MESSIAH COLLEGE

Engineering News

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JOCILYN ERIKSON

Ben Friedline '04, Ray Diener, Erika Peterson '04, and Carl Erikson

Source of living water

By Erika Peterson '04

It is the goal of the Kekchi community to give their children a chance to develop their talents and skills to be used in an honoring way to God.

In January of 2002, I had a unique experience as a student. I attended a meeting with professor Carl Erikson and Mr. Ray Diener, president of Elizabethtown Crystal Pure Water, to discuss the possibility of starting a new engineering project at Messiah College. The proposed project would help students become aware of the global need for potable drinking water and encourage them to seek simple yet practical ways of addressing this global problem. Through God's grace and provision, Water for the World has been going ever since.

The mission of the project led Water for the World to Bezaleel School, located 20 minutes outside of Coban, Guatemala. The school was established five years ago to give the Kekchi people a chance to receive a junior high education founded in the love of Christ. Bezaleel is mainly run by the Kekchi people, with a little help from Mennonite Central Committee (MCC) missions when needed. The name Bezaleel comes from the book of Exodus and is the name of the craftsman that used his skills to build the tabernacle. It is the goal of the Kekchi community to give their children a chance to develop their talents and skills to be used in an honoring way to God. Bezaleel has an open atmosphere and is also used to train local pastors and teach missionaries the ways and customs of the Kekchi people. Because of the school, drinking water has become a great need. Currently, the kitchen boils water over a brick stove heated by wood, while the students use bottled water shipped from Coban. Bottled water can be costly in Guatemala, so it can quickly become a financial burden for the school to provide water for the students.

Water for the World learned of this need through MCC missions and devised a way to help. This past August, Water for the World sent a professor Carl and Jocilyn Erikson, Ray Diener, Ben Friedline '04 and me to Guatemala. I had the oppor-

continued on page 2 . . .

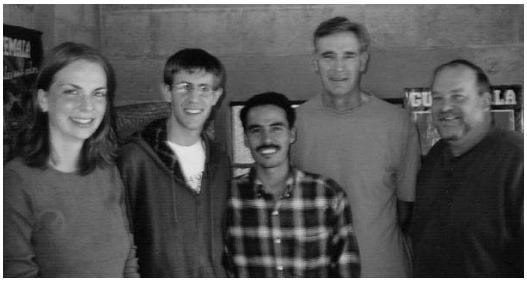
continued from page 1 . . .

Local Guatemalan

tunity to help discuss the application of a water purifying system that uses filtration and ultra violet light at Bezaleel. The school currently uses a 253-feet well with a known history of bacteriological contaminants. Two tests revealed 20 to 30 colonies of coliform to be present in the well, even after the system was shock- treated with chlorine. A single-phase- pump is used twice a week to fill a 30,000-gallon storage tank located on one of the surrounding hills. The storage tank provides protection for the well pump, while the elevation of the tank provides the needed water pressure. Adding an ultra violet light would eliminate the threat of bacteriological contaminants without leaving a taste residue like chlorine does. Thus, we recommended the ultra violet system.

While demonstrating our concept and talking about logistics of a system like this at Bezaleel, our team met Rovi. Rovi is a local health official who took us to other local communities to test their community water sources. This trip opened my eyes to the true need of potable water. Many of the sites had water that I wouldn't want to swim in, let alone drink. Though many sites may have pure water flowing into them, water contamination can occur from many sources, including the site itself.

The trip also showed me the hope offered by our project. Once the school's system has been up and running for a year, it can become an example to others of how to make water potable.



Erika Peterson '04, Ben Friedline '04, Rovi Ramirez, Ray Diener, and Carl Erikson

Meanwhile, Water for the World has its job set out for it. Devising an appropriate way to make an ultra violet system work in rural areas where electricity has not yet reached is our next big task. Through appropriate technology and a bit of engineering, we hope to devise systems for these communities. Most importantly, we hope to use the clean water as a way of spreading Christ's love for his people because He is the source of living water.

Interpreting in Guatemala

By Benjamin Friedline '04

I recently had the opportunity to accompany a group of engineers to Coban, Guatemala, to work on bettering the water quality in rural Guatemalan communities. I am not an engineer, at least not in the sense of how an engineer is generally perceived (e.g., mechanical engineer, electrical engineer, or civil engineer), but I did get a chance to do a different type of engineering — the construction of words and language through interpretation.

In the community in which we worked, the people spoke Spanish and Kekchi, a branch of the language of the ancient Mayans. I do not speak Kekchi, but through my knowledge of the Spanish language, I was able to interpret the words of the Kekchi people from Spanish to English for our group. Consequently, interpretation allowed us to work directly with the Kekchi people and a local health official so that we could easily gather the information that we needed.

Although my role was important as an interpreter for the group, it was no less important than the roles of the other members of the group. We all worked together as engineers of the Guatemalan reality to bring this project to fruition.

Student builds robotic surgical wrist

Lee Sverduk '04 builds robotic surgical wrist on research experience for undergraduates (REU) program at Berkeley

Recently, Lee Sverduk '04 was honored by three offers of admission to Summer Undergraduate Research Programs (SURP) sponsored by the National Science Foundation (NSF). He elected the Engineering Research at Berkeley (SURPERB) program sponsored by the University of California at Berkley.

This summer, I was at the University of California at Berkeley campus doing undergraduate research in the area of millimeter scale robots. I worked with Berkeley graduate student Ranjana Sahai under the supervision of Dr. Ron Fearing.

The National Science Foundation (NSF) sponsored the program to provide students with opportunities to gain research experience by working on projects alongside engineering faculty and graduate students. We took field trips to places like Intel and IBM, where we visited clean-room fabrication facilities wearing full "bunny" suits and talked with chief engineers about graduate school. While program directors at Berkeley want to motivate and prepare students to attend graduate school, for compensation, REU participants all over the country receive a stipend, housing, board, and reimbursement of travel expenses. As a result of my involvement, I will be second author to a paper published in Institute of Electrical and Electronics Engineers (IEEE) Intelligent Robots and Systems (IROS) New Orleans, La., April 26–May 1, 2004.

My research focused on millimeter scale robots, an emerging technology with great potential to support minimally invasive surgeries. The process of designing and constructing millimeter scale robots, however, is currently bottlenecked at the prototype stage. This stage requires numerous hours of work under the microscope or costly manufacturing by specialized companies; therefore, many new ideas are overlooked in favor of more dependable designs. It was my task this summer to test the process whereby the prototyping of a milli-robot can be completed on the desk of the researcher. This was centered on work done at U.C. Berkeley in the area of micro assembly and more specifically upon a paper that was written by my graduate student mentor. The aim of the work is to develop an efficient, and reliable, yet flexible, fabrication technique. I was to test these criteria by the construction of a prototype millimeter-scale, one degree of freedom (DOF), robotic surgical wrist. The design had been successfully constructed prior to my test, but I served as an outside party to demonstrate the efficiency of the prototyping assembly. Comparing this construction with that performed previously demonstrated the reliability of the system. Finally, the flexibility of the fabrication was tested through improvements we made on the wrist's design and our ability to implement these improvements.

The one-DOF surgical wrist was designed to enable minimally invasive surgeries. It allows surgeons 90 degrees

Lee Sverduk with his REU group at Berkeley

We took field trips to places like Intel and IBM, where we visited clean-room fabrication facilities wearing full "bunny" suits and talked with chief engineers about graduate school.

continued on page 5 . . .

Students build solar-powered boat

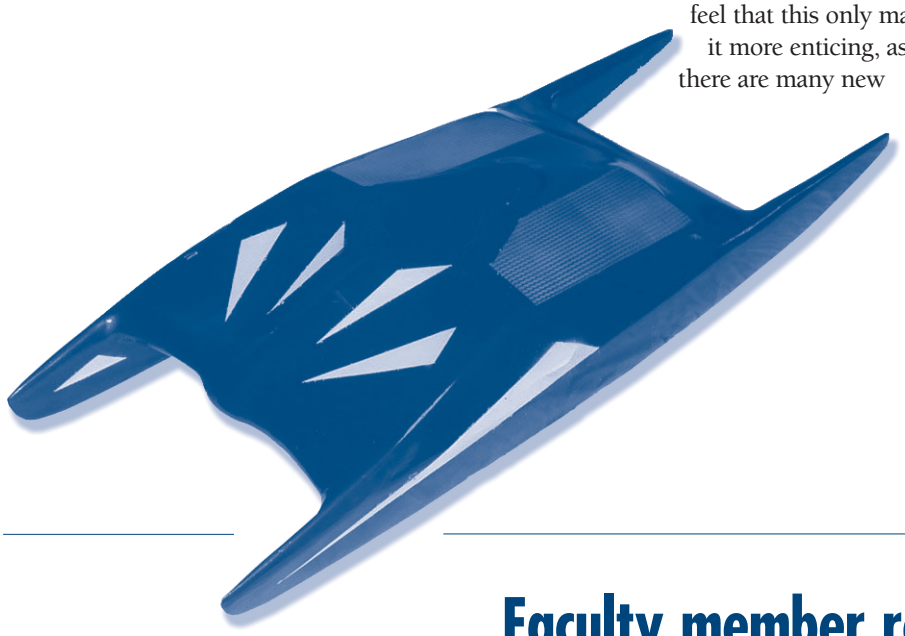
by Zach Eakin '05 and Nate Bird '05

The Department of Engineering is sponsoring a new project this year. Continuing in the tradition of the Genesis solar racing car, students are planning to build and race a solar-powered boat in the annual Solar Splash competition held each June in Buffalo, N.Y. Students responded very positively to the idea and a team was quickly formed. The project is being advised by Dr. Don Pratt, who has a good deal of experience with the previous Genesis projects.

Although this is Messiah engineering's first foray into the world of marine racing, the students running the project feel that this only makes it more enticing, as there are many new things to learn and new ideas to try. The Solar Splash consists of three competitions: the sprint (fastest time for 300 meters), the slalom (fastest time around a slalom course), and an endurance race (farthest distance in two hours). The Genesis II team's current plan is to build a twin hull catamaran-style boat that is approximately 12–13 feet long with a motor in each hull. Although the boat is still being designed, the team plans to use larger motors in the sprint, with hopes of hitting speeds in excess of 30 mph during that part of the competition, perhaps even breaking the current speed record.

The students have high hopes for the success of this project based on Messiah's winning tradition in solar events.

The project is currently in the research and design stage. Construction began in late October. The team's goal is to have the boat completed by the beginning of April for plenty of testing time on the water at Pinchot Park. The students have high hopes for the success of this project based on Messiah's winning tradition in solar events. They are anticipating many challenges, but have confidence that with hard work and creative thinking, they can overcome all the potential obstacles. Watch for updates as the project progresses.



Faculty member receives award

Dr. Don Pratt has received the 2003–2004 Messiah College Creative Teaching Award, which is designed to support a faculty member who takes the initiative to provide special attention to the teaching role of all faculty on campus. The award provides a load reduction, stipend, and budget for the faculty member to present a series of sessions intended to be interesting and helpful to the entire College faculty. Dr. Pratt will be presenting six sessions and three workshops on the subject of technology in the classroom. Sessions will focus on both software and hardware, including the use of BlackBoard, a software package that simplifies and facilitates many basic class functions, such as delivering course content to students, fostering discussion, and recording grades. Hardware topics will include the use of pocket PC computers for such things as time management and class demonstrations. Sessions will consist of a mix of panel discussions, group discussions, and presentations by guest speakers. Workshops will augment the sessions by providing hands-on opportunities for faculty to try out the technologies currently available to them at Messiah College.

continued from page 3 . . .

of motion (45 in each direction) in a one-DOF field near the end of their instruments. Currently there are wrists that are 10 millimeters in diameter; however, our final design was half that size (5 mm). While this design does not employ conventional machined mechanisms, it does involve multiple structures more readily miniaturized, such as hollow, triangular steel beams and polyester flexures; yet, due to their small size, they are painstakingly difficult to position and assemble. This difficulty includes all aspects of the construction, from the cutting of materials to the final wiring of strain gages. Through the use of such UC Berkeley rapid prototyping devices as the laser-cutting machine and the ortho-tweezers, I learned to cut and position the milli-scale parts with extreme precision. I am continuing this work at Messiah College for my capstone project in consultation with Dr. Fearing.

TO LOOK FOR SIMILAR SUMMER INTERNSHIP OPPORTUNITIES, *visit the NSF SUR website at http://www.nsf.gov/home/crssprgm/reu/start.htm and search for a program that offers research in your area of interest. Here are some tips I picked up from the program administrators at Berkeley for making a successful application:*

- Start early — deadlines for the NSF programs are very early in the spring semester. Transcripts, essays, and good letters of recommendation take time to obtain.
- Obtain letters of recommendation from your professors. Letters from professors carry more weight with universities than those of employers. In the application process, these recommendations are one of the most important elements to being accepted.
- Mention in your personal statement your desire to attend graduate school. SUR programs often have a secondary goal of recruiting you to their graduate programs. Knowing that you are interested in graduate education can improve your chances.

Department welcomes new technician

This fall, we welcomed Matt Walsh '00 as our new electrical and computer technician. Matt has been with us since June to fill the position vacated by Earl Swope '03, who received his bachelor's degree in engineering from Messiah College and became a product lines engineer at TB Woods. Matt has returned to Messiah College after graduating with emphases in both electrical and mechanical engineering. Most recently, Matt worked as an electrician for Spectron Electrical and as an electrical designer for Benatec Associates. Matt also served for six years before and after graduation in the U.S. Air Force Reserves as an arial port technician. Matt cites his experience with students involved in Dokimoi Ergatai — where he has served as an advisor, project manager, and mentor — as helping identify his calling to the Christian college campus. Matt enjoys working on technical problems with college students and discussing life issues with them, including what it means to be a Christian engineer in the world.

Graduate wins NCAA scholarship

Andy Vogel '03 was awarded an National College Athletic Association postgraduate scholarship, and is now a graduate student and teaching assistant in electrical engineering at North Carolina State University. While at Messiah College, Andy set a record for the most wins in men's wrestling at 152-14. He is a three-time All-American, three-time Academic All-American, and recipient of many other awards. Congratulations, Andy!

2003 James T. Scroggin excellence in engineering award

At the Senior Celebration last April, Aaron Dahlstrom '03 was selected to receive the James T. Scroggin Excellence in Engineering Award based on scholarship, leadership, and service to the department and College.

Dokimoi Ergatai offers second workshop

Dokimoi Ergatai (DE), a service-learning program that supports missions and development work, offered a second Leadership and Project Management workshop for student project leaders and their faculty and alumni mentors. DE Staff Manager Elizabeth Barr developed the curriculum in consultation with faculty advisor Dr. David Vader.

Representatives from Students in Free Enterprise (SIFE) and Water for the World joined DE this year for the three-day workshop, held August 28-30. Students from the School of Mathematics, Engineering, and Business and the School of Natural Sciences attended. Among the projects presented were solar energy, water purification, irrigation, human- powered transportation, and microenterprise development.

News & notes from engineering alumni

Aaron Dahlstrom '03

After our Philosophy of Technology class, I've been looking for work that 1) kept me near my family, 2) had a measure of Kingdom value, and 3) enabled me to grow in my engineering expertise. After searching all summer, I'm happy to say that I've found such a job!

Atkinson Koven Feinberg (AKF) Engineers has offered me a position as a mechanical engineer for their Center City Philadelphia office. I'll spend 80–90 percent of my time learning the ropes of traditional building HVAC design, and 10–20 percent of my time researching and evaluating proposals to integrate environmental sustainability into AKF's work. The partner I'll be working under, Rob Diemer, is the leader of AKF's Sustainable Design Initiative. He told me that he's been having trouble interesting mechanical engineers in the environmental implications of their work, so he's excited that I'm enthusiastic about sustainability. Mr. Diemer is experienced and open—he's already starting mentoring me by giving me a basic orientation to the personalities and office culture at AKF's Philly office. I feel terribly blessed to have this opportunity in my work. After all our discussions about the real economic limitations on Kingdom work for engineers, it is exciting to be part of a firm that wants to see environmental considerations incorporated into their designs.

At my interview, Mr. Diemer asked me what I'd done that was relevant to HVAC design. After mentioning heat transfer, thermo, and fluid mechanics classes, I pulled out my senior project final report and told him about heat load calculations, tank sizing, pump sizing, and all the rest. Then I showed him our final oral presentation on PowerPoint—and he really liked what he saw. Though I never had classes in HVAC design, I think my practical experience helped immensely: when Mr. Diemer made the job offer, he mentioned the importance of the lessons I learned from my senior project. The senior project, as crazy as it seemed as we completed it, gave me key experience that helped me land this job.

Sam Blanchard '98

I just wanted to let you know that I passed my Professional Engineer Exam! Praise God. Also in the news, if you visit this website, w.vanishedplanetgames.com, you can learn about the company that I'm creating with my partner and fellow Messiah alumnus Craig Oliver '97. We made a cooperative board game and took it to the World Gameboarding Championships Convention in Maryland July 29–August 3 for a big unveiling and to kick off the sales. We had several thousand copies of the game made for us overseas. Games were shipped out in August after the convention. The game is one of the few cooperative board games available. Cooperative means the players work together as a group to try and win instead of working against each other with only one winner. In a cooperative game, everyone wins or everyone loses.

Samuel Blanchard
President
Vanished Planet Games
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2003 automated bio-diesel production team wins ISA award

Each year the Instrumentation Society of America (ISA) awards a $500 cash prize, a plaque, and a one-year society membership to a student project team for exemplary use of instrumentation and controls in engineering design. Congratulations to Michael Emberger '03, Walter Guzik '03, Chris Smith '03, and Shawn Stauffer '03, members of our Automated Bio-diesel Production Project team, who received the 2003 ISA Award presented by Dan Elliot, a sectional representative for ISA, at the Senior Design Conference in April. The team designed used microprocessor-based controls to prototype an automated bio-diesel system that converts waste vegetable oil into diesel fuel. Bio-diesel burns cleaner than conventional diesel fuel, and recycles a waste product available in quantity from the restaurant industry. Their work will continue this year under the direction of a new capstone project team.

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DEPARTMENT OF ENGINEERING

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Department acknowledges supporters

The faculty and students of the Department of Engineering want to thank the many donors who so generously gave matching dollars for the Pennsylvania Engineering Equipment Program. We met the match and received our full allocation from the Commonwealth.

We want to especially mention the support of the Black & Decker Corporation. Mr. Danny Brotto, technology manager for Black & Decker in Towson, Md., visited Messiah College during the spring 2003 semester to meet with engineering students and professors, and to present a $5,000 check. Black & Decker also recruits on our campus for both career and extern/intern positions. We are grateful for the outstanding internship opportunity they provided last summer for Zack Eakin '05.

The mission of Messiah College is to educate men and women toward maturity of intellect, character, and Christian faith in preparation for lives of service, leadership, and reconciliation in church and society. Graduates of the engineering program will therefore be technically competent and broadly educated, prepared for interdisciplinary work in the global workplace. The character and conduct of Messiah engineering graduates will be consistent with Christian faith commitments. We accomplish this mission through engineering instruction and experiences, an education in the liberal arts tradition, and mentoring relationships with students.