

EWH CHAPTER OF THE YEAR 2015-2016 COMPETITION REPORT
Engineering World Health University of Toronto (EWHUofT)
May 1, 2016

PROGRAMS/PROJECTS DESCRIPTION

ENGINEERING

We hosted two hands-on workshops to introduce attendees to basic circuit construction and troubleshooting broken equipment, as well as to spread interest in the EWH Summer Institute.

(1) Workshop I (December 8, 2015, 25 attendees) – The focus of this workshop was resistors, capacitors, and transistors. Participants assembled a double LED blinker circuit on a breadboard based on a given circuit diagram (*Appendix 1*) and learned to use soldering equipment to finalize their designs.

(2) Workshop II (January 29, 2016, 42 attendees) – Electrical engineer Dr. Shakiba gave an interactive lesson on diagnosing electrical component failure. Attendees learned to find broken electrical components using a multimeter and applied their newly acquired knowledge to a power supply (*Appendix 2*).

(3) Medical equipment acquisition – To build realistic training modules, we launched an initiative to request donations of unused or malfunctioning equipment from local hospitals. These modules will simulate scenarios that students may encounter when confronted with broken medical equipment. We have written a donation request letter (*Appendix 3*) and have started contacting local hospitals.

(4) Volunteering with Ghana Medical Help - We have partnered with Ghana Medical Help (GMH) (<http://www.ghanamedicalhelp.com/>), a non-profit that provides medical equipment to hospitals in Ghana. By providing opportunities for our members to volunteer with GMH, we hope to draw from their considerable experience in equipment specification, needs assessment, and fundraising. Every year, they host a packing party where they organize and pack donated medical equipment for shipment.

EDUCATION

We organized two initiatives under our Education pillar this year.

(1) EWH Summer Institute (SI) information session (November 26th 2015, 25 attendees) – Two of our members (Sandra Fiset and Justina Hwang) gave a presentation introducing EWH and the SI. Justina (2015 SI Rwanda participant) spoke about her experience in Rwanda as a biomedical technician. She provided examples of equipment repair she performed, and described how the program was a great opportunity to practice her troubleshooting and problem solving skills (*Appendix 4*).

(2) Collaboration with Let's Talk Science to build educational kits for high school students - As part of UofT's Engineering Strategies & Practice design (APS112) course, a calorimetry kit was designed with Let's Talk Science (LTS) Canada (*Appendix 5*). In this kit, students measure the energy released from the combustion of different types of food to learn about nutrition content. Students learn about the global health challenge of malnutrition in low- and middle-income countries. We have recruited a team of student volunteers to help build and test the kits, as well as facilitate workshops in classrooms across the city through LTS' extensive high school outreach network (<http://www.letstalkscience.ca/>).

INNOVATION

We had two main initiatives under our Innovation pillar this year.

(1) Vaccine carrier design team recruitment – A multidisciplinary student team was recruited to oversee the development and commercialization of the Vaccine Carrier Project we initiated in 2014 (*Appendix 6*). In addition, we have developed partnerships with two organizations – the Entrepreneurship Hatchery (<https://hatchery.engineering.utoronto.ca/>) and Enactus (<http://www.enactus.ca/>) to mentor our Innovation design team. These partnerships are expected to accelerate project development and validation in anticipation of field testing in summer 2017.

(2) EWH Ideathon (February 28, 2016, 30 attendees) - An ideathon is similar to a hackathon; however, the focus is on ideas, not hacks. This event was an opportunity for students to work in interdisciplinary teams, apply the insights gained from our Symposium (which took place the week before) and generate

innovative solutions to global health issues. The diversity of attendees was phenomenal, composed of graduate and undergraduate students from the Faculties of Engineering, Medicine, Arts, Science, Business, and Global Affairs (*Appendix 7*).

EWHUofT 2016 SYMPOSIUM

The 2nd annual EWH Symposium took place on February 22nd 2016 at the UofT William Doonan Auditorium (*Appendix 8*). The theme of this year's event was "Engineers as Global Health Interdisciplinary Team Players", and had a strong focus on the role of engineers and the importance of interdisciplinary collaboration for tackling global health problems. The Symposium attracted 110 attendees from a variety of fields including engineering, global affairs, pharmacy, public health, and nursing. Please see our program brochure for speaker biographies, panel discussion topics and poster session abstracts. A summary of the live tweets posted by all our attendees using the #2016EWHS hashtag can be found at <http://sfy.co/f1IYs>.

FUTURE ACTIVITIES

We are partnering with the UofT chapter of Engineers Without Borders (EWB) to host a university-wide Global Engineering Week in 2016-2017 with seminars and classroom outreach. We are also collaborating with the Graduate Students Alliance for Global Health (GSAGH) for student-led lecture series to enable co-mingling of engineering students with global health policy students.

ORGANIZATIONAL ACTIVITIES

CHAPTER STRUCTURE AND STATISTICS

Our chapter is organized into three main focus areas: Engineering, Innovation and Education. The executive board is composed of 16 officers that meet on a monthly basis to organize group activities. The three focus area teams also meet every two weeks to organize their specific events. In addition, the organizing committee for our flagship event, the EWH Symposium, is composed of 18 officers who meet once a month and then twice a week for the month preceding the Symposium (*Appendix 9*).

We communicate to our membership through multiple channels, including a monthly e-mail newsletter, Facebook (www.facebook.com/groups/EWHuoft/, 111 members), Twitter (@EWHUofT, 132 followers), Instagram (@ewhuoft, 27 followers), and our website. Through social media, we provide helpful educational resources such as online courses, videos, research papers, and World Bank statistical data. Our website (<http://ewhuoft.sa.utoronto.ca>) is the information hub, where we actively blog about past events and where more information can be found regarding our chapter and organizational structure. We currently have a total of 250 EWHUofT chapter members.

FUNDRAISING APPROACHES

We received external sponsorship (totaling \$1550) and internal grant funding (totaling \$5950) from UofT sources (*Appendix 10*). Additionally, we were able to secure a travel grant scholarship (\$1000) exclusively for UofT students applying for the Summer Institute program via the Clinical Engineering Society of Ontario (CESO). We also received a UofT Centre for Community Partnerships grant (\$950) for building and deploying the Education team's calorimetry kit in Toronto high schools.

OTHER CHAPTER ACTIVITIES

We participated in the UofT AIDS Awareness Week by organizing an interactive AIDS info session and questionnaire, with prizes given out to knowledgeable participants. We hosted an EWHUofT student booth at the UofT Annual AIDS Gala. EWHUofT members attended Ghana Medical Help's Gala for Ghana fundraising event (*Appendix 11*). Our Engineering co-director, Charles Yoon, is involved in a UofT research collaboration with the Canadian Medical and Biological Engineering Society focused on summarizing medical equipment donation practices across Canada with the aim of establishing good donation practices. We are also hosting a booth to teach kids about "Superpowers 1010: Learn the "power" of electrical circuits" at the day long Science Rendezvous event on May 7th 2016.

APPENDIX - PHOTOS, TABLES, SCHEMATICS AND ADDITIONAL MATERIAL



Appendix 1. December 8, 2015 Engineering Workshop I. At this event, we learned all about resistors, capacitors, and transistors and spent most of the time being hands-on and learning how to assemble a double LED blinker circuit on a breadboard based on a given circuit diagram.



Appendix 2. January 29, 2016 Engineering Workshop II. We invited Dr. Shakiba (UofT engineering alumni) for an interactive lecture on assessing electrical circuit components. Members were able to learn how to identify non-functioning electrical components using a multimeter and were guided through the step-by-step process of diagnosing a power supply.



Proposal to Toronto Hospitals: Donating Medical Equipment

Engineering World Health-International

The Engineering World Health (EWH) organization seeks to inspire, educate, and empower the biomedical engineering community to improve healthcare delivery worldwide. To accomplish this mandate, EWH sends biomedical engineering students from universities all across the world through the Summer Institute Program to low- and middle-income countries, such as Nicaragua, Rwanda and Tanzania. In these countries, students provide technical support for local hospitals by repairing and restoring life-saving medical equipment. In fact, almost 40% of medical equipment in local hospitals are out of service and in need of technical repair [1, 2]. Reports have found that this problem stems from a lack of training, health technology management, and infrastructure. This provides an important opportunity for engineers and engineering students to provide their expertise to address these issues and to positively impact these communities.

Engineering World Health-University of Toronto Chapter

The University of Toronto chapter of EWH (EWH-UofT) is a *student-led* organization that was established in August 2014. We aim to motivate and mobilize the student community to improve health care in low- and middle-income countries. We accomplish this through improved education, application of engineering principles, and development of innovative solutions. Since our inauguration, we have expanded to over 200 student members and been involved with numerous on-campus initiatives (see page 3).



In the past summer, our chapter had the privilege of sending an undergraduate biomedical engineering student, Justina Huang, to Rwanda. There, she was able to repair and restore functionality to over 30 medical devices, including oxygen concentrators, infant warmers, and patient monitors. She was also heavily involved in empowering local nurses and doctors by demonstrating best practices for the long-term maintenance of these machines. We believe Justina's experiences showcase our potential as an organization to have a real impact in these communities and in the next few years we hope to expand our chapter's international involvement.



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EWHUofT.sa.utoronto.ca

Appendix 3. Donation request letter for unused or malfunctioning medical equipment being sent to local Toronto hospitals (full version attached as a PDF document to submission).



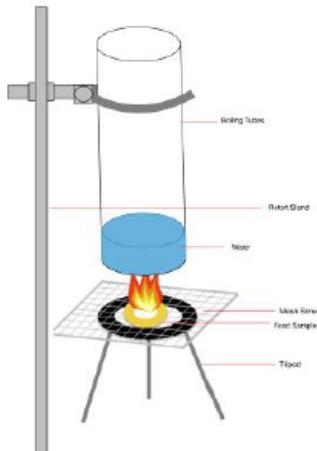
Appendix 4. November 24, 2015 EWH Summer Institute Info Session. Justina Hwang presenting on her experiences on participating in the 2015 EWH SI program in Rwanda.

RECRUITMENT FOR A WORLD-HEALTH SCIENCE OUTREACH KIT DEVELOPMENT TEAM

INTRO

Let's Talk Science (LTS) is a volunteer organization devoted to inspiring and educating youth about science, technology, engineering and math. Engineering World Health University of Toronto (EWHUofT) and LTS are collaborating to design a hands-on science workshop activity to teach students about nutrition via measurement of caloric content of various types of food. The activity will also educate students about the challenging global health problem of malnutrition in low- and middle-income countries.

PROJECT



The design of the kit has been completed, and now we are recruiting students (undergraduate or graduate) to bring this kit from concept to reality. We are seeking volunteers to build, validate, and test these kits, and to run these workshops in science classrooms around Toronto over the next year.

COMMITMENT

Involvement in this project would include:

- Developing the workshop based off of the current design
- Running this workshop in classrooms around the city

CONTACT INFO

To apply to be a part of this exciting volunteer opportunity, please contact the EWHUofT Education Director, Daniel McInnis at daniel.mcinnis@mail.utoronto.ca.

Appendix 5. Collaboration with Let's Talk Science to make educational kits for high school students - As part of a 1st year UofT engineering design course last year, a food calorimetry kit was designed for Let's Talk Science Canada (<http://www.letstalkscience.ca/>). This kit is currently being built by an EWHUofT student team for deployment in Toronto high schools in September 2016. Full report on design specification for this kit is attached as a PDF document to submission.

SmartVaccine Project Recruitment

Name:
SmartVaccine

Summary:

SmartVaccine is dedicated to development of new technologies for preserving vaccines.

Location:

Toronto, CA

Industry:

Health

Stage:

Seed

To apply:

Submit your resume and cover letter to:

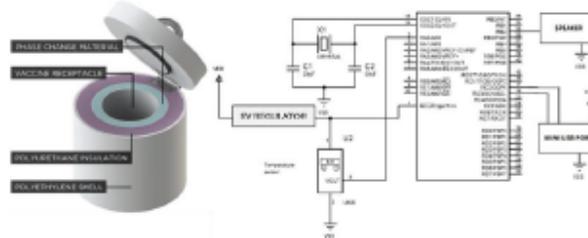
smartvaccine@gmail.com

Overview:

SmartVaccine - A novel vaccine carrier for low and middle income countries.

Project Snapshot:

Vaccination forms an essential component of the Canadian global health strategy and is estimated to prevent 2.5 million deaths every year [CDC]. However, low and middle income countries (LMICs) struggle to achieve complete vaccine coverage because of challenges in maintaining the vaccine "cold chain". From manufacturer to patient, most vaccines must be kept between 2-8°C to maintain their biological potency. Excursions from this narrow temperature range are especially common in LMICs, leading to vaccine wastage and compromised public health. The final stage of the vaccine cold chain – often referred to as the "last mile" – poses unique challenges for LMICs. Vaccines must be transported in passively cooled insulated carriers over long distances from local cold stores to rural communities by individual health workers on foot or on small vehicles. Existing vaccine carriers for the last mile have numerous shortcomings, including an inability to effectively prevent freezing, inadequate cold life, and a lack of temperature monitoring. SmartVaccine is a novel low-cost passively cooled vaccine carrier designed to address these shortcomings while meeting the specific needs and limitations of LMICs. Our proposed design includes three major features that improve upon existing carriers: 1) Active temperature monitoring and logging, 2) Use of innovative phase change materials, 3) Improved packaging (i.e. geometry) to prevent temperature change. The SmartVaccine tracks vaccine temperature and alerts medical professionals if the temperature range has been exceeded potentially compromising vaccine quality. Improved material and geometry ensure the temperature changes are minimized.



Qualifications:

We are looking to recruit students to take a lead on: 1) Hardware Engineering, 2) Design and testing and 3) Operations and Business development.

Hardware engineering:

- Experience in C Programming
- Experience in circuit design
- Experience in PCB design (or willingness to learn)

Design and testing:

- Experience in industrial design
- Experience in 3D modeling and printing (or willingness to learn)
- Experience working with phase change materials is a plus

Operations and Business development:

- Experience conducting customer validation
- Sales and marketing experience
- Past work experience with world health non-profits is a bonus

Appendix 6. Vaccine carrier design team recruitment. A multidisciplinary student team was recruited to oversee the development and commercialization of the Vaccine Carrier Project initiated in 2014 by EWHUofT.



We kicked off the day with an inspiring and informative panel composed of members from Health Mission Outreach, World Spine Care, and Engineers Without Borders. During the panel, it became clear just how important creating solutions collaboratively on the ground is to success.



Next was a fun and fast-paced workshop with Hadi Salah, co-founder of Hacking Health and Manager of Health Ecosystem Partnerships at MaRS. In this workshop, we were encouraged to put Canadian healthcare innovation on the map and learned techniques on how to drive creation of innovative healthcare solutions.



The teams worked hard in the afternoon to solve the world's toughest global health issues. Fuelled by pizza that was sponsored by the Hatchery (UofT incubator), the solutions our multidisciplinary teams came up with were thought-provoking, unique and inspiring. Our extremely well-versed judging panel was so impressed with the calibre of work our students demonstrated in just a few hours.

Our winning team, HealthBridge, is now developing a business plan and prototype under the Hatchery that will be submitted to the EWH Design competition.



Appendix 7. February 28, 2016 Ideathon (“Ideas Hackathon”) event. Executive summary given out to teams one week before event is attached as a PDF document to submission.





Appendix 8. February 22, 2016 EWHUofT Symposium. Symposium brochure is attached as a PDF document to submission.



Appendix 9. 2015-2016 EWHUofT executive team members (top) and 2016 EWHUofT Symposium organizing committee (bottom).

External Sponsorship Companies	
Engineering World Health	
Centre for Commercialization of Regenerative Medicine	
The Printing House	
Javelin	
Internal Sponsorship from University of Toronto	
Institute of Biomaterials and Biomedical Engineering	
University of Toronto Graduate Students' Union	
Mechanical and Industrial Engineering	
University of Toronto Student Life	
University of Toronto Students' Union	
Engineering Alumni Association	
You're Next Career Network	
Student Initiative Fund	
Chemical Engineering	
New College	
Travel Grants and Awards	
Clinical Engineering Society of Toronto	
Centre for Community Partnerships	
Total 2015-2016 Funding Secured	
\$	9,450

Appendix 10. 2015-2016 EWHUofT funding sources.



Appendix 11. Gala for Ghana black-tie fundraising event with collaborators Ghana Medical Help with a special invitation given to EWH UofT executive team. Chris Hadfield (top panel), a prominent Canadian astronaut who lived on the International Space Station, was the guest of honor at this event and gave out his signed autobiography.



Appendix 12. EWHUofT booth at the 2015 World AIDS Day Gala at Hart House at University of Toronto.

Service Abroad Program
**ENGINEERING WORLD HEALTH
SUMMER INSTITUTE INFO SESSION**



Tuesday, November 24, 2015 6pm
Red Seminar Room (2nd Floor)
The Donnelly Centre (CCBR)
160 College St.
Toronto, ON M5S 3E1



Saving Equipment is Saving Lives

Are you interested in applying your technical skills to save lives?

Come find out how to participate in an incredible summer program where you can help fix medical devices in Nicaragua, Rwanda, or Tanzania. You will repair old machines that don't work anymore and put them right back into the field to help those who need it most.

All UofT students are welcome!

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Building global health one circuit at a time

Engineering Training Workshop

December 8, 2015
Tuesday, 4-6:30pm
Room HA403
Haultain Building
170 College St. Rear
Toronto, ON M5S 3E3

The first event of the learn-and-build series is here! We will be providing an introductory course on circuits, giving you an opportunity to do some hands-on electronic building. We will cover how to read circuit diagrams, identify and learn the function of basic electronic components, and get a taste of integrating components onto a circuit board. Non-engineering students are welcome as well!

Spots are limited, be sure to register at our website EWHUofT.sa.utoronto.ca to reserve your spot!



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Building global health one circuit at a time

Engineering Training Workshop

January 29, 2016
Friday, 4:30-7pm
Room WB342
Wallberg Building
184 College Street
Toronto, ON M5S 3E5

Engineering World Health sends students to help return broken medical equipment to service and improve hospital infrastructure around the globe.

In the second installment of our workshop series, we will take the plunge and begin to tackle the challenges of repairing broken equipment! We will be applying our knowledge learned from Workshop 01 to go through the troubleshooting, assessment, and repair process.

Don't worry if you weren't able to attend the last session as we will provide a quick overview.

Spots are limited, so please be sure to register at EWHUofT.sa.utoronto.ca/



Engineering World Health
University of Toronto

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[@EWHUofT](https://twitter.com/EWHUofT)
EWHUofT.sa.utoronto.ca

FREE Registration & Poster Abstract Submission by February 21st at our website EWHUofT.sa.utoronto.ca

FEATURING
Dr. Amy Bilton
Dr. Jillian Kohler
Dr. Shaun Morris
Dr. Matt Ratto
Ghana Medical Help



ENGINEERING WORLD HEALTH SYMPOSIUM

Engineers as Global Health Interdisciplinary Team Players

FEBRUARY 22ND, 2016 (8:45AM-5:30PM)
William Doo Auditorium, 45 Willcocks St., Toronto, ON M5S 1C7

The annual EWH Symposium aims to expose the UoT community to current global health initiatives. This year, we will focus on how engineering solutions can contribute to interdisciplinary health challenges in low- and middle-income countries. The symposium spans a full day of talks, panel discussions, networking opportunities, and a poster session.

Free Registration Free Lunch Poster Prizes

Symposium Sponsors:    

FREE Registration at our website EWHUofT.sa.utoronto.ca by February 22nd



ENGINEERING WORLD HEALTH IDEATHON

Sparking Opportunities & Change through United Efforts

FEBRUARY 28TH, 2016 (9:00AM-8:30PM)
Rm. 412, Rosebrugh Bldg., 164 College St., Toronto, ON M5S 3G9

This complementary event to the EWH Symposium is an opportunity for students to work in interdisciplinary teams, apply their knowledge gained from the EWH Symposium, and generate innovative ideas geared at solving global health issues. This is not a hackathon, rather this is a gathering of brilliant minds ready to spark positive change.

Free Registration Free Meals Great Prizes

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Appendix 13. Advertisement material for our events his year including the EWH Summer Institute information session, Engineering Training Workshop 1 and Workshop 2, EWH Symposium and EWH Ideathon.

EWH CHAPTER FEEDBACK.

It would be really awesome to have a teleconference meeting with the heads of all the EWH Chapters around the world. Perhaps we can use this to discuss an annual theme, facilitate collaboration between Chapters or just update each other on local chapter activities.

Thanks!

EWHUofT

