HUMBOLDT STATE UNIVERSITY

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Environmental Resources Engineering

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ERE TEAMS ARE MERITORIOUS WINNERS AT 2010 MATH MODELING CONTEST

By Brad Finney, HSU Professor

The results are now official, and the two HSU ERE teams have each earned a Meritorious Winner award for their entries in the 2010 Consortium for Mathematics and Its Applications (COMAP) Mathematical Modeling Contest. The contest ran from February 18 to February 22, 2010, with teams competing from US and foreign universities. Each team prepared a report detailing its solution to one of three possible modeling problems.

The team consisting of Cailan Halliday, Adam Howell, and Jake Woodbury competed against 2,254 teams. Their report addressed the problem of providing a local police agency with a method to aid in their investigations of serial criminals. The approach they developed was required to make use of at least two different schemes to generate a geographical profile of serial crimes and provide a useful predictive tool for law enforcement officers. Their entry received the Meritorious Winner Award, scoring in the top 20 percent category, with only 21 teams scoring in higher categories.

The team consisting of Claudine Custodio, Jason McClelland, and Brett Vivyan chose a different problem, and competed against 356 teams. Their report addressed the complex issues stemming from the presence and accumulation of debris in the Pacific Ocean ("The Great Pacific Ocean Garbage Patch"). They were required to develop a model that could be used by researchers and government policy makers to understand the severity, range, and potential global impact of the "Patch." Their entry also received the Meritorious Winner Award, scoring in the top 15 percent category with only 10 teams receiving higher scores.

Nice work!!!! Thanks for giving your time and doing such a great job representing the Environmental Resources Engineering Department!

See related article "Serial Murderers Found!" on page 10

(From left-right) Brett Vivyan, Claudine Custodio, Jason McClelland, Cailan Halliday, Adam Howell, and Jake Woodbury.

IN THIS ISSUE

FROM THE EDITORS

Hello from the messenger staff! We hope you enjoy this Spring 2010 edition.

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"People demand freedom of speech to make up for freedom of thought which they avoid."

- Soren Kierkegaard (1813-1855)

Alumni Profiles

Christine Backman
B.S. ERE 2008
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The decision to seek a degree in Environmental Resources Engineering was easy. I always liked math, but a degree in Mathematics did not feel practical to me. I wanted to save the world. How could math do that? I attended a HOP orientation and was paired up with Mike Anderson. He told me about the Arcata Marsh and I was sold. I could save the world through math! Getting the degree, however, was challenging. I felt continuously pushed to comprehend, absorb, synthesize, and apply the material I was being taught. It has been to my great satisfaction that my ERE "skills" have been key to my professional success.

It took me five years to graduate Humboldt State University, even after transferring, with about a year's worth of general education. An extended graduation timeline was necessary for me to balance my family and academic life. I have two children who grew up on campus and they really helped me enjoy my time at HSU. Together we went to football games, attended Humboldt Music Academy, and other non-SciD activities. I took my time and would recommend that approach to anyone who thinks life is about the journey rather than the destination.

After graduation our family relocated to search for jobs. My husband, Justin, also an ERE grad, found a job developing drinking water facilities. He loved his hydrology and groundwater classes, so this was a perfect fit. We settled in Davis which was an easy transition from Arcata (If it only had an Ocean!).

It didn't take long for me to track down the company I wanted to work for, Davis Energy Group. The company is only a mile from my house and they specialize in building energy efficiency. Their basic job qualifications were an engineering degree, exemplary programming skills, eagerness to learn, and ability to manage projects and communicate with team members and clients effectively. The job included training in building energy simulation tools such as DOE-2, EnergyPlus, BEopt, and other programs. I feel I match their qualifications to a "T". I even had DOE-2 experience through the Building Energy Analysis class, which in my field is a sought-after skill.

I applied and got the job. This was in December 2008, well into the recession. I felt blessed that I had to submit only one resume and got a job when people were struggling and looking for employment for months. The justification I gave myself for this blessing is that getting a great job is the reward for all the hard work the ERE degree asked of me. All those problem sets, semester reports, and presentations were preparation for my career. I have used information I have learned from almost every class I took. My very first assignment on the job was to look at utility data between two sets of homes and calculate a 95% confidence interval. I was like, "Thank you Dr. Chamberlin;" I knew exactly how to do this.

My first piece of advice is to keep good notes; you will need them. My second is, don't take this time for granted, enjoy every minute and visit the beach often. Lastly, save a fun class (art or music, not anything where you might have to write a paper) for your senior semester, you'll need it.

Alumni Profiles

Frank Garofalow

B.S. ERE 1993
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I loved my time at HSU, and the skills I learned through the ERE degree assist me everyday. I graduated from HSU in December 1993. Chasing and catching love, I migrated to Australia almost immediately after finishing my degree. I was able to get a position with the Australian National Physics Laboratory doing computer support, but I wanted to work in the environmental field and I continued to apply for relevant positions that came up. I was eventually successful in securing a good job as Environment Officer with Wyong Shire Council.

Wyong Shire Council is equivalent to a county local government in the US, and covers a large coastal area with a forested hinterland, urbanized coastal plain and three large estuarine lakes. I was responsible for all environmental management activities including estuary management activities, water quality testing, native vegetation management, and stormwater/urban runoff issues.

While working there, I completed a Masters of Science in Environmental Management at the University of New England. The focus of my studies was native Australian ecosystems management. In particular, I studied threatened species management and ecosystems restoration.

I moved on from Wyong Shire Council to Blue Mountains City Council where I am presently employed. It is located in a World Heritage listed area of amazing beauty and environmental significance. I hold the position of Manager, Environmental Management Branch. The Branch has a staff of 60 and an annual budget of $25 million. The core responsibilities of the Branch are Waste, Natural Systems, and Bushfire and Emergency Management.

In terms of Waste Management, the Branch has a weekly collection of domestic waste, recycling, and bulky waste, and it provides a green waste chipping service to 30,000 residences. We also manage two open and two closed waste management facilities. The Natural Systems Section manages 22,000 hectares of native bushland. Primary natural systems programs include weed control, native vegetation and threatened species management, water quality testing and streambank restoration, and nature based recreation management. The Bushfire and Emergency Management Section is responsible for emergency preparedness and response, mechanical and prescribed burning fuel reduction, and fire mitigation planning.

Hartmut Fischer, Ph.D.

B.S. ERE 1989
Manager, Strategic Projects
Deutsche Bahn
Frankfurt, Germany

I came to HSU from Germany because of the environmental focus of the undergraduate engineering program and its ties with Campus Center for Appropriate Technology (CCAT.) I followed my BS ERE with a Masters in Engineering Management at Stanford University. After graduation, I moved back to Berlin and worked, first with Kienbaum Management Consulting and then Arthur D. Little, for a total of 13 years. The main focus of these years was developing and marketing "Zero Loss Management", a management tool for generating win-win-effects for profit and environment by reducing resource losses (materials, water, energy) in manufacturing and product distribution. This was also the subject of the Ph.D. I completed while working. I also consult with federal and state environmental agencies on performance improvement, and with East German companies after reunification.

In 2003, I joined Deutsche Bahn to build and lead its in-house management consultancy, which I do now. With 240,000 employees, Deutsche Bahn provides regional/long distance passenger services by rail in Germany, cargo services by rail/truck in Europe and by ship/plane services worldwide, and operates the German rail infrastructure. We support top management in its key agenda, increasing competiveness relative to other rail/bus operators, shifting market share from road to rail and building a strong European rail network. With 50 consultants, we compete directly with McKinsey, Bain and others.

Family life is my main focus outside of work. My wife is Italian, we have two sons of our own and a foster daughter. I also like to be outdoors, make and listen to music and follow politics.

The ERE training gave me a quick grasp of engineering facts relevant to management decisions and a good analytical basis for professional work. The ERE professors were important role models to me, in their dedication to students and having positive impact in the real world. Generally, the time I spent at HSU was formative for me, and some friendships made then continue today.

To ERE students, I would like to pass on that your first professional choice will likely not be your last one, and following your passions in these decisions – instead of preconceived career paths – will help you maintain your energy, humour and job satisfaction.

The Evolution of Environmental Engineering

By Charles Chamberlin, ERE Professor

Many graduates of Environmental Resources Engineering are hired into positions titled "Environmental Engineer", where they work to maintain or improve water quality and to limit peoples' exposure to communicable disease and toxic chemicals in their communities. Although some believe Environmental Engineering is a new kind of engineering, it is but a new name for a type of engineering that was the child of the industrial revolution and which has been practiced for over 160 years.

Beginning in the late 1700s, Great Britain, followed by the United States and Europe, moved from human and animal powered economies to those based on machines powered by water wheels, and later by steam produced using coal. At the same time construction of canals, improved roads, and later railroads facilitated bringing raw materials to the machines and carrying the products to the markets. However, machines still needed people to maintain and manage them, which attracted vast numbers of men and women (and boys and girls as well) from the farms to manufacturing cities. The areas and populations of these cities exploded, some increasing by a factor of 10 or more within 30 years.

The water supplies and waste handling systems of these cities were not prepared to handle such populations. This resulted in routine epidemics of typhoid in the summer, periodic epidemics of cholera, skyrocketing infant and child mortality due to dysentery, pneumonia and tuberculosis due to crowding, and devastating fires. Led by sanitary reformers like Edwin Chadwick and John Snow in the 1840s and 1850s in the UK and Lemuel Shattuck in the 1850s in the U.S., the Sanitary Revolution adhered to three tenets: 1) communicable disease is primarily the result of the lack of good drainage, refuse removal, and a clean water supply; 2) public health problems are fundamentally engineering rather than medical problems; 3) efficient and consistent application of engineering knowledge and techniques can economically reduce disease.

Over the next 50 years, Sanitary Engineers such as Ellis Chesbrough, Allen Hazen, and George Fuller, designed and built modern drinking water supply and sewer systems, inventing the water treatment systems we use today: sedimentation basins, coagulation and flocculation, rapid sand filters, disinfection systems, and many others. These engineers dramatically reduced the incidence and mortality due to typhoid and other diseases, sometimes by simply moving river drinking water intakes from downstream of sewer outfalls to upstream. More generally, cities that switched from using untreated to

Continued on next page

ERESA Coffee Table
(Where Everybody Knows Your Name)

by Kendra Miers, ERESA President

Just rode your bike to campus in a storm? Up until midnight last night finishing a lab report? Just sat through an 8am lecture with no coffee? Fortunately, there is a respite for weary travelers of the E.R.E. major. ERESA's coffee table is open from 8am to 1pm everyday for all of your yummy-in-your-tummy bagely goodness needs. The coffee table's 25 faithful servants each pull a one-hour shift per week to bring nourishment and warm caffienation to haggard and weary engineering students at HSU. Notable crusaders of the cause are: Coffee Table Coordinator , Craig Lorenc, and weekly shoppers Mattie Bossler, Nanette Nickerson, and Gabriel Salazar. You can always stop by in the morning to kickstart your day. Tell yourself you'll be better at multitasking through massive caffeine consumption!

Besides yummy fuel to keep you going through the day, hanging at the coffee table can also get you:

>A not-so-brief lesson in linear algebra and finite difference approximation, with a touch of fluid dynamics or any other subject, courtesy of Craig (the Craig-u-lator), whose weapons of choice are a marker and the fishbowl windows,

>Into a quick orange peel free throw tournament,

>Invaluable homework and test advice from the upperclassmen (and women),

>A buddy or three to walk with you up the hill to Founders' Hall,

>A place to blow off steam about that last exam!

Some of our gourmet selections include Parmesan bagels, artichoke tapenade, sundried tomatoes, and chocolate muffins. The table is the main fundraising effort for ERESA, so stop by often for food, friends, homework help, and laughter. Stop by enough, and we'll greet you by name!

Ode to the Coffee Table

ERE's giant table of food
To not stop by would just be rude,
The coffee here is always hot
And equations are taught
With snacks to suit
any mood!

(Continued)

treated drinking water (by building a modern drinking water treatment plant) could expect reductions of typhoid mortality rates of up to 85% in a single year.

But the success of Sanitary Engineers in reducing the death and suffering due to communicable disease resulted in contamination of rivers, lakes, and coastal waters with vast amounts of organic matter from sewer discharges and the resulting creation of dead zones due to zero or low dissolved oxygen. At the U.S. Public Health Service, Earle Phelps began to study the rates of deoxygenation of rivers in 1906. Beginning before the U.S. entry into World War I, Phelps and Harold Streeter studied oxygen and biodegradable oxygen demand (BOD) levels in the Potomac, Ohio, and Illinois rivers and developed a mathematical model of the dissolved oxygen (DO) Sag Curve that they published 7 years after the end of World War I.

In 1947, soon after World War II, Clair Sawyer began to investigate eutrophication of lakes caused by excess phosphorus loadings due to discharges of treated sewage. In 1962, Rachel Carson's Silent Spring was published, enlarging the scope of environmental concerns to the effects of DDT and other manufactured toxic chemicals in the waterways and ecosystems. Both events set the stage for the environmental movement which expanded the understanding of a myriad of environmental problems that only engineers could solve.

Although the name Environmental Engineering is only about 50 years old, innovative and conscientious engineers working since the early 1800s blazed the way in protecting human health and our environment. Our field is young, but its heritage is deep and rich. And as new challenges to the health and well being of both humans and our environment arise, the meaning of "Environmental Engineering" will continue to evolve.

Fall Follies

by Izzy Konopa, ERE Student

Every fall, Environmental Resources Engineering Student Assn. (ERESA) and Society of Women Engineers (SWE) sponsor a Thanksgiving potluck dinner for students, faculty, friends and family of the ERE department. Entertainment ranges from student bands and comedy skits to ERE Jeopardy. This is also the time when new officers are elected to ERESA. For many, it is a fun night where students and faculty get to enjoy food and fellowship together, outside of the classroom.

This year Fall Follies was held at the Arcata Lutheran Church at 151 East 16th street in Arcata, right next to the HSU campus. Preparations began early in the day when SWE showed up with the decorations and some ERE students prepared turkey and mashed potatoes in the kitchen. Soon, people began showing up with side dishes, dips and desserts. There were pies, cookies, sushi, stuffed mushrooms, anchovy garlic dip, and a host of other tantalizing treats. Everyone dug in and many went back for seconds…and even thirds. After the feast, the sound of music began to fill the hall and we were all treated to some fantastic music by Brett Vivyan and the Brett HarteBreaker Band.

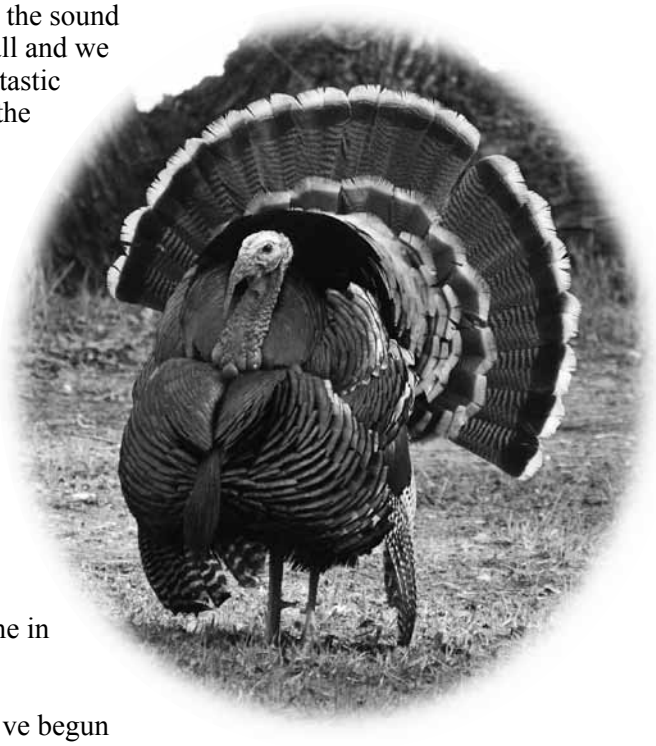
After the live performances and applause died down, it was time for some ERE Jeopardy. Students broke into teams and our host, Kendra 'Trebek' Miers, got the game going. Categories ranged from absurd to hilarious with such thought provoking questions as:

"How can you tell you've been spending too much time in Science D?"

One team's response: "You've begun programming the microwave in a do loop."

ERESA elections followed right after Jeopardy. Votes were tallied and new officers were elected into ERESA: Kendra Miers as president, James Defenbaugh as Vice President, Izzy Konopa as ASCE Liaison, Mattie Bossler as Treasurer, and Annie Bartholomew as Secretary. Soon the food was all gone and the crowd began to break up. Some people left to go bowling while others stayed behind and cleaned up.

Overall the night was a great success. First year ERE student Charles Swanson had this to say about Fall Follies, "It is a really good place for all levels of the ERE department to get together and socialize. My favorite part was when Professor Beth Eschenbach and her 7-year old daughter got on stage and played a song together. The live music was definitely a highlight." Fun was had, friendships were formed and nobody got hurt, save for the turkeys.



Funding Students' Green Ideas

By James Robinson IV, ERE Student & HEIF Manager

The Humboldt Energy Independence Fund (HEIF) has had a successful couple years. This fund began from the conceptualization of ERE Graduate Michael Winkler, a research engineer at Schatz Energy Research Center, and an Arcata City Council representative. The fund was accepted by an 86% majority vote from the student body in the fall of 2007 and was officially implemented as a $10 per student per semester fee increase as part of tuition with the help of President Richmond and CSU Chancellor Reed. The first project proposals were written and accepted in the spring of 2008. Since then, seven out of ten proposed projects have been implemented, with more proposals being written each semester.

The mission of HEIF is to reduce the environmental impact of energy use at Humboldt State University through student driven projects. Our five main goals are to (1) encourage strong student involvement, (2) measure and report quantitative and qualitative results, (3) connect HEIF's project to university curriculum, (4) disseminate information and (5) publish accomplishments and experiences through a variety of media – including the ERE Messenger!

Out of the implemented projects thus far, one highlight includes the first project to be proposed and implemented by students: an ethernet connection of the Solar Radiation Monitoring Station (SoRMS) to transfer data collected directly to a database managed by the National Renewable Energy Laboratory (NREL). SoRMS gathers data to provide a more local understanding of the sunlight, both diffuse and direct beam, that reaches the ground in Arcata. This unit sits upon the HSU library roof and feeds data to NREL and the Renewable Energy Student Union (RESU) website (resu.humboldt.edu).

Another project highlight is a 10.5 kW PV solar array sitting atop the Old Music Building on the north end of the Art Quad (Music A on the campus map). The public display is seen while walking toward the Clock Tower on the Main Quad. The north side of the array will soon have a mural project hung there that can be seen from the Quad. What you see currently was implemented last summer, almost a year and a half after being proposed. Although it was accepted at the same time as the SoRMS upgrade, more bureaucracy was required to implement it due to the decision to hire student laborers under prevailing wage. HEIF's strong mission of student involvement encourages students to help implement projects which often requires paving new channels through the university system. HEIF actively tries to create student jobs; we currently have three permanent positions and have had four temporary positions in the past. We are lucky to be a part of a university with such a unique and innovative program.

A project recently completed was a colossus of planning and cost: the Redwood Bowl Relight, which became a larger project than anyone anticipated. Now with a lower power requirement, the Redwood Bowl has more lumens on the field than before due to the angle of the lights and more efficient reflectors. The project saves 61,000 kWh per year and it also prevents light from being wasted to the sky for the rest of Arcata to see; not to mention that the new poles and hoods add much more aesthetic value.

Other projects worthy of mention are the solar hot water panels on the roof of CCAT, and a set of Hydration Stations in the Depot and the KA building that will be supported by a series of videos in Ann Alter's class to encourage the use of reusable water bottles. Also, soon to come: a project to save building-wide energy from a retrofit of the Heating, Ventilation and Air Conditioning (HVAC) system of Science D and the replacement of airblade electric hand dryers in the set of bathrooms on the main floor of the Library.

For those students interested in leaving a long-lasting legacy on campus, we encourage you to take advantage of this program. There will be another round of project proposals accepted in the fall, with a kick-off session around the middle of September, and proposals due middle of November. We are pioneering the idea of an energy independent campus, and inspiring other campuses to follow our lead!

Please visit our website at www.humboldt.edu/~heif

Kayaker Extraordinaire

by Scott Ligare, ERE Alumnus

At first blush, my path toward pursuing an advanced degree in Environmental Engineering with a concentration in Water Resources may seem an unlikely one, but it's a journey I've been on my entire life. For as long as I can remember, I've been fascinated with problem solving, water, and fluid motion. Whether the goal was to descend an unexplored river canyon deep in the Himalayas with my kayak, or earn a degree in Environmental Resources Engineering from Humboldt State University, I've pursued these objectives with rigor and fascination. My curiosity about the dynamics of moving water has been the driving force through both my academic and professional kayaking careers.

At the age of 15, I began whitewater kayaking on the Weber River in Northern Utah with a group of friends who are still some of my best friends today. When we were all 16 my friend Nick bought a 1976 Volkswagen bus that he used to drive us and our boats to the rivers, greatly increasing the number of rivers we could explore. Every weekend we drove to rivers in Wyoming, Idaho, and Montana, camping out and returning with stories of both success and carnage. In the summer of 1996, at the age of 19, we made our first kayaking trip to California. We drove through the Sierras, paddling the most scenic and difficult whitewater rivers we had ever seen along the way. Our guide was the essential text, *The Best Whitewater in California*, by Holbeck and Stanley. My desire to move to California grew as I returned home to the dry desert of Utah after the epic adventure. One day, while flipping through the pages of Holbeck and Stanley, I saw that there were many winter whitewater runs on the North Coast of California that would allow me to paddle year round and go to school in the same location. The next year I moved to Humboldt to paddle and study at HSU.

My father is a passionate photographer, and during the time I was attending HSU he taught at the Brooks Institute of Photography in Santa Barbara, CA. He gave me a digital camera in 2002, and photography has since become another passion of mine. Upon graduation from HSU in 2003, I was offered a job teaching Photography and Videography for World Class Kayak Academy, a traveling school based in Missoula, Montana, which I accepted for 3 semesters. This position allowed me to combine my passions of kayaking and photography.

To my surprise, people continued to pay me to photograph rivers and "river life" after I left World Class Academy, so I started a photography business on the American River near Sacramento, shooting rafting photos from my kayak. The commercial rafting season on the American River is primarily May through September, leaving me with 7 months per year to travel. Taking advantage of this travel time over the years, I traveled with my kayak and camera to places like Ecuador, Peru, Chile, Argentina, Croatia, Bosnia, Kyrgyzstan, Uganda, Kenya, Tanzania, Nepal, India, Mexico, and Canada. Pieces fell into place for me along my journey, and I co-produced an award winning documentary film about the impacts of large-scale hydropower development in foreign countries titled The Last Descent. Something I have learned is that when you follow your passion, doors naturally open and things always seem to work out.

After traveling to different communities around the world and watching the way water resources are being developed, I decided to return to Engineering. Water resources development is occurring worldwide, in many instances without the consideration of environmental impacts, without preserving some land and water for future generations. This inspired me to return to school to study Civil and Environmental Engineering at UC Davis with the hope of furthering peoples' understanding of human impacts on the environment and how with better policies and planning we can develop water resources, but preserve environmental values as well.

Σ

EWB and RESU Joint Project on Forks of Salmon School

By Rachel Williams, ERE Senior Student, EWB President

Over the past three semesters the Renewable Energy Student Union (RESU) and Engineers Without Borders (EWB) have taken on a joint project to address the energy needs of the Forks of Salmon School located deep in Six Rivers National Forest. The community of Forks of Salmon was originally established as a logging community, and it has remained as isolated today as it was then, if not more so. The remoteness of this small town is the source of the problem RESU and EWB were attempting to address. The town is off of the power grid, and with little motivation for power companies to link them up, much of the town faces the continued reliance on diesel for their energy. The Forks of Salmon School, made up of six individual buildings, recently took steps to increase the efficiency of their system by replacing their generators and batteries. They want to set an example for their community in energy efficiency and use of renewable resources. The three goals of the clubs were to perform an energy audit to determine the community's greatest room for improvement in energy efficiency, evaluate the potential for solar panels, and design the system.

This process required two site visits done last summer. We performed the energy audit, collected solar path finder data and diesel consumption data. The energy audit was used to determine how the school would best reduce their energy consumption. Numerous incandescent light bulbs in the buildings, the proverbial 'low hanging fruit' for energy use reduction, can be replaced with CFLs. The buildings also maintained three refrigerators and four large capacity freezers for school and community use. By replacing two refrigerators and three freezers as well as the light bulbs, Forks of Salmon School stands to reduce energy use by approximately 55% from 206 kWh/day to 93 kWh/day. The cost of the replacements would be approximately $7,500, which the school will seek grants to provide. Evaluation of the solar pathfinder analysis found that panels on the classroom roof could provide an average of 40 kWh/day when school is in session, and 62 kWh/day during the summer months. While the solar panels could not entirely offset the use of diesel, when implemented these changes could reduce diesel costs significantly, as well as decrease the risk for diesel spills due to the difficult transit to the remote location.

Although the project is not finished, both groups learned a lot about working with communities to which they do not belong. As well as being culturally different from Arcata, Forks of Salmon has social and political structures with which we were unfamiliar. Unfortunately, we discounted some of these differences before visiting the community. We found that some individuals did not welcome various ideas for energy reduction at Forks of Salmon School and that those individuals who spoke for the community did not speak for everyone. As a result we quickly learned the value of striving to address an entire community before beginning a project. In retrospect, the first task of our visits should have been organizing a community meeting to discuss project ideas. Had we done this, I am confident that support for energy reduction at the school would have taken a less turbulent path.

As a service learning project, the Forks of Salmon School energy analysis provided RESU and EWB students with experience that we would not have gotten in the classroom, as well as helping a remote community improve their quality of life. We hope that the implementation of this project can stand as a positive example for the rest of the community.

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Field Notes from a Part-Time Lecturer

by David Kuszmar, ERE Assistant Professor

When I joined the faculty of the ERE department in Fall 2008, less than 10 years from my own graduation from HSU, I expected practically everything to be different from the way it was when I was in school…

I expected that students would have done away with rushing to meet deadlines, super-late-night study sessions, and ill-advised dietary choices due to lack of funds. I imagined myself striding across campus and graciously nodding to nervous scholars, sipping exotic teas while listening to classical music during my office hours, and dining weeknights with colleagues at the finest Arcata restaurants.

I pictured Mike Anderson and me amusing ourselves by sliding clever solutions to advanced mechanics problems under each others' office doors. Margaret and Beth would most likely flatter me with stories about how much they enjoyed having me as a student in the program years ago. Brad and Robert would teach me their secret handshake and forgive me for having never successfully compiled a working finite element program in FORTRAN.

My wild imagination did not imagine things exactly as they would turn out to be, and over the course of the last four semesters of my teaching career I have had the following revelations:

(1) The life of a teacher strongly resembles the life of a student.

I quickly realized that working as an ERE instructor is not easy, rarely glamorous, and never routine. My typical week as an instructor now seems hardly distinguishable from my typical week as a student 10 years ago. My life revolves around a class schedule and I am required to do a ton of homework. I still rush to complete my assignments on time and occasionally have to beg for deadline extensions. I still get locked out of campus buildings by accident, I'm not guaranteed a parking space, and I live in fear of the latest dorm flu!

Based on these facts, the only significant difference between my life as a faculty member and my life as a student is that I now have access to free office supplies, a copy machine, and a mini-fridge.

(2) I must be getting old.

I planned to capitalize on my youth and enthusiasm to win the favor of my students. Surely, I could parlay these attributes to build my reputation as a relatable instructor, uniquely in touch with today's university student. Sadly, over the course of just a few weeks as an instructor, my presumed connection to today's youth was tested and ultimately disproved.

For example, many times I found myself walking the halls of Science D clumsily attempting to converse with students listening to their iPods. Half of the students I approached wisely pretended not to notice me. The other half politely removed their earpieces only to find I was just making idle chit-chat, thereby exposing my lack of awareness for modern iPod etiquette.

Perhaps even more alarming were the occasions I caught myself saying the same things to students that my instructors used to say to me when I was in school:

"Skipping class to finish your homework is not a wise choice." (C. Chamberlain)
"Where's your coordinate axis?" (M. Anderson)
"Didn't I just answer that question five seconds ago?" (B. Finney)
"You need to get your act together." (B. Trush)

It is my theory that these brushes with justice are the product of a curse placed on me some time ago by one of my former instructors – perhaps even one of my current colleagues – to someday become a teacher and have a roomful of students just like me.

(3) Our students are learning more than they realize.

Since earning my degree at HSU, I have not been shy about my love for the ERE program. I believe its curriculum, and faculty, and the school's natural surroundings combine to produce a special academic experience for students. However, until given this recent opportunity to serve as a part-time faculty member, I don't believe I truly grasped how special my own experience was – and how much of that I owed to my professors.

There were indeed times in my academic career that I doubted the value of the work I was being asked to do. At times I felt unnecessarily busied by my instructors, and I grew weary of all the group work that was required to get things done. Despite these occasional misgivings, I chose to put my head down, to accept the word of my professors, and to work through the ERE program as it was fed to me.

Looking back, I now recognize what my professors and the program were carefully (but silently) teaching me. They were teaching me that diligence, and heart, and humility would be required to do my job. They were teaching me that an engineer's greatest asset is his ability to communicate – in writing, in drawing, in speaking. They were teaching me that most real projects are group projects – and you don't get to pick your team members. And finally, they were teaching me that no matter how long I work in my chosen field, I could always use more practice.

SERIAL MURDERERS FOUND!

By Jake Woodbury, ERE Senior

Murder was the Case They Gave Us
Thursday, February 18. Two teams were waiting for the COMAP (Consortium for Mathematics and Its Applications) website to load. At exactly 5 pm, three problem statements were posted. The teams began immediately by choosing a problem based on interest and gauging the amount of information available. This year's problems were: 1) Model one aspect of the high plastic concentrations occurring in the Northwest Pacific Ocean, 2) Mathematically determine the sweet spot on a baseball bat, and 3) Develop a geographical profiling technique which can be used to find the location of a serial criminal. Cailan Halliday, Adam Howell, and I (aka Team Control # 8197) quickly agreed that baseball bats aren't worth thinking about, ruling out problem #2. The possibility of modeling plastic degradation in the ocean was debated. However, as environmental engineers we were bored with "saving" the environment through Fortran programs. Thus, with deer stalkers atop our heads and calabashes hanging loosely from our mouths, we set off to the crime lab (HGH conference room) to develop a geographical profiling model capable of predicting the whereabouts of serial murderers Peter Sutcliffe and Richard Ramirez.

Mind of the Criminologist
Friday, February 19. Ten hours into the competition, the team was scanning through journals on geographical profiling methodology and serial criminology. Our research revealed that geographic profiling utilized "center-of-mass" techniques to predict the anchor point of a serial murderer, equations similar to those used in statics. Rather than considering the continuous weight distribution of a steel plate, the geographic coordinates of discrete murder locations are the weight and the center of mass represents the likely anchor point (home base) of the serial criminal. Another approach utilized probabilistic density functions, such as normal and lognormal, to describe the most likely area of the killer's residence. The geographic profile output is a topographic or contour image superimposed over a map of the crime region, indicating to law enforcement where to allocate resources to find the criminal.

By 2pm we had a method outlined, and between Friday afternoon and 4:55 pm on Monday evening we: collected geographic coordinates of serial murders from the Peter Sutcliffe and Richard Ramirez cases, developed a Fortran program to determine the serial murderers' anchor point using five "center-of-mass" techniques and a probabilistic approach to create a geographic profile, and wrote a 15-page report describing the approach. The work days were long and hard. We carried on through the nights fueled by coffee, donuts, and an insatiable thirst for justice, until our model was accurately predicting the locations of the two psychopaths.

Our model prediction is presented as a contour plot outlining the most likely area for Peter Sutcliffe's anchor point. The discrete points indicate the known crime scenes, the "center-of-mass" anchor point predictions, and the known anchor point. Using the contour map, law enforcement would be able to focus their search within 15 km of the killer's home. Using the discrete prediction locations, law enforcement would be searching within 0.5 kilometers of the killer's home.

The Chase
Monday, February 22, 4:30 pm. We were rushing out of the HGH conference room to print out our report in Sci-D. The model results were complete and the document was written. The last remaining task was to hand two hard copies to the team adviser (Brad Finney), burn a copy to a CD, and email a copy directly to COMAP no later than 5 pm that Monday.

We landed in the back row of SD-23 where Brad was finishing a Computational Methods Lab. As we attempted to compile the report with the required COMAP title page, LaTeX decided to shift our report summary off the page and into the land of Narnia. As Adam and Cailan (two wizards of this cryptic type-setting program) chased down the formatting error, I sunk into my chair and watched my pointer finger twitch to the rhythm of the blinking cursor from my computer screen. We had been working for 33 hours straight. Overwhelmed by the possibility of losing the most important portion of our report due to a LaTeX compiling error, my input in the last 10 minutes of the competition consisted of worthless remarks, "Why the F*#! did we use LaTeX! This is NOT saving us time. $&#%*$#!n@ LaTeX!". Brad Finney was leaning casually against the wall, hands in pockets, watching us with a smirk on his face. Within five minutes of the deadline, LaTeX was forced to cooperate and the document was successfully submitted to COMAP.

Hind Sight
Looking back on the competition I would make the following suggestions: Do not use LaTeX! Trying to find a compiling error (e.g. a missing bracket) by the end of the competition may be more than your brain can handle. The judges don't care how beautiful your document is, they are interested in content. Spend more time writing a good document and interpreting results than developing the model. The judges are interested in a well developed analysis, not a complex computer program. Don't be intimidated! Take part in the competition even if you aren't super strong in math. A group only needs one math nerd to be successful. Finally, the math modeling competition is one of the best experiences I have had as an engineering student at HSU and I recommend it to all EREers.

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Get Involved: ERE Clubs Information Board

Compiled by: Luke Armbruster

Organization	2009-2010 Activities	Upcoming Plans
Society of Women Engineers (SWE) Email: swe@humboldt.edu Webpage: http://www.humboldt.du/~swe/	• Hosted calculator tutorial to introduce students to graphing calculator functions • Outreached to the Girl Scouts and children at Freshwater Elementary Science Night to encourage the pursuit of engineering as a career • Hosted Lego competition and sushi night (SWEshi) to increase student involvement in club	• Organize Fall fundraising efforts for club expenses • Outreach to middle to early high school girls to encourage engineering as a potential career • Attend national and/or regional SWE conference
Environmental Resources Engineering Student Association (ERESA) Email: eresa@humboldt.edu Webpage: http://www.humboldt.edu/~eresa/	• Organized pizza with professional engineers night, resume & cover letter workshops, and mock interviews with professional engineering firms • Members attended WSCL-ASCE workshop • Restructured meetings to include food and updates on all ERE club activities • Planned Fall Follies and Welcome Back Pizza Night for student enjoyment	• Organize more professional development activities: mock interviews, workshops, and other professional engineering networking opportunities • Provide students with more unique, fun activities: rafting trip and food gathering
Renewable Energy Student Union (RESU) Email: resu@humboldt.eed Webpage http://resu.humboldt.edu/ Project Descriptions: http://resu.humboldt.edu/?q=node/1	• Developed a circuit to monitor and report voltage for the EPA's People, Prosperity, and Planet grant to solve an electrical distribution problem in Bhutan • Applied for HEIF grants to reduce power consumption in library through replacing lighting, virtualization of servers, and reduction of paper towel waste	• Forks of Salmon School project (refer to EWB list) • Relocate an 80 ft. wind monitoring tower to a new site as part of a past P3 project • Submit a new proposal for the P3 program in Fall 2010: accepting ideas now
Engineers Without Borders (EWB) Email: ewb@yahoo.com Webpage: http://www.humboldt.edu/~ewb/home.html	• Welcomed first faculty advisor, Margaret Lang to the club • Designated the Events Field as site to monitor precipitation • Organized a poker night for ERE students to raise money for club • Planned a project to design and install a rain catchment system for a greenhouse on campus to begin assessing uses of water source.	• Install precipitation gauge and coordinate data collection with other clubs, and make data available for public use • Test pumping efficiency of a Ram Pump • Partner with RESU to complete an energy analysis of Forkes of Salmon School • Work with local professional chapter in their new projects in the Nicaragua sister city

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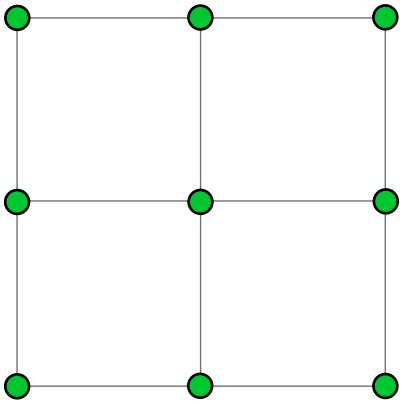
PUZZLE

Connect the Dots



PROBLEM:
Connect the nine dots shown above with four or fewer straight line segments, connected at their end point, and drawn without taking the pencil (or pen) point off the paper. Line segments may cross each other.

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