MESSIAH COLLEGE

Engineering News

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COURTESY OF JMU MINE AWARENESS INFORMATION CENTER

Messiah Students will visit land mine sites like the one above in May as part of the Messiah College Landmine Action Project

Messiah students to visit minefield in Nicaragua

By Dr. Don Pratt

MCLAP hopes to learn more about the challenges and dangers faced by deminers, so that they can better focus the project's research efforts here at home, looking to provide deminers with better tools and protective gear in the field.

In May, students in the Messiah College Landmine Action Project (MCLAP) plan to journey to Nicaragua as part of the group's ongoing efforts to raise awareness of the global problem of land mines and to find ways to increase student involvement. The trip is a joint effort between MCLAP, the Office of Mine Action Initiatives and Partnerships of the U.S. Department of State, the Organization of American States, and the Polus Center, which runs the Walking Unidos Clinic for land mine survivors.

Students plan to spend several days at a live minefield along the border between Nicaragua and Honduras to observe demining techniques and meet with deminers in the field. MCLAP hopes to learn more about the challenges and dangers faced by deminers, so that they can better focus the project's research efforts here at home, looking to provide deminers with better tools and protective gear in the field.

Plans are also in the works for students to spend time with land mine survivors at the Walking Unidos Clinic in Leon, Nicaragua, learning first hand about the difficulty of rehabilitation and reintroduction into the workforce after a land mine accident. Engineering students

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on the MCLAP team are interested in becoming involved with the design and development of new prosthetic devices and adaptive equipment to help land mine survivors return to being productive members of society. Dr. Don Pratt of the Department of Engineering, faculty advisor for MCLAP, is hosting the trip, and the expenses are being underwritten by a gift to the Collaboratory for Experiential Learning, of which MCLAP is a part.

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Rehabilitation for a land mine survivor (above) can prove difficult, but the MCLAP is looking for ways to assist this process.

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MCLAP students will have the opportunity to speak to land mine survivors (above)

COURTESY OF JMU MINE AWARENESS INFORMATION CENTER

Messiah students will learn how to assist deminers, like the ones above, in their challenging and dangerous task.

New dean brings experience, encourages collaboration

As Ray and his wife Helene make the transition to the States, giving educational opportunities for their children, we in MEB will benefit from Ray's leadership.

The School of Mathematics, Engineering and Business (MEB) welcomed W. Ray Norman this past fall as its new dean. In August 2002, he and his family moved to Grantham from Mauritania, Africa. While in Mauritania, he served as the national director for World Vision International, a Christian relief and development organization that serves more than 70 million people in nearly 100 countries. World Vision's Mauritania work began in 1983, by responding to the effects of drought during the '70s and '80s. As Ray and his wife Helene make the transition to the States, giving educational opportunities for their children, we in MEB will benefit from Ray's leadership.

Ray brings academic credentials (Ph.D. in agricultural and biological engineering from Cornell University), technical expertise, teaching, and administrative experience to his position as dean. Having lived and worked in some 10 countries, he will help broaden the school's worldview. One of his first priorities is to help students understand their role as citizens in a global village. Living in other countries has sensitized him to the way non-Americans perceive many Americans as arrogant about their position in the world. Dr. Norman will also develop coaching and mentoring models within MEB. He believes it is important for administrators and faculty to work closely with students — helping them develop their technical base, challenging them to expand their minds, and encouraging them to become more secure in their faith.

Dean Norman affirms the Engineering Department's plans for further developing the collaboratory. As grounds for diverse experiential learning, he thinks it can be expanded to include math and business interests as well. He looks forward to assisting each department in developing stronger partnerships with regional and national businesses, local government, and not-for-profit organizations.

Ray has noticed that faculty, staff, and students in mathematics engineering and business are committed to cooperating with each other and him. Resource needs are different among these departments, but everyone seems to have reasonable expectations. Strong friendships across department lines already exist.

Welcome Dean Norman!

—By Yvonne E. Martin, editor of Beyond the Bottom Line*, Messiah College Department of Management and Business Newsletter*

David Vader receives Barnabas servant leader award

In Fall 2002, Dr. David Vader was selected as the first faculty to receive the Barnabas Servant Leader Award. The award is based on significant contributions in areas of ministry, community service, and leadership. Each recipient received $1,000, including $250 for a charity of choice. In addition to the monetary award, Vader received a black and white framed Tony O'Brien print of a towel and basin, which represents Messiah's symbol of servant leadership. His ministry includes serving at his church as a board member and Sunday School teacher. David also developed Dokimoi Ergatai, a student program that works with SIM's Handicapés en Avant in Burkina Faso, Africa. Other recipients included students Justin Cline, Rebecca Knight and the first alumna Miriam "Mim" Stern.

Mahadaga solar team leader, Lee Sverduk, and friend Yembobo near the future site of a photovoltaic installation for Handicapés en Avant.

New Mahadaga solar project on schedule

Dale Johnson (2000, engineering), Project Advisor

Handicapés en Avant ministers to the disabled by providing physical therapy, training for marketable skills, supplying an income, and sharing the good news about Jesus.

The newest project for Dokimoi Ergatai (DE) is a second solar power system in Mahadaga, Burkina Faso. DE's first project team constructed a solar power system in 1998 for a medical clinic in Mahadaga. That project introduced DE members to Françoise, a missionary from France, and the organization she founded to serve persons with disabilities. Handicapés en Avant ministers to the disabled by providing physical therapy, training for marketable skills, supplying an income, and sharing the good news about Jesus. In an increased effort to provide more resources to this underprivileged group of people, Handicapés en Avant is building a small trade school and workshops for the handicapped. Françoise asked DE to design a solar power system to provide power to the buildings.

We are designing the system to generate about eight kilowatt-hours of electricity per day to operate computers, lights, hand tools, and sewing machines. Our present specifications call for 16, 120-watt solar panels, 12 deep-cycle batteries, and a 2.4 kilowatt inverter. The system will provide power through two cloudy day conditions, and will have a gas generator backup. Our work is on schedule, with construction to begin in January of 2004.

In December 2002, Françoise reported that she has raised all of the funds for the project. A single donor will contribute up to $27,000 for material and shipping costs. Meanwhile, the DE project team, made up of six students, has nearly completed the designs of the system. DE hopes to purchase material in the spring semester to begin testing the design.

As always, we appreciate your prayer support. Please pray for the success of this project and the continued spiritual growth the team.

Internship versus externship: some definitions and related Q&A

By Robert Clancy and Harold Underwood, Engineering Department Externship Coordinators

What is an internship?

Internship is the traditional code word for a "learner's" job. Ideally, the lower than normal pay rate affords an employer more latitude in moving a student employee between work assignments to broaden his or her experience. Messiah College allows students to take internship program courses. According to the Messiah College catalog (p. 62–63), "Internships integrate practical work experience with a directed, reflective, academic component under the supervision of the Internship Center faculty. Students develop academically, professionally (for example: build a network of professional contacts), and personally (build maturity and confidence). All internship credits are elective credits. . ." For more student and/or employer information on internships through Messiah College, see also www.messiah.edu/internship.

What is an externship?

An externship essentially means a learner's job without academic credit. Thus, an externship excludes any formal directed, reflective component under the Internship Center faculty, but often yields some similar benefits to the student from the experience. Most Messiah College engineering students do externships.

Why does a company seek externs?

A company often seeks externs to connect with the College as a way of outreach and support. Usually, the experience serves as an extended job interview at the end of which a company will know if it wants the individual as a permanent employee.

Why does a student seek an externship?

. . . to taste the "real world" of engineering. Perhaps more important, a student just wants a summer job, especially one that might be continued part time through the following school year.

How do Messiah students do?

As a rule Messiah students do remarkably well. They are bright and positive with excellent work habits. This leads to the concept of a "Messiah chair" at a firm — that is, when an extern leaves, an opening may exist in anticipation of a follow-on replacement from Messiah.

How may collaboratory projects benefit?

Here a tension may exist: Can a specialty experience at a firm enable a student to make an advanced contribution to a Dokimoi Ergatai project? For instance, a student returning from a summer of well drilling with the Eichelberger firm might prove a great asset to an African water project. On the other hand, a student that takes on an externship will not be able to simultaneously undertake significant work assignments in those same DE projects.

Can Messiah furnish enough students to satisfy the internship or externship needs of central Pennsylvania's firms?

Definitely not. Continued growth in collaboratory projects could result in a reduction of the number of students available for internships or externships, off campus. Although fewer Messiah candidates available might moderate solicitations of companies, it may also be an opportunity to screen for those firms that have proven best for Messiah College students.

Access senior projects via internet

By Earl D. Swope, EE Technician

After months, if not years, of dormant disarray, the final reports of all Senior Design Projects in the Messiah College BSE Program will now be accessible through the Internet. All students receiving their BSE degree from Messiah College successfully complete a Senior Design Project, including a final written report, the hard copy of which has been traditionally stored in the Electronics Laboratory.

While these reports have been stored over the years in the Electronics Laboratory, with an increase in volume came an increase in disorganization. The EE Technician and a work-study student have recently worked with Lisa Swope, an alumna of Messiah College, to cross-reference and categorize all 87+ Senior Design Project final reports that have been completed since inception of the BSE program

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With abstract pages on the Internet, students can easily click on a topic of interest and get a rough idea of what has been done previously at Messiah College.

at Messiah College. These reports will be organized according to Library of Congress call number, assigned by Lisa Swope. The abstract of each report, as well as a soft-copy of more recent reports, are now posted on the Engineering Department's Web page (http://www.messiah.edu/acdept/depthome/engineer/Projects/seniorproj.html). These abstract pages are indexed by project title, team members' names and related topics.

Final reports by Senior Design Project students have often been an invaluable tool for juniors about to begin their Senior Project course (ENGR 491). From these reports, prospective team members may find ideas for their own projects. Also, in cases where teams have worked on a device to be used in Lab by the Engineering Department (such as the Inertia Friction Welder and the MTS Machine Upgrade), these final reports can become a form of users' manual. Having these reports cataloged and referenced makes them an even more accessible tool. With abstract pages on the Internet, students can easily click on a topic of interest and get a rough idea of what has been done previously at Messiah College. Thus, needless work may be avoided by discovering, for example, that a prototype already exists, hidden in the corner of the model shop (as Mr. John Meyer, the Mechanical Engineering Technician, can probably confirm).

Proposal abstracts of current Senior Design Projects are also posted on the web by the Department Webmaster, who updates them periodically, based on input received from student members of the Senior Design Project teams. Proposal abstracts can be helpful not only for juniors, but also for engineering students in lower division engineering courses, who have assigned projects to complete. When Senior Design Project Teams need a helping hand (or three), a mutually beneficial connection can occur. Hopefully, in coming years, such connections will create more collaboration between seniors and underclass students.

This year, two teams have chosen projects of a carry-on nature: one developing the hybrid electric scooter initiated last year, and one working on a radio controlled robotic lawn mower, similar to a project completed in 1996.

Custom-made adapters facilitate prototyping

By Earl D. Swope, EE Technician

Recently completed in-house, several new adapters connect Surface Mount Technology (SMT) devices and 50-pin I/O Ports of Data Acquisition (DAQ) cards directly to a breadboard, making it easier for students to prototype circuits. Work-study student Lee Sverduk, under the guidance of EE Technician Earl Swope, hand-soldered these custom-made adapters, to meet the need. In the electronics industry, trends have been toward smaller SMT circuits and software-based controls. These new custom-made adapters help Messiah College Engineering projects stay abreast of these trends.

SMT-breadboard adapters

Messiah College Engineering has had in-house facilities to make PCB's for some time. The process begins with a prototype circuit schematic of interest, then via software and a photosensitive etching process, results in a working PCB. Most of the PCB's have been fabricated with non-SMT-sized components, such as the dual in-line package (DIP) and the basic transistor (TO-92), since they are easier to handle and seat well into the initial prototyping breadboard. However, smaller footprint SMT devices save real estate on the PCB, and as more manufacturers use them, SMTs are becoming standard. In fact, suppliers often provide free samples in SMT form. In an effort to take advantage of these "freebies" some students have tried to prototype with SMT components, but have run into difficulties. The new custom-made SMT adapter and clip solves these problems.

Custom-made SMT-breadboard adapters and clip make solder-less breadboard prototype connections possible. Previously, students who attempted to prototype with SMT had two options: 1) carefully solder small wires onto SMT components to seat them, by adapting them to the breadboard or 2) build, or buy, an SMT-to-breadboard adapter and solder an SMT component to the adapter. Besides the inconvenience, neither of these methods enabled the final PCB to take advantage of the reduced SMT footprint, since the original (sample) SMT components were used up, and could sel-

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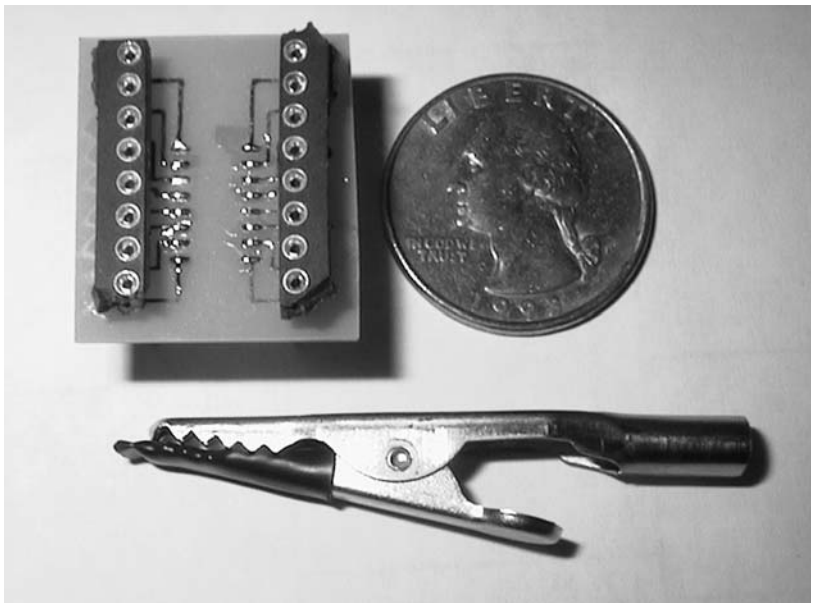
dom be reused (due to practical de-soldering considerations). The custom-made adapters along with an alligator clip create a solder-less SMT connection to the breadboard. The clip secures the SMT device to the SMT-breadboard adapter, making the SMT devices reusable. Thus, reduced size PCBs from sample SMT are now feasible.

50-pin parallel-port-breadboard adapters

Messiah College students have often employed National Instruments' LabView® in a senior design project as a software-based control. In the Mechanical concentration, the Manufacturing Processes course (ENGR 384) also utilizes LabView® to facilitate its Lego® Lab projects. However, a problem for LabView® users has been the Data Acquisition (DAQ) card with I/O ports that interface with a 50-pin header. Like the SMT components, these 50-pin headers do not easily connect with prototyping breadboards. Previously, students who wished to interface a prototype circuit with Lab View via the 50-pin header ran 22-gauge solid wire from an individual socket of the header to the breadboard. As multiple connections were created in this way, the circuit prototype often became a rat's nest of wires, difficult to trace and troubleshoot. Furthermore, individual wires between the DAQ card and the breadboard were prone to fall out, making the circuit unreliable. The new 50-pin parallel-port-breadboard adapter solves this problem by connecting the 50-pin header more directly and securely to an organized and accessible group of pins on the breadboard.

The two custom-made adapters enhance the Electronics Lab for SMT and software-based control applications by reducing the stress of wiring connections, shortening the time to prototype and allowing students to focus on other more critical aspects of design.

50-pin parallel-port-breadboard adapter.



SMT-breadboard adapter with clip.

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Mechanical laboratories update

By John Meyer, Shop Supervisor

This past fall has seen some minor additions and upgrades to the equipment inventory in our mechanical labs. With matching funds from The Pennsylvania Department of Education Engineering School Equipment Program, we were able to purchase two National Instruments 4531 temperature and voltage measurement boards. Coupled with LabView® software, these boards will allow us to take up to fourteen channels of thermocouple, thermistor or RTD input directly into the desktop for measurement and analysis. We feel these new temperature measurement and analysis tools will better support student and laboratory activities by reducing our reliance on strip chart recorders and manual data collection with handheld meters.

A Nikon digital camera was also purchased this fall. We will use this camera to replace the Polaroid camera back that's been in use on the metallurgical microscope for the past ten years. By switching to digital technology, we will significantly reduce the present $2.00 cost per photograph and allow for direct download of images to the desktop or school network. This camera will also be available for student project documentation during times of the year when it is not in use in the lab.

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.