

## **Medical Mission to Mongolia**

**Lucas Vitzthum**

**Amit J. Nimunkar**

### **A. Describe the event or conference including its purpose and audience:**

#### **earthMed's goals:**

The earthMed is an independent, non-profit, non-sectarian, non-political organization on a medical mission to provide various programs to improve health care for the people of Mongolia. In Ulaanbaatar, Mongolia, earthMed teams perform the following medical procedure and training:

1. teach and perform thoracic surgery, mostly lobectomies and biopsy procedures.
2. teach anesthesiologists to place specialized monitors and teach methods for post-operative pain relief.
3. provide cardiac surgery consultation.
4. teach anesthesiologists regional anesthesia for orthopedic surgery to avoid the need for general anesthesia for orthopedic surgery.
5. teach pacemaker implantation procedures.
6. support surgery/treatment for adults and children and will lead earthMed's nursing team to provide education and training for nurses.
7. evaluate bypass pump and provide refined training on techniques for using bypass machine in cardiac surgery.

#### **Our primary goals:**

As representatives of the University of Wisconsin-Madison Engineering World Health Madison Chapter, our primary tasks will be the following:

1. preventative maintenance training of the medical equipment used in the surgical and diagnosis procedures
2. calibration of the medical equipment and troubleshooting if they are not functioning properly
3. ensuring our work has a sustainable, extended impact by developing maintenance and calibration schedule with local technicians
3. training the medical staff on how to use some of the machines and the technicians on how to repair these medical equipments
4. identifying sources and vendors to obtain parts for the medical equipments
5. identifying equipment manuals and other documentation which helps the medical staff and technicians understand the proper usage of the machines and the safety considerations and help convert some of these manuals in native languages
6. researching what are some of the common medical equipment needs of the community
7. researching some of the common illness and diseases in the area and what are some of medical equipments that could help diagnose these diseases
8. researching what are some the low-cost medical devices that could be designed and built which would help diagnose these common disease
9. evaluating on how the low-cost medical device technology can be implemented to make a difference in their health care

10. establishing a relationship between Shastin Engineering and EWH-Madison Chapter for academic and research exchange.

**Our secondary goals:**

1. establishing an academic and research and cultural exchange with Shastin Hospital, the National University of Mongolia and the University of Wisconsin-Madison
2. bringing Mongolian culture to Madison, but arranging cultural seminar to educate UW students about the history, culture and life style of Mongolia
3. promoting global engineering by making UW students aware of the healthcare, environmental and other issues in Mongolia and engineering internship opportunities

**Engineering World Health – Madison Chapter:**

Engineering World Health Madison Chapter is a new student organization dedicated to the delivery of medical expertise and equipment to underserved nations. We currently accomplish this with our ethnically and culturally diverse student body through repair workshops, technical seminars, K-12 education and medical missions. Our organization would like continue our dedication towards global engineering by attending this medical mission and working with international medical communities. Establishing these connections will allow our organization to better understand the needs and requirements engineering low-cost medical equipment for the developing world. For more information please refer to <http://www.engr.wisc.edu/studentorgs/ewh/contact.html>

**B. How will this event/conference benefit the Madison campus community?**

The UW-Madison campus, especially the college of Engineering has a very limited Mongolian culture and student body. Participating in this program would allow us to interact with Mongolian medical and academic communities to expose our university to an under represented culture.

We plan to organize seminars through Engineering World Health Madison Chapter to present our experiences working on the maintenance and repair of medical equipment in an environment where resources are scarce. We would be able to demonstrate to student the engineering challenges faced when working on medical equipment at these places and teach them the skills needed to overcome them. We will introduce to the UW students the idea of global engineering, which would involve working on engineering problems in different parts of the world, means to overcome the language and cultural barrier and communicate effectively when working towards a common goal and raise awareness in our community and encourage UW students to take personal initiatives to work in international projects.

EWB Madison Chapter is also working on developing low-cost medical devices to provide affordable healthcare for more than half billion people afflicted with respiratory and lung disease around the world. The medical mission to Mongolia will help us do to a. research and find out what is the current medical facility available to the people to diagnose respiratory and lung disease, b. what type of medical technology we can design at UW Madison which would be useful to the people in Mongolia and c. evaluate the feasibility of the medical technology we design in terms of its actual usage and its impact in the community.

Please refer the following for more information:

**Seminars and workshops:** <http://ecow.engr.wisc.edu/cgi-bin/get/bme/200/webster/7.suppleme/>

**Projects:**

A. Low-cost spirometer ([http://homepages.cae.wisc.edu/~bme300/spirometer\\_s09/](http://homepages.cae.wisc.edu/~bme300/spirometer_s09/))

B. Low-cost pulse oximeter

([http://homepages.cae.wisc.edu/~bme300/pulse\\_oximeter\\_s09/](http://homepages.cae.wisc.edu/~bme300/pulse_oximeter_s09/))

C. Low cost thermometer

([http://homepages.cae.wisc.edu/~bme300/digital\\_thermometer\\_s09/](http://homepages.cae.wisc.edu/~bme300/digital_thermometer_s09/))

### **C. How were students selected to attend?**

The students were selected from our chapter by vote into leadership positions. Members had to then apply for the biomedical engineering position through earthMed, and were accepted by its Director Lou Schonder, and its board of directors.

Amit J. Nimunkar and Lucas Vitzthum were the two students selected to participate in the medical mission to Mongolia.

**Amit J. Nimunkar** is a graduate student in the Department of Biomedical Engineering (BME) at the University of Wisconsin-Madison. He have been a teaching assistant at the BME department since fall 2006 and he teaches the laboratory section for the courses, *Medical Instrumentation* (BME 462) <http://ecow.engr.wisc.edu/cgi-bin/get/bme/462/webster/laboratori/> during the fall semesters and *Introduction to Biomedical Instrumentation* (BME 310) <http://ecow.engr.wisc.edu/cgi-bin/get/bme/310/webster/bmelabexpe/> during the spring semesters. He has hands-on experience working with different medical equipments with respects to their maintenance, calibration and safety. He has written lab experiments with involves design and operation of medical devices and their safety standards. He is the graduate student advisor for the student organization Engineering World Health (EWH) UW-Madison, Madison Chapter. He works closely with two non-profit organizations in Madison, Sharing Resources Worldwide ([www.sharingresourcesworldwide.org/](http://www.sharingresourcesworldwide.org/)) and The Hackett Hemwall Foundation ([www.hacketthemwall.org/](http://www.hacketthemwall.org/)), who distribute medical equipments and supplies to underdeveloped/developing countries around the world. Before these medical equipments are shipped, he organizes sessions to bring some of these to our teaching lab for testing, calibrating and fixing if necessary and if possible. He teaches the students the basic engineering principles involved with the medical equipments, the safety tests and calibration test to be performed and how some of these equipments could be repaired. The students write manuals in different languages such as English, French, Spanish, Portuguese and Swahili on the basic operation of the machine and the safety tests performed.

He also does outreach activities with the CoE and the office of education such as:

a. *Engineering Impact High School Design Competition 2008-2009* – Teach high school students the basics steps involved in design and engineering.

b. *Racine and Lindblom high school visits (2007-08)* – Organize BME activities in the teaching lab to introduce high school students to medical technology and how they interface with human body, to get them excited about science and engineering.

c. *Engineering Open House (2008)* – Introduce the prospective students accepted in CoE, to BME through hands-on activities.

d. *Exploring Engineering: From the Nanoworld to the Universe (2009)* – To help high school students investigate the numerous ways that engineering shapes our world and how it directly impacts our lives every day.

**Lucas Vitzthum** is a senior in Biomedical Engineering with an emphasis in bioinstrumentation at the University of Wisconsin-Madison. He is the current president of the UW-Madison EWH chapter. Previous medical equipment repair experience in the developing world includes working as a Volunteer Engineer for the national EWH organization for three months in Arusha, Tanzania. At the University, he organizes medical equipment repair sessions and technical seminars for students. Lucas has presented the educational benefits of this hands on training at the American Society for Engineering Education conference April 3-4<sup>th</sup> in a paper titled ‘*Student Initiated Organization for Community Outreach and Delivery of Medical Instrumentation to Underserved Nations*’.

**D. If your sending seniors and students graduating in the current academic year, explain how this benefits the future of your organization.**

One of the students is a graduating senior, but is planning on staying at UW-Madison for graduate school. They will stay heavily involved in the EWH-Madison organization, and will take on a new role in helping design medical equipment for developing countries.

**E. How will information gained from this trip be made available to other students? (newsletters, brownbags, handouts, videotapes, etc.)**

The information from the trip will be available to other students in the following ways:

**Documentary video** – We plan to prepare a 1 hr documentary video (and make it available to students) to highlight our medical engineering mission, the technological challenges faced, our outreach programs, the culture and geography of Mongolia, the local community and our interactions with the them and the country’s economic and technological progress in recent times.

**Publications** – We plan to write report and publications on what are some of the medical issues in the region where we plan to work, the biomedical engineering needs of the area, what are some of the devices we can built, its feasibility of implementation and evaluation of the impact it can have on the society. We plan to present some of this work in national and international conferences.

**Seminars** – We will conduct seminar on UW campus to introduce students the ideas of global engineering and educate them with the social-economic-technological culture of the country.