



WEEF PROPOSALS

SUMMARY

W2021



Academic Equipment and Resources		
Proposal Title	Pg. #	Requested
Expanded WATiMake Capacity - MTE	1	\$11,900.00
Aerial Drone – LiDAR attachment - CEE	3	\$14746.50
Chemical Engineering Computer Teaching Classroom and 4th Year Study Room Workstation Replacements. - CHE	4	\$45,765.00
Upgrading of CO2 Capture Laboratory Experiment for ChE Undergraduate Laboratory Learning. - CHE	5	\$8,889.00
Tools for engineering student shops – Sedra Student Design Centre	7	\$6,219.00
Ideas Clinic - Water treatment	8	\$5,000.00
New Computers for the Computer Lab - ARCH	10	\$76,478.40
Portable Welding Screen - School of Architecture - Fabrication Lab	12	\$600.00
Capstone Lab 3D Printer - CHE	14	\$5,850.00
Ideas Clinic - Industry 4.0	15	\$15,000.00
New Computers for the MLab - ARCH	17	\$12,433.89
Total		\$ 202,881.79
Miscellaneous		
Jobsite Table Saw for Design Build Projects - Waterloo Architecture Fabrication Lab	19	\$2,000.00
Furniture for CPH nook (Winter 2021)	20	\$4,000.00
Student Wellness Initiative (Flasks/Induction Unit to improve student experience - CHE	21	\$1,179.00
Digital Signage - School of Architecture	24	\$8,139.20
Discord Server Enhancement – MECH (8) 25	26	\$100.00
Engineering Orientation - OWeek	28	\$2,155.00
Total		\$ 17,573.20
Reallocation		
University of Waterloo Nanorobotics Group (UWNRG) Winter 2021 WEEF Proposal	30	\$687.50
Total		\$687.50
Student Teams		
Waterloo iGEM Winter 2021 Funding Proposal	32	\$6,000.00
W2021 UWRT WEEF Proposal	34	\$8,100.00
Essential Software for UW Blueprint	36	\$612.72
Waterloop WEEF Proposal W21	37	\$4,500.00
UWaterloo IISE WEEF Sponsorship Proposal	40	\$430.00
Materials for at home testing	43	\$550.00
VEX U Robotics 2021 Winter	45	\$2,000.00
Kraken of The Sky	48	\$5,300.00
MS XIV Electrical System	51	\$8,000.00
WATonomous W21 WEEF Proposal	54	\$2,180.00



UWFM Winter 2021 for 2022 Season	56	\$8,400.00
Proposal for Hardware/Software for Industry 4.0 Case Competitions	58	\$1,899.00
WARG Winter 2021 WEEF Proposal	60	\$3,860.00
Interactive Virtual Education Hardware - EWB	62	\$5,510.00
W21 WatLock WEEF Proposal Presentation	65	\$1,629.01
PCB Assembly Station Equipment	67	\$20,000.00
Waterloo Formula Electric Funds Proposal Winter 2021	69	\$4,846.00
Total		\$83,816.73
TOTAL REQUESTED FUNDING		\$304,959.22



Expanded WATiMake Capacity

Mechanical and Mechatronics Eng (WATiMake)

MTE 481, MTE 482, ME 481, ME 482, MTE 380, ME 380, ME 101, ME 100, MTE 100

Eugene Li, Mechatronics Engineer in Training

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Description of Proposal

The WATiMake Facility is a makerspace in DWE that offers students access to 3D printers, a laser cutter and various other tools. Prior to the pandemic, we were able to offer students the ability to gain hands on experience with the tools during their courses and personal projects. Since the pandemic, we have pivoted to a model where the staff has been fabricating parts for students to continue to gain some hands-on experience.

In WATiMake there are four large bed filament printers, four small bed filament printers and two resin printers. Within the last year we have noticed an increased complexity in jobs being submitted by students. These jobs often require the large bed printers, and this quickly becomes a bottleneck. We are proposing to purchase another large bed printer to allow for a higher throughput of complex jobs.

WATiMake also has power supplies available for student use. These bench top power supplies typically supply 3-5A of power, but there were a few options that supplies up to 20A. Unfortunately, these power supplies were stolen during the chaos of the pandemic. We are proposing to replace and purchase more of these power supplies as they are of high demand.

Lastly, many students often have trouble interfacing their design projects with their computers to program effectively. We are proposing to purchase some high-speed USB DAQs that would allow students to directly control physical hardware with their laptops. This would make prototyping and controlling complex projects easier

Proposal Benefits

By purchasing this equipment WATiMake will be better able to support more complex student projects. The equipment that is currently available creates a bottleneck for the high demand items that can be addressed with these purchases.

Estimated Equipment Lifetime

Assuming typical usage we expect that this equipment will function without issue for 5-10 years. The power supply units should be able to be used for longer (10-15) years assuming proper use.

Implementation Schedule

The equipment can be purchased and integrated immediately. All items are in stock



Cost Breakdown

Item	Option 1	Option 2	Option 3	Option 4
382275 Power Supply	3050	2500	1900	0
High Speed USB DAQ	4050	3250	2450	0
Cubicon 3D Printer	4800	4800	0	0
0	0	0	0	0
0	0	0	0	0
Total	11900	10550	4350	0



Aerial Drone – LiDAR attachment

Civil and Environmental Engineering

CIVE100, ENVE330, ENVE 382/383, AE 280, several AE300 & 400 level courses, as well as others

Mark Hummel, Technologist – Field Survey and Water Resources

mark.hummel@uwaterloo.ca

Description of Proposal

Last term I had a successful proposal for a DJI M300 RTK drone. Splitting the cost 50/50 with my department (CEE) we were able to procure it earlier this year. With this next round of funding and another 50/50 split with the CEE department we are looking to add a LiDAR payload to the aircraft. LiDAR will allow us to create point cloud models of terrain, infrastructure and watersheds for use in labs, lectures, assignments, design days, capstone projects and anything else you could possibly want modeled or analyzed from the air.

Proposal Benefits

The LiDAR is intended to be included in several undergrad courses (CIVE100, ENVE330, ENVE 382/383, AE 280, several AE300 & 400 level courses, as well as others) as a display of data collection possibilities and use cases.

I’ve also reached out to professors across the department to consider how they can include LiDAR imagery from around campus, the city, and the province to include in lectures/labs so that content can be relevant as well as tangible and there was very positive feedback from this idea.

Capstone/Design days - similar to the other benefits. Having the LiDAR would allow for more relevant and updateable content in the design days. Allowing for more localized content and a better understanding of the problem you are given to solve.

Estimated Equipment Lifetime

A life expectancy of 10+ years for all of the equipment requested.

Implementation Schedule

All items will be purchased as soon as funding is granted. Available to be booked and flown by our licensed pilots as Covid protocols allow.

Cost Breakdown

Item	Option 1	Option 2	Option 3	Option 4
DJI Zenmuse L1 RGB LiDAR	14746.50	0	0	0
0	0	0	0	0
Total	14746.50	0	0	0



Chemical Engineering Computer Teaching Classroom and 4th Year Study Room Workstation Replacements

Chemical Engineering
All Courses
All courses
dherman@uwaterloo.ca

Description of Proposal

Replace 50 student computer workstations in Chemical Engineering Computer aided teaching classroom (CHEMCAT) DWE 2529 and 4th year study room E6 5022. These workstations are currently 12+ years old and failing regularly and unreliable.

Chemcat currently contains 61 workstations and the 4th year study room contains 10 workstations. 21 of these have been replaced recently by the department therefore we are requesting the replacement of the remaining 50 .

Proposal Benefits

Improved computer workstation availability, capability, responsiveness and student productivity.

Estimated Equipment Lifetime

5-10 years.

Implementation Schedule

As soon as available.

Cost Breakdown

Item	Option 1	Option 2	Option 3	Option 4
50 Intel NUC8V5PNK workstations + 500 GB SSD + 8 GB RAM	45765	22882.50	9153	4576.50
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
Total	45765	22882.5	9153	4576.5



Upgrading of CO₂ Capture Laboratory Experiment for ChE Undergraduate Laboratory Learning

Chemical Engineering

ChE 490, ChE 491

John Zhang, Senior Laboratory Instructor/Manager

m78zhang@uwaterloo.ca

Description of Proposal

This proposal is for the purchase acquisition of equipment necessary to upgrade a unit operation lab experiment for chemical engineering undergraduate teaching laboratory. The proposed equipment below will be essential for the upgrading and modernization of the multipurpose open-ended lab project on CO₂ capture and storage (CCS) for our senior students in two unit operations lab courses. Specifically, the proposed equipment units include:

1. A CO₂ analyzer capable of measuring and recording real-time process CO₂ concentration.
2. A gas flow controller for controlling and measuring air flow rate in broad flow rate range for the pilot-scale unit.
3. A gas flow controller for controlling and measuring CO₂ gas flow rate

Proposal Benefits

1. Students will use the multi-column unit to conduct mass transfer experiments on CO₂ capture using various absorbents, a subject highly relevant to ChE curriculum contents and of environmental significance.
2. The flow controllers are necessary to control the gas flow rates and interface with computer for advanced mass transfer and process control experiments.
3. The CO₂ analyzer, capable of real-time measurement at specified sampling rate, allows students to carry out experiment under both transient and steady-state operation conditions.
4. About 280 undergraduate students will benefit from the equipment upgrading in ChE 490 and ChE 491.

Estimated Equipment Lifetime

The equipment in the list above has proven quality and should serve our purposes for many years to come.



Implementation Schedule

The equipment can be assembled and tested as soon as they are available and will be ready for the laboratory courses in the Fall term of 2021.

Additional Information

Our department agreed to cover the cost of small accessories and provide additional funding to fully upgrade the experimental setup.

Cost Breakdown

Item	Option 1	Option 2	Option 3	Option 4
Quantek CO2 Analyser (Model 960)	4150.00	4150.00	4150.00	4150.00
Brooks Thermal Mass Flow Controller	2650.00	1325.00	1325.00	1325.00
CO2 Mass Flow Controller (Cole Parmer UZ-32678-10)	2089.00	1044.50	0	0
0	0	0	0	0
0	0	0	0	0
Total	8889	6519.5	5475	5475



Tools for engineering student shops

Sedra student design centre

Graeme Adair, Manager Sedra student design centre

gadair@uwaterloo.ca

Description of Proposal

To purchase new equipment to expand our tool inventory and to broaden student project support.

Proposal Benefits

Reduce manufacturing times.

Improve quality and professionalism of parts.

Estimated Equipment Lifetime

30 years plus

Implementation Schedule

Immediately

Additional Information

0

Cost Breakdown

Item	Option 1	Option 2	Option 3	Option 4
Power feeder for milling machine. Options are different quantities, 4 -1	2825	2118.75	1412.5	706.25
6" Rotary table with 4" chuck	1205	1010	0	0
6" Sine plate with toolmaker vice	1260	924	0	0
Depth micrometer and coolant proof caliper	929	528	401	0
0	0	0	0	0
Total	6219	4580.75	1813.5	706.25



Ideas Clinic - Water treatment

Engineering Ideas Clinic

Chris Rennick, Engineering Educational Developer

crennick@uwaterloo.ca

Description of Proposal

The Engineering Ideas Clinic is working to bring real-world problems and equipment to undergraduate students. We firmly believe that “bringing the real-world into the classroom” will reinforce the theory you are learning in lecture, show you the context of that material, and will provide an opportunity for you to integrate all the knowledge you are learning.

To continue bringing meaningful, hands-on activities to students, the Ideas Clinic needs to continue purchasing equipment. As we move forwards, the Ideas Clinic is pushing into domains that until very recently only existed in research labs, and in work terms.

This proposal is seeking WEEF’s support for an “Industry 4.0” ideas clinic activity in water treatment. We are seeking \$5,000 from WEEF for 5 bench-scale water treatment “plants”. The Ideas Clinic is currently employing two co-op students who have begun development of the prototype of this platform. This platform can then be used in courses across the Faculty of Engineering with an emphasis on Environmental and Chemical Engineering. To ensure the success of this project, and to make it as real as possible, the Ideas Clinic has partnered with Brock Solutions, a local firm in industrial automation as well as Opto-22 (a supplier of PLC hardware) and Inductive Automation (a supplier of control software).

Proposal Benefits

This unique equipment will allow the Engineering Ideas Clinic to hold high-impact Engineering Days events for students from CHE, ENVE, GEOE, and any programs that overlap with automation (e.g. ECE, MTE). In addition, this equipment can be used to directly support existing (and new) technical electives from across Engineering.

This platform, and the proposed activity using it, will allow students to experience industrial automation equipment and controllers, industry-grade sensors and instrumentation, and control systems.

An estimated 500 students per year will directly benefit from the activities that this equipment will allow.

Estimated Equipment Lifetime

We expect a life of 5+ years from this equipment.

Implementation Schedule

The equipment will be purchased as soon as funding is granted.



Additional Information

The Ideas Clinic will provide the salaries for any and all co-op students, and/or grad students required to develop the platform. The Ideas Clinic has also secured the support of industry, both for their technical expertise and for the controllers and so

Cost Breakdown

Item	Option 1	Option 2	Option 3	Option 4
Pump and piping (\$300 per setup)	1500	1200	900	600
Tank (\$150 per setup)	750	600	450	300
Sensors (salinity, dissolved oxygen, pH, temperature, water level) (\$300 per setup)	1500	1200	900	600
Electronics (\$50 per setup)	250	200	150	100
Manual testing/verification equipment (\$200 per setup)	1000	800	600	400
Total	5000	4000	3000	2000



New Computers for the Computer Lab

Architecture

ARCH113, ARCH126, ARCH173, ARCH193, ARCH212, ARCH292, ARCH293, ARCH392, ARCH393, ARCH493, ARCH570, ARCH684

Alfredo Sordo Client Support Specialist

asordo@uwaterloo.ca

Description of Proposal

The School of Architecture Computer Lab needs new computers. Currently there are a total of 22 lab computers available for over 400 undergrad and graduate students. The computers are over 4 years old and at the end of their life cycle. The computers are slow running architectural software and some have failed which causes students to lose time completing school work which leaves students frustrated and stressed. The majority of the computers are with an i5 CPU, inadequate graphics card, half have a 250GB hard drive which is inefficient to run the software needed for students to get their work done. The computers cannot be updated the latest CPU and RAM because the motherboard is too old and no longer supported.

I'm proposing 24 new computers for the Computer Lab.

CPU: i9

Hard Drive: 1TB SSD

Memory: 36GB RAM

Graphics Card: Dedicated NVIDIA GTX/Quadro 8GB video card

The total cost for replacing the computers would be \$66901.24 including tax.

Proposal Benefits

The new computers would be a great benefit to the students at the School of Architecture. With the new computers' students will be able to finish projects/assignments and school work in a timely manner which will allow even more students access to the computers in the lab. It would relieve student frustration and stress.

Estimated Equipment Lifetime

The estimated lifetime of the equipment would be around 5 years.

Implementation Schedule

The implementation schedule would be in the summer/fall or basically whenever we will be back at the school.



Cost Breakdown

Item	Option 1	Option 2	Option 3	Option 4
24 new computers for the Computer Lab.	66901.24	76478.40	60016.56	62186.16
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
Total	66901.24	76478.40	60016.56	62186.16



Portable Welding Screen

School of Architecture - Fabrication Lab
ARCH 193/292/293/393/493
Abeer Ali - 1B WEEF Representative
a353ali@uwaterloo.ca

Description of Proposal

At UWSA, the ability to experiment with multiple different materials is essential to student progress. Ensuring safety is taken into account with the provision of welding screens will grant students at the school the opportunity to broaden their range of skills, and the range of possibilities for ideation and project development by making metal a viable material option. The school has already invested in welding equipment, and students have expressed interest in using this medium for their work, but safety is the missing factor that is preventing them from doing so. This proposal is for the purchase of portable welding screens, with varying costs depending on quantity.

Proposal Benefits

The Fabrication Labs has a growing demand for metal and metal working tools. With recent investments in welding, the lab would like to allocate an area dedicated to welding. Welding areas can be unsafe environments without proper protections in place. To keep students and staff safe, the screens can create customized spaces designated specifically for welding operations. They can also reduce noise levels, contain high temperatures from welding flames to one space, shield others from the intense light, keep welding fumes and sparks from spreading and, ultimately, keep the welder safe from harm. With these necessary precautions in place, all students at the architecture campus (around 400-500) will have the ability to experiment with and utilize a new material in all their design and fabrication courses.

Estimated Equipment Lifetime

5+ years

Implementation Schedule

Immediate upon return to in-person classes.

Additional Information

Each welding screen costs 200.00 CAD. The funding options vary based on the quantity of screens, ranging from one (\$200) to three (\$600).

Cost Breakdown

Item	Option 1	Option 2	Option 3	Option 4
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Academic Equipment and Resources

Proposal W21-154



Portable Welding Screen	200.00	400.00	600.00	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
Total	200	400	600	0



Capstone Lab 3D Printer

Chemical Engineering
CHE482/483

Jason Grove, Assoc Chair Chem Eng
jagrove@uwaterloo.ca

Description of Proposal

The chemical engineering department provides a research lab for the exclusive use of capstone project teams. We would like to provide a 3D printer for use in this lab.

Proposal Benefits

Capstone teams will have easy access to a 3D printer for prototyping.

Estimated Equipment Lifetime

Long say 10 yrs

Implementation Schedule

We will purchase and install the equipment over the summer, ready for the next cycle of capstone projects

Cost Breakdown

Item	Option 1	Option 2	Option 3	Option 4
Ultimaker 3S 3D-printer	5850	2925	1500	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
Total	5850	2925	1500	0



Ideas Clinic - Industry 4.0

Engineering Ideas Clinic

MTE 100 and MTE 460

Chris Rennick, Engineering Educational Developer

crennick@uwaterloo.ca

Description of Proposal

The Engineering Ideas Clinic is working to bring real-world problems and equipment to undergraduate students. We firmly believe that “bringing the real-world into the classroom” will reinforce the theory you are learning in lecture, show you the context of that material, and will provide an opportunity for you to integrate all the knowledge you are learning.

To continue bringing meaningful, hands-on activities to students, the Ideas Clinic needs to continue purchasing equipment. As we move forwards, the Ideas Clinic is pushing into domains that until very recently only existed in research labs, and in work terms.

This proposal is seeking WEEF’s support for an “Industry 4.0” ideas clinic activity. We are seeking \$15,000 from WEEF for 10 bench-scale assembly lines. The Ideas Clinic is currently employing five co-op students who are continuing the development of the prototype of this platform. This platform can then be used across the Faculty of Engineering. To ensure the success of this project, and to make it as real as possible, the Ideas Clinic has partnered with Brock Solutions, a local firm in industrial automation as well as Opto-22 (a supplier of PLC hardware) and Inductive Automation (a supplier of control software).

Proposal Benefits

This unique equipment will allow the Engineering Ideas Clinic to hold high-impact Engineering Days events for students from ECE, MME, SYDE, and Software. In addition, this equipment can be used to directly support existing (and new) technical electives from across Engineering. In the short term, this equipment will be used in both MTE100 and MTE 460 in 2021.

This platform, and the proposed activity using it, will allow students to experience industrial automation equipment and controllers, machine vision, neural networks, and control systems.

An estimated 1500 students per year will directly benefit from the activities that this equipment will allow.

Estimated Equipment Lifetime

We expect a life of 5+ years from this equipment.

Implementation Schedule

The equipment will be purchased as soon as funding is granted.



Additional Information

We want to thank WEEF for their support of this project in Fall of 2019. Now that prototype development is nearing completion and we have identified host courses for the project in 2021, we need to scale the hardware to match demand.

Cost Breakdown

Item	Option 1	Option 2	Option 3	Option 4
NVIDIA Jetson Nano (\$100 each)	1000	0	0	0
Stereo camera \$200 each	2000	0	0	0
Electronics \$200 each	2000	0	0	0
Mechanical components for assembly line \$1000 each	10000	0	0	0
0	0	0	0	0
Total	15000	0	0	0



New Computers for the MLab

Architecture

ARCH113, ARCH126, ARCH173, ARCH193, ARCH212, ARCH292, ARCH293, ARCH392, ARCH393, ARCH493, ARCH570, ARCH684

Alfredo Sordo Client Support Specialist

asordo@uwaterloo.ca

Description of Proposal

The MLab at the School of Architecture is in dire need of new computers and monitors. The MLab is a completely student-run maker space open to all Waterloo Architecture students. The MLab has 3 MakerGear 3D printers and one small CNC Machine. Currently there is only 2 computers in the space which is not enough computers for all the devices. The 2 computers in the lab are very old, over 10 years old and need to be replaced. The computers are very slow, inefficient, unreliable, cause a lot of frustration for students, and are out of date and cannot be upgraded.

I'm proposing 4 new computers and 4 new 24" monitors for the MLab.

CPU: i9

Hard Drive: 1TB SSD

Memory: 32GB RAM

Graphics Card: Dedicated NVIDIA GTX/Quadro 8GB video card

The total cost for replacing the computers would be \$12433.89 including tax.

Proposal Benefits

The new computers would be a great benefit to the students at the School of Architecture. With the addition of the new computers it would cause a greater number of students to access the lab and be able to use all the devices at the same time in a more efficient, productive, and reliable manner. The new computers will alleviate frustration and increase student morale.

Estimated Equipment Lifetime

The estimated lifetime of the equipment would be around 5 years.

Implementation Schedule

The implementation schedule would be in the summer/fall or basically whenever we will be back at the school.



Cost Breakdown

Item	Option 1	Option 2	Option 3	Option 4
4 new computers and monitors for the MLab.	12433.89	12746.40	11286.44	11268.36
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
Total	12433.89	12746.4	11286.44	11268.36



Jobsite Table Saw for Design Build Projects

Waterloo Architecture Fabrication Lab

Alexa Holder, Waterloo Architecture Student Association WEEF Representative
amholder@uwaterloo.ca

Description of Proposal

The Waterloo School of architecture has a number of classes and student groups that engage in design-build projects. Using the school fabrication lab, students create installations, artworks, and even furniture for academic and extracurricular work. Although we have a shop-style table saw in the workshop, we have interest and need for a portable table saw to better facilitate these projects.

Proposal Benefits

As it currently stands, any lumber we use for design build projects has to be cut in the workshop and transported to wherever we are assembling the installation. This is challenging and inconvenient, especially for projects assembled outdoors or not at the school. A jobsite table saw solves this issue and streamlines the construction process. We have specified 3 options at various price points, with the more expensive choices having more comprehensive safety features to prevent injury. The table saw has a reputation of being a hazardous tool, and although there is a slightly increased cost, we hope you agree that the injury-prevention potential of the more expensive choices is worthwhile.

Estimated Equipment Lifetime

10+ years

Implementation Schedule

Purchased immediately with use beginning as soon as COVID restrictions allow.

Cost Breakdown

Item	Option 1	Option 2	Option 3	Option 4
Jobsite Table Saw	2000	1699	850	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
Total	2000	1699	850	0



Furniture for CPH nook (Winter 2021)

First Year / Engineering Undergrad Office
Mary Robinson - Assoc Dir First Year Eng
mary.robinson@uwaterloo.ca

Description of Proposal

The nook outside of CPH-1325 was regularly used by students to relax, chat, charge phones and study. The furniture that was there is old, dirty, and not well-suited for this use. In partnership with the Dean's Office and Plant Ops, we are looking to update the furniture to make it more inviting for students.

Proposal Benefits

Upgraded study and relaxing space for all Engineering students to use at any time of day. Reconfigurable furniture means that it can be adapted to the needs at that time. Additional power plugs to charge your phone or laptop in a convenient, safe location.

Estimated Equipment Lifetime

20+ years

Implementation Schedule

I'm working with Plant Ops and the Dean's Office to get the floor plan finalized and purchase orders issued for the furniture, once we have sufficient funding. Based on the E2 foyer project, total process can be < 6 months.

Additional Information

With input from WEEF and EngSoc, the furniture will be the favourites from E5/6/7 as identified by students. Exact cost is dependent on fabric and furniture style.

Cost Breakdown

Item	Option 1	Option 2	Option 3	Option 4
Chairs (up to 4 at \$1500 each)	3000	1500	0	0
Tables (up to 3 at \$500 each)	1000	500	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
Total	4000	2000	0	0



Student Wellness Initiative (Flasks/Induction Unit to improve student experience

Chemical Engineering
Denise Mueller/Academic Advisor Undergrad. Studies
dmueller@uwaterloo.ca

Description of Proposal

Requesting funds to support the purchase of air flasks and a double induction cooking unit (or 2 individual units). These items will be used several times throughout the term to support the wellness initiatives for Undergrad. students.

Each term during "Thrive" week (or "Bell-Let's-Talk" in January) and during the final exam period the ChE Undergrad office provides free coffee/tea and snacks for the undergrad. students. The 'set-up' is in a classroom or at the 4th floor study area in E6. The urns we have been using are heavy, old and not the safest to transport. It would be safer to use insulated air flasks to transport the hot beverages.

We would like to host a cooking class/demo - once a term for each cohort. To facilitate the demo we need an induction cooking unit and pots/pans. Although we do have a kitchen in E6 there are no cooking surfaces. Induction cooking is safe and environmentally friendly. The food handling safety issue has been taken into consideration; we plan to demo vegetarian dishes (meatless) or if using meat – it is pre-packaged/already cooked. All foods items needing refrigeration will be properly stored and the demo held in the E6 lunchroom/kitchen.

Additional items (i.e. coffee/tea/utensils/food) will be paid for by the ChE Department and through donation.

Proposal Benefits

Benefit to the students:

- improves sense of community within the cohort and between students/faculty/staff; provides a message of balance between academics and wellness/self-care
- during final exams - students are stressed; tired and possibly low on funds by end of the term - making coffee/tea and healthy snacks available for them provides not only practical/physical support but the knowledge that we care about them (emotional support)
- the cooking demonstration will help the students with life skills - how to care for themselves in regard to food with healthy choices; how to feed themselves from an economic perspective (less eating 'out') and good food handling practices

Benefit of the insulated air flasks:

- improved safety when transporting hot beverages and for students to self-serve (can get burned with the urns and they have power supply issues – need to run extension cords to accommodate both urns)



Miscellaneous
Proposal W21-155

Benefit of the induction cooking units:

- safety; only heats when steel pot is placed on the element; easy transport to a table top so more students can see the demo

Estimated Equipment Lifetime

Air flasks - 5-10 years; lids may need replacing earlier (baffle/gasket or hinge can break with use)

Induction cooking unit - warranty ranges from 1-5 years

Condiment Organizer/Pots&Pans – lifetime

Implementation Schedule

When back on campus...

Fall 2021:

Air Flask use: during Thrive Week (October); during pre-exam/study days and finals (over 2 weeks in December)

Induction unit use: demo would take place for the 2A, 2B, 3B and 4A students (each cohort would have their

Additional Information

If students are not back to campus for Fall 2021; implementation would be Winter 2022.

Air Flask use: during "Bell Let's Talk" week (end of January); during pre-exam/study days and finals (over 2 weeks in April)

Induction unit use: demo would take place

Cost Breakdown

Item	Option 1	Option 2	Option 3	Option 4
Portable Induction Countertop Burner: double burner	246	312	160	0
Airpot	552	230	410	0
Portable Induction Countertop Burner: single burner (instead of double burner - item #1	200	202	0	0

Miscellaneous
Proposal W21-155



Plastic Unit to hold sugar packages/stir sticks/tea/napkins	56	0	0	0
pots/pans set	125	95	116	0
Total	1179	839	686	0



Digital Signage

School of Architecture
Abeer Ali - 1B WEEF Representative
a353ali@uwaterloo.ca

Description of Proposal

At the School of Architecture, we have a unique opportunity to engage with our students and visitors to the school through digital signage using the platform developed by the University of Waterloo Science Department. As a pilot project, we have been displaying digital signage on a 4:5 Vertical Christie micro tile display at Musagetes Library. Musagetes is accessible to the general public and is highly visible to our students; the micro tiles are prominently located at the top of the main staircase of the School. With the success of the pilot project, we feel it would be beneficial to have 2 displays and switch to LED display technology as the Christie micro tiles are no longer supported by the company.

Proposal Benefits

As we move through the pandemic and protocols change, we feel digital signage would be an effective way to communicate the changing health and safety protocols as well as feature exciting student initiatives, projects and events being undertaken at the School of Architecture. Feedback has been very positive on the pilot project and digital signage will be relevant for years to come. Before the pandemic, students, faculty and staff were submitting images for display regularly, so the signage will continue to be beneficial past the end of the pandemic. The Library remains an excellent location and adding a display at the Design at Riverside Gallery would give us even better exposure to students and visitors.

Estimated Equipment Lifetime

5 years

Implementation Schedule

As soon as possible.

Additional Information

The options below vary in cost depending on quantity as well as the type of mount used for the signage.

Cost Breakdown

Item	Option 1	Option 2	Option 3	Option 4
Digital Signage	7419.96	7725.86	8139.20	0
0	0	0	0	0
0	0	0	0	0

Miscellaneous
Proposal W21-165



0	0	0	0	0
0	0	0	0	0
Total	7419.96	7725.86	8139.20	0



Discord Server Enhancement

Mechatronics Stream 8 Class of 2025

Mr. Garrett Miller-Junk

gmillerjunk@uwaterloo.ca

Description of Proposal

The Mechatronics Engineering Class of 2025 has created an online server to allow for ease of communication and to allow its members to socialize and connect from wherever they may be. This server has evolved into the centralized method of learning for many members of the Mechatronics class with over 300 thousand messages being sent since the start of the fall term. The server is present to 117 of the Mechatronics stream 8s and 80 of the mechatronics streams 4s, and is used as way for many students to study in groups, discuss practice problems, and receive help in areas where they struggle.

On top of this, the server also allows students to monitor assignment deadlines, connect with upper year students, participate in resume critiques, find out about job interviews and opportunities, connect with people applying to mechatronics engineering, and much more.

Overall, this server has become a vital resource to a multitude of mechatronics students.

Considering the extent to which this server has grown, we are asking for funding in order to increase the quality of the server.

The Mechatronics 2025 server is hosted on discord which allows for the server to be upgraded, or “boosted”, for the price of \$9.99 per month. This upgrade would largely improve the quality of the server and lead to better learning environment for numerous students.

Proposal Benefits

- better audio quality leading to ease of communication during study sessions or various meetings.
- increased stream quality when students share their screen or video cameras
- increased maximum file size, allowing for larger files to be sent over the discord (study sheets and problem sets)

Estimated Equipment Lifetime

Based off the plan chosen, the estimated lifetime will change.

Implementation Schedule

ASAP after receiving funding



Cost Breakdown

Item	Option 1	Option 2	Option 3	Option 4
Discord Server Booster (\$12 per month)	100	50	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
Total	100	50	0	0



Engineering Orientation

Engineering Orientation Team
Shein Saunders-Henning, Engineering Orientation Team
engoteam@uwaterloo.ca

Description of Proposal

Every year, over 2000+ first-year students join the Faculty of Engineering and around 250 upper-year Engineering students volunteer their time to welcome them. In these unprecedented times we are facing the challenge of welcoming first years students to UW without meeting them in person. In order to continue engaging with our first years students in a meaningful way online, a large number of our traditional in-person events will be delivered via live streams and video calls. We are requesting funding to assist us in creating and executing high-quality, captivating live streams that will reach as many first-years and leaders as possible. In addition to event use, the live streaming equipment will be used to train leaders, and engage with directors to create programming for the week.

Proposal Benefits

We are requesting a desktop computer, web camera, microphone, keyboard and mouse to create and deliver high-quality live streams and video calls before and during Orientation Week 2021.

The desktop computer will be used by OTeam and leaders to create and deliver content for orientation week. This will include creating videos, building the Waterloo Minecraft campus as well as setting up and executing all Orientation related live-streams and calls. This computer will ensure that the Engineering OTeam has the required hardware to transfer all of our traditional in-person programming online without fear of technical problems during the week.

The benefits of the web camera and microphone include enhanced audio and video quality while delivering content to all those involved in Engineering Orientation. A web camera comes with the additional benefits of a high resolution video, high frame rate, auto-focus, a wider field of view and the ability to position the webcam however it is required. This will remove all limitations from our live-streams and video calls so we can deliver enjoyable and interesting content during Orientation Week.

This equipment will be used in tandem with the monitors purchased by the 2020 Engineering Orientation Team to create a full set-up used for all our live-streaming needs. To complete this set-up we are also requesting a mouse and keyboard in order to use the equipment effectively. The mouse and keyboard will not only facilitate the use of the desktop computer but will also allow for the creation of high calibre videos and graphics for Orientation Week. All of this equipment will be housed in the Engineering OTeam Office (once we can return to campus) in order to enhance productivity in the space for the 2021 team and future teams. The requested equipment will ensure OTeam and leaders alike have access to all software and hardware required for orientation anytime they are in the office, which will ensure meetings and program planning happen successfully, leading to an enhanced orientation



Miscellaneous
Proposal W21-176

experience for all.

Estimated Equipment Lifetime

We expect a life expectancy of 5+ years for all of the equipment requested. These items will be passed down from team to team for them to use in their office and future planning respectively.

Implementation Schedule

All items will be purchased as soon as funding is granted. Items will be installed in the Engineering Orientation Team office once access to campus is permitted and will be used by a team member at their home before then.

Additional Information

You can find previous pictures and videos created by the Engineering Orientation Media team here: <https://www.flickr.com/photos/froshmedia/> and <https://www.youtube.com/user/FroshMedia/videos>

If we receive any funding, we will:

- Add the WEEF logo on our website
- Highlight your contribution via our social media platforms
- Link to the WEEF website on the Engineering Orientation website and social media platforms
- If Option 1 is granted and we purchase first year shirts this year, add the WEEF logo on first year shirts

Cost Breakdown

Item	Option 1	Option 2	Option 3	Option 4
ThinkStation P330 Tiny	1750	0	0	0
Logitech C920 Webcam	160	160	160	160
Audio Technica AT2020	170	170	170	0
Lenovo Wireless Mouse Keyboard Combo	75	75	0	0
0	0	0	0	0
Total	2155	405	330	160



University of Waterloo Nanorobotics Group (UWNRG) Winter 2021 WEEF Proposal

University of Waterloo Nanorobotics Group (UWNRG)
Sofia Rizzo - Business and Marketing Team Lead
business@uwnrg.org

Description of Proposal

The University of Waterloo Nanorobotics Group (UWNRG) is an undergraduate robotics and research group devoted to the design and construction of next-generation technology that manipulates materials on a micro-scale.

The robots constructed by UWNRG have been successful in competing at the International Conference on Robotics and Automation (ICRA). This conference, hosted annually by the IEEE, provides a platform where we display our original robot designs. In our past competitive years, we have participated in the Mobile Micro-Robotics Competition as well as the Micro-Assembly Challenge. Despite facing tough competition from Ph.D. and Doctoral teams from world-class institutions such as ETH Zurich and the University of Texas at Arlington, our team has placed highly at these competitions. At ICRA 2016 in Stockholm, Sweden, our team finished 2nd for mobility and 1st for micro-assembly. In 2018, we placed 2nd for the micro-assembly challenge and 3rd for the mobility challenge at ICRA in Australia with our Solenoid Actuated Microrobot (S.A.M.). S.A.M. uses solenoids and magnetic actuation to guide a small neodymium robot that will be able to accomplish various tasks and challenges put out by the organizers of ICRA.

Our robotics subteam is currently developing MAYA, a Microscopic Airborne YBCO Assembler. MAYA's completion will open up the possibilities for performing complex operations at a micro-scale. This has many potential applications such as automated surgeries, industrial micro-assembly, and targeted drug delivery. Our research subteam, HyDRA, has developed a system that reduces ethylene levels in hydroponic nutrient solutions. In this system, the plant experiences less stress which thereby promotes growth. All that is needed now is to implement this system. Currently, HyDRA is creating biosensors that will produce live feedback of the bacteria and nutrients present in our hydroponic system. HyDRA's research has much to offer to the agriculture industry and we have already received offers of partnership from professors who want to take our project to the next level.

Proposal Benefits

UWNRG is an exclusively undergraduate student group, providing students with an opportunity to get hands-on experience during their study terms. UWNRG also offers a unique co-op opportunity every year to 3-4 members, who are sent to the National Institute of Materials Science (NIMS) in Japan. They work under Dr. Genki Yoshikawa to research technology with a focus on nanorobotics, specifically MEMS devices and sensors. This co-op is not happening this winter due to the pandemic, but will resume afterwards. Members are taught to be innovative in their engineering design which has led our team to great success in the past. The access to high-quality labs on campus provides a unique opportunity to apply the nanofabrication techniques discussed in lectures. The technical teams



Reallocation

Proposal W21-146

challenge their members to innovate, testing and developing members' design philosophy. The business and marketing teams allow students to develop skills beyond a technical skill set, such as communication and technical writing. Experience gained with UWNRG is quite broad and flexible, allowing our members to explore concepts and designs they are interested in. UWNRG teach our members the value of communication, collaboration, creativity, and innovation, setting our members up for a successful post-undergraduate career. These opportunities greatly benefit all the engineering students involved in UWNRG.

Estimated Equipment Lifetime

The COMSOL license will last permanently and perpetually since it is a software product. Both the Raspberry Pi 4 model along with SD card preloaded with NOOBS (operating system) will last perpetually until broken. Since both work in conjunction with each

Implementation Schedule

We will use all of our materials for both subteams once we have funding for it since they are essential components to conduct our experiments.

Additional Information

For the reallocation proposal, the total funding UWNRG has recieved from WEEF in Winter 2020 and Fall 2020 amounts to \$5015.85.

Cost Breakdown

Item	Option 1	Option 2	Option 3	Option 4
Precision Pump Tube will be used to steadily pump liquid nitrogen to the MAYA assembly for more accurate quatum flux pin.t	687.50	618.75	550.00	481.25
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
Total	687.5	618.75	550	481.25



Waterloo iGEM Winter 2021 Funding Proposal

Waterloo International Genetically Engineered Machine (iGEM) Design Team
James Stapleton, Team Finance Lead
James.stapleton@uwaterloo.ca

Description of Proposal

We are requesting funding to cover two immediate and absolute expenses: coverage of operative software packages and/or partial coverage of competition registration fees

Proposal Benefits

The ability to participate in this project in a competitive format gives students the opportunity to develop a synthetic biological innovation with incentives as well as receive and perform critical analyses that aid in the continuous development of the project. Convenient access to equipment and materials provides strategic and innovative approaches to thoroughly developing a synthetic biology project. Additionally, students not being limited by a lack of resources for testing and production pushes the boundaries of what they are able to achieve in their research. This is an incredible developmental experience for students to take on a wide variety of key roles in the entire process of creating a novel synthetic biology product, gaining as much insight as possible throughout the competition process. We aim to continue to push and innovate computational modelling of biological systems to further understanding of the dynamics of the world around us, as well as how we can harness it to better humanity. Ultimately, establishing Waterloo as a leader of student innovation in the field of synthetic biology.

Estimated Equipment Lifetime

One-time competition registration fee in May 2021. Software licenses likely to be temporary, to be used from time of purchase until end of competition period in November 2021.

Implementation Schedule

Registration fee implemented at time of purchase, May 2021. Software licenses implemented as purchased and applied throughout the year

Cost Breakdown

Item	Option 1	Option 2	Option 3	Option 4
Coverage of access to software licenses (based on last year's expenses of	1500	2000	2500	3000

Student Team
Proposal W21-148



approximately \$2500 CAD)				
Partial coverage of registration fees	1500	2000	2500	3000
0	0	0	0	0
0	0	0	0	0
Total	3000	4000	5000	6000



W2021 UWRT WEEF Proposal

UWaterloo Robotics Team
Vanessa Hu- Finance/ Business Lead
uwaterloorobotics.finance@gmail.com

Description of Proposal

UWRT WEEF sponsorship proposal for W2021

Proposal Benefits

The UWRT has proven to be a great educational ground for undergraduate students interested in robotics for 15 years as one of the most iconic student teams in Waterloo. With WEEF's funding, UWRT can continue to participate in university events put on by organizations such as the SDC, WiSTEM, and Engineering Outreach. A truly multidisciplinary group, UWRT builds robots that could not be imagined by a single type of engineering emphasizing teamwork, collaboration, and system integration.

In preparation for the University Rover Challenge, there are many upgrades that we need to make to our existing rover to improve performance.

Estimated Equipment Lifetime

Electrical Components

- PCBs and parts for PCBs: 1 year
- Battery Pack Development and battery cells: 2 years

Mechanical Components

- CNC Router Machine: 5 years
- Various Tools/ Power Tools: 3 years
- Spot Welder: 5 years
- Part/ Shelving Organizers: 5

Implementation Schedule

Will all be purchased ASAP

All to be used before University Rover Competition (held June 3-5). Part/ shelving organizers will be used to immediately inventory our parts as we're moving into our new workspace.



Cost Breakdown

Item	Option 1	Option 2	Option 3	Option 4
Electrical Components	4000	3360	2544	1732
Mechanical Components	3700	3108	2354	1602
Software/ Firmware Components	400	336	256	174
0	0	0	0	0
0	0	0	0	0
Total	8100	6804	5154	3508



Essential Software for UW Blueprint

UW Blueprint
Narayan Subramoniam, VP Finance
nsubramo@uwaterloo.ca

Description of Proposal

Blueprint needs funding to pay for essential software (Slack) that we use on a daily basis. We brought down the cost by \$3000 USD by applying for a Slack discount and we need help with the remaining 121.50 USD/month.

We've approached Techyon, a tech nonprofit, for funding and that could reduce our need. We're also applying for EngSoc and MEF grants with the same need.

Proposal Benefits

All of our 88 members, of whom 55 are engineers, use Slack on a daily basis for all communication. We use it for onboarding, events, and as a database.

Being able to continue with Slack would help our engineers (and other members) solve problems quickly and without any new hassles.

Estimated Equipment Lifetime

The full funding would have a lifetime of 4 months, by which we will have improved our corporate sponsorship level.

Implementation Schedule

Monthly recurring cost of \$121.50 USD per month.

Additional Information

We're working really hard to drive our costs down and increase our corporate sponsorship. In the mean time, we would appreciate absolutely any amount (option 4 or even lower) to help us out here.

Cost Breakdown

Item	Option 1	Option 2	Option 3	Option 4
Slack monthly payments	612.72	306.36	204.24	153.18
0	0	0	0	0
Total	612.72	306.36	204.24	153.18



Waterloop WEEF Proposal W21

Waterloop
Quinlin Wu, Sponsorship Lead
q243wu@uwaterloo.ca

Description of Proposal

At Waterloo, we believe that the Hyperloop is the future's premier method of transportation, promising speed and safety with the added benefit of being designed on the University of Waterloo campus itself! Our pod, Goose V is designed to transport passengers in an airtight, nearly-vacuum pressurized tube, theoretically moving at over 1,300 km/h due to the lack of contact-based friction and air resistance. This would allow passengers to travel from Montreal to Toronto in 30 minutes!

This Winter term, we are continuing our work on developing the Goose V pod, which has been designed to be faster, stronger and more resilient than ever before. As a result, the Goose V has been envisioned with a carbon fibre aeroshell. This will provide an external layer to decrease negative aerodynamic effects and protect internal components. The aeroshell will be designed and manufactured completely inhouse, and this term, we are asking for WEEF's support for the construction of the aeroshell. We have already finished the shell's design, and all that needs to be done is its manufacturing. To verify the manufacturability of the shell, test runs will need to be conducted. The planned test is a quarter scale replica of the shell, which follows the same manufacturing method as the large scale shell, allowing us to test the mounting, layup, and shape before moving onto the final design, as well as allowing us to gain experience with carbon fiber.

Furthermore, Waterloo will look to continue its regular development of Hyperloop technology. For this, funding for general electrical as well as mechanical supplies will be greatly appreciated.

Proposal Benefits

Benefits to WEEF

Waterloop's business/sponsorship team works on building contracts with various companies that help sponsor us by providing materials we might need at discounted rates, in exchange for marketing their brand on our website and pod (depending on the agreed-upon terms). Our sponsors also provide support in the form of technical materials, software, and marketing. We believe that WEEF's funding assistance will help our business team greatly.

Waterloop provides perks for all of our financial sponsors. The funding requested would qualify WEEF for the Transonic Tier, in which the agreed terms would include:

- Exclusive tickets to our pod unveil event
- WEEF logo displayed on the Waterloo website
- Dedicated social media exposure acknowledging WEEF's support of Waterloo
- Logo on presentation materials



Student Team

Proposal W21-170

- Logo on pod shell

Benefits to Engineering

The process of being a part of a proprietary development provides students with insight into manufacturing as well as research and development basics that can be brought into future co-op or other professional endeavours. Having experienced students going out into the workplace will not only reflect well on Waterloo, but the university itself. Through funding from WEEF, the research, design, and construction of the aeroshell will provide a unique and rewarding experience that students will find difficult to receive elsewhere.

Waterloo has consistently been one of the largest student design teams at the University of Waterloo, taking in new members every term. To continue to grow and improve our roster will benefit not only us, but the university as a whole due to the nurturing and development of talent. Furthermore, many students have gone above and beyond the curriculum to learn graduate-level topics. We have had, and continue to have, an impact across the University of Waterloo, with members from all faculties, but especially in Engineering where a majority of our members are from. Waterloo's team culture puts a heavy emphasis on nurturing the talent of younger members, and our team leads work hard to provide a strong mentorship experience. Having a stable design team such as Waterloo will ensure the University of Waterloo generates a reputation as a leader in hyperloop design and development in Canada, attracting new students and investors to the university itself, and garnering attention through our accomplishments.

Estimated Equipment Lifetime

Mechanical and electrical components can be reused as needed in future iterations of the pod. This term, our mechanical team is working on various projects to integrate the pod systems. This includes a status light indicator system, sensor mounts, enclosu

Implementation Schedule

January 2021 - preliminary research into aeroshell manufacturing process

February 2021 - aeroshell mould design and small-scale test rig prototyping; completion of outstanding systems integration

March 2021 - machining of pod subsystems; assembly of embed

Additional Information

Waterloo is grateful for the support that WEEF has shown over the years. The team will be happy to accept any partial funding over no funding. More information about our team, along with past and future initiatives, can be found on our website: <https://t>



Cost Breakdown

Item	Option 1	Option 2	Option 3	Option 4
Aeroshell	2000	1700	1500	1000
General Mechanical Supplies	1500	1200	1000	700
General Electrical Supplies	1000	800	600	400
0	0	0	0	0
0	0	0	0	0
Total	4500	3700	3100	2100



UWaterloo IISE WEEF Sponsorship Proposal

UWaterloo IISE
Dana Mohammed, Co-President
d8mohamm@uwaterloo.ca

Description of Proposal

The Institute of Industrial and Systems Engineers, IISE, the world's largest professional society dedicated solely to the support of the profession, is an international, nonprofit association that provides leadership for the application, education, training, research, and development of industrial and systems engineering. The purpose of this organization is to provide knowledge, training, and networking opportunities that inspire students to become technically and socially competent Management and Systems Engineers. Specifically, our chapter strives to provide avenues for growth academically, professionally, and socially through unique events and services.

Currently the team provides services such as resume critiques, mock interviews, speaker panels and run various events and workshops to allow students to develop their skills in professional, social and academic aspects. With the pandemic, the chapter was also able to adjust operating remotely and still provide such support to students. The chapter has launched IISE Spotlights last year, which are blog posts on interviewing Management Engineering students and shining light on their amazing academic and professional experiences. Most importantly, the UWaterloo IISE team puts a great amount of effort each year in organizing and providing funding for the various events that the chapter hosts, attends and participates in. One of the main highlight events in IISE is the IISE Annual Regional Conference which targets mainly undergraduate students in different universities across Canada, and gives them exposure to networking events, speaker panels, academic and professional competitions and many other events that add to their industry experience and exposure in a professional environment.

The team also participates in various events which include open houses, Management 101, Student Design Showcase, in which the team partially represents Management Engineering and is the front face of IISE in the University of Waterloo as well. Participating in such events requires some supplies and equipment in order to help the executive team manage and execute the various events. These include a calendar (organizer) for the team to effectively plan and manage the different events it will host and participate in, upcoming milestones to meet as well as make plans for upcoming terms. Also, a subscription to one of the virtual meeting platforms will greatly help the team manage its different meetings and make it easier for members both on and off campus to easily attend the meetings.

The chapter team also hosts various other academic, social and professional events targeted towards the students which require financial contribution. The team sincerely appreciates the Waterloo Engineering Endowment Fund in providing the chapter with any sort of funding for the items specified below in this proposal.

Proposal Benefits

The IISE Waterloo Chapter provides the opportunity for all engineering students across the university to participate in the various events that it hosts. Considering the Industrial Engineering focus in the



Student Team

Proposal W21-159

Institution, the majority of participants are Management, Systems, and Mechanical Engineering students. One of our main goals for the upcoming events is to encourage and involve more first year students and new members into the IISE family, in a way of promoting these events as a helpful tool that will contribute to the development of the students' skills in academic, professional and social aspects. These events are also a great way for students to get a head-start in the industry prior to graduation, by hosting events that invite industry professionals, alumni and other key guest speakers that discuss career options, professional tips and insight, which will make them at an advantage upon graduation in terms of employment.

Throughout the years we have been able to successfully branch out to other engineering programs in promoting what the chapter has to offer. With Management Engineering students having the strongest presence at 45% due to the nature of the team, the team also constitutes of a wide range of students from other programs: 19% Systems Design, 12% Mechanical, 6% Software, 4% Electrical & Computer, 3% Civil, and 3% Chemical. As the chapter grows and progresses, we hope to encourage more students from different disciplines to participate in and take part of the different events being hosted.

The past year has been a successful one for the UWaterloo IISE student chapter, as the chapter was able to reach the incoming Management Engineering class by hosting professional events to help them with their co-op applications, academic sessions where upper year students would provide tips and helpful information to guide the students through their transition to university life, as well as social events that aimed to keep students connected while conduction their semester remotely during this pandemic. Also, the delegation representing UWaterloo at the University of Toronto IISE Annual Conference in January 2020 was able to earn several prizes in the competitions hosted at the conference. Furthermore, the team was previously selected to present at the 2017 IISE Annual Conference & Expo in Pittsburgh, Pennsylvania, with all other student teams and chapters attending. Participating in these events is a great opportunity for students to represent Waterloo on an international scale and the UWaterloo chapter takes pride in this accomplishment.

Over the years, the events hosted by UWaterloo IISE have been a great way to help students develop and progress throughout their years at university.

With the help of our partners and sponsors we hope to reach more students each year, and make UWaterloo IISE a student team that stands out from the rest with its appearance in representing the Institution to the best extent possible.

Estimated Equipment Lifetime

All the items mentioned above will be used by the executive team members to further develop the workflow and implementation strategy of the UWaterloo IISE agenda, which will have its effect on all future and upcoming events it participates in, attends or

Implementation Schedule

All expenses contributed towards the calendar and subscription will be purchased preferably upon the receipt of the funds, in order to be fully prepared for any upcoming events.



Cost Breakdown

Item	Option 1	Option 2	Option 3	Option 4
Calendar/Organizer	60	80	60	50
Zoom Subscription	320	350	300	300
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
Total	380	430	360	350



Materials for at home testing

Waterloo Aquadrone
Amaar Quadri, Team Captain
aquadri@uwaterloo.ca

Description of Proposal

University of Waterloo Aquadrone is a student design team focused on developing a fully autonomous submarine to compete in the 2021 International RoboSub Competition.

Currently we have finished the design and the manufacturing needed for our large autonomous submarine. We are also well into the design process of our second mini-submarine/scout, and have even started prototyping some of its key components. Due to the heavy restrictions caused by COVID-19, all in person activities for the team have been made significantly more difficult. The purpose of this proposal is to acquire the funding necessary to allow our team to purchase the items necessary to be able to safely and remotely test the submarine that our team members have been working on. Specifically, this proposal requests for a medium sized pool that we can use for testing, as well as some other materials required for the testing process.

Presentation can be found at this link: bit.ly/AquadroneWEEFW21

Proposal Benefits

The funding will be incredibly useful to our team because it is essential to allowing our team to test the submarine. The pool will allow us to test the submarine's waterproofing, functionality, maneuverability, controls system, torpedo firing system, and vision system.

Additionally, there will be many new tasks that our members will be able to work on as a result of this purchase, despite working remotely. For example, a lot of data analysis of the results and fine-tuning of the submarine's software can be done entirely remotely.

Lastly, many of the members of our team are incredibly excited to see the designs that they have worked on being tested to their full extent. We anticipate that this will increase our member's engagement and passion for the team as well as help attract new members to the team. This will significantly help increase our young team's presence and longevity.

Estimated Equipment Lifetime

All the equipment that will be purchased will be useful throughout the life of our team. Every component being purchased will be used throughout until the competition in 2021, and likely beyond that as well for future competitions. Despite any potential



Implementation Schedule

All the components will be purchased immediately, and all applicable social distancing guidelines will be followed throughout testing.

Cost Breakdown

Item	Option 1	Option 2	Option 3	Option 4
Pool	350	350	350	350
Miscellaneous testing equipment (O rings, marine epoxy)	200	100	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
Total	550	450	350	350



VEX U Robotics 2021 Winter

VEX U Robotics
Alex Su, Electrical Lead
Alex.Su@uwaterloo.ca

Description of Proposal

VEX U is a university-level competition that enables over 300 post-secondary institutions all over the world to compete at an international level. The rules of the competition are similar to VEX EDR, however, VEX U offers more flexibility in the robot design, electronics, and manufacturing process. In particular, students have the opportunity to customize circuitry, boards, and sensors to enhance the functionality of the robot. Additionally, the machining of steel, aluminum and composite materials, and 3D printing of plastics is permitted, allowing for a more versatile robot. Students who are familiar with high school robotics, as well as newcomers will be provided with opportunities to succeed and learn about things outside of the curriculum. Along with greater technical skills, we aim to form students into members of a team, and productive members of our community. VEX U competitions have historically been held mostly in Mexico and the United States. However, in recent years Canadian teams have the opportunity to compete domestically as a competition will be held at the University of Waterloo each year. This event will allow Canadian teams to qualify for the World Championship held in Dallas, Texas which will be broadcasted on ESPN/CBS. We are led by a core of students with a background of success, having reached the world championships as well as achieving an Ontario Championship at the high school level. In recent years we also received 2x Design Award and 2x Robot Skills Champion, 1x Robot Skills 3rd place. We are currently ranked 2nd in World Skills ranking out of all the universities over the world

We are requesting funding to allow us to grow the universities' first VEX U team. We have made great progress in the past years, however there are still many items that we would like to purchase to make our team well equipped to compete at future competitions. Funding would cover equipment, tools, sensors and robot parts etc. In addition to this, funding in these areas would alleviate team members' pressure on competition fees we encounter. Many resources, such as electronics, parts, tools, and the playing field are reusable past their time of purchase. We believe that a VEX U team would fill the University's void of not having a large scale competitive robotics team. At the same time, the team is such that it is not intimidating to new students who only have had a high school background since there is only a small learning curve involved. It will be a fun and competitive way for students to get an introduction to the various aspects of robotics, programming and engineering.

Proposal Benefits

The existence of this team would come with many benefits. For instance, it would benefit undergraduate engineering education, as well as the University as a whole. This team would further the educational experience of engineering undergraduate students by providing a competitive, educational, and fun environment to learn about robotics. The current robotics teams can seem daunting to new students, as they demand a large time commitment as well as the requirement to do a lot of additional learning, outside of meeting the already strenuous academic requirements. The teams are also easily

Student Team

Proposal W21-164



scalable unlike others, if more students are interested in joining, we can simply register more teams and share the parts between robots. This would allow all students to participate in all aspects and will not feel left out. They would have the opportunity to implement their own design since the cost of additional robots is lessened. This team would also act as a good opportunity for students to get their first hands-on experience, a valuable characteristic that co-op employers look for. Not only would this benefit students in their search for co-op placements, but it would increase the University's reputation of producing students that have applied experience. Another way this team would benefit the University's reputation is through the competitions. Good performances at competitions can bring international recognition to the University. At the very least, just having a presence at competitions builds the reputation of the University. Lastly, we are in the process of gathering the resources needed to host a VEX High School Competition on campus, which would attract high school students to the campus and giving professors/lecturers the chance to talk to students with potential interest to the university

Thank you greatly for your support, we were able to kickstart our rookie year from your generous support. You are a Platinum sponsor. We appreciate your consideration in sponsoring universities' first VEX U team.

Platinum (\$2000+)

- Recognition in official team name announced at competition
- Company name in social media, press releases, brochures
- Large logo on robots
- Premium logo on website, team banner and jersey

Gold (\$1000+)

- Company name in social media, press releases, brochures
- Medium logo on robots
- Large logo on website, team banner and jersey

Silver (\$500+)

- Company name in social media, press releases, brochures
- Medium logo on website, team banner and jersey

Bronze (\$300+)

- Company name in social media, press releases, brochures
- Small logo on website, team banner and jersey

Blue (\$100)

- Small logo on website, team banner and jersey



Estimated Equipment Lifetime

The initial start-up cost for a VEX U team was high mainly because of the long term assets we need to operate the team, such as storage, tools and electronics. However, it soon became clear that the majority of this cost exists in the first few years. Pas

Implementation Schedule

In order to be ready for competition, our team must have two competition-ready robots (the university competition requires a 15" and 24" robot). Next term we are starting the new season and we will be designing, programming and tuning our robots so that t

Additional Information

We didn't request funding in Fall 2020 because the funding allocated previously was enough to sustain the team throughout the term. However, with the difficulty in obtaining MEF, Eng Soc funding and the fact the team has grown during the year means we wil

Cost Breakdown

Item	Option 1	Option 2	Option 3	Option 4
Robot Belts	400	350	300	250
Power Station	500	450	400	350
Competition Field Perimeter	1100	1000	800	700
0	0	0	0	0
0	0	0	0	0
Total	2000	1800	1500	1300



Kraken of The Sky

Waterloo Rocketry
Shirley Kong, Team/Airframe Lead
s9kong@uwaterloo.ca

Description of Proposal

Waterloo Rocketry is a student design team specializing in the development of hybrid and liquid rockets. We compete annually at the Spaceport America Cup with more than 100 teams from across the globe, and this year we are entered to compete in the inaugural Launch Canada competition. Our work comprises the design, manufacture, and testing of all flight and ground systems required to launch the rocket.

In 2019, we flew our rocket Shark of the Sky (SotS) at our annual competition and finished second in our category (30,000 ft Student Researched and Developed Hybrid/Liquid). The team was unable to compete in 2020 due to the ongoing pandemic, and instead are taking the time to advance and upgrade our older systems and develop new projects. Some of our new additions for the 2021 competition include fill sensing, a payload housing a particle physics experiment, and a new nozzle with an experimental cooling system. As well, we are continuing development of our new, more complex liquid engine.

We are requesting funding for the following categories:

Work Bay Upgrades

This funding would be used to better organize the bay and make use of wasted space. Purchases would include items such as bins and tool stands, which would be used to store ongoing projects and keep the work tables and floors clear.

Plumbing

Our propulsion ground systems utilize a network of plumbing components for filling and venting. The team is currently in the process of upgrading our plumbing systems to be completely stainless steel, as well as purchasing new components for our more complex liquid fill system.

Avionics

Our avionics systems are critical to the safe and efficient operation of our rocket. They allow us to communicate with and control our propulsion and recovery systems remotely. Our focus in the coming terms is to continue to maintain and upgrade the systems as necessary.



Student Team
Proposal W21-171

Proposal Benefits

Work Bay Upgrades

Although the organization and cleanliness of our work bay has always been important, it has become even more crucial due to the ongoing pandemic, which places limits on the number of people allowed in the bay at one time due to social distancing constraints. Having a well organized bay that efficiently uses the space also removes potential safety hazards, such as things left on the ground that could be tripped on or tip over.

Plumbing

By upgrading our plumbing to stainless steel, we remove the danger of rust in our plumbing systems, which can cause the oxidizer in the system to decompose explosively. Although we have strict sanitation procedures for all plumbing, this upgrade is the best way to ensure that our systems, and the team members working near them, remain safe. As well, the purchase of new components will allow us to create more complex systems necessary to successfully launch new rockets to greater heights.

Avionics

Making sure that our avionics systems are robust and reliable is crucial for our primary goals of launch and recovery. Upgrades over the coming terms will allow us to communicate with and control more complex testing, propulsion, and recovery systems, and ensure our operations run smoothly and safely. The design of these upgrades has been finalized, so this funding will go towards purchasing the final revisions of PCBs and other electrical and payload components.

Estimated Equipment Lifetime

Work Bay Upgrades

The team will ensure that any purchase made for work bay upgrades will have taken the length of life into account, as we would like these upgrades to last as long as possible. Items such as bins can easily be used for up to a decade before

Implementation Schedule

All purchases will begin after funding is secured and designs are finalized, likely near the end of W21, and continuing into S21.



Cost Breakdown

Item	Option 1	Option 2	Option 3	Option 4
Work Bay Upgrades	300	250	250	200
Plumbing	3000	2800	2500	2500
Avionics	2000	1800	1700	1200
0	0	0	0	0
0	0	0	0	0
Total	5300	4850	4450	3900



MS XIV Electrical System

Midnight Sun Solar Rayce Car Team
Kristen Shiozaki (Operations Manager)
keshioza@uwaterloo.ca

Description of Proposal

This year, Midnight Sun is celebrating its 33rd year since its founding and has since continued to represent the University of Waterloo at various international solar car competitions. We are currently in the process of manufacturing our next vehicle MS XIV, in hopes of competing at the American Solar Challenge in the Summer of 2022. Previously, we had planned to attend this race this year, in 2021. However, due to the ongoing pandemic uncertain conditions, the health and safety of our members and the community, we have made the decision to delay our attendance and instead, take the time to focus on team development and manufacturing.

Building a solar car from scratch requires constant review and iteration in our design, manufacturing, and assembly, to ensure our end product profoundly rises up to the engineering challenge that solar car racing poses. Once completed, MS XIV will boast double the carrying capacity from our previous vehicle, improved efficiency, and a re-imagined user experience. With this project, we are striving to bridge the gap between solar cars and consumer-grade vehicles to demonstrate the potential of sustainable transportation.

Any granted funding for this proposal will go towards the acquisition of equipment and components for our electrical team, which is responsible for designing and connecting the vehicle's electrical system. This term, many of the electrical team members have been able to continue limited manufacturing from the comfort of their homes.

We would like to request a total of \$8000 where \$4000 will be for PCBs and PCB Components, \$1750 will be for soldering and labeling equipment, \$1050 will be for HV cables, connectors and fuses, \$700 will be for NiMH cells and \$500 will be for an Asus MB16AMT 15.6" touchscreen.

Proposal Benefits

The equipment and components will be a major determinant in the manufacturing speed and successes of MS XIV, as they will help our electrical teams work more efficiently and with less errors due to the age of our current equipment.

Additionally, supporting the acquisition of electrical components and equipment is equivalent to supporting our entire team. Midnight Sun is one of the largest student design teams at the University of Waterloo, boasting more than 100 active members this term. Our members study under a wide range of engineering programs including Electrical, Computer, Management, Software, Mechanical, Mechatronics, Nanotechnology, Biomedical and Systems Design Engineering.

We are proud to support the success of students around the engineering faculty by providing a practical learning environment for them to thrive and explore skills outside of the classroom. By joining our mechanical, electrical, business and strategy subteams, each member is able to learn and apply a variety



Student Team
Proposal W21-147

of skills to a unique project, which can then follow them as they enter the workforce and advance their careers.

Technical skills that our members learn include Mechanical Design & Manufacturing, Embedded Programming, PCB & Electrical System Design, Financial Management, Project Management and more. Furthermore, the members pick up and develop numerous soft skills including problem solving, leadership, teamwork and communication.

After becoming the first Canadian team to finish the 2018 American Solar Challenge in the Multi-Occupant Vehicle Class, Midnight Sun has successfully promoted Waterloo Engineering in international markets. Most recently, Midnight Sun has been involved in outreach activities with the University, such as the eSTEM series with Renison College. With the development of MS XIV, we plan to continue this promotion of both Waterloo and WEEF at the American Solar Challenge in 2022. Our original goal was to attend ASC 2021. However due to the ongoing COVID-19 situation, we are now aiming to attend the race in 2022 and will be using this extra year to revisit some design aspect of our car and focus on the development and training of the team members themselves.

WEEF has continued to support our team since the start of the development of MS XIV in Fall 2018, WEEF will be a Diamond Sponsor for our team, where the perks will include your logo on our vehicle, team jerseys and promotion at events.

Estimated Equipment Lifetime

The components themselves will be useful to the success of our team for the entire lifetime of our new vehicle, MS XIV, which can stretch from anywhere from 3-5 years. It is also safe to say that any equipment purchased will have lifespans of 10 years or

Implementation Schedule

Last term, when we had access to our workbay on campus, we were able to start the assembly of an electrical mockup of our powertrain (Driver Controls, Power Selection, DCDC, Power Distribution, Motor Controller Interface) and also began firmware and hardw

Cost Breakdown

Item	Option 1	Option 2	Option 3	Option 4
PCBs and PCB Components	4000	4500	4600	5000
Soldering and Labelling Equipment	1750	0	0	0
HV Cables, Connectors, and Fuses	1050	0	0	0
NiMH Cells	700	0	0	0

Student Team
Proposal W21-147



Asus MB16AMT 15.6" touchscreen	500	0	0	0
Total	8000	4500	4600	5000



WATonomous W21 WEEF Proposal

WATonomous
Mr. Ashwin Sureshchandra
sponsorship@watonomous.ca

Description of Proposal

After being established in 2017, WATonomous represents the University of Waterloo as one of two Canadian teams participating in the SAE Autodrive challenge. Our goal in this competition is to transform a Chevrolet Bolt EV into a fully electric SAE level 4 autonomous self-driving vehicle, with our team of bright students from all programs and years. Currently, WATonomous is composed of 66 members, with 65% of them being engineering students. We seek to provide a culture of innovation and learning for all individuals on our team, whether it be through our business, electrical, software or mechanical subteams. Students at WATonomous are provided with the rare opportunity to work on an autonomous vehicle all the while competing in a world-renowned competition.

This year's objective is to complete a series of fully autonomous robo-taxi pickups and drop-offs at specific locations in Michigan's MCity. In order to achieve this, the team will require the proposal to cover shipping costs, casters with mounting plates for our dummy rig, and rope. With the provided funding, we will be able to purchase the necessary equipment to facilitate the proper testing of our autonomous vehicle. In particular, we will enable students to plan and evaluate complex autonomous driving scenarios reflecting real-world situations.

Proposal Benefits

All of the items mentioned in the proposal are crucial to our success and essential for us to compete. The shipping cost for the year 4 competition will be used to purchase a shipping crate, which will allow WATonomous to transport equipment to Michigan where the competition is being held. In addition, the miscellaneous expenses will be used to cover any emergency costs that arise during the competition, which has historically averaged to roughly \$800. The casters will be used to move around our human dummy when we test our vehicle's ability to detect pedestrians while driving. Furthermore, we require a 50-foot rope to move around our traffic lights during testing. With the funding, WATonomous can improve the quality of our testing, our ability to compete, and ultimately the experience we provide to the many current and future engineering students on our team.

Estimated Equipment Lifetime

Shipping Crate - 3 years

Casters - 5 years

Rope - 5 years



Implementation Schedule

Shipping Crate - Immediate purchase upon receiving funding, and will be utilized yearly during transportation for competition

Casters - Immediate purchase upon receiving funding, and will be utilized immediately during testing

Rope - Immediate purchase u

Cost Breakdown

Item	Option 1	Option 2	Option 3	Option 4
Shipping Costs for the year 4 competition	1290	800	400	0
Miscellaneous emergency expenses during competition	700	300	0	0
Caster with mounting plate for dummy rig (4 units)	160	0	0	0
Rope	30	0	0	0
0	0	0	0	0
Total	2180	1100	400	0



UWFM Winter 2021 for 2022 Season

University of Waterloo Formula Motorsports
Sam Swift, Technical Lead
seswift@uwaterloo.ca

Description of Proposal

The University of Waterloo Formula Motorsports Team designs, builds, and competes with a small open-wheel formula style race car in the Formula Society of Automotive Engineers design series. This proposal is intended to secure funding in order to better perform in all of our future seasons and secure more points at competition.

Proposal Benefits

The first item we are requesting funding for in our proposal is \$6500 for a Yamaha WR450. Given the fact that lock down made it no longer feasible to continue with 2021 build we decided the best decision for the team would be to bring out 2020 car up to competition spec and spend an extra three months on our 2022 design season. With this extra time, we wanted to choose an ambitious project that would engage all of our systems and with that decided going with an ultralight single cylinder design would provide the largest learning opportunity for our members requiring all subsystems to nearly start from scratch. We are also requesting \$1000 in funding in order to purchase spare rebuild parts for the engine. The next item we are requesting funding for is a Dremel rotary tool for \$250. We are requesting \$550 for sensors and electronics components. The items included in this group a lithium ion battery, battery charger, temperature trip stickers, a cam position sensor, wheel speed sensors, a brake pressure sensor, a manifold absolute pressure sensor, a dash kill switch, and a steering pot. These components are necessary for our electronics system which is responsible for collecting data, a large portion of shifter functions as well as electronic fuel injection. A number of these components are focused on data collection which would allow would allow the opportunity to collect more data on the car and ensure we are maximizing the car's absolute performance as well as driver training. Last term we got funding for a 3D printer and the last item we are requesting funding for is \$100 for filament for this printer.

Estimated Equipment Lifetime

The Yamaha WR450 will last us a minimum of 5+ years although with rebuild parts we could potentially extend this life span beyond 10 years. The engine parts rebuild parts also have a life span on 5+ years. The Dremel will last us a minimum of 5 years. The

Implementation Schedule

We are currently specing components and finding engine suppliers. Parts will be purchased once we have confirmed funding and have finished the selection.



Cost Breakdown

Item	Option 1	Option 2	Option 3	Option 4
Yamaha WR450 and Parts	7500	6700	6000	5500
Dremel	250	250	250	0
Sensors and Electronics components	550	550	250	0
3D Printer Filament	100	0	0	0
0	0	0	0	0
Total	8400	7500	6500	5500



Proposal for Hardware/Software for Industry 4.0 Case Competitions

Industry 4.0 Design Team
Sanjenah Visagan
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Description of Proposal

The Industry 4.0 team would like to receive financial support to develop the technical component of our competition. The funding will go towards purchasing hardware such as a new Fischertechnik model (~\$1000), 2 Dobot robots (\$1800 each), and Mindstorm Lego robots (\$390 each). The Fischertechnik factory simulation provides a realistic production model with educational opportunities through haptic comprehension. This will allow us to build our main simulation for the competition. Previous usage of the Fischertechnik models have been very successful and we look forward to utilizing them in upcoming competitions. We will also use the Dobot robots and Mindstorm Lego robots to expand the simulation and create a larger manufacturing system for the competitions. However, if COVID-19 stays present as an obstacle to in-person collaborative work, an alternative option for the competition is to host a virtual simulation with software applications, similar to the competition held this year. There may be costs associated with this as our team is looking into upgrading to game-making applications such as Stencyl and Construct 2 which require a monthly/annual fee.

Proposal Benefits

- The funding will allow us to expand our current manufacturing process and build more complex competition designs
- Integrating the simulation models allows for the team to build a competition with a storyline and unique concepts that will engage high school students
- Currently, we are the only student design team that directly outreaches to high school students, developing both the Management and Waterloo Engineering brand.
- The funding will provide flexibility and adaptability to our team so that in the event of COVID complications, the team is able to adjust to the circumstances and still develop a comprehensive competition. For example, due to COVID this year, we had to switch our operations to online and designed the simulation with Unity. However, this presented us with many challenges, as many students who were using school Chromebooks were not able to access the game using ChromeOS. Therefore, we are expecting to move our simulation onto a website, using Construct 2, an HTML-based game editor, instead of using programs like Unity, that would present accessibility issues.
- The competition is quickly growing in size, expanding from 17 teams last year to 37 teams across Canada this year, despite the challenge of teams working remotely. Over 160 participants were included, and this number will only continue to grow. With the funding, we will be able to reach a greater audience.

Estimated Equipment Lifetime



The simulation models will be able to last beyond our competition for future teams. In addition, if the software is a one-time purchase option, it can be continuously used by other teams later on.

Implementation Schedule

If funding is granted, the implementation will start immediately to develop our simulation for the upcoming 2022 competition. We expect to start using the costs in the 2021 Fall term.

Cost Breakdown

Item	Option 1	Option 2	Option 3	Option 4
Manufacturing Simulation Hardware (Fischertechnik Models, Dobot Robots, Lego Mindstorms, Lego Technic Liebherr)	1000	1800	390	500
Game-making Software (Construct 2, Stencyl, Adobe Animate)	250	99	360	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
Total	1250	1899	750	500



WARG Winter 2021 WEEF Proposal

WARG
Alexandre Roman
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Description of Proposal

The Waterloo Aerial Robotics Group (WARG) is a team of passionate students developing autonomous aerial vehicles capable of performing various tasks. WARG will be competing in the annual Unmanned Systems Canada Student Competition this May.

This term, WARG is preparing for the annual Unmanned Systems Canada competition in May. We got some work to do, our team is grinding away day by day to give it our best. As COVID-19 has shown, we have to take the good with the bad. Working remotely with both on-term and co-op students, WARG is moving forward towards some big things. Our team has taken off again, and we're looking to continue driving growth and prosperity. To do this, we have begun to make improvements all around, from the bottom up. WARG is putting everything under the microscope to update, upgrade and reach new heights, both literally and figuratively.

This term's proposal highlights these changes we are making within - including but not limited to a new airframe, sensors, radios and transmitters; we want to come out on top, and WEEF's unwavering support and sponsorships help our team do just that.

In the next few months, WARG will be doing a flight test to gather data for our computer vision sub-team and testing our auto-pilot firmware! We will be assembling new development boards to test sensors and radios and transmitters! And perhaps one of the biggest things - our mechanical sub-team will start our airframe redesign!

WEEF's sponsorship will allow us to continue to learn, develop and implement these changes.

Our proposal consists of 5 main items: sensor development boards, an improved Zeropilot flight controller board, telemetry equipment, sensors, and the new airframe. With WEEF's support, we can successfully accomplish all our goals leading up to our May competition.

Proposal Benefits

First and foremost, WARG is a student design team. Regardless if we fly, crash, or don't even get off the ground - we want all of our members to have learned something during their time at WARG. Whether it's how to solder, or machine, or program- we want to be able to provide those opportunities for students to develop critical skills they'll need in their future. At WARG, we are fortunate to have many opportunities for everyone to learn, whether it's developing flight controller firmware on our new custom Zeropilot boards, training computer vision models, or designing a UAV from scratch.

WARG has recently doubled in size, and our new team members are eager to learn more. Having the opportunity to support and encourage learning is something we take seriously at WARG, and we're hoping WEEF will see the benefit in the experiences we offer.



Student Team
 Proposal W21-167

WEEF has always been a large contributing member to WARG, and this is something we take great pride in. WEEF is unique in that it's money comes from students, for students. By sponsoring WARG, we continue to keep WEEF in our "High Flyer" bracket - allowing us to spread the word about WEEF by including their logo (and where applicable, information) on our UAV, apparel and social media. Spreading the word about the good WEEF does is a priority!

WEEF is currently in our highest sponsorship bracket. This proposal will allow WEEF to continue to be a "High Flyer" sponsor. Being a High Flyer means that a large WEEF logo will be added to our aircraft, website, and on team apparel.

Estimated Equipment Lifetime

As a rough estimate, we expect all of our requests to last upwards of 3 years. Specifically, the sensors and sensor development boards should last around 3 years, while telemetry equipment (transmitters/receiver, XBees, etc.) should last around 4 or 5 wit

Implementation Schedule

WARG will be purchasing all items as soon as possible; within the W21 term. The airframe may need a bit more time - potentially around S21 term.

Additional Information

WARG is willing to take partial funding for each of the items.

Airframe request is a renewal of previous allocation with \$300 extra for additional costs determined since original allocation.

Cost Breakdown

Item	Option 1	Option 2	Option 3	Option 4
Sensor Breakout Boards	950	600	350	0
Zeropilot Board	650	350	0	0
Telemetry Equipment	360	250	100	0
Various Sensors (GPS, airspeed, ultrasonic)	400	300	200	0
Airframe	1500	1200	0	0
Total	3860	2700	650	0



Interactive Virtual Education Hardware

Engineers Without Borders - University of Waterloo Chapter
Hussein Hassanali, Chapter President
chapterpresuw@gmail.com

Description of Proposal

The University of Waterloo Engineers Without Borders Chapter is piloting a remote-access desktop project to provide high-end computing equipment and access to software to students of all ages (elementary, secondary, and post-secondary) in Canada to support technical and professional development. The scope of work includes hardware sourcing and virtualization, software license management, logistics & operations, and outreach. Use of the hardware will be further extended to other design teams and clubs where events/programs with a similar scope and mission are proposed, and/or if long-term computations are required for technical work.

Proposal Benefits

The proposal has benefits specific to University of Waterloo students and the broader KW, Canadian, and global community.

Benefits to Students:

- Gain technical experience in hardware virtualization, project management, and education development through implementation and ongoing management of the project.
- Provides a sandbox for students to add thorough, educational, and interactive material to youth engagement programs.
- Expand use for other clubs and design teams at the University of Waterloo to allow for faster mobility in running intensive software or other educational programs.
- Connection opportunities to individuals in rural and global settings.
- Provide an alternative to Waterloo's VPN Remote Desktop service which has limited capabilities.

Provide opportunities for Waterloo's Engineering Student Body to collaborate with EWB and help them assist with beginning side projects that would eventually be implemented into the project. This includes outreach to different students from various engineering disciplines such as mechanical and computer to help produce products like physical security systems and aid in software issues.

Benefits to Community:

- Provide remote, secure, and controlled access to a consumer-level high-end desktop environment to anyone in Canada with stable access to the internet. The initial implementation should be able to host 2 students simultaneously.
- Support self-learning of popular topics through hands-on experience by equipping students with access to a variety of programs (GIS, CAD, data analysis, open-source technologies). The initial implementation



Student Team
Proposal W21-168

will focus on providing a space to use open-source technologies (containerization with Docker, Network Virtualization with OpenStack, GIS, etc.) in conjunction with popular free-courses available online and massive open online courses (MOOCs) through platforms including EdX, Coursera, etc.

- Alleviate social inequity by removing technological barriers associated with student or school-owned software licenses, by providing a powerful environment to run intensive tests and programs. For example, a public school that owns licenses to the software they cannot support through their computers can use this environment to temporarily provide students with access.
- Support small businesses & start-ups by providing computing resources for business development, specifically in the KW area and other Engineers Without Borders Social Ventures.
- Support various distributed computing projects for social good (ex. COVID folding at home).
- The outlined benefits and examples specifically target Sustainable Development Goals #4 and #10, Quality Education and Reduced Inequality.

Estimated Equipment Lifetime

The equipment is estimated to appropriately handle software and user load for seven years. The equipment will still be completely usable and operational at this point, however based on the scope of projects taken, certain components may need to be upgrade

Implementation Schedule

May 2021 - Beginning of Spring 2021, the team plans to begin planning fundraising events and reaching out to external sponsors outside of the university. Fundraising events planned will follow strict COVID-19 protocols.

July 2021 - The majority of fundin

Additional Information

The Team has procured approx. \$1500 towards this project in funding from the Dean of Engineering, Fundraising, and Sponsorships. The items requested for funding below have been split into computer hardware, security and peripherals, and software licenses.

Cost Breakdown

Item	Option 1	Option 2	Option 3	Option 4
Computer Hardware (12-Core, 4.6GHz AMD Ryzen 9 3900X, 2x8GB DDR6 NVIDIA GPU, 64GB 3200MHz DDR4	3350	2000	1500	1000

Student Team
 Proposal W21-168



RAM, 1TB SSD) - \$3350 CAD				
Security and Peripherals (Kensington Lock and Cage, Keyboard, Mouse, Monitor) - \$800 CAD	800	600	400	200
Software Licenses (AutoDesk, AutoCAD & Revit LT, Fusion 360, Windows 10 Pro, Unraid) - \$1360 CAD	1360	1000	750	500
0	0	0	0	0
0	0	0	0	0
Total	5510	3600	2650	1700



W21 WatLock WEEF Proposal Presentation

WatLock
Alyssa Ang - Business Lead
waterlooairlockteam@gmail.com

Description of Proposal

WatLock is a student team that is participating in the University of British Columbia's Mars Colony Airlock Challenge. Our goal is to create an airlock that could be transported to and used in the harsh environments of Mars at a reasonable cost. Hopefully, this will bring habitation among the stars closer to hand.

The challenge is split into two segments; a design proposal and a prototype fabrication. The first stage has been completed, where we were awarded the Best Presentation Award. We are currently in the second stage of the challenge and are thus attempting to fabricate a prototype airlock for August 2021.

Our team consists of thirteen students from a variety of faculties, including engineering (69%), arts (15%) and science (15%) with eleven programs being represented. We are always actively recruiting students from various levels of experience and backgrounds every semester to help us build our design into reality.

Proposal Benefits

Aside from the potential to aid in the colonization of Mars, an unprecedented human achievement; this project provides students with project management, human management, teamwork, and various other skills and experiences that are vital to developing students who are capable of going beyond. Skills learned during this challenge include, but are not limited to the aforementioned management skills, fabrication, and design, problem-solving. Furthermore, students in their various teams (Mechanical, Electrical, and Business) will gain hands-on experience with skills that are pertinent to each field of practice.

Estimated Equipment Lifetime

We plan to propose to showcase our prototype to help encourage innovative students to participate in the Waterloo community by starting their own design team or to join one to interact and learn from multidisciplinary peers. We wish to leave a legacy of a

Implementation Schedule

The fabrication of the airlock is planned to occur mainly in Spring 2021, thus we plan to order materials when possible to have them prepared for construction in spring.

Additional Information



Thanks to WEEF, the WatLock team has participated in the first step of the UBC Airlock Competition and presented their design to the judges. Following this step, the design team would like to turn this design into reality and present the Airlock to those

Cost Breakdown

Item	Option 1	Option 2	Option 3	Option 4
Freezer Storage Sandwich Panel - used for wall panels	557.65	557.65	557.65	557.65
Crew Lock Chamber Fabric - to help create a vacuum space	500	300	400	500
CO2 Sensors	471.36	471.36	314.24	0
COVID-19 Safety Materials - To provide our team members with protective gear	100	50	50	100
0	0	0	0	0
Total	1629.01	1379.01	1321.89	1157.65



PCB Assembly Station Equipment

SSDC

Micah Black, Student/Midnight Sun Electrical Lead
mj2black@uwaterloo.ca

Description of Proposal

The Sedra Student Design Centre (SSDC) is the home to over 20 student competition teams under the Faculty of Engineering. Each team sets ambitious goals to design and build state-of-the-art technologies that they then take to compete on the international stage. The projects each team takes on spans across various engineering disciplines, from designing a solar car from scratch to building robots.

Each student design team can be broken down further into sub-teams -- one of the significant sub-teams is the electrical team. They are responsible for the projects' electrical system(s), which involves the design and manufacturing of multiple PCBs. The general procedure to create a PCB consists of three steps: solder paste stencil printing, component placement, and reflow soldering. Fewer errors in this process and better quality results can be attained through the usage of a pick and place machine and reflow oven in the second and third steps, respectively.

This proposal is supported by the Midnight Sun Solar Rayce Car Team, Robotics Team (UWRT), Waterloo Formula Electric, Waterloo Rocketry Team, Waterloo, Watomous and the University of Waterloo Alternative Fuels Team (UWAFT). Any granted funding for this proposal will go towards the acquisition of one of the two machines named above, for the shared use of various design teams.

Proposal Benefits

Supporting the acquisition of electrical components and equipment is equivalent to supporting not just all student design teams, but also all undergraduate students studying under the Faculty of Engineering.

Waterloo student design teams provide hands-on engineering opportunities to hundreds of students, with the majority studying under the Faculty of Engineering, every year. We are proud to support the success of students around the engineering faculty by providing practical learning environments for them to explore and apply newfound skills outside of the classroom. Our teams allow each member to learn and apply these skills to a unique project, which will then follow them as they advance in their careers. Examples of technical skills that students may learn include Mechanical Design & Manufacturing, Embedded Programming, PCB & Electrical System Design, Financial Management, Project Management and more. Furthermore, the members pick up and develop numerous soft skills including problem solving, leadership, teamwork and communication throughout their time with these organizations.

Furthermore, we intend for this equipment to benefit the SSDC as all student teams would have access to this equipment in order to allow for better access to manufacturing and potentially improve the quality of their projects. We believe the access to this equipment should be extended to the Engineering department, for undergraduates and graduates, in their projects as well as to assist students in prototyping and development of their FYDP capstone projects.



WEEF has continued to support student teams and will be recognized for their contributions to each project's success, according to their team sponsorship benefits outline.

Estimated Equipment Lifetime

With the proper maintenance and usage of the machines, both the pick and place machine and reflow oven would have lifetimes of 10 years or longer. We would also like to note that we have been discussing the potential of both pieces of equipment with the S

Implementation Schedule

With the re-opening of the SSDC recently confirmed, each team is prepared to resume manufacturing under safety precautions outlined by the University and the Safety Office. Overall, either machine will highly benefit each team during the manufacturing pha

Additional Information

We have recorded two items in this proposal and would like to inform WEEF that the teams and the SSDC are still discussing final purchase plans. Currently, a reflow oven is available for usage in the Rapid Prototyping Center (RPC). However, the model we a

Cost Breakdown

Item	Option 1	Option 2	Option 3	Option 4
Pick and Place Machine	11500	11000	10500	10000
Reflow Oven	5500	0	0	0
ESA Visit and Modification	3000	0	0	0
0	0	0	0	0
0	0	0	0	0
Total	20000	11000	10500	10000



Waterloo Formula Electric Funds Proposal Winter 2021

Waterloo Formula Electric
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Description of Proposal

Waterloo Formula Electric is requesting \$1100 to purchase driver safety gear, including fire suits and arm restraints, which meet competition safety standards.

We are also requesting sponsorship for electrical components, necessary to finish building the new accumulator at the end of the Winter 2021 term.

In addition, firmware boards will help facilitate learning remotely for new members.

Finally we are requesting a hot air gun station to speed up PCB assembly

Proposal Benefits

Waterloo Formula Electric greatly appreciates the funding that WEEF helps the team with, as demonstrated by the WEEF logo proudly displayed on the race car, the website, and on team wear. Based on the value of this sponsorship, the team will continue to display the WEEF logo in these places, as well as on team merchandise, our banner, and our social media pages.

Estimated Equipment Lifetime

Driver gear is expected to last 5 years. The hot air gun is expected to last 10 years and can be shared with other SDC teams. Electrical components will last for potentially 2 seasons.

Implementation Schedule

After receiving confirmation of the funding, WFE will purchase the items and put them into service by March 2021.

Cost Breakdown

Item	Option 1	Option 2	Option 3	Option 4
Driver Safety Gear	1100	830	680	550
Electrical Components	1590	1590	1090	740
Transponder	756	535	0	0
Firmware development boards	400	330	240	150
Hot Air Gun	1000	0	1000	0
Total	4846	3285	3010	1440

