IPRO 335: Developing Technology to Improve Education in Haiti

Advisor:
Prof. Laura Hosman

Students:
Regine Antenor
Mario Berrones
Simon Brauer
Stephanie Brummer
Jacob Ernst
Brandon Hammond
Erik Harpstead
Annie Hutches
Dhara Shah
Hana Tai
Ryan Tillman
95% of primary schools in Haiti lack electricity.
Objectives

1. Powering the laptops
2. Community Outreach
3. Educational Content Development
4. Continuity
Building a Cohesive Team

3 Returning members

4 Travelers

4 Committees
Organization

Solar Committee
Education Committee
Fundraising Committee
Public Relations Committee
Challenges

Communication with Haiti

Continuity

Raising Funds

Bridging the Cultural Divide
Ethical Considerations

- Prioritizing Needs of the Society
- Economic Sustainability
- Equity with Teachers
- Acceptance of New Technologies
- Acceptance of who we are
- Equitable to all of the Community
Our Progress: Last Semester

- Built a mini-model
- Won an award from Society of New Communications: Certificate of Merit
- Created a video
- Created a website
- Started solar calculations
Our Progress: Selection of Pilot Schools

St. Gabriel

Ecole Baptiste
Our Progress: Solar Solution

The Sizing Calculations
The XO laptop needs 17 watts (at 12 volts) of electricity for 1.5 hours to fully charge a full discharged XO;

\[
\text{THEREFORE } 17 \text{ watts} \times 1.5 \text{ hours} = 25.5 \text{ watt hours per OLPC XO}
\]

For 350 XO laptops;

\[
350 \text{ XO's} \times 25.5 \text{ watt hrs} = 8,925 \text{ watt hrs}
\]

Assuming the average month at 5.25 hours (in Haiti) of direct sunlight, the size of the solar panel would be;

\[
8,925 \text{ watt hr} / 5.25 \text{ hours} = 1700 \text{ watts from solar panels each day}
\]

The battery(ies) required to charge the 12 volt XO laptops would be,

\[
8,925 \text{ watt hr} / 12 \text{ volts} = 744 \text{ amp-hr}
\]

70% usage factor on the battery and the systems requires,

\[
744 \text{ amp hr} / 0.70 = 1062 \text{ amp-hrs battery(ies) required}
\]
## Our Progress: Bill of Materials

### St. Gabriel

<table>
<thead>
<tr>
<th>Item/amount</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solar panels (18)</td>
<td>$8,400</td>
</tr>
<tr>
<td>Charge Controller</td>
<td>$680.00</td>
</tr>
<tr>
<td>Batteries (4)</td>
<td>$4,500</td>
</tr>
<tr>
<td>Wires</td>
<td>$500</td>
</tr>
<tr>
<td>Mounting</td>
<td>$1,000</td>
</tr>
</tbody>
</table>

### Ecole Baptiste

<table>
<thead>
<tr>
<th>Item/amount</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solar panels (13)</td>
<td>$6,000</td>
</tr>
<tr>
<td>Charge Controller</td>
<td>$680.00</td>
</tr>
<tr>
<td>Batteries (3)</td>
<td>$4,000</td>
</tr>
<tr>
<td>Wires</td>
<td>$500</td>
</tr>
<tr>
<td>Mounting</td>
<td>$1,000</td>
</tr>
</tbody>
</table>

### Travel

<table>
<thead>
<tr>
<th>Item/amount</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plane Tickets (10)</td>
<td>$2,500</td>
</tr>
<tr>
<td>Hotel Room ($80/night staying for 14 nights)</td>
<td>$4,480</td>
</tr>
<tr>
<td>Travel Insurance (package)</td>
<td>$500</td>
</tr>
</tbody>
</table>

**Total:** $34,740
Our Progress: Fundraising

Total: $10,000
IIT class designing solar chargers for Haiti's schools

By Hallie Branson-Potts, Tribune reporter

April 13, 2011

Jacob Ernst, an architecture student at the Illinois Institute of Technology, won’t soon forget the severed power lines he saw in Haiti in January.

“Occasionally, you’ll see someone actively cutting down a power line to take the electricity,” Ernst said. “There are a lot of problems with energy sources applying to Haiti’s power system.”

Two months after the earthquake in Haiti in January 2010, the One Laptop Per Child program distributed hundreds of XO computers to children at two schools in a town called Lanthemak. The town is in Haiti’s central plateau, northeast of Port-au-Prince and about an hour south west of the border with the Dominican Republic. When the quake struck, it toppled out the town’s power, and it reports two reliable electricity sources. The irony is that OLPC had chosen the spot for its demonstrator power test so the laptops would have a place to charge.

With luck and some financial generosity, the wall may not be much longer. Students at the university, the University of Haiti and the Illinois Institute of Technology, have a plan: to put solar panels on the campus’ laptops. If they can raise the money to demonstrate their solution at one schools, they think they can scale it up to laptop charging stations in the rest of the country, and even the whole country.

"Everything about our project is designed to scale across Haiti and other countries," said Laura Hodeman, a political science professor at IIT who heads the course working in Haiti.

Laptops and only laptops

The plan is simple. The students will provide enough solar power to charge all the school’s laptops, and nothing else.

To do that, the students first calculate how much power the school needs. For a full charge, each laptop requires 25.6 watt hours. Assuming 5-6 hours of usable sunlight, a school with 250 laptops needs about 1,260 watt/ hour panels. The student team figured.

Then, the team will need to provide the school’s electricity. A 30 watt charger can top off a laptop in an hour. It’s not a stretch to imagine that solar will also power the school’s other needs.

The team is working on a plan to install the solar system of its own. The project will cost about $7,500 per school. And if the laptop charging station works, the school will order more panels to keep the project running.
Our Progress: Educational Component

Electricity Safety

How does Solar Energy work

Benefits of renewable resources

Natural Disaster Response and Preparedness
Our Progress: Plans for Continuity
Moving Forward
Next Semester

Learn from the implementation

Improve on the maintenance training and how-to guides

Improve lesson plans to be more effective

Continue to strengthen continuity plans with in-country partners
“A quality education is one of the most effective, long-term pathways out of poverty and dependence, toward self-sufficiency”

-- Dr. Laura Hosman
Developing Technology to Improve Education in Haiti

Questions?