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Village lights

U ELECTRICAL ENGINEERING STUDENTS HELP LIGHT REMOTE NICARAGUA

By Pauline Oo

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Patrick Delaney and chickens go way back. The University of Minnesota senior used to raise them as a child in Afton, Minnesota. So no wonder that he had a smile as bright as the tropical sun when a family gave him a chicken on a recent trip to a remote mountainous region in Nicaragua.

Soda-bottle lights: A common source of lighting in many of the homes. Villagers fill empty soda bottles with kerosene, place the cap back on, and poke a hole in the cap. The fumes that escape are then lit.

Photos by Patrick Delaney

Delaney received the unusual token of appreciation for helping the family fix their solar panel system.

"They were a little bit more well-off than [the other villagers in Jinotega]," says Delaney, who went there in December to conduct research for a senior electrical engineering design project. "They told me they had owned [the solar panel] for about six months but it didn't work. I took a look at it, and they had connected the panel and the battery all right but the light-bulb wiring was wrong. I was surprised that they had gotten as far as they had because the instructions were all in English."

The bilingual Delaney jotted down a few notes in Spanish, drew some pictures "of how things should be wired up," and connected one light to the system for the family. He then left to try his hand at coffee picking.

"When I got back [to the village], they had all five lights lit up and people from the surrounding countryside were there to gaze in awe," he recalls. The grateful family wanted to pay the gregarious Delaney for his services, but all he wanted was for the family to pass on the knowledge.

Delaney's willingness to help is just one example of how U engineering students are making a difference by bringing their skills to remote regions of the world. Thirty engineering students from the Institute of Technology recently formed the first Minnesota chapter of "Engineers Without Borders," a group whose mission is to link engineering students and professionals with developing communities around the world.

This prototype of the solar lantern was created to test the amount of energy needed to supply the light the team wanted. It's a Light Emitting Diode (LED) lamp with eight white LED's wired together and glued onto some plastic pipe inside a baby-food jar.

Later that night, "the solar panel family arrived with a chicken in hand." And not long after, Delaney changed the focus of his senior project.

"I had a revelation [about my senior project]," says Delaney. "I went from house to house, and almost across the board the villagers told me it would be nice to have light. They're living in the countryside way off of any electrical grid. There's no electricity and the sun sets at about 6 p.m." Very few people, he adds, have the money to install a $1,000 solar panel on their roof like the family he had helped. Most, he says, get light to read by and heat to cook with from a kerosene-filled bottle. (See top photo).

Instead of building a micro hydropower system, which the villagers could install near running water, Delaney decided to create a solar-powered light-emitting kit that his new friends could tote anywhere and that would give them low-grade lighting for a few hours each night.

Since his return to the United States, Delaney has been working with five other students in the U's electrical engineering department--Lacey Nielsen, Adam Flink, Omkar Deodar, Valentina Michelson, and Ther Xiong--to design "a solar lantern" that

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can then be manufactured in Nicaragua and purchased cost-effectively by the people there. (This month, Nielsen will take a prototype with her on a trip to Venezuela to test it.)

The students are also collaborating on the project with their peers at the University of Nicaragua and the University of Calgary, Canada. (Dave Irvine-Halliday, an electrical engineering professor at the University of Calgary, is founder of Light Up the World Foundation that has brought solar-powered Light-Emitting Diode or LED technology to nearly 10,000 homes in 27 developing countries; see sidebar.)

Lighting up the world with LED

According to University of Calgary professor Dave Irvine-Halliday (in a 2005 interview with *The Christian Science Monitor)*, LED lamps produce "nearly 200 times more useful light than a kerosene lamp and almost 50 times the amount of useful light of a conventional bulb." The technology, he adds "can light an entire rural village with less energy than that used by a single conventional 100 watt light bulb," and without the need for electricity. After the initial cost, solar energy continues to light the lamps free of charge.

"Originally, [Delaney] went to Nicaragua on a whim to see how he could build social capital down there--how we, as Americans, could come in and save the day--but he changed his mind very quickly and realized that a collaboration is necessary, that we have as much to learn from others as they do from us," says Paul Imbertson, who directs the electrical engineering department's senior design projects (there are 19 in all).

Patrick Delaney

"A project like this involves designing a system that is made, as much as possible, from found parts, so it can be produced on site and it creates a sustainable situation," says Imbertson. "[And because the students are required to build a system] from scientific engineering principles, we could take these designs, drawings, and plans and actually use them in Nicaragua and Minnesota schools, environmental learning centers, and adult education to show real applications of math and science."

For more information about the project or to help fund it, e-mail Patrick Delaney. (The team has $200 in its coffers but the students have had to cover most expenses, such as travel, themselves.)

To hear Delaney speak about the project, tune in to University of Minnesota Moment's "Solar Energy in Nicaragua."