab	$ 2,550.00	$ -
Colour Printer for the WEEF Lab	$ 10,900.00	$ -
Enviro Eng 4th year Room Monitor Upgrade	$ 2,560.00	$ 960.00
		$ 4,460.00
Sub-Total Department	**$ 159,907.00**	**$ 45,135.00**
Student Groups		
Clean Snowmobile Challenge (CSC2001)	$ 5,314.00	$ 1,800.00
Midnight Sun VI Solar Car Project	$ 5,000.00	$ 3,000.00
R/C Aero Design Team	$ 1,110.00	$ 650.00
Team Advancement for the Formula SAE Project	$ 4,000.00	$ 1,840.00
ESQ Lego Mindstorm	$ 5,605.00	$ -
University of Waterloo Electronics Club	$ 1,185.00	$ 500.00
GNCTR 2001: Two Toboggans Teams	$ 1,050.00	$ -
UWAFT - Alternative Fuels Team	$ 3,038.00	$ 1,500.00
WARG - Waterloo Aerial Robotics Group - Equipment	$ 7,000.00	$ 3,000.00
Iron Warrior - Digital Camera	$ 1,200.00	$ 500.00
WART - Waterloo Automous Robot Tag	$ 400.00	$ 200.00
GNCTR 2002	$ 2,000.00	$ 1,500.00
Free Flight Glider Team	$ 250.00	$ 250.00
Sub-total Student Groups	**$ 37,152.00**	**$ 14,740.00**
Total	**$ 197,059.00**	**$ 59,875.00**

Waterloo Engineering Endowment Fund



Fall 2000 Proposals

WEEF Proposals - Fall 2000

	CHEMICAL AND ENVIRONMENTAL CHEMICAL	
1	Spectrophotometer	$7,960.00
39	Chem 4th Year Room Computer Upgrade	$9,000.00
	CIVII, ENVIRONMENTAL CIVIL*, GEOLOGICAL	
2	Rehabilitation of reinforced concrete with fibre reinforced polymer sheets	$2,500.00
3	Peristaltic pump	$1,150.00
4	Sartorius Balance	$2,355.00
5	Compressometer-Extensometer	$2,680.00
6	Dedicated Undergraduate Data-Acquisition system	$3,733.00
7	COMPUTER CONTROLLED DATA ACQUISITION SYSTEM	$10,300.00
	ELECTRICAL AND COMPUTER	
8	E&CE 30 Series 'Projects in Semiconductors and Electronic Circuits'	$8,000.00
9	WebObjects Development Server	$2,910.00
10	E&CE Digital Lab. Pentium Upgrade	$28,750.00
11	E&CE 223 Xilinx FPGA Upgrade – Part 2	$3,480.00
12	E&CE 4th Year Room - Computer Upgrade	$2,300.00
	ENVIRONMENTAL	
35	Dionex AS 11 Column	$1,400.00
	MECHANICAL	
13	High Resolution Image Analysis System	$25,000.00
14	Fluid Dynamics Media Presentation	$1,446.00
15	Materials Lab Upgrade	$4,686.00
16	ME 447 Robot Equipment Upgrade	$6,100.00
38	Hydraulic Transport Components for ME 561 Lab	$3,612.00
	SYSTEMS DESIGN	
17	Systems Design Oscilloscope FFT Upgrade	$800.00
18	Systems Design Student Laptop	$4,000
19	Systems Design Mezzanine Computers	$2,500.00
20	Systems Design Work Shop Electronics Soldering Station Proposal	$4,750.00
	MISC	
21	Bandsaw for Student Shop	$4,485.00
22	Electronic White Board for the WEEF lab	$2,550.00
23	Colour Printer for the WEEF lab	$10,900.00
37	Enviro Eng 4th year room Monitor Upgrade	$2,560.00
	Sub-Total Departmental	**$159,907.00**
	STUDENT	
24	Clean Snow mobile Challenge (CSC2001)	$5,313.74
25	Midnight Sun VI Solar Car Project	$5,000.00
26	R/C Aero Design Team	$1,110.00
27	Team Advancement For The Formula SAE Project	$4,000.00
28	ESQ LEGO MindStorm	$5,604.76
29	University of Waterloo Electronics Club	$1,185.00
30	GNCTR 2001: Two Toboggans Teams	$1,050.00
31	UWAFT--Alternative Fuels Team	$3,038.17
32	WARG--Waterloo Aerial Robotics Group--- Equipment	$7,000.00
33	Iron Warrior--Digital Camera	$1,200.00
34	WART--Waterloo Autonous Robot Tag	$400.00
36	GNCTR 2002	$2,000.00
39	Free Flight Glider Team	$250.00
	Sub-Total Student Groups	**$37,151.67**
	TOTAL	**$197,058.67**

Table of Contents

1. Spectrophotometers

Submitted By:

Name: Siva Ganeshalingam
E-mail:sganesh@engmail.Uwaterloo.ca
Phone Number: 6161
Position: Senior Technician

Description of Proposal:

- **Spectrophotometers** are required for a Reaction Kinetics Experiment for the second year Laboratory.
- In this experiment kinetics of the reaction is studied at **different temperatures** to evaluate the **rate constants** and hence the **activation energy**
- The existing spectrophotometers are **very old** and give **erratic readings**. These have to be replaced.
- A special **water heated cell holder** is also required to keep the sample at specified temperature during the course of the reaction.

Proposal Benefits:

- Both **Environmental Engineering and Chemical Engineering** students perform this experiment in the second year (2A).
- The Spectrophotometers could also be used for **two of the experiments in the fourth year Unit Operations** Laboratory by 4A students.
- They can be used in the **development of new experiments** too.

Cost Breakdown:

(Include partial funding options)

(1) Novaspec II, 120V Spectrophotometer: $2485 each
For two of these units: $4970

(2) Water Heated Cell Holder for Novaspec: $1495 each
For two of these units: $ 2900

Total funding requested: $7960

Implementation Schedule:

To be ready for Winter 2001 term

Note: The department will pay whatever the taxes involved and the transportation cost.

2. Rehabilitation of reinforced concrete with fibre reinforced polymer sheets

Submitted By:

Name: Khaled Soudki
E-mail: soudki@uwaterloo.ca
Phone Number: x4494
Position: Assistant Professor

Description of Proposal:

Deterioration of Canadian infrastructure is a significant problem. A new course on Rehabilitation of Structures (CivE 412) has been developed in Civil Engineering (Spring 1999) to introduce the students to the assessment, rehabilitation and/or strengthening of concrete infrastructure. Topics include: damage mechanisms, instrumentation and non-destructive test methods, conventional repair techniques, innovative repair and strengthening techniques with fibre reinforced polymer (FRP) sheets.

As part of the course, a laboratory experiment is proposed for flexural and shear strengthening using externally bonded FRP sheets. The students will fabricate reinforced concrete beams (2.0 meters long, 100 mm wide, and 150 mm high), apply the FRP repair system and load test the specimens to failure. Shear strengthening will be achieved by wrapping FRP strips with fibre orientation in the transverse direction (i.e. perpendicular to longitudinal axis of beam). Flexural strengthening will be achieved by bonding FRP sheets to the tension face of the beam (bottom face) with fibre orientation in the longitudinal direction. The students will be divided into groups of three or four members. Each group will have three lab sessions and is responsible for casting, FRP repair and testing of the beams.

This proposal is written to seek funding for the FRP material/epoxy resin system and specimen fabrication that are an integral component of this laboratory experiment.

Proposal Benefits:

Laboratory experiments are a vital component of applied engineering courses. The purpose of the laboratory in CivE 412 - Rehabilitation of Structures - course is to introduce Civil Engineering students to the strengthening techniques using externally bonded FRP sheets. The students will learn the practical application of the FRP repair system as well as the theoretical tools to design an FRP repair system. They will observe and note development of cracks and failure modes in FRP repaired beams, as well as trace the full response of FRP repaired beams using DEMEC strain gauges and LVDT defection transducers.

Cost Breakdown:

Item	WEEF	Department
FRP material/epoxy resin system	$1750.00	$1750.00
Specimen fabrication and tools to apply FRP system	$ 750.00	$ 750.00
Total	**$2500.00**	**$2500.00**

Implementation Schedule:

Task	Time
Specimen fabrication	15 May 2001
Application of FRP sheets	10 June 2001
Testing beams	25 June 2001

3. Peristaltic pump

Submitted By
Name: Terry Ridgway
E-mail: tridgway@uwaterloo.ca
Phone Number: 3042
Position: Lab Technologist

Description of Proposal:
Model 410 Peristaltic pump, 12-volt field unit 60ml/min to 3l/min

Proposal Benefits:
This unit would primarily benefit the Env. Eng. 330 class where a field peristaltic pump is needed to sample wells during the fieldwork as well as pumping dye during the dispersion/mixing portion of the course.

Cost Breakdown:
$ 1150 based on a verbal quote from Solinst Canada. I do not know about partial funding as the Chairman is unable for comment but I will know at the presentations.

Implementation Schedule:

Spring Term

Additional Information:
At present a full size bench peristaltic pump is taken into the field along with a generator to supply the power. This would enable the student /staff to carry less equipment to the study site and simplify the set up.

4. A 150 kg /0.005 kg Sartorius Balance

Submitted By:
Name: Terry Ridgway
E-mail: tridgway@uwaterloo.ca
Phone Number: 3042
Position: Lab Technologist

Description of Proposal:
Digital weigh scale for larger items up to 150 kgs with a resolution of 5g. Stainless steel construction with dust and water protection.

Proposal Benefits:
The scale will benefit all labs were larger item than 12 kgs are needed to be measured as well as any student projects.

Cost Breakdown:
$ 2355 based on the current VWR catalogue. I do not know about partial funding as the Chairman is unable for comment but I will know at the presentations.

Implementation Schedule:
Immediate

Additional Information:
As far as I know there are no large capacity digital scales available in engineering so this will be a benefit to all faculties. The scale will be secured in the fluids lab E3-2103 which is on of the only multidiscipline labs so the scale will be available to all students.

5. Compressometer-Extensometer

Submitted By:
Name: Richard Morrison
E-mail: rmorriso@uwaterloo.ca
Phone Number: X5834
Position: Civil Engineering Technologist

Description of Proposal:
Combined compressometer and extensometer for 4" diameter concrete cylinders. Apparatus is used for evaluating deformation and strain characteristics axially and diametrically. The two displacement transducers incorporated in the apparatus will send electronic signals along with existing load and cross-head displacement signals to a data acquisition system to be saved to file and displayed real-time.

Proposal Benefits:
Civ. Eng. 126 projects
Civ. Eng. 265 with approximately 80 students
Civ. Eng. 313 with approximately 80 students
Civ. Eng. 300 and 400 projects
Civ. Eng. 412 with approximately 50 students
Concrete toboggan teams

Cost Breakdown:
(Include partial funding options)

1-Compressometer-Extensometer model H-2912D from Hoskin Scientific: $2,680

The Department of Civil Engineering will contribute towards this proposal, but due to the absence of the chair the actual amount cannot be confirmed at this time. This will be determined and reported prior to the presentation.
Implementation Schedule:
January 2001

Additional Information:
Currently the Forney testing machine lacks this accessory for properly determining the modulus of elasticity for concrete test specimens with on-specimen instrumentation.

6. Dedicated Undergraduate Data-Acquisition system

Submitted By:
Name: Richard Morrison
E-mail: rmorriso@uwaterloo.ca
Phone Number: X5834
Position: Civil Engineering Technologist

Description of Proposal:
A dedicated data-acquisition system to be used for a variety of structured laboratory coursework and projects as well as benefit other student project teams. The system would support a variety of transducer inputs including displacement, load, strain, temperature. As well as portable (console mounted) the display of real-time data would be highly visible with raised multiple monitors.

Proposal Benefits:
Civ. Eng. 126 with approximately 80 students
Civ. Eng. 126 projects
Civ. Eng. 205 with approximately 80 students
Civ. Eng. 205 Bridge building competition
Civ. Eng. 265 with approximately 80 students
Civ. Eng. 313 with approximately 80 students
Civ. Eng. 300 and 400 projects
Civ. Eng. 412 with approximately 50 students
Concrete toboggan teams
Other undergraduate data acquisition needs for coursework, team projects and training

Cost Breakdown:
(Include partial funding options)

1-National Instrument DAC card, PCI 6035E
1-68 pin shielded cable, SH6868
2-Shielded connector box, SCB68
1-pentium I computer
2-video card (for dual display under win98)
----------$3733
The Department of Civil Engineering will contribute the following equipment towards this proposal:
1-equipment console
2-monitor
1-SCXI multiplexing chassis and modules for extra channel needs on an as needed basis
various- displacement, load, strain transducers on an as needed basis
1-application software previously developed

Due to the absence of the chair the amount of departmental funding cannot be confirmed at this time. This will be determined and reported prior to the presentation.
Implementation Schedule:
January 2001

Additional Information:
Currently the Forney testing machine has a dated data-acquisition system as well as other test frames and undergraduate experiments without systems. With increasing levels of laboratory activity there is a shortage of data-acquisition equipment readily available and more importantly easily set up for the students to use on short notice in project work.

7. Computer Controlled Data Acquisition System and Pressure Panel

FOR GEOTECHNICAL ENGINEERING LAB

Emails: gcascant@waterloo.ca, mknight@waterloo.ca, kbowman@waterloo.ca

Submitted by: Giovanni Cascante, Mark Knight, and Ken Bowman

Extensions: 2098, 6919,3656

Positions: Assistant Professors, Lab Technician

Description of Proposal:

A traditional instrument is self-contained, with signal input/output capabilities and fixed user-interface features. Inside the box, specialized circuitry includes analog-to-digital (A/D) converters, signal conditioning, microprocessors, memory, and internal communication bus. These devices, then, convert real-world signals to results for the user. On the other hand, virtual instrumentation empowered engineers to develop customized systems using computers as the engine for instrumentation. The basic components of a virtual instrument are transducers, one A/D card, one computer, and specific software to link the hardware. This proposal is for virtual instruments or computer controlled data acquisition systems and a pressure panel to be used in the Geotechnical Engineering Lab. This equipment will be used to update and enhance the direct shear and the triaxial tests, which are two of the four laboratory tests required in the CE-353 course. In addition, the equipment could also be used in any other course or project that may require a data acquisition system. The proposed system can provide control for a maximum of eight transducers. These transducers could be load cells, linear displacement transducers (LVDT), strain gages, thermocouples, or any other transducer that generates a voltage (+/- 10V) as a response of a given excitation.

The proposed transducers are two LVDTs to measure horizontal and vertical displacements in the direct shear apparatus. The pressure panel will replace a complex set of valves, making the triaxial laboratory easy to understand and follow. The proposed A/D card is the PCI-MIO-16E4, which has eight differential channels and a sampling rate of 250k. This card is compatible with LabView, which is a graphical programming software that permits a fast and easy development of customized applications. Once that the application is ready, it can be saved as an executable file, which can be used in any other computer with the specified A/D card. Therefore, with one license of the program, many projects could get the benefit of this software.

Benefits of Proposal:

- The proposed equipment will update and enhance the geotechnical engineering lab to reflect the technological developments that are used today by industry.
- The proposed equipment can be used for different applications that require a data acquisition system. Then, it could be used in any experimental course or project (400-project, work-term project). The virtual instrument technology permits simulation of measuring devices such as oscilloscopes and multimeters.
- Students can upgrade laboratory tests by making them computer-controlled. So, the next class will benefit from it, and enhance the existing application by adding new modules to it.
- Students working on projects that involve data acquisition can speed up the data collection and processing by transferring the data directly from the measuring device to a spreadsheet for example.
- Students will get experience on instrumentation, which is an area of increasing concern in industry Development of techniques that can be economically implemented is clearly of interest to many industries, including regulatory agencies.

Cost Breakdown:

Two linear displacement transducers (LVDT)	$800.00
Pressure panel	$5,000.00
Analog-to-Digital card with 8 channels	$1,500.00
(Including 10% discount for teaching purposes)	
LabView Software (Site licence available at UW):	($1,900.00)
(Including 35% discount for teaching purposes)	
Pentium III MHz computer	$3,000.00
(Including 10% discount for teaching purposes)	
Department contribution (from 1/3 to 1/2)	
Total	**$10,300.00**

Implementation Schedule:

LabView provides a very friendly programming environment, and includes tutorials for different applications. A couple of days are required to start using the software at a basic level. The interconnection of the equipment for the direct shear and triaxial tests is expected to take one term each. This will be done as a 400-projects. Then, students willing to use this instrumentation software could start their projects immediately, after the purchase of the equipment.

8:E&CE'30'Series 'Projects in Semiconductors and Electronic Circuits'

Submitted By:
Your Name: Paul Hayes
E-mail: phayes@ece.uwaterloo.ca
Phone Number: ext. 3969
Position: Lab. Staff

Description of Proposal:

One Agilent Technologise 2 channnel 100MHz Oscilloscope Model # 54622A at	$ 4000
One Agilent Technologise O'Scope GP-IB measurement/ storage Model # 54657 A	$ 940
One Agilent Technologise Function generator Model # 33120A	$ 2300
One Agilent Technologise Dual output Power Supply E3620A	$ 700

Proposal Benefits:
These unit will be used for 4th year projects in electronic circuits.

Total Cost :
$ 8000

Implementation Schedule:
Winter 2001.

Additional Information:
Contact Paul Hayes EXT 3969 , E-mail phayes@ece

9. WebObjects Development Server

Submitted By:
Name: Ash Mishra
E-mail: a2mishra@eestaff.uwaterloo.ca
Phone number: ext. 3226
Position: Lab Instructor, E&CE Department

Description of Proposal:
The E&CE Department would like to complement the current WebObjects *production* server with a WebObjects *development* server.

WebObjects has successfully been used to deploy web-based applications to allow students to access real-time data regarding their Fourth Year Projects [within E&CE]. With the Fourth Year System, students can upload required submissions electronically, review proposals, view their marks, etc. We have also deployed an web-application to allow for electronic mark recording and electronic submission to support all courses. It is currently used by E&CE 250, and 223. Again, students can view their marks online, and submit projects electronically.

We welcome application ideas, and also other departments in Engineering to use tools we have developed.

The validation behind purchasing a development server is to ensure that applications are fully tested in an environment that mirrors the production environment, before deployment. This ensures that the production server and the data it holds is safe from applications which are still being developed. It would also permit adequate testing by beta testers.

Proposal Benefits:
More web applications deployed for undergraduate use

Cost Breakdown:
$2420 Apple Macintosh G4 / 400 MHz computer
$490 Mac OS X Server 1.3

Implementation Schedule:
Winter 2001

10. E&CE Digital Lab. Pentium Upgrade

Submitted Fall 2000 By:
Your Name: Eric Praetzel
E-mail: praetzel@ece.uwaterloo.ca
Phone Number: ext. 5249
Position: Laboratory Staff
Description of Proposal:

The Pentium 133 computers (WEEF, Fall 1997) used in several of our labs [E&CE 48x in CPH-3371, E&CE 318 in E2-3339] and Pentium 200 computers [purchased Winter 1998) used in our digital labs (E2-2356, E2-2364 – E&CE 222, E&CE 223, E&CE 354, E&CE 324 – all core courses] are starting to fail [hard drives, power supplies, fans]. They are also insufficient for the new software that we are going to use in E&CE 324, E&CE 223 [Altera Excalibur – requires Win 98 or 2000, 128+M RAM, 400+ MHz].
The move to this software will require that the machines be removed from Polaris. As such, they will no longer have all of the non-lab software [Matlab, word processors, etc] until such time as a Win 2000 version of Polaris is created. The setup would be similar to the Win 2000 lab in E2-3344 which E&CE uses for E&CE 241. Only software required for the lab., and projects, is installed.

The plan is to upgrade the P200 computers in one of the digital labs [E2-2356 or E2-2364], then use the P200's to replace P133 computers (in other labs, E&CE 4th year room and staff [yes, most of our staff still use P133 computers]) as well as providing parts for future repairs.
Proposal Benefits:
Faster and more capable computers for the shift to Win 98+ software which requires more RAM (digital hardware design – E&CE 223, 324, 427, etc), CPU power and larger harddrives.
Cost Breakdown:
$1150 per Celeron 600 computer with 128M [bare minimum].

Groups of 5 units, upto 25, are preferred. I.e. 5 units ($5,750), 10 ($11,500), 15 ($17,250), 25 ($28,750),
although any funding will be appreciated.
Implementation Schedule:
Fall 2001. These computers are not absolutely needed until Winter 2002 and we are still testing the software and evaluating system requirements
Additional Information:
The Department will match funds as the budget allows. The purchase of 28 computers to re-fit the lab is very large relative to our yearly budget. Therefore we will not be spending the WEEF funding immediately and will reapply for more in later terms.
The existing monitors [15", 17"] are sufficient at this time and will not be upgraded.

Priority:
Medium

11. E&CE 223 Xilinx FPGA Upgrade – Part 2

Submitted Fall 2000 By:
Your Name: Eric Praetzel
E-mail: praetzel@ece.uwaterloo.ca
Phone Number: ext. 5249
Position: Lab. Staff

Description of Proposal:
The E&CE Dept. would like to upgrade the obsolete Xilinx 3020 FPGAs (programmable gate arrays). We were given $1340 in WEEF funding (Summer 2000) for this. However, we have been unable to design, build and produce a durable new board in time.

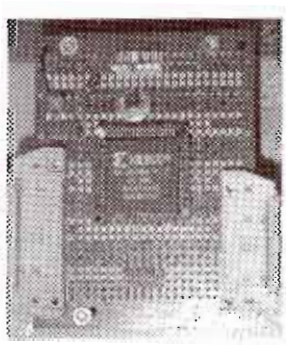
The E&CE Dept. has elected to instead purchase the Digilent XL board (Xilinx Spartan XCS10 chip). It is quite suited to our purposes. The department has purchased one and it is being evaluated.

We propose to purchase enough of these boards to replace the existing boards, some extra ones to expand the lab so that we can have one development FPGA board per computer, as well as some for 4th year projects. Since this involves an expansion of the number of lab. stations; the department will match any WEEF funding.

Proposal Benefits:
E&CE 223 – a core Fall, Winter E&CE course with 360 students per year
E&CE 4th year projects - ?? students per year
Cost Breakdown:
$174 per FPGA development board (quantities of 6+)
Groups of 5 units upto 20 are preferred. I.e. 5 ($870), 10 units ($1740), 15 ($2610), 20 ($3480)

Implementation Schedule:
ASAP for limited Jan. 2001 E&CE 223 lab use.

Additional Information:



This is our current board using the Xilinx 3020 FPGA.

The new boards (http://www.digilent.cc) will replace our existing FPGA board, download cable and pwer/switch/LED chassis. It will mean that lab work can be done outside of the lab since the software is already available for home use. However, at this point we have no plans to loan out large numbers of these boards for use in the E&CE 223 course.

Priority:

12. E&CE 4th Year Room - Computer Upgrade

Submitted Fall 2000 By:
Your Name: Eric Praetzel
E-mail: praetzel@ece.uwaterloo.ca
Phone Number: ext. 5249
Position: Lab. Staff

Description of Proposal:
The E&CE Dept. would like to upgrade the two older computers in the E&CE 4th year student room.

The older Pentium 133 MHz computers are too slow for any of the newer software that the 4th year E&CE projects use. We propose to upgrade the computers to something capable of running Windows 2000 and high power digital design software that many students have been using in their 4th year design projects.

Proposal Benefits:
E&CE 4th year projects - some 4th year E&CE students (however many can share the machines)

Cost Breakdown:
$1150 per Celeron 600 MHz computer with 128M, CDROM, 20G HD
1 ($1150) or 2 units ($2300)
Implementation Schedule:
Winter 2000
Additional Information:

The 4th year room currently has 5 computers I2 of P133, 2 of K6-2/266, P2-233] The P133 machines have 2G hard drives and 32M of RAM They were upgraded to 17" monitors and the monitors do not need to be upgraded.

Priority:
Low

13. High Resolution Image Analysis System

Submitted by: M. Kaptein, Mechanical Engineering
E-mail: rkap@mecheng1.uwaterloo.ca
Position: Lab Director, Mechanical Engineering

Description of Proposal:

Obtaining metallographic images from polished samples is a technique that is first introduced to the students in ME 215 and ME 230. All students enrolled in 400 and 500 level materials courses use these techniques to complete their lab projects. With the recent purchase of image analysis equipment (purchased with the help of WEEF funds), we have the ability to capture and store these images electronically and obtain quantitative measurements from them.

The image analysis system, which consists of an optical microscope, video camera, computer and image analysis software (i.e. IMAGE PRO) represents state-of-the-art metallographic analysis equipment identical to that used in industry. Therefore it is a valuable training tool. Over the two years in which it has been available it has enjoyed increasing use by professors in their courses and consequently by the students. It has reached the point where the single system is heavily used and represents a bottleneck in the ability for students to complete their projects on time

Our current analog camera limits the resolution of the electronic image. This limits the accuracy of our image analysis capabilities and means that photographs are still required in some cases to obtain a high quality printed image for project reports. The inclusion of a high resolution digital camera as part of our second system and upgrade of the analog camera on our current system, would allow the students to take full advantage of our new image analysis system and directly print the electronic image, avoiding the use of expensive photographic film.

Benefits of the Proposal:

All undergraduate students in ME 215, ME 230, ME 435, ME 531, ME 535 and ME 544 will benefit from this upgrade.

Cost Breakdown of Proposal:

Microscope $10,000.00
High resolution digital cameras (2) 10,000.00
Image Pro Software 2,500.00
Computer for image analysis system 2,500.00
TOTAL FOR SYSTEM $25,000.00
The entire system is expensive so we would accept partial funding at this time for specific components.

14. Fluid Dynamics Media Presentation

Submitted by: M. Kaptein, Mechanical Engineering

E-mail: rkap@surya.uwaterloo.ca

Position: M. Kaptein, Lab Director, Mechanical Engineering

Description of Proposal:

Since the early 1960's Mechanical Engineering has had super 8mm fluid mechanics instruction and demonstration material. At some time in the 1980's they were rebroadcast on videotape. However the quality of the instruction material is not very good.

Professor MacDonald is requesting new engineering video material to give more recent coverage of the subject of fluid dynamics. The Insight Media Company offers several choices; we would like the following:

Fluid Quantity and Flow
Fluid Mechanics
Fluid Dynamics of Drag

Benefits of the Proposal:

The above mentioned videos (a and b) can be used for ME 351 and ME 569, video c can be used as an introduction to ME 362.

Cost Breakdown of Proposal:

Fluid Quantity and Flow (Video)	$ 249.00	(U.S.)
Fluid Mechanics (Video)	269.00	(U.S.)
Fluid Dynamics of Drag (Video)	299.00	(U.S.)

Total in Canadian Dollars including tax $1,446.00

Implementation Schedule:

Winter 2001

15. Materials Lab Upgrade

Submitted by: M. Kaptein, Mechanical Engineering

E-mail: rkap@mecheng1.uwaterloo.ca

Position: Lab Director, Mechanical Engineering

Description of Proposal:

Undergraduate students in Mechanical and Civil Engineering are taught the relevance of material properties, structure, elasticity and plastic deformation, strengthening etc. In addition to the lectures courses have a substantial laboratory component. During the last to years the Department has purchased new test equipment – some with WEEF funding.

Currently we are using two (2) 486 computers which run a Windows 3.1 test program for both dynamic test frames.

We are requesting funding to upgrade the two (2) computers and the test program to Windows 98/2000.

Benefits of the Proposal:

All undergraduate students in ME 215, ME 230, CIV 265 and many projects students in engineering will benefit from this upgrade.

Cost Breakdown of Proposal:

2 Computers $3,220.00
1 Software Licence $1,466.00

Total $4,686.00

Implementation Schedule

Winter 2001

16. ME 447 Robot Equipment Upgrade

Submitted by: **J. Huissoon, Mechanical Engineering**

E-mail: rkap@mecheng1.uwaterloo.ca

Position: **Professor, Mechanical Engineering**

Description of Proposal:

The project component of ME 447 uses two small robot arms, two PCs with frame grabbers and a CCD camera. The objective is to write a program (for the PC) that.

- acquires an image of the robot workspace
- analyses the image to determine the location of a block
- determines the robot joint angles that will position the gripper over the block
- transmits these joint angles to the robot.

A program written for the robot controller uses the joint angles received from the PC to get the robot to pick up the block, and place it in the bin.

The robot equipment was purchased in 1986, and the controllers are showing their age. The controllers are shipped to the manufacturer (CRS Robotics in Burlington, Ontario) once per term for servicing, yet still have serious reliability problems. This leads to frustration for the 40-50 students trying to complete their projects

Benefits of the Proposal:

The current system is not reliable and this results in wasted time and effort for student trying to complete the project component of ME 447. Replacing this system now will benefit the students enrolled in this course (40-50) as well as future students.

Cost Breakdown of Proposal:

To replace the 2 robots	$38,000.00
WEEF's contribution	$12,900 00
Mechanical Engineering	$12,900.00
Still required	$12,200.00
Request from WEEF for this term	$6,100.00
Mechanical Engineering will contribute	$6,100.00

Implementation Schedule: Winter 2001

17. Systems Design Oscilloscope FFT Upgrade

Submitted By:

Name: General Leung
E-mail: g2leung@engmail
Phone Number:
Position: Student

Description of Proposal:

This proposal is for an upgrade to one of the current oscilloscopes in the Systems Design Work Shop Lab. This upgrade consists of a physical module that is to be installed in the oscilloscope. This module will provide communications with other computers for data acquisition and will also perform real-time FFT (Fast Fourier Transform) operations.

Proposal Benefits:

This upgrade has been requested by various students and would help them in applying and understanding concepts in signals and systems analysis.

This upgrade would benefit Systems Design students mainly. The oscilloscope would be located in the Systems Design Work Shop Lab and thus would be available to student projects if required (they would be required to sign out a key for security reasons)

Cost Breakdown:

This upgrade will cost $800. The department is willing to fund up to 50% of this.

Implementation Schedule:

This upgrade would be performed in January 2001 and made available to the students by the end of that month.

Contact Information for Funding if different than above:

Name: James Morrison
E-mail: jm2morri@thinair
Phone Number: X5218
Position: Lab Instructor

18. Systems Design Student Laptop

Submitted By:

Name: Fred Lai
E-mail: fcklai@engmail
Phone Number:
Position: Student
Description of Proposal:

This proposal is for a new laptop for the Systems Design Department. This laptop would be available for sign out by students for various presentations or any other use that requires portable computing. The Department currently has one laptop for this use and it is in constant demand. The laptop would be equipped with general software for presentations and the most common applications.

Proposal Benefits:

This laptop would benefit the students of not only Systems Design, but of special student projects as well. For instance, Midnight Sun recently used our current laptop to present their sponsorship pitch to Toyota Canada. Proper operation of this laptop is necessary for these types of presentations to be successful.

The current laptop is also used by students to practice for upcoming presentations and to make sure that their presentation materials are in order. Having another machine will increase the availability of this resource.

The current laptop is constantly booked out. Usage is especially high during the end of each term when many presentations are performed. There is no time available for maintenance (defragging, virus checking, cleaning up hard drive, ...) and upgrading for fear that a change couldn't be fully tested before the laptop is signed out again. An extra laptop would provide for more time to upgrade/maintain our current laptop

Cost Breakdown:

A reasonable laptop would cost $4000. The Systems Design Department is willing to fund up to 50% of this proposal.

Implementation Schedule:

This laptop will be purchased and ready for use by January 1, 2001.

19. Systems Design Mezzanine Computers

Submitted By:

Name: Graham Taylor, Gord Lueck
E-mail: gwtaylor@engmail, gjlueck@engmail
Phone Number:
Position: Students
Description of Proposal:

This proposal is for the purchase of two (2) new computers to be located in the newly constructed mezzanine in the Systems Design Work Shop Lab.

These computers will be equipped with modern hardware design software. Our department currently has two (2) licenses for OrCad (a schematic capture and PCB layout tool) but has no machines that adequately handle the requirements of this software (memory and video card limitations).

An under-utilised plotter would also be attached to both of these to provide local plotting capabilities in addition to the standard network printing options.
Proposal Benefits:

This proposal would benefit all students who need access to these types of design tools. There is 24/7 access to this lab (for security reasons students would be required to sign out a key from technical staff).

The vision of this area is to become an area with modern design tools. Combining these design tools with the wealth of information available online and in our data book library our students would be able to excel in providing modern electronic solutions to modern problems.

These tools will be of specific use to those students who design hardware for their 4th year projects, but also to any student who requires to debug, repair, or modify hardware for these projects.

Cost Breakdown:

2 PC's with 19" monitors (this size of monitor makes PCB layout much more productive) will cost $2500 each for a total of $5000. Systems Design is willing to pay for up to 50% of these computers.

20. Systems Design Work Shop Electronics Soldering Station Proposal

Submitted By:

Name: Dave Orr, Chris Collins
E-mail: dcorr@engmail , clcollin@engmail
Phone Number:
Position: Students
Description of Proposal:

This proposal is for a soldering station that would be capable of handling the fine pitch components necessary for leading-edge electronic design. New and more powerful electronic components are only being offered in surface mount packaging. It is impossible to solder these components with the naked eye.

The Stereo Microscope provides the necessary magnification to allow soldering of the fine-pitched leads of these types of components.
The Fume Extraction Unit is necessary to remove harmful fumes from solder and flux. These fumes have been known to cause disease.
The Anti-Static Work Area System will provide a professional work area in which electronic components will not be damaged by electrostatic discharge (ESD).

The soldering irons we have are sufficient for this station, although new, finer pitch, tips will have to be purchased. Also, finer solder and solder wick will need to be purchased. The Systems Design Department will cover the cost of these, and other, supplies.
Proposal Benefits:

This equipment will allow for students to implement leading-edge electronic designs by hand. Work shop projects and student projects (like Midnight Sun, WARG, etc...) will be able to use this equipment to populate and repair electronic boards.

Using high-speed, surface-mount components makes speed-wiring virtually impossible. Engineers in industry today prototype boards with quick turn PCB's and hand population using this type of equipment. These skills acquired by students will greatly increase their marketability upon graduation. The Lab Instructor has industry experience using these tools and can provide training for those who require it.

This equipment will also aid in the maintenance and upgrading of electronic boards used in the Systems Design Lab Courses: SYDE192, SYDE292, and SYDE352.

The equipment will be placed in the new Systems Design Work Shop Lab Mezzanine. This lab has 24/7 access for all students. For security reasons, students must sign out a key for the lab. The lab is now accessible from both the 1st and 2nd floors of CPH so it is not necessary to know the code to the 1st floor door.
Cost Breakdown:

The following table gives a breakdown of cost:

Description	**Cost**
Stereo Microscope	$4200
Fume Extraction Unit	$400.00
Anti-Static Work Area System	$150.00
Total	$4750.00

Implementation Schedule:

The construction of the Systems Design Work Shop Lab Mezzanine should be completed by Nov. 3. This soldering station would be implemented as soon as possible. This will ensure maximum benefit to the work shop projects of this year's students.

Contact Information for Funding if different than above:

Name: James Morrison
E-mail: jm2morri@thinair
Phone Number: X5218
Position: Lab Instructor, Systems Design Engineering

21. Band Saw for Student Shop

Submitted by: Clarence Wallace, Supervisor, Engineering Student Shop
Extension: 2301

E-Mail: rkap@surya uwaterloo.ca

Description of Proposal:

The Student Machine Shop provides essential hands-on experience for all undergraduate students either for core class courses or special projects. In order to facilitate the ever-increasing number of students it is essential that we upgrade some of our machines. It would be a great asset to the shop to have a band saw.

Benefits of Proposal:

Students from all engineering disciplines will benefit from a better- equipped student shop. More courses are requiring hands-on projects - making it essential to have better and safer equipment available. The number of students using the shop has increased quite dramatically over the past two years and this underlines the need to continually upgrade wherever possible. A new band saw would also promote safety, efficiency and provide better quality work.

Cost Breakdown:

T-Jaw Model T-450 vertical variable speed band saw – complete with 1P x 2.4 KVA electric welder.

	$ 3,900.00
GST	273.00
PST	312.00
Total	**$ 4,485.00**

Implementation Schedule:
Upon Receipt of Funding.

22. Electronic White Board for the WEEF lab

Submitted By:
Name: Hector Budman
E-mail:hbudman@cape.uwaterloo.ca
Phone Number: ext 4601, or ext 6980
Position: Associate Dean for Engineering - Computing
Description of Proposal: **Install an electronic white board at the front of the WEEF lab to assist the instructor in teaching certain concepts.**

Proposal Benefits: **This tool will enhance teaching capabilities in the WEEF computer lab using the features of an electronic white board. White boards allow a person to record everything written on them at any given time. Then, the information can be filed, printed or e-mailed. Using the Class-Net technology, currently available in the WEEF Lab, the instructor can broadcast the information written on the white board to the student's computers. This tool will be an ideal supplement to Power-Point based courses to convey intermediate steps or side issues during a class which are not discussed in detail on the transparencies. Typically, during Power-Point based lectures, the student does not have sufficient time to pay attention to the additional explanations given on a black board and record all this information at the same time.**

Cost Breakdown:
Ibid 600 Professional Series 4 ft x 6 ft board – cost $4050.00 (incl Taxes)

Engineering Computing Contribution	$1500.00
Request from WEEF	$2550.00

Implementation Schedule: January-February 2001.

23. Colour Printer for the WEEF lab.

Submitted By:
Name: Hector Budman
E-mail:hbudman@cape.uwaterloo.ca
Phone Number: ext 4601, or ext 6980
Position: Associate Dean for Engineering - Computing
Description of Proposal: **Acquisition of a new colour laser printer to be attached to the Waterloo Polaris network with maximum accessibility for the students.**

Proposal Benefits:
Currently Engineering Computing supports one colour printer on Polaris for public use in Engineering. It is a Tektronix Phaser 340 solid colour ink printer. The printer was purchased in 1995 and resides in an area near an Engineering Computing staff member. This is so that the printer can be monitored for defective output and good output filed. Output is filed 3 times a day in CPH 2367. Printing is a two step process. The job is first sent via the normal route but is held in the spool space. Next the user must walk to CPH 2367 and release the job. This double release mechanism is to safeguard people from accidentally sending jobs to the printer, as this could prove to be expensive for the student.
The main problems with the current setup are:
the printer is too slow to print, 5 minutes/meg. If unused the warm-up time to start a new job is usually 5 minutes.
The technology is now getting old, the service contract expensive. Additionally, it should be noticed that Tektronix has sold their colour laser printer division to Xerox.
It is only a 300 dpi (dot per inch) printer.
Student norms of printing, at the last minute, have not lent the current system of filing 3 times a day, to be as useful as our black and white print on demand system.

We are proposing to provide, with the new printer, a faster, higher resolution colour printer for our students. The aim will be to have maximum accessibility We are targeting for a 24 hours/ 7 days a week accessibility if possible. Of course after hours, as with all our printers, there would not be technical support.

Cost Breakdown:
The colour printer candidates are:

HP 8550DN cost $10,900
HP4500DN cost $ 5,400
Partial Funding Options: **Engineering computing will contribute up to 20% of the cost of the chosen printer model.**
We have added in the sequel, under the additional information heading, a comparison between the two printers.

Implementation Schedule: **January-February of 2002**

Additional Information: **The main advantages of the 8550DN printer are an increase in print speed, capacity and the ability to print 11"x17" size pages.**

	8550DN	4500DN
Print speed B&W	24 ppm	16 ppm
Print speed colour	6 ppm	4 ppm
Processor	300 MHz	133 MHz
Input paper trays	4	3
Input paper capacity	3,100	900
Duplex printing	Yes	Yes
Max. Paper size	12"x18.5"	8.5"x14"
Memory standard	64MB	64 MB
Max memory	512MB	208 MB
Resolution	600 dpi	600 dpi

24. Clean Snowmobile Challenge (CSC2001)

Submitted By:
Name: Andy Punkari
E-mail: aepunkar@engmail.uwaterloo.ca
Phone Number: 888-4567 x 6167
Position: CSC team member-MASc student
Description of Proposal:

The Clean Snowmobile Challenge 2001 is a competition initiated by Yellow Stone National Park and the Society of Automotive Engineers (SAE). The focus of this competition is to improve the emissions, fuel economy and reduce noise levels of a two-stroke snowmobile while maintaining or improving performance. The modified snowmobile will compete during the annual World Championship Hill Climb in Jackson Hole, Wyoming. The competition is scheduled to take place at the end of March, 2001

I would first like to thank WEEF for the support that was given to us previous to this proposal. With the support from WEEF we were able to capture 2nd place at the inaugural Clean Snowmobile Challenge which was held in March of this year. For this term, I would like to propose that WEEF assist the team in the purchase of several items that will enable us to improve upon last years results. In particular I would like WEEF to assist the team in purchase of a few necessary items, that will allow the team to finish the implementaion of a 4 stroke motor in this year's sled. These items include a dry sump oil pump, performance rear suspension, roller secondary clutch, sound meter and lightweight track.

Proposal Benefits:

A Dry Sump Oil Pump is one of the necessary parts required in finishing the installation of the 4 stroke motor in this year's snowmobile. The motor has undergone severe modifications (severing the transmission) in order to make this motor a viable option for the team. These engine modifications were a big part of the 481 projects we had this term and will carry on into next term's 482 projects. The 481 students have come to the conclusion that this lubrication system is optimal for us due to space restrictions and cold starting characteristics.

A performance rear suspension will give the snowmobile better handling and a more comfortable ride by allowing more travel better power transfer to the ground-or snow in this case. The chassis we are working on was purchased without a rear suspension system in order to reduce cost at the time. Support has been obtained from a company which is willing to provide the suspension for a fraction of the retail price. This addition will give the team an edge during the Handling, Hill Climb and Acceleration Events.

The current chassis was also purchased without a secondary clutch. A Trackmaster Roller Secondary Clutch will increase the efficiency of the snowmobile drivetrain and provide better

performance. This will be advantageous during all events of the competition by providing better shifting, better throttle response, reduced fuel usage and reduced noise. This clutch is most appropriate for the team since its adjustability will be required in order to get the correct clutch set-up for the new 4 stroke.

A Sound Meter is required by the team and can also be used by Formula SAE and Ethanol Vehicle teams. We are required to have a noise level under full throttle acceleration less than 78 dB. Last year we were over that limit and received a 200 point penalty and were also deemed ineligible to win the best design award. This circumstance was created by not having the appropriate equipement to test the sound levels. The other teams also require their sound levels to be less than a maximum level designated by the competition rules.

A more aggressive, light weight track will provided increased traction, acceleration and braking while decreasing the rolling resistance of the sled. This track will allow us to finish better in the all-important Hill Climb event as well as the Acceleration and Fuel Economy Competitions. At last year's competition, our stock track was the main reason we did not win the Hill Climb event, and took us out of contention for first place.

Cost Breakdown:
We are asking WEEF for funding to cover all or any combination of the items described above and listed below in order of importance.

Dry Sump Oil Pump: $800/ $920.46 with tax

Fast M-10 Rear Suspension: $2750 minus sponsorship=$725/ $833.75 with tax

Erlandson Engineering "Track Master" Roller Secondary Clutch: $761.25 / $875.44 with tax

Sound Meter: $1500/ $1725 with tax

Camoplast Predator Track: $833.99 / $959.09 with tax

Total Cost: $4620.64 / $5313.74 with tax
Implementation Schedule

Dry Sump system to be purchased as soon as funding is available in order to finish the design and implementation of the 4 stroke.

Secondary clutch to be purchased as soon as funding is available to allow for dyno testing of system.

Remainder of items can be purchased at a slightly later date (Dec), as snow will be needed for their utilization.

Additional Information:

Until recently there has been little attention given to the adverse effects that two-stroke recreational vehicles have on the environment. This has sparked research and development into the improvement of these vehicles. Industry players and off-road enthusiasts are finally starting to address the concerns of the public because of recent threats by the Clinton government to ban such activities in public parks and forests. We are one of only two Canadian teams at the competion, it is our national duty to finish well at this competition.

Contact Information for Funding if different than above:
Name: Prof. R.A. Fraser
E-mail: rafraser@engmail
Phone Number: x4764
Position: Faculty Advisor – Team Eco-Snow

25. Midnight Sun VI Solar Car Project

Request for Funding Fall 2000
Submitted By:

Name: Connie Kwan
E-mail: Cmkwan@uwaterloo.ca
Phone Number: (519) 888 - 4567 x 2978
Position: Business Manager

Description of Proposal:

The Midnight Sun Solar Car Project strives to design and construct an efficient solar car. Every term, about 100 University of Waterloo students, primarily engineers, spend numerous hours working on our project. At the present time, the Midnight Sun VI design is underway. The completely re-engineered car will be racing in American Solar Challenge and World Solar Challenge in Australia. Midnight Sun VI aims for a lighter car, higher efficiency solar cells and improvements in aerobody, mechanical and electrical systems. Building on solid engineering practices, the latest in computer aided engineering, a wealth of past experience, and an influx of new ideas, the team is poised for the new challenge ahead. We are confident that these improvements will bring home another top 10 finish in the 2001 races. However, success does come with a price. In our current situation we need more funds for research, which is a vital step to a successful car Thus we approach WEEF for funding in the purchase of a data acquisition card (DAQ) for the array stand, as well as Maximum Power Point Trackers (MPPTs).

DAQ card for the automatic array stand

The automatic array stand is a new venture for the team. During a race, the batteries need to be charged at the end of each racing day. Since only solar power is allowed to charge the batteries in the course of a race, the array is the only energy source. The array will be placed upon the array stand at the end of each racing day. To capture the maximum power from the sun, the array stand will adjust itself so that the array will be perpendicular to the sun "rays" during charge. This DAQ card is critical for operation of the array stand. It acquires the data necessary to determine the exact position at which the array should be placed and rotate the stepper motors accordingly. This DAQ card has 16 analogue inputs, 8 digital I/O, and a sampling rate of 200ks/sec. The entire package includes the DAQ card, the cable and connector block and the software link.

Maximum Power Point Trackers (MPPTs)

The MPPT is a highly efficient DC:DC converter coupled with an intelligent power tracking system used to maximize the power transfered from the solar array to the batteries. The power electronics (MPPTs) used on Midnight Sun V to maximize the solar array output are very efficient (~99% under ideal conditions). This efficiency drops due to the operation of the MPPTs under non-ideal conditions. Research has begun into the development of our own MPPTs so that we may be able to extract even more power out of the array under non-ideal conditions. These non-ideal conditions include the temperature gradients present while driving along the road, as well as intermittent shading caused by random clouds. These MPPTs are currently under construction. Materials need to be purchased to support its production.

Proposal Benefits:

Students from many faculties are involved in designing and building subsystems for Midnight Sun. A recent recruitment meeting has brought in another 40 or so students from different faculties, with engineering as the most prominent percentage. Many students make research for the car's subsystems a student project and learn much from the experience. We currently have 5 mechanical projects for the ME481 course done by team members in that course. We also have an electrical research on MPPTs that is used to fulfill a course requirement. Many students will also be dealing with industry for obtaining sponsorship and consulting. The investment by WEEF in the Midnight Sun VI project will make Waterloo a stronger competitor the 2001 races. Since Midnight Sun represents the University of Waterloo Engineering, a successful team gives Waterloo greater exposure. The team routinely displays the car at shows such as the Canadian International Auto Show (CIAS), Molson Indy, High Tech Show and participates in local festivals such as Earth Day, Canada Day and the upcoming Oktoberfest.

Goals of Midnight Sun VI:

To design and construct an efficient solar car for ASC 2001 and WSC 2001
To develop an interdisciplinary engineering project that promotes education through applied engineering experiences
To represent Waterloo Engineering through exposure of the project at races, trade shows, and media events
To further alternative fuel technologies through research and development efforts

Students who work on this project develop manufacturing techniques and rigorous validation systems in order to produce a winning design. Students also benefit through working with industry contacts, professors, graduate students, and each other.

Cost Breakdown:

Approximate costs outlined. Exact costs will be discussed at presentation. Partial funding is appreciated as well.

	Item	Quantity	Amount	
Plan A				Total: $
	DAQ card for the array stand	1	$2000	$5000
	MPPTs	5 x $600	$3000	
Plan B				**Total: $**
	DAQ card for array stand	1	$2000	$4100
	MPPTs	3.5	$2100	
Plan C				Total: $
	DAQ card for array stand	1	$2000	$3800
	MPPTs	3	$1800	

Implementation Schedule:

Items being requested will be purchased immediately upon the availability of funds. Please note that the array stand is currently being designed and built, and the DAQ card is crucial for its operation. The card we require has already been sourced. MPPTs are important for acquiring the maximum power output from the array. Coupling the array with these MPPTs gives us the "best bang for the buck." The entire set of 5 MPPTs work together to achieve this power advantage, thus, we prefer that it be funded as an entire package to be useful.

Additional Information:

Midnight Sun would like to thank WEEF for its on going support of Midnight Sun. As a result of contributions made by WEEF to Midnight Sun, WEEF is currently a **Silver Sponsor**.

26. R/C Aero Design Team

Submitted By:
Name: Ian Rainey & Steve Viola
E-mail: ianrainey@altavista.net & stephen_e_viola@yahoo.com
Phone Number: 725-3449
Position: Team Leaders

Description of Proposal:
We are in the process of reviving the R/C Aero Design Team, which last competed in 1997. We are conducting research and development in preparation for the 2002 SAE Aero Design Competition. The competition attracts over 40 universities worldwide. Funding is needed to purchase the necessary components for a test plane. The plane will be used for learning and development purposes.

Proposal Benefits:
WEEF contributions would enable the reinstatement of a team that would offer valuable learning experiences to engineering students. This project will provide opportunities for students to apply and develop mechanical, electrical and aerodynamic theory. We are a young, enthusiastic team that has the opportunity to remain intact for a number of years.

Cost Breakdown:

Option #1

Item	**Price**
K&B 0.61 Engine	$100
R/C Plane Assembly	$650
Servo Motor Kit	$220
12V Battery	$ 40
Research Material	$100
Total	**$1110**

Option #2

Item	**Price**
R/C Plane Assembly	$650
Total	**$650**

Implementation Schedule:

Purchase and begin assembly of test plane as soon as funds become available.
Additional Information:

This project has received approval from the Chair of the Mechanical Engineering Department. Professor F.S. Lien will be the staff supervisor.

27. Team Advancement For The Formula SAE Project

Submitted By:

Name: Asita Perera
E-mail: fsae@engmail.uwaterloo.ca
Phone Number: x5904
Position: 2001 Formula SAE Team Leader

Description of Proposal:

To purchase the following equipment for the further advancement of the Formula SAE 2001 team and all future FSAE teams:

Option 1:

Items
Laptop

Option 2:

Items
Tires
Wheels

Proposal Benefits:

Laptop: During the past few years the University of Waterloo Formula SAE Team was one of the leading teams as far as powertrain development is concerned. This position was partly maintained by an excessive amount of dyno testing and calibration of the engine. To work with the dyno test unit it is necessary to have a reliable and performing laptop. Unfortunately our two laptops broke down during the past term; therefore the purchase of a new laptop has the highest priority, as the dyno test season is getting closer. This laptop will not only be helpful for this year's team, but also for future teams, as engine management systems do not evolve as fast as other computer systems and therefore a powerful laptop should be able to handle the software for the coming five years.

Tires and wheels are one of the most important safety features of a racecar, if not of any car at all. Being the only interface between the ground and the car the tire and wheel assembly sees enormous fatigue loads, therefore it is not considered to be safe to reuse the wheels after one year of excessive testing and racing. Tires generally tend only to last a week end of hard testing and are for this reason an expensive limitation to the testing done, nonetheless only testing can increase the possibility of achieving top ranks, as most of the points in the competition can be won in dynamic events, as the Auto- X or the endurance race.

The Formulas SAE team gives students the chance to apply knowledge gained during their education at the University of Waterloo in a practical and challenging environment. Students design, test and manufacture different components working together to build a competitive car. Strong entries in the past also contribute to the reputation of the University of Waterloo a first class engineering school.

Cost Breakdown:

Option 1:

Items	*Cost*
Laptop	$3,000
TOTAL	$3,000

Option 2:

Items	**Cost**
Wheels	$2000
Tires	$2000
TOTAL	$4000

Implementation Schedule:

The items listed above would be purchased as soon as possible. Each item would have an immediate positive impact on the 2001 FSAE team as well as future teams.

Additional Information:

Priority funding is, as mentioned above, to a laptop.

28. ESQ: LEGO MindStorms (including Wireless RCX Interfaces)

Submitted By:

Your Name: William R. Baer
E-mail: wrbaer@esq.uwaterloo.ca
Phone Number: ESQ office x.5239 or home 572-5141
Position: Co-Director (Engineering & Technology)

Description of Proposal:

ESQ (formally Engineering Science Quest) is an ongoing student run program (entering its tenth year of operation) whose goal is to create an awareness and appreciation of science and engineering in a fun setting for children. ESQ provides twelve programs for children ranging from grade 1 to 12. The aim of each program is to explore new horizons in engineering and science by giving the campers an opportunity to see, touch, invent, design, create and experiment. ESQ runs weekly programs **each summer in the months of July and August**. ESQ also provides similar experiences through workshops, offered during the months of May and June, at local elementary schools.

The LEGO MindStorms (including the RCX Wireless Interface) kits will be used as a key component of four programs, Camp Bondar, ExXtreme! 0, I, & II (grades 5 to 12). The students will discover how to design, build, and create programs to control robots that can interact in their environment. In addition, the high school students will be introduced to control theory through the use of input sensors and RoboLab software (based on National Instruments LabView).

Normally, ESQ uses the **LEGO MindStorms** during the summer term (May to August). The LEGO MindStorms can then be used by a variety of courses during the fall and winter terms. In particular, Professor Carolyn MacGregor has expressed an interest to utilize the LEGO Mindstorm hardware for the SD 161 course, commencing next fall term (see attached letter of support).

Finally, ESQ will be developing a "LEGO Design Challenge" for the upcoming winter term. Thus project will be similar to the MIT Robotic Design challenge, and will be team orientated. The design teams will have a variety of programming languages to develop programs, such as C++, Visual Basic, RoboLab, NQC (Not Quite C) and pbFORTH (developed by UW EE 86 Alumni). ESQ is currently in discussions with a potential supporter, to provide prizes.

Proposal Benefits:

With the use of the Wireless RCX Interface and the LEGO pieces of the MindStorm kits, many engineering courses could benefit. Programming courses could be enhanced, providing opportunities to program "mechanical robots" verses file manipulation. Early design courses can combine simple to use building materials (i.e. LEGO) with advanced programming tools (i.e. LabView) to introduce the design process.

A new faculty wide "LEGO Design Challenge" could be offered during the fall and/or winter term. The challenge will incorporate the LEGO MindStorm kits. The challenge could vary each year, incorporating design and programming skills to solve an engineering problem.

The Wireless RCX interfaces can also be used to test newly developed, designed and built sensors, such as touch, angle and position sensors. For example, the Wireless RCX interfaces could be incorporated in a "rooming campus robot" to help direct parents to their child's.

The LEGO MindStorm kits would be available for fourth year student projects in the fall and winter terms.

The participants of the four ESQ programs would benefit immeasurably. Each participant would have access to the LEGO MindStorm kits considerably longer, providing a better opportunity to explore robotics and their control. Also, since RoboLab is based on National Instruments' LabView, ESQ is indirectly introducing the participants to software they will see in their future University careers (assuming they enter either engineering or science programs).

Cost Breakdown:

ESQ hopes that WEEF can fund Option #1. This would provide a total of 32 MindStorm kits, which should accommodate a "normal" class size, including TA's for development purposes. In addition, three additional options have been provided for partial funding considerations.

Proposal Levels	Item Description	Cost per package [1]	Quantity	Extended Cost [2]
Option #1	MindStorm Kit	$254	20	$5,604.76
Option #2	MindStorm Kit	$254	16	$4,483.81
Option #3	MindStorm Kit	$254	12	$3,362.86
Option #4	MindStorm Kit	$254	08	$2,241.91

(1) Includes a 15% discount through Spectrum Educational Inc.
(2) Includes PST (8%) and GST (2.33%)

Implementation Schedule:

Currently, ESQ has 12 complete LEGO MindStorm kits (including the Wireless RCX Interface). However, with four programs utilizing these kits, ESQ could use up to an additional 20 LEGO MindStorm kits to provide 8 LEGO MindStorm kits for each program. These kits will be used during the months of July & August.

During the fall and winter terms, up to 32 LEGO MindStorm kits will be available for courses and project work. In the past, ESQ has provided LEGO MindStorm and LEGO Control Lab kits to fourth year projects with great success. As previously mentioned the LEGO MindStorm kits will be used in Systems Design 161 this coming fall term. Also, Professor Sanjeev Bedi has expressed an interest in utilizing the kits for a Mechanical Engineering course.

ESQ will also utilize these kits during the fall term (usually during UW Reading Week) when travelling to Moose Factory, Ontario. This is part of ESQ's Aboriginal outreach program, now in its second year of operation.

Finally, a design project (similar to the MIT project that actually created the first prototype of the RCX interface) will be developed for all engineering students. ESQ will be offering the design project in the winter term, and will include PRIZES (e.g. Panasonic has expressed an interest in providing commercial products).

Additional Information:

The following links are included to provide further details of the LEGO MindStorm product and potential uses of the hardware:

- http://www.esq.uwaterloo.ca [ESQ home page]
- http://www.lego.com/dacta/robolab/default.htm [RoboLab product line]
- http://www.oreilly.com/catalog/lmstorms [The Unofficial Guide to LEGO Mindstorms Robots!]
- http://www.hempeldesigngroup.com/lego/pbFORTH [pbFORTH for LEGO MindStorms]
- http://www.oreilly.com/catalog/lmstorms/resources/index.html [How to make your own sensors]
- http://ldaps.arc.nasa.gov/LEGOEngineer/ [LEGO Engineer interface]

TO: WEEF Executive

FROM: Prof. C MacGregor,
Dept of Systems Design Engineering
cgmacgre@engmail.uwaterloo.ca x 2897

Re: Letter of Support
WEEF Proposal - Bill Baer, Engineering Science Quest

DATE: June 22, 2000

I strongly support the submission made by Bill Baer of Engineering Science Quest requesting funding to purchase of 20 RCX and Mindstorm kits. These purchases will be used by ESQ during their summer programs and are to be made accessible to undergraduate engineering courses during the Fall and Winter terms.

This Fall, I will be teaching SYDE 161 (Introduction to Systems Design Engineering). One of the objectives of the course is to provide students with opportunities to work in teams on various design projects. Having access to the combination of RCX, IR tower, and the Mindstorm kits will allow us to challenge the students (in teams of 3-4) with a "robotic-based" design assignment. They will construct their robots using familiar materials (i.e. LEGO), and will incorporate learning from other courses (e.g. use their programming skills learned in SD 121 Digital Computation to control the robot).

With support from WEEF and with Mr. Baer's expertise, it is conceivable that a faculty-wide "LEGO Design Challenge" could be established for First Year Engineering teams in future years. This may encourage other departments to adopt such innovative tools for teaching design.

Lending financial support to Mr. Baer's proposal will be money well spent.

29. Proposal for the University of Waterloo Electronics Club

Submitted By:
Name: John Sollazzo
E-mail: jnsollaz@engmail.uwaterloo.ca
Phone Number: (519) 725-0959 (home)
Description of Group:

The University of Waterloo Electronics Club (UWEC) is a club with an electronics design project-oriented focus. Started in the fall of 1999 by Arun Patel and Dylan McGuire, and sponsored by Ed Spike of the E&CE department, UWEC is an undergraduate club open to all students in Electrical, Systems Design, and Computer Engineering interested in the design and development of functional electronics projects.
Description of Proposal:

Having completed an introductory first-year project, a microprocessor-based alarm clock, UWEC is aiming to take on a more complex project while building a solid student membership. To cater to experience levels ranging from beginner to advanced, the club proposes a branched approach to projects, involving newcomers in some basic logic and microprocessor designs, while more experienced members gear up to tackle an embedded-system design.

Often students find it difficult to gain relevant design experience early in their academic careers. It is our desire to support junior students in their efforts to gain knowledge and experience in hardware design. As well as providing exceptional educational opportunities, the Electronics Club aims to give back to the faculty of Engineering. For instance, the club has been asked to design and create various projects for Mr. Spike.
Additionally, in preponderance of the compulsory fourth-year projects in the department of Electrical and Computer Engineering, UWEC will provide the opportunity for students to develop the skills required for this undertaking. We would like to request the Waterloo Educational Endowment Fund's support in this endeavour.
Description of Current Project:
The current project entails designing and constructing a digital media player. In order to do this, an embedded microcontroller and digital signal processor are required. Furthermore, a storage medium, namely flash memory and hard drive space, is necessary. Various user interface components must also be incorporated into the final design.

Cost Breakdown:

Component	**Price**	**Quantity**	**Total**
DAC/DSP	$100	2	$200
Flash	$30	2	$60
Microprocessor Development Board	$500	1	$500
PIC	$15	4	$60
LCD	$20	2	$40
Discrete Components	$50	1	$50
Board	$30	2	$60
Door Solenoid	$15	1	$15
USB Controller	$20	2	$40
USB Interface	$10	1	$10
HDD (1.8 GB laptop)	$150	1	$150
Total:			**$1185**

Implementation Schedule:

Development would begin immediately upon receipt of funding for the DSP and microprocessor unit.

Additional Information:

None.

30. GNCTR 2001: Two Toboggan Teams!

Submitted By:
Name: Patricia O'Donnell, Gord Turner, Duane Frost, and Meaghan Halligan
E-mail: paodonne@engmail (for Patricia)
Phone Number: (519) 885-0622 or 4th year room @ ext. 5122 (for Patricia)
Position: Team Members
Description of Proposal:
The two toboggan teams are requesting funding for the costs of constructing the formwork used to cast the toboggans, as well as material costs for the portion of the superstructure (for each team) that would not be donated by sponsors. We would also like to request funding for supplies required for the two Technical Expositions and both Final Reports.
Proposal Benefits:
GNCTR is a renowned event in Canada. The University of Waterloo hosted the event in 1999 and is always a strong competitor in the race. The race is an engineering competition combining creativity and innovation. Each team is required to design, construct, and race a toboggan with a running surface made from Portland Cement based concrete. In addition, each toboggan must be equipped with a braking system to stop the sled at the bottom of the hill. Judges ensure the toboggans meet all dimension, weight and safety requirements and award points at a technical exhibition (for report writing, displays, brake design, team enthusiasm, and moral) and on race day (for time trials, braking performance, and team spirit).

GNCTR allows our class to work together on a large-scale project. It also allows us to apply our knowledge in a fun, but competitive, environment. This competition gives the students an opportunity to work as a team for a common goal, network with other universities across Canada and the United States, and showcase Waterloo's engineering talent and determination.
Cost Breakdown:

Costs for materials to build formwork (i.e. lumber, nails, Plaster of Paris, Styrofoam and other supplies as needed)	400.00
Material cost for superstructure (i.e. braking systems and roll bars)	500.00
Technical Exposition and Report Expenses (i.e. presentation boards, colour printing, film and film processing)	150.00
Total	**$ 1,050.00**

Implementation Schedule:
The competition will take place in early February. Construction on the formwork will begin later in this term, while work on the superstructure is expected to begin during the Christmas break. Preparation for the Technical Exposition and finalising the Written Report is expected to begin during the Christmas break or early January.
Additional Information:
This funding request is the last opportunity for the GNCTR 2001 teams to apply for assistance. Our financial commitment is already greater then usual since we are submitting two sleds to the

competition, as such, the teams would greatly appreciate any assistance that WEEF can offer. Thank you.

31. University of Waterloo Alternative Fuels Team (UWAFT)

Submitted By:

Name: Eric Powell
E-mail: epowell@engmail.uwaterloo.ca
Phone Number: (905) 875-1741
Position: Team Member

Description of Proposal:

This fall's proposal consists of two separate components.

i) Two high quality Quad-Tech electrical test leads were borrowed by UWAFT from the Microelectronics Laboratory in the summer 2000 term to perform testing on ethanol as part of a 4th year project. The leads were damaged during their use and need to be replaced. They are high quality leads that produce minimal losses and allow consistent, fine and accurate measurements to be made.

ii) This term, research is being done into the effects on performance, emissions and fuel economy of introducing hydrogen into the engine's incoming air stream. Also, UWAFT is continuing to develop strategies such as using hydrogen to aid in starting the vehicle in the extreme cold. There has become a need to be able to work with hydrogen safely and UWAFT is requesting financial support in obtaining a sensitive hydrogen detector.

Proposal Benefits:

i) Originally there were three Quad-Tech electrical leads in the Microelectronics Lab and now there is one operating lead of this type. There will be significantly more work next term in which these leads could be used. Replacing the two damaged leads will allow better use of the existing equipment for students and allow more precise work to be done.

ii) Using a sensitive hydrogen detector is an effective method of checking for leaks in a hydrogen system, verifying joint integrity, ensuring test fixtures are assembled properly, etc. UWAFT foresees the benefits of using hydrogen in several different automotive applications; however, safety is a high priority and a hydrogen detector is an investment that needs to be made to improve student safety and facilitate working with hydrogen.

Cost Breakdown:

Option i): Quad-Tech Test Leads

2 * $197.18/each + Tax = $453.51

Option ii): BW Technologies M3-FM H_2/CO Detector

US Dollars = $1465.00
CDN Dollars (@ $0.655 US/CDN) + Tax = $2584.66

Option iii): Both i) and ii)

Total = $3038.17

Implementation Schedule:

i) The test leads will be put into use in the Microelectronics Lab as soon as they are purchased.

iii) Currently a test method and apparatus is being designed to determine the effects of introducing hydrogen into the engine's incoming air stream and actual testing could happen as early as this term. The hydrogen detector will be an immediate asset to UWAFT.

32. Waterloo Aerial Robotics Group (WARG) Equipment

Submitted By:

Name: Doug Hemingway
E-mail: djheming@warg.uwaterloo.ca
Phone Number: 888-4567 x5109
Position: Project Manager/Co-ordinator

Description of Proposal:

The Waterloo Aerial Robotics Group is currently preparing for the 2001 International Aerial Robotics Competition. To make progress over the next several months, the team will require some new sensors for flight control and some parts to repair a severely damaged helicopter. We are also hoping to replace some equipment that was stolen in a break-and-enter incident that occurred in the summer. Finally, several workshop and fourth year design projects will use WARG subprojects as their topics and funding for these projects could be very helpful.

Proposal Benefits:

For the past three years, the WARG team has been providing undergraduate engineering students with a unique opportunity to experience hands-on robotics development including the design of flight control, artificial intelligence and computer vision systems. The team has recently expanded to include nearly fifty undergraduate engineering students from all disciplines. The students working on WARG have a chance to get a lot more out of their education than what is presented in class. This equipment will help to maintain WARG's position as one of the very best teams competing in this international competition.

Cost Breakdown:

Option 1 ($7,000):
- Replace stolen laptop: $2,000
- 3-D vision processing board project *: $2,000
- 5-DOF tethered helicopter test platform project *: $1,500
- Helicopter repairs package (rotor blades, gears, tail, etc): $1,500

Option 2 ($6,500):
- Gyros for roll/pitch/yaw sensing: $3,000
- Replace stolen laptop: $2,000
- Helicopter repairs package (rotor blades, gears, tail, etc): $1,500

Option 3 ($5,000):
- Gyros for roll/pitch/yaw sensing: $3,000
- Replace stolen laptop: $2,000

Option 4 ($4500):
- Gyros for roll/pitch/yaw sensing: $3,000
- Helicopter repairs package (rotor blades, gears, tail, etc.): $,1500

Option 5 ($3500):
- Replace stolen laptop: $2,000
- Helicopter repairs package (rotor blades, gears, tail, etc.): $,1500

Implementation Schedule:

This is an ongoing student project that is expected to evolve for many years in the future. Funding for most of the above subprojects will be used immediately. However, those projects denoted by a * will be implemented as fourth year projects beginning in the summer.

Additional Information:

Contact Information for Funding if different than above:
Name: David Kroetsch
E-mail: ddkroets@warg.uwaterloo.ca
Phone Number: 888-4567 x5109
Position: Team Leader / Treasurer

33. Iron Warrior Digital Camera

Submitted By:

Name: Raymond Ho
E-mail: rjho@engmail.uwaterloo.ca
Office Phone Number: (519) 888-4567 x2693
Local Phone Number: (519)725-4321
Position: Editor-in-Chief, The Iron Warrior

Description of Proposal:

Our proposal is for a digital still camera for use in production of The Iron Warrior. An exact model is not available at this time, as the possibility exists that new models will be released in the time between proposals and selections. However, there are a few current models under consideration, including the Nikon CoolPix 950, the Kodak DC3400, and the Olympus D-490. These are all at least 2 megapixel cameras with zoom, and they are all compatible with our current equipment.

Proposal Benefits:

The primary benefit to the Iron Warrior would be the reduction in the cost of film purchasing and developing. Currently the Iron Warrior spends $30 per issue on film and developing which adds up to nearly $200 per term. Due to these costs and the tight budget of the Iron Warrior, the number of events that the Iron Warrior covers with pictures is restricted. However, with a digital camera, the Iron Warrior could attend more events both within and outside of Engineering and better inform Engineering students of what's taking place outside of class. Also, the presence of a digital camera in the Iron Warrior would encourage more students to volunteer to work on the paper, exposing them to a variety of skills outside of daily Engineering courses such as photography, layout, image editing, and above all, teamwork.

There is also the possibility of signing out the digital camera to other engineering students for usage in various events and activities, and for academic applications such as course projects.

Cost Breakdown:

The Kodak DC3400 and Olympus D-490 both currently cost $799.99, which would come to $919.99 with taxes. The Nikon CoolPix 950 is currently $999.99 or $1149.99 with taxes. However, the Nikon CoolPix 950 has better features including increased zoom and photo resolution. If WEEF chooses to provide partial funding, the Iron Warrior could make up the difference, at the possible expense of upgrading our existing software.

Implementation Schedule:

We would hope to purchase the camera as soon as possible, and begin using it as part of the production process as a complement to and ultimately as a replacement for our existing film based cameras.

34. Waterloo Autonomous Robot Tag (W.A.R.T.)

Submitted By:

Name: Sam Wong
E-mail: ss2wong@engmail.uwaterloo.ca
Phone Number: (519) 886-5416
Position: 4A Mech. Eng. Student

Description of Proposal:

The purpose of this proposal is to aid in the funding for our Waterloo Autonomous Robot Tag competition consisting of team members Sam Wong (4A mech.), Hai Truong (4A mech.), Jason Gilman (4A systems), and Simon Dimuantes (4A systems). This is a brand new competition organised by Carleton University.

Contest Objectives:

To build two (2) autonomous computer-controlled mobile robots that can play a revolving game of flashlight tag. The robots must conform to the tagging specifications in order to play with other robots. Both robots must be able to switch roles (predator/prey) upon a successful tag, handle the confusion of false tags, communicate with other robots, and exhibit aggressive movement algorithms.

This is meant to develop competing pursue/flee algorithms in a static environment, while focusing on robotic co-operation and communication to ensure both robots can appropriately handle both successful and false tags. The final goal of the project is to have a large number of robots play several different types of games together in the same arena.

Note that the main thrust of the competition is to develop a pair of robots that will compete with each other. Our team will be judged on how well our robots can play the game. A secondary goal is the round-robin 'Eliminator' game where one of our robots will play another robot from another team. Other games are being planned, but will just be for fun. (ie: they will not affect the competition score)

Proposal Benefits:

The main benefit of funding our project is to maintain the University of Waterloo's well-known reputation as leaders in innovation and the advancement of today's rapidly growing technology sector.

Plus, there's nothing more embarrassing for our school than Waterloo engineers losing to Carleton engineers based solely on lack of resources.

Cost Breakdown:

Our team will need to purchase the following major items to make our project successful:

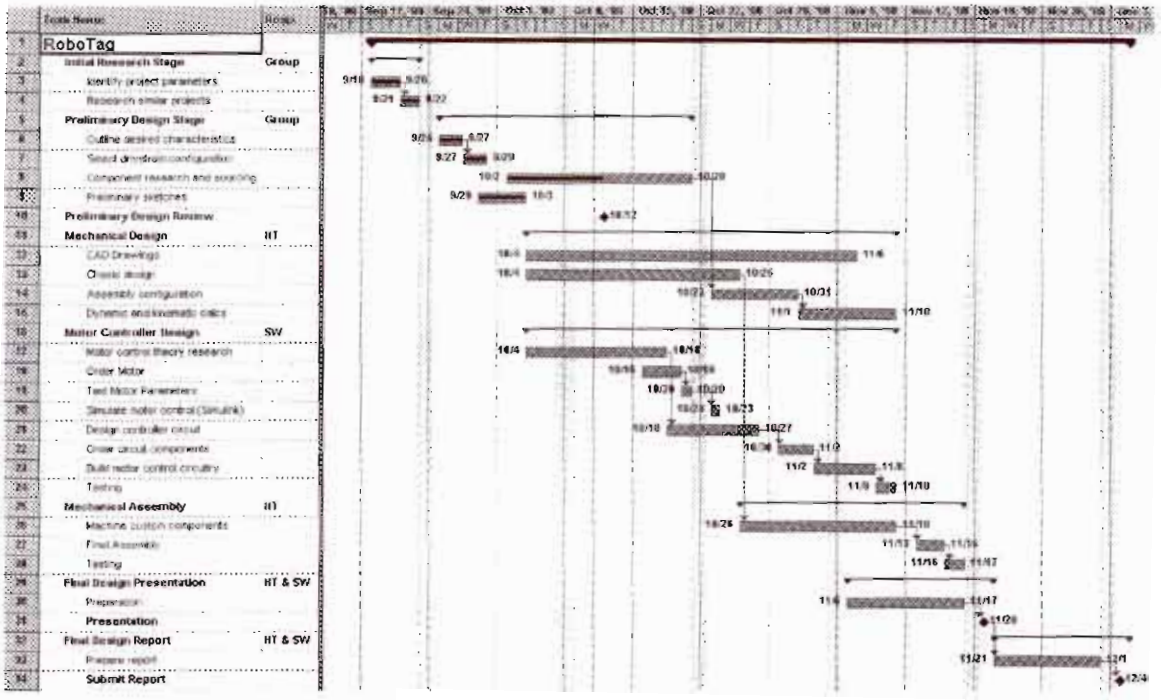
Item:	Cost:
AM/FM radio transmitter and receiver (x 2)	$110
IR range sensor (x 2)	$70
DC servo motor and gear box (x 4)	$80
DC positioning servo motor (x 2)	$38
Mechanical components (e.g. wheels, bearings, etc.)	$40

Electrical components (e.g. ICs, MOSFETs, etc.)	$60

The total cost will amount to approximately $400.

Note: So far the funding for this project has come out of our own pockets because we have not been able to find any other source.

Implementation Schedule:



Additional Information:

See competition web site: (http://robotag.carleton.ca/)

35. Dionex AS 11 Column

Submitted By:
Environmental Engineering (Civil)
Your Name: Mark Sobon
E-mail: msobon@sunburn.uwaterloo.ca
Phone Number: Ext. 5263
Position: Chemical Engineering Technologist

Description of Proposal:
Two Dionex AS 11 Columns. For use in the Dionex DX-200 Ion Chromatograph.

Proposal Benefits:
Two AS 11 columns are required to perform the separation of inorganic anions, oxyanions, and organic acids, which are used in conjunction with the Ion Chromatograph (IC). The AS 11 columns will provide for the ability to quantify perchlorate compounds, expanding the capabilities of the instrument. The columns will be used in a Env E 430/431 design project and the Env E 275/330 labs and projects (Approx. 100 Students/year).

Cost Breakdown:
The total cost is $1400CDN ($910 US) plus shipping and taxes.

Implementation Schedule:
Immediate

Additional Information:
The Civil Department has agreed to pay 1/3 of the cost. Additional information will be provided upon request.

36. Great Northern Concrete Toboggan 2002

Submitted By:

Name: Allister Mason
E-mail: awmason@engmail
Phone Number: 725-2637
Position: Head of Concrete Mix Design Team

Description of Proposal:

Six CSA approved motorcycle helmets, which are required to enter the competition

Funding towards the purchase of team uniforms.

Funds for the purpose of promoting the team both within the facility of engineering but also in the community. These promotional materials will include such items as brochures, stationary and novelties.

Proposal Benefits:

The helmets are a requirement of the competition and will protect our team members during the competition. Traditionally these helmets have not been passed on from one team to another. Our team plans to initiate this sharing between teams by passing these helmets on to the class below us, which will save everyone money in the long term.

The uniforms give the team a sense of identity in addition to providing us an avenue to promote our school and our sponsors. All sponsor logos are displayed on the back of each uniform and this will give WEEF great exposure to a large, international audience.

Finally the promotional materials will assist us in promoting our team to both potential corporate sponsors and across campus. This will aid us in achieving the necessary funding we require to make this team a success.

Cost Breakdown:

		$2000
6 Motorcycle Helmets		$1000
Team Uniforms	$500	
Promotional Materials		$500

Implementation Schedule:

Immediate

Additional Information:

The concrete toboggan is a major team competition. It has been run annually for over 25 years with Waterloo achieving extremely high results. It is the intention of our team to continue and even surpass this storied past. The GNCTR 2002 team wishes to thank WEEF for its past donation and hopes this relationship remains strong over the years.

Contact Information for Funding if different than above:

Name: John Tjeerdsma
E-mail: jptjeerd@engmail
Phone Number: 747-4066
Position: Treasurer/Head of Finance

37. Environmental Engineering Study Room Monitor Upgrade

Submitted By:

Name: André Friedmann
Email: amfriedm@engmail.uwaterloo.ca
Phone Ext: 6017
Position: 4th Year Undergrad Student

Description of Proposal:

The 4th Year Environmental Civil class would like to have the monitors on the Polaris stations in the 4th year Environmental Engineering study room upgraded. Most of the monitors have 14" screens and have various minor defects that are not easily repairable (dim screens, blurriness, etc.).

We propose to purchase TTX 17" model 1771 monitors at $320 (approximately) each.

Proposal Benefits:

All 4th year Environmental Engineering students (both the Civil and Chemical streams)

Cost Breakdown:

$320 per monitor

There are 8 workstations in the 4th year study room, bringing the total cost to $2560. Replacing each workstation's monitor would be preferred.

Implementation Schedule:

Winter 2001

38. Free Flight Glider Team

Submitted By:

Name: Scott Redmond
E-mail: smredmon@engmail.uwaterloo.ca
Phone Number: 519 588-3696
Position: Project Leader

Description of Proposal:

The Free Flight Glider Team requires funding for the following items:

- **Dremel Tool and Bits**
  Historically, the Free Flight Glider Team used a dremel tool during the final stage of glider construction. However, the dremel tool that was used belonged to one of the team members who has since graduated. This tool has been very valuable in the past, both as part of the construction process and for making repairs in the field, when powered by a car's lighter adapter.

- **Hot-Wire Power Supply Parts**
  The Free Flight Glider Team uses a hot-wire cutter as the principal method for wing construction. The power supply currently in use is nearly four years old and does not allow fine current control. The new power supply would be designed and constructed by a team member, to provide opportunity for learning and minimize cost.

- **General Tools**
  During prototype construction and testing, various materials such as duct tape, aluminum tape, styrofoam cups, popsicle sticks and latex gloves are used quite frequently. These items have little individual cost, but the glider team requires funds to pay for them in order to proceed with normal research and development.

Proposal Benefits:

Dremel Tool and Bits:
- Can use the tool at the flying field using our car power kit (used at the 2000 competition).
- Dremel tool will be owned by the team, to be used in future competitions and by other teams.

Hot-Wire Power Supply Parts:
- The new power supply will provide greater control over input current, improving production quality.
- The Free Flight Glider Team's hot-wire cutter is often used by other teams, such as Formula SAE.

General Tools:
- Early and frequent prototyping is a proven method for success

Cost Breakdown:

Complete Funding Option:

Item	Price
Dremel Tool and Bits	$150.00
Hot-Wire Power Supply Parts	$40.00
General Tools	$60.00
TOTAL	**$250.00**

Partial Funding Option:

Item	Price
Dremel Tool and Bits	$150.00
TOTAL	**$150.00**

Implementation Schedule:

Fall 2000	✈ Dremel finishing of prototypes ✈ Construct new power supply
Winter 2001	✈ Dremel finishing of prototypes ✈ Dremel finishing of field modifications ✈ Use new power supply to build prototypes and competition glider

Additional Information:

WEEF will be acknowledged online, in print and on the glider as a sponsor of the Free Flight Glider Team.

In addition to excellent competitive achievement, the Free Flight Glider Team participates in many local community events. During the summer of 2000, University of Waterloo gliders were present for Engineering and Science Quest demonstrations and our team had a booth at the Aerial 2000 event held at Kiwanis Park. The Free Flight Glider Team has also been recently invited to do presentations to grade 5 and 6 students at a local elementary school. This is a project that is great for students because it is successful and it provides many opportunities to learn. This is also a project that is great for the university because it is successful and it is involved in the local community.

39. Chem 4th Year Room - Computer Upgrade

Submitted Fall 2000 By:
Your Name: Ryan Elliott
E-mail: rd2ellio@uwaterloo.ca
Phone Number: ext. 3649
Position: 4th year Student

Description of Proposal:
New computers needed for Chem 4th year room.

Proposal Benefits:
All Chem 4th year students (approximately 60 students)

Cost Breakdown:
$1500 per machine

- 600mHz
- P3
- 128 MB RAM
- 20G Hard drive
- 17" Monitor

Department will pay 20% = $1250 per unit

Asking for 3 to 6 units
= $4500 to $9000 - 20%
= **$3750 to $7500**
Implementation Schedule:
Winter 2000
Additional Information:

The 4th year room currently has 15 computers of varying power. Depending on machine 2 to 3 open applications pushes the memory limits.

Certain simulations (polymer reactions, plant design) take hours to run and the speed is directly proportional to speed of CPU.

Current situation causes spill over into 2nd + 3rd year room which is often full.