

Columbia University Engineers Without Borders

2020 Information Packet



COLLEGE OF ENGINEERING
COLUMBIA UNIVERSITY
COLUMBIA
ENGINEERING FOR
HUMANITY

CREATIVE • DEVICES • ROBOTICS • DATA SCIENCE • SENSING • IMAGINING
SUSTAINABLE • VISUALIZATION • HEALTHY • VISUALIZATION • SENSING
SECURE • SIMULATION • MODELING • MATERIALS • NANOSCIENCE • CONNECTED



ENGINEERS WITHOUT BORDERS USA
Columbia University Chapter

CU-EWB Accomplishments by the Numbers

1

world's 1st high-density polymer simple suspension bridge designed and built in Morocco

700

students now have access to rainwater-harvested drinking water in Uganda

814

households now have access to vaccines and advanced medical testing without leaving their community

1,000

students now have access to schools with lighting for night classes and boarding

1,000

people now have access to KVIP latrines in Ghana

1,500

people now have access to potable water in two communities in Ghana

10,000

people now have access to crop processing engines in Uganda



ENGINEERS WITHOUT BORDERS USA
Columbia University Chapter

Our Mission

Building a better world | One community at a time

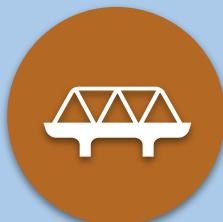
The Columbia University Chapter of Engineers Without Borders USA supports international community-driven development programs by collaborating with local partners to design and implement sustainable engineering projects, while creating transformative experiences and responsible leaders. In this way, the program seeks to empower communities to meet their basic human needs and help solve the world's most pressing challenges in places that would often be overlooked by large scale philanthropic efforts.

What We Do - Areas of Focus

CU-EWB takes on a wide variety of infrastructure and development projects that address major global issues.



Clean Water



Structures



Energy



Sanitation



Sustainably
Built



Community
Driven

Our current projects range from solar electrification in Uganda to borehole drilling for potable water distribution in Ghana to a well-supplied pipeline water distribution system in Morocco.



ENGINEERS WITHOUT BORDERS USA
Columbia University Chapter

What Makes EWB Projects Successful?



Community
Driven



Sustainably
Built

Project direction and goals are based directly on community needs and input. The first step in our projects is an in-depth assessment trip where we work with our main partner, the community, to set design guidelines.

Project materials are sourced from local businesses which supports the local economy and makes repairs feasible.

Our projects are designed for long-term success by working with the community to develop financial plans to raise funds for long-term repairs and maintenance.

We have a minimum five-year community partnership, and fully transition project ownership and responsibility to the community.



ENGINEERS WITHOUT BORDERS USA
Columbia University Chapter

CU-EWB

Partner Communities

Ait Bayoud, Morocco



Amanfro, Ghana

Otubet, Uganda



ENGINEERS WITHOUT BORDERS USA
Columbia University Chapter

Ghana

Bringing potable water
to the community of
Amanfro



Amanfro, Ghana - Water Distribution System

Developing a safe and sustainable water source for 2,500 community members

- Before partnership with CU-EWB, Amanfro's water supply consisted of unreliable surface sources with high values for fecal coliform and E. Coli
- CU-EWB has installed four boreholes in the community of Amanfrom with the goal of meeting the WHO water standard for hygiene and health of 50 Liters per person per day
- The distribution system empowers women and children by reducing the amount of time they must spend gathering water each day
- Revenues from the water supply support maintenance and repairs of the system, and can be used for community improvements

Ghana Program Current Engineering Challenges

- Designing a water treatment system for the two northern boreholes which currently have unsafe levels of iron and manganese for consumption
- Minimizing the effects of erosion on the distribution structures by improving community drainage systems



ENGINEERS WITHOUT BORDERS USA
Columbia University Chapter

Morocco

A bridge and a water distribution system to make clean water, education, and healthcare accessible



Ilguiloda & Izguoaren, Morocco - Water Pipeline

Providing access to clean water to small villages in an arid region

- Analyzed hydrogeology and water table mappings of the region to determine optimal location for a borehole well
- Drilled a well and successfully tapped into nearest groundwater aquifer
- 1300 meters of pipeline have been built with a temporary distribution site to provide residents access to water until the pipeline is extended
- Plan to extend the pipeline to 7200 meters to bring water to the communities, eliminating the need for women and children to trek 3 hours to the nearest safe water source
- Due to the remoteness of the well site from nearby power lines, a solar power system is being designed to power the water pump

Morocco Program Current Engineering Challenges

- Rocky terrain leads to surface pipe damage and prevents pipe burial
- Seeking cost-effective method for protecting pipeline on the long route
- Assessing HDPE plastic and other alternatives to galvanized steel pipe
- Assessing solar power as a more sustainable power source



ENGINEERS WITHOUT BORDERS USA
Columbia University Chapter

Uganda

Improving education,
medical care, and
economic opportunity
through solar
microgrid electricity



Otubet, Uganda - Solar Microgrids

Electrification that empowers students, medical staff, and entrepreneurs

- Otubet lacks access to electricity, hindering education and medical care
- CU-EWB installed 3 solar microgrids, powering 2 schools and 1 health center
- Health center's lighting, refrigeration, and microscopy allows for vaccine storage, advanced medical testing, and 24-hour treatment
- School's lighting and computing capability allows for night classes, boarding, and additional educational opportunities for over 1,000 students
- Revenue from the trading post electrification in the summer of 2019 will subsidize the repairs and maintenance of the schools and medical center, while also giving business owners opportunities to offer new services and products that require electricity

Uganda Program Current Engineering Challenges

- Designing a decentralized microgrid network to provide lighting for businesses in the trading center
- Creating a pay-as-you-go model to allow entrepreneurs to use the microgrid electricity to expand their businesses
- Designing charge control for affordable, self-sustained street lights



ENGINEERS WITHOUT BORDERS USA
Columbia University Chapter

What does a typical project cost?



Project Materials

Expenses range from \$10,000 to \$25,000 for project construction. CU-EWB typically has two visits per project (six total) each year.



Travel Costs

Each student's personal travel costs are typically about \$2,000. A trip usually consists of five students and a mentor.

TOTAL YEARLY BUDGET IS \$125,000



Technical Mentorship

Each program works with mentors from academic institutions and industry professions to ensure that our engineering work meets the same standards as top engineering firms worldwide

What do mentors do?

- Mentors support CU-EWB by advising students on engineering decisions and reviewing our project paperwork and documentation to ensure accuracy
- Mentors have the option to act as a traveling mentor and work with a group of students in-country to assess, implement, or monitor one of our projects

CU-EWB on Campus

CU-EWB is comprised of students from Columbia's undergraduate and graduate schools who hail from a variety of unique social and geographic backgrounds. Our diverse student-led teams accomplish significant project tasks each year.

We have an active presence within the Columbia community. We have seven meetings a week throughout the school year, host professional development speakers (such as Bernard Amadei, founder of EWB USA, last fall), and typically send six teams each year to our partner communities. This spring we are planning to host an EWB regional conference.

How your company can help

- Make a tax-deductible monetary donation
 - Yearly sponsorship
 - Monetary donation
- Technical Mentorship
 - Engineering and international development expertise
 - Providing in-country engineering advice
- Support with travel
 - Sponsor a student and their travel costs
- Donate Materials
 - Project or event materials
- Sponsor CU-EWB events @ Columbia University
 - Our large, upcoming event is the EWB regional conference in Spring 2019
 - Other professional networking and development events

Thank You!

Chapter Information

cu-ewb@columbia.edu
cuewb.org

CU-EWB Presidents

Michael Couch

mgc2161@columbia.edu

Sophie Reese-Wirpsa

smr2225@columbia.edu



ENGINEERS WITHOUT BORDERS USA
Columbia University Chapter