The Ohio State University
College of Engineering
Conference on Engineers for Community Service
Saturday, April 14, 2007
Scott Laboratory, Bldg 148
201 W. 19th Ave.
The Ohio State University
Columbus, Ohio 43210

Room	Time	Schedule of Events
E100	8:00	Registration and Breakfast
E001	8:30	Welcome, Introduction, and Overview of Conference Goals Aimee Gall, Theresa Vonder Haar, and Kevin Passino, The Ohio State University
	8:40	Steve Silliman, Associate Dean for Undergraduate Programs in Engineering and Professor of Civil Engineering and Geological Sciences, University of Notre Dame Reflections on a Progression of Opportunities for Engineering Students Working in a Developing Country: The Benin Project, West Africa
	9:25	Margie Pinnell, PhD, Assistant Professor, Director of ETHOS, Department of Mechanical and Aerospace Engineering, University of Dayton ETHOS Overview and Projects
	10:10	John Merrill, PhD, Director First-Year Engineering Program, The Ohio State University Gina Langen, Director of Communications for the College of Engineering, The Ohio State University Nicole Lammeier, Undergraduate Student, Montaña de Luz Project Coordinator, The Ohio State University A Service-Learning Relationship Between ECOS and Montaña de Luz
E100	10:40	Break/Refreshments
E001	11:00	Student Presentations on Projects: Session Chair: Eric Reynolds
	11:00	Josh Heyne, University of Dayton, Difficulties in the Field
	11:20	Megan Schroeder, University of Notre Dame, EPICS, Student Engineers Reaching Out: Community Based Research and a Survey of Technical Community Needs
	11:40	The Ohio State University, ECOS, Montaña de Luz Projects in Honduras
E100	12:00	Lunch
E001	1:00	Thomas Colledge, PhD, The School of Engineering Design, Technology and Professional Programs Penn State University Development of a Certificate Program in Engineering Service Learning and Entrepreneurship
	1:30	Roger Dzwonczyk, Clinical Associate Professor, Department of Anesthesiology, The Ohio State University The Project HOPE Clinical Engineering Experience
	2:00	Hal Walker, Associate Professor, Department of Civil, Environmental, and Geodetic Science, The Ohio State University Service Learning and Environmental Sustainability at Ohio State
E100	2:30	Break/Refreshments and Student Poster Session
E001	3:15	Student Presentations on Projects. Session Chair: Theresa Vonder Haar
	3:15	Nikki Skrinak, The Ohio State University, South Africa Water Reuse Initiative, From Grey to Green: A Greywater Reuse System for Edendale Valley School
	3:35	Justin Forzano, University of Dayton, Bringing Water to Cameroon, West Africa
	3:55	Lori Hanna and Eric Urban, University of Dayton, Solar Cooking in Nicaragua
	4:15	Brendan O'Grady, University of Dayton, Solar Dehydrator
	4:35	University of Cincinnati, EWB, Using Engineering to Partner with a Developing Community for a Better World
	4:55	Nicholas Hoffman, University of Dayton, The Design and Development of a Low Cost Wood Moisture Sensor
	5:20	Wrap Up Panel Discussion: Best Practices and Model Programs Kevin Hallinan, Professor and Chairperson, Department of Mechanical Engineering, University of Dayton Steve Silliman, University of Notre Dame Thomas Colledge, Penn State University Kevin Passino, Professor, Department of Electrical and Computer Engineering, The Ohio State University Aimee Gall, Undergraduate Student, ECOS Vice President, The Ohio State University
E100	6:00	Dinner and Adjourn

Driving Directions to The Ohio State University:

From the north:
Take any major highway to I-270. Take I-270 to SR 315 south. From SR 315 south, exit at Lane Ave. Turn left. Turn right on Tuttle Park Place. Park in Tuttle Park Place Parking Garage.

From the south:
Take any major highway to I-71 north. Take I-71 north to SR 315 north. Exit at Lane Avenue. Turn right. Turn right on Tuttle Park Place. Park in Tuttle Park Place Parking Garage.

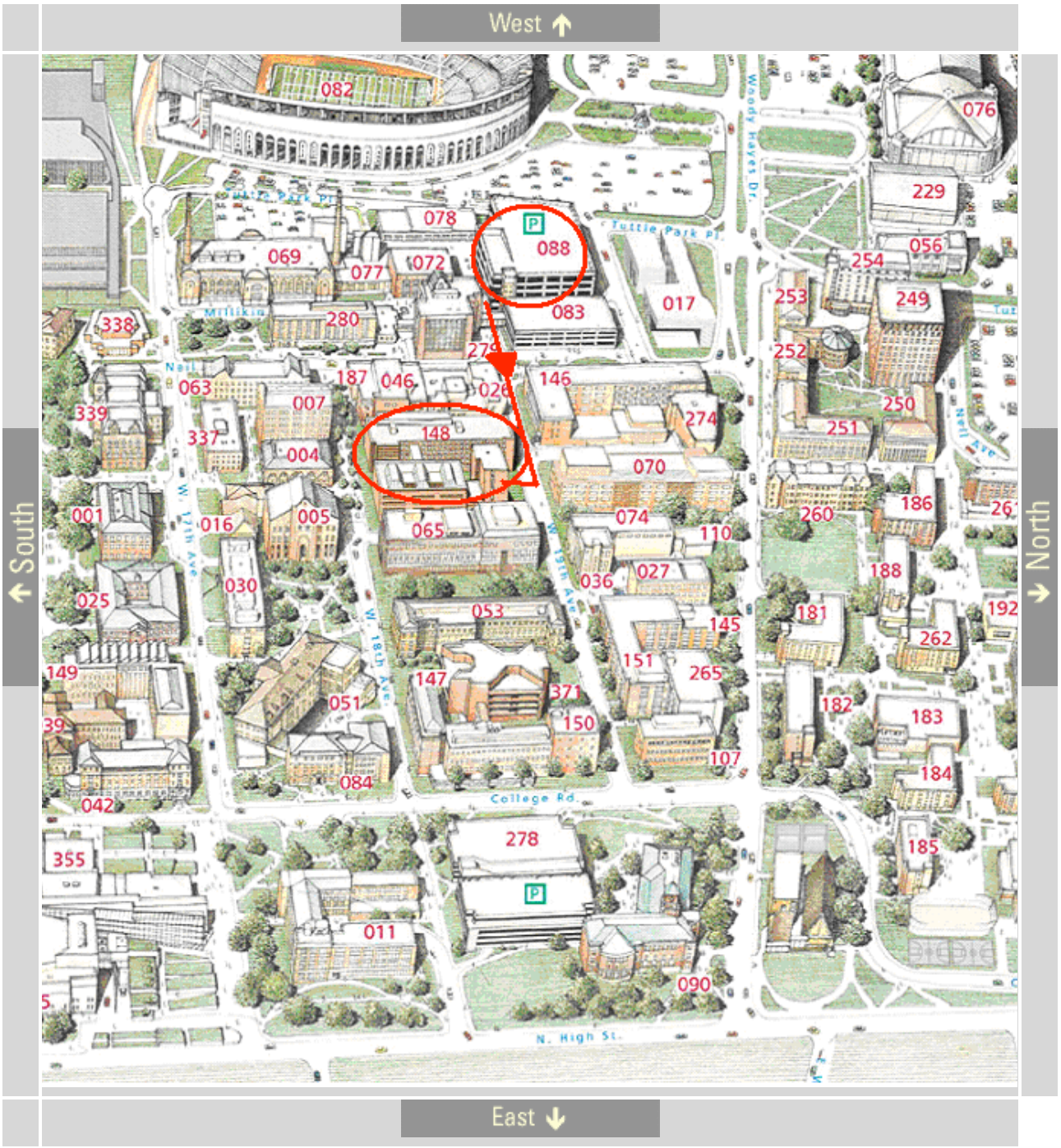
From the west:
Take any major highway to I-70 east. Take I-70 east to SR 315 north. Exit at Lane Avenue. Turn right. Turn right on Tuttle Park Place. Park in Tuttle Park Place Parking Garage.

From the east:
Take any major highway to I-70 west. Take I-70 west to SR 315 north. Exit at Lane Avenue. Turn right. Turn right on Tuttle Park Place. Park in Tuttle Park Place Parking Garage.

Parking Garage: Tuttle Park Place
Building 088
2050 Tuttle Park Pl
Columbus, OH 43210

Scott Laboratory SO
Building 148
201 W. 19th Ave.
Columbus, OH 43210

<u>Walking Directions from Tuttle Park Place Parking Garage to Scott Laboratory</u>: Walk outside the parking garage with the football stadium to your back. Walk down 19th avenue until you come to Scott Laboratory. The registration room is on the first floor at the end of the East wing in room E100. There will be signs to direct you.



If you have any problems please call Aimee Gall at 513-257-6358.

Abstracts of Presentations: Faculty

Reflections on a Progression of Opportunities for Engineering Students Working in a Developing Country: The Benin Project, West Africa

Steve Silliman, University of Notre Dame

These reflections start with a warning: Long-term engagement with colleagues and local populations in an international education / research project can be habit forming! Among the lessons learned from ten-years of interaction with friends in Benin (West Africa) is that, if one is open to opportunities, one will never stop learning from others. Significantly, these opportunities will tend to fill one's life with increasingly exciting, time-consuming, and complex projects. The Benin project was founded in 1998 as a water-well drilling project. It has evolved to include exchange of faculty, student involvement in field work in Benin, research collaboration among students from both countries, collaboration with both a national Beninese water agency and an NGO, and substantial curricular impact for engineering students at Notre Dame. This evolution has been guided by a desire to provide engineering students with greater depth of research and cultural experiences. In terms of positive impact, the project has provided life-changing experiences involving new friendships and the interplay of engineering skills and the realities of life/education/research in Benin. It has also led to publication-quality research in both the technical and educational realms. Finally, it has encouraged students to pursue advanced degrees and/or service-oriented careers. The primary challenges have been related to funding, health, security, and time commitment. Specifically, it is now recognized that, without attention to commitments and competing responsibilities, these international projects can become overwhelming to the time commitments of the students, the faculty and, indeed, the families of the faculty. Again, these types of projects can become habit forming! However, the speaker has little doubt that, with proper design, the positive impacts from these experiences in developing countries will significantly outweigh the challenges, particularly for the local populations and the students / faculty from both countries.

The Project HOPE Clinical Engineering Experience

Roger Dzwonczyk, Clinical Associate Professor, Department of Anesthesiology, The Ohio State University

Project HOPE (**H**ealth **O**pportunities for **P**eople **E**verywhere) is a nongovernment nonprofit organization that brings global health care to people in developing countries around the world. Project HOPE's mission is to achieve sustainable advances in health care around the world by implementing health education programs, conducting health policy research, and providing humanitarian assistance in areas of need, thereby contributing to human dignity, promoting international understanding, and enhancing social and economic development. The essence of Project HOPE is teaching and the basis is partnership. Sustainability is a key measure of Project HOPE's success. In 1958 Project HOPE transformed a decommissioned US battleship into a floating full-service hospital, the SS HOPE. For 15 year the ship made many voyages to bring medical care and health education to people around the world. Today, Project HOPE is a land-based organization continuing in this mission. The clinical/biomedical engineering focus of Project HOPE was developed by Herman Weed, a long time OSU engineering professor and founder of OSU's Department of Biomedical Engineering. His engineering work is now carried out by engineers around the US. In this presentation I will outline the history of Project HOPE's engineering global outreach programs and detail my experiences, discoveries, responsibilities, opportunities and challenges in bring clinical and electrical engineering and technology to hospitals in the developing world healthcare community.

Development of a Certificate Program in Engineering Service Learning and Entrepreneurship

Thomas Colledge, PhD, The School of Engineering Design, Technology and Professional Programs Penn State University

The presentation includes a discussion of the impetus and motivation for development of a certificate program focusing on engineering service learning at Penn State. An emphasis is placed on ABET requirements, industrial needs, community expectations of engineering graduates, and student expectations and interests. Hurdles encountered in development of such a program are addressed, the programmatic obstacles and how they were overcome, issues related to collaboration with partnering universities, and how students were brought into the process. The certificate program, leading to a minor, in engineering service learning at Penn State will be discussed along with examples of parnterships formed in the various countries we have formed partnerships with:
Kenya, Nigeria, El Salvador, Jamaica, Belize and Ecuador. The importance of a learning community at the university with a focus on such matters is discussed, along with discussion of an outlet for student work in the form of the International Journal for Service Learning in Engineering which was founded for this specific purpose.

A Service-Learning Relationship between ECOS and Montana de Luz

John Merrill, PhD, Director First-Year Engineering Program, The Ohio State University

This panel session will: Provide background information on an existing Service-Learning course at Ohio State, and the relationship that ECOS has with Montana de Luz, an orphanage in Honduras; describe the process of assessing needs for the children's home; describe the process of responding to the needs based on the skill set within the Ohio State community of Engineering students; and review the opportunities for future trips. The educational opportunities will be discussed from multiple perspectives: the pre-trip planning, acquiring

materials and supplies, fundraising, project implementation, cultural exchange, student reflection (through journals), post-trip assessment, and future plans. Other topics may include the cultural exchange opportunities, the challenges of specific on-site issues: water quality (key health concern), electrical safety and equipment function (e.g., pump house for water), communications (due to remoteness and mountainous conditions), and computing needs (administrative and educational). Other practical issues will be explored such as technology transfer, appropriate technology, and the long-term sustainability and reliability of projects in a developing country.

Service Learning and Environmental Sustainability at Ohio State

Hal Walker, Associate Professor, Department of Civil, Environmental, and Geodetic Science, The Ohio State University

This presentation will discuss recent engineering service-learning activities conducted at Ohio State University focusing on environmental sustainability. A major Ohio State University initiative is the service-learning based Green Campus Program. The mission of the program is to identify, design, and implement projects which improve the environmental sustainability of the university, via a collaboration of engineering students, faculty and staff, with an emphasis on service-learning. Current activities which will be discussed include (1) a project examining solid waste flows between OSU and the Solid Waste Authority of Central Ohio (SWACO), (2) a collaboration between OSU and the Columbus Green Building Forum (CGBF) to design and build LEED-certified homes for low-income families, (3) the design and analysis of the use of high volumes of recycled mineral content in two parking structures to be built as part of the Ohio State University Medical Center Master Plan and expansion, and (4) incorporation of campus sustainability projects into academic design courses.

Abstracts of Presentations: Students

Difficulties in the Field

Josh Heyne, University of Dayton

Whenever someone shows up for work it is generally expected that the company has all of the supplies and resources to get the job done. If the company does not have the equipment, it is then expected that they will acquire it reasonably soon. This is not the case with doing field work in many areas in the world. 'Tool' is a four letter word that is just not used. With limited time and resources, local people get the job done. Then why shouldn't the college educated American? Dealing with language boundaries, cultural differences, and new friends was expected; but not doing a good job was out of the question. Coming from experience, there are issues that need to be dealt with in an ambitious and reserved manner. With this insight it is advised to go into an immersion trip prepared mentally and physically with tools. Expect set backs and prepare extensively before the trip. The ensuing challenge will not be soon forgotten.

Student Engineers Reaching Out: Community Based Research and a Survey of Technical Community Needs

Megan Schroeder, University of Notre Dame, EPICS

We introduce Student Engineers Reaching Out (SERO), an EPICS team at the University of Notre Dame committed to Community Based Research (CBR) founded in engineering curricula. Two SERO case studies highlight the framework, implementation, challenges, and shared benefits of CBR when coupled with engineering. For both studies we examine the application of Kolb's learning cycle. The first study demonstrates the progressive refinement of a single project and the second study involves completion of numerous varied projects for a single client. Based on the success of the case studies, a comprehensive survey of the local non-profit community was undertaken. The overwhelming magnitude and variety of technical community needs are presented as opportunities for additional CBR projects in engineering curricula.

From Grey to Green: A Greywater Reuse System for Edendale Valley School. South Africa Water Reuse Initiative (SAWRI)

Nikki Skrinak, The Ohio State University

This design project focuses on an option for water demand management in South Africa and aims to document a greywater reuse case study at the Edendale Elementary School in KwaZulu-Natal. During a 3-quarter capstone design experience inspired by a study abroad trip with the Department of Food, Agricultural, and Biological Engineering at the Ohio State University, students will design and test a natural filter for the treatment of greywater. The treated greywater is intended to replace the use of clean municipal water, a limited commodity in South Africa, in irrigating the school's surrounding community gardens. Greywater is generated from laundry washing, bathtubs, showers, or sinks and is collected apart from sewage and kitchen wastewater. The study intends to find that greywater reuse has the potential to lessen the school's dependency on municipal water and ease flooding due to improper greywater disposal. These results will emphasize the promise for water recycling and resource conservation without compromising public health or environmental quality. The ultimate goal of this project is to return to South Africa for implementation of the student's design.

Bringing Water to Cameroon, West Africa

Justin Forzano, University of Dayton

Justin Forzano traveled to Cameroon, West Africa to initiate collaboration with a non-government organization, the Organization for Sustainable Rural Infrastructure (OSRI). OSRI specializes in sensitizing communities on the importance of potable water as well as developing the physical and social infrastructure of developing rural communities in the South West province of Cameroon. In doing so, OSRI has constructed water supply schemes, bridges and community buildings and organized community development committees to promote social awareness. Forzano traveled to existing project sites to study the structure of rural water supply schemes and understand the importance of a completed water supply scheme and the essential role it plays in developing rural communities. Meeting with traditional chiefs and village notables allowed for a better understanding of how the people directly benefit from the implementation of a water supply scheme, from beginning studies and committee-organization to the construction of actual piping and filtration schemes. His work with OSRI allowed him the opportunity to execute feasibility studies for one water supply scheme. The feasibility studies included initiating a study of the water source, completing a topographical survey of the surrounding environment, and collecting information from the people to assess the individual needs of the community and estimate a population increase that will occur once the water supply scheme is complete. Forzano learned about the internal structure of OSRI and the problems that they currently face. A serious lack of funding prohibits OSRI from continuing to achieve its goal of promoting social justice and eliminating poverty in the South West Province of Cameroon.

Solar Cooking in Nicaragua

Lori Hanna and Eric Urban, University of Dayton

Through The University of Dayton ETHOS Program, two students lived and worked in the small, rural community of Sabana Grande, Nicaragua for eight weeks during the summer of 2006. Living with host families, they learned to live without electricity or running water. They also gained valuable experience in conducting technical research despite language and culture barriers. Under the leadership of the NGO Grupo Fenix, they researched and promoted solar cookers. The cookers were a simple box design, heated by passive solar energy. Their work included leading the construction of an improved cooker and testing it in actual conditions against old models. The key design improvements did, in fact, increase the cooking temperature capacity of the cookers. The students also researched a new use of the solar cookers, invented by the women who use them—solar coffee roasting. Roasting coffee in a solar cooker, as opposed to over a fire, produces better and more profitable coffee, according to the women who use and sell it. The experience benefited many parties, in addition to the students and their personal growth as engineers and as humans. Their work exposed the local people of Sabana Grande to scientific methods and thus increased their skills in these areas. In addition, the memories from the experience have served to raise awareness at home, through local presentations and discussions.

Solar Dehydrator

Brendan O'Grady, University of Dayton

The solar dehydrator is an example of appropriate technology. In many developing countries appropriate technology provides solutions. As a service project a group of students traveled to Mt. Vernon Kentucky to ASPI, an appropriate technology institute, to build a solar dehydrator. A solar dehydrator is a device that is used to dry fruits, vegetables, herbs and other items. There are two sections to a solar dehydrator, an angled surface to for the sun's rays to enter and a top compartment to hold the items being dried. The sun's rays enter through a transparent surface hit a black board inside. This heats the air, causing it to rise into the compartment and the heat flow dehydrates the food. As the air cools it recycles back down the device to be reheated. The purpose of this project was to educate and increase awareness of appropriate technology in the Appalachian region.

Using Engineering to Partner with a Developing Community for a Better World

University of Cincinnati, EWB

Our student chapter of Engineers without Borders, if chosen, will be presenting on several key ideas that are directly related to engineers for community service. Our plan is to have a few members present using the visual aid of a PowerPoint slideshow about our own community service project and our organization. We will start by introducing ourselves, and then explain what Engineers without Borders stands for including the mission statement, a brief history and highlights of the national organization. We will then move on to our chapter's structure, history and reason for existence. Our presentation will include our beliefs concerning the importance for students to get involved in organizations like ours. This organizational bio and advocacy will make up the smaller portion of our presentation. The main focus of the presentation will be our current project. The topic will then shift to the water abstraction, storage and distribution system we are designing and will assist in constructing in Nyando, Kenya. By the date of the conference, our group will have recently returned from the first trip to Kenya. Our presentation will have plenty of good pictures and fresh anecdotes about rural Kenya and the desire for water. We will discuss our feelings as to why it is so important for us to collaborate with this village on this project. Also, we will discuss the methods (engineering, management and fundraising) we are implementing as well as some of the obstacles in our path and troubleshooting needed to complete our project. We will conclude by sharing how we have grown as an organization and what we have learned about engineering service work.

The Design and Development of a Low Cost Wood Moisture Sensor

Nicholas Hoffman, University of Dayton

Wood moisture content (MC) is an important factor in determining the efficiency of wood burning stoves. Issues such as deforestation, pollution, rising fuel cost, and global climate change can be mitigated by improving combustion efficiencies. There are more than two billion people who rely on wood for cooking; as a result, improving wood combustion is an important task. Wood moisture content is a measurement of the water moisture contained in wood and is defined as a percentage of the wood's dry mass [1]. Direct measurement methods and electrical measurement methods exist for determining wood MC. Direct methods are time-consuming and impractical for field testing. Electrical methods are fairly accurate, provide an instantaneous reading, and are non-destructive. Unfortunately, the cost of commercially available electric moisture meters can be prohibitive to many non-profit research organizations such as Proleña [2]. A low cost method for determining wood moisture content was developed. A simple voltage divider and buffer circuit was used to calculate the resistance of the wood. The correlation of wood resistance to MC is species dependent and was used to calculate the wood MC. Accuracy was improved by including a temperature compensation coefficient. Initial measurements were performed to validate the circuit design. Plans for further species characterization have been developed.