

Farita Tasnim  
MIT MISTI India Summer 2017 Letter of Motivation, Proposal, and Logistics

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## Motivation

### Personal Motivation and Qualifications

Ever since I found out about MIT MISTI's India program last semester, I have been bouncing on the balls of my feet at the opportunity to teach abroad, especially in South Asia. Not only do I crave to re-immersede myself in the language and culture of my homeland of Bangladesh, but I am also enamored with the art of teaching. I was born in Bangladesh, but moved to the United States when I was four, and am seriously yearning to go back and make an impact in my home country.

I realize that I am in the unfortunately small percentage of the global population who have been lucky enough to receive an extremely high quality of education. Through the mentorship I have received from my research, robotics, and space program mentors, and my own efforts to help others, I know that the active encouragement provided by mentors, professors, and positive role models contributes significantly to success. With this in mind, I hunger to spread an inquisitive mindset and a powerful STEM education to less privileged children.

I began teaching advanced mathematics and tutoring FLL robotics at Girls, Inc. in high school, and most recently continued my teaching passion abroad in Israel. I can offer four years of professional working experience in electrical engineering and alternative energy harvesting, as well as four years of teaching experience in electrical engineering, computer science, mathematics, and robotics to students ranging from age 5 to age 19. When I teach, I feel

blessed because the kids' faces light up whenever they develop a new robot design, programming algorithm, math proof, or circuit. For much greater detail about my educational and engineering qualifications, please see my resume in the **Appendix** section.

### Goals

Currently, I am working on a long-term project to start, a few years after graduating from MIT, inquiry-based schools in Bangladesh and West Bengal, especially in rural areas. I also want to found a global non-profit organization that connects scientists with youth in Bangladesh and India, so that children will be inspired and guided through their own project-based scientific journeys. I hope their eyes will glow with the spark of science and the joy of discovery.

I can offer my utmost passion and desire to make a measurable impact on global education, as well as my constant laughter and ability to grow and improve in the face of failure. By participating in MISTI India, or rather MISTI South Asia, I hope to accomplish three major educational goals:

- (1) understand, from personal accounts of students, teachers, and families, as well as my own teaching of classes, the current situation of access and quality of education in various regions in Bangladesh,
- (2) increase the availability of quality education to less privileged children, especially those that grow up in rural or slum areas in India and Bangladesh, and
- (3) develop a detailed K-12 general education curriculum that replaces the current system of information delivery and rote memorization with a mesh of inquiry-based and project-based learning methods, which will be based on my own research as well as the knowledge and teaching experience I hope to gain over the 5 weeks I spend in West Bengal and Bangladesh. The most important factor to learn about is **scalability** (How can I use technology, adaptable curriculum, and teacher training to set up a sustainable K-12 education platform?)

### Background Information and Research: Importance of Education

I desperately hope to help increase the number of people with access to excellent education, especially in my own developing homeland. Bangladesh is lagging behind the rest of the world in terms of not only education, but also, standard of living and economic health. I believe improving education in Bangladesh will lead to an improved literacy rate, a more educated global workforce, a higher standard of living, economic growth, and lower levels of governmental and societal corruption there. I discovered the disheartening inequality in the availability and quality of education for people from different levels of affluence or geographic locations when I started volunteering at Girls, Inc. Since then, from teaching underprivileged kids, talking to MIT friends originating from different parts of the world, and reading online about Bangladeshi education systems, I have realized the urgent need for providing equal access to quality education for all.

Since I learned most of what I know about engineering, including circuit design, PCB layout, and programming, through projects and one-on-one mentorship, I have developed a strong sense of duty to help others discover their passions in STEM through project-based education and personalized instruction. I believe these methods can provide a solid foundation to help tackle the issue of education inequality. With this in mind, I want to reform education, and even more importantly, help reverse the brain drain in Bangladesh. This means that I want to reverse the

current phenomenon by which most of the brightest students and workers in Bangladesh leave to build their careers and settle in developed countries such as the United States. This brain drain is evidenced by the fact that Bangladesh's migration rate is -3.1 migrants/1000 people, according to the World Factbook.

Based on my research, my own experience visiting Bangladesh, as well as accounts from my parents, and friends and family in Bangladesh, I have realized that the factors that most degrade the quality and accessibility of education are:

- (1) the demand of child labor in agricultural areas,
- (2) the early age of arranged marriage (starting at even age 9!),
- (3) the limited income of parents, making them unable to pay for their kids' schooling,
- (4) the standard teaching method of simply delivering information,
- (5) the standard learning method of rote memorization in preparation for qualifying exams

### Potential Solution

In order to even begin to try to improve the education situation in Bangladesh, it is critical to fully understand these problems underlying lack of quality and equal access to education there as well as why these problems are so extensive and difficult to fix. Preliminary research reveals some ghastly truths. According to the World Bank (Oct 2016), while improvements are being made, still only 4 percent of Bangladesh's workforce possesses anything more than a secondary education degree. Primary and secondary education dropout rates are still quite high, with only 50% of students who enroll in first grade reaching tenth grade. "Around five million Bangladeshi children between the ages of six and 13 – mostly from poor families, urban slums, and hard-to-reach areas – remain out of school."

Still, according to the World Factbook, the government of Bangladesh only spends 2.2% of its GDP on public education, compared to the global education giants such as Norway, Sweden, and Switzerland, who spend 5 - 10% of their GDP on education. It is because of this lack of governmental support and the difficulty of shaping public policy that I believe that the best way to begin improving education in Bangladesh is to start new schools and change learning styles in existing schools, while providing technology-enhanced education free of charge to the children and their families. It is also crucial to start this endeavor in the private education sector, with funding from external, even out-of-country, companies and governments so as to somewhat sidestep corruption concomitant to Bangladeshi governmental involvement.

### Proposal

#### Overview

With my goals in mind, I plan to carry out three action items in each location I visit in West Bengal and India. The **first** is to interview students, teachers, and families in schools in rural, urban slum, and urban posh areas to develop a better understanding of their various living situations, concerns, and issues, and their views on the current education system in Bangladesh. The **second** is to teach a few lessons in schools in each location, at both non-profit JAAGO schools and public schools, using a mix of inquiry-based and project-based approaches. The **third** is to videotape the interviews, my own teaching, and standard schooling with consent of those being video taped, of course. With my videos, I will develop a final polished video, or series of videos, whichever is preferable for MISTI South Asia, so as to showcase both my project and my vision for Bangladesh and West Bengal while creating

content that would display what MIT students are interested in doing in these areas. I believe these videos would help MISTI South Asia gain funding from companies to send more students to Bangladesh to teach and intern there in the future. The urgency of my listed goals are detailed in the following sections:

### **Developing Situational Understanding**

It is integral to understand the plights that children and families face as well as their daily concerns and general mindset in order to effectively start schools and improve existing teaching methods and teacher training in Bangladesh. These factors are very important because parents must be convinced, for example, that it is more beneficial in the long term for their children to get an education now (so as to invest in their future success and impact on society) rather than to marry them off at an early age to a wealthier family or to have them work in their family farm for the rest of their lives. Conducting interviews revealing personal accounts and experiences can help me better understand the situations in different areas of Bangladesh.

This is why the main goal of my proposed trip to West Bengal and Bangladesh is to immerse myself in the lives of Bangladeshi parents, children, and teachers such that I can better understand how to convince parents to educate their children, to motivate children to continue their education despite societal pressures, and to adopt a more progressive, inquiry-based teaching style in a country rather lacking in development. Furthermore, it is important to note that these methods of shaping societal mindsets and tackling teaching will change even within Bangladesh, from region to region. For instance, the education solution required in the rural upazilas in Dinajpur will be different than the solution required in the urban slums in Dhaka, which will also be different from the solution required for people living in posh areas in Chittagong, and so on.

### **Utilizing Inquiry-Based and Project-Based Learning**

Much of the phenomena of students lacking attention, excitement, and passion for learning, which in turn result in their eventual dropout from school, are due to, other than societal and economical concerns addressed above, the current poor system of schooling in Bangladesh. This system consists of the monotonous dissemination of information with rather strict teaching methods and harsh punishments for swaying from the rules. Thus, the students are constrained in their thinking (or, truly, lack of [critical] thinking) and fail to develop a naturally inquisitive mindset or a desire to learn. If they have the motivation to pass qualifying exams, mostly they learn through memorization. More likely, if they lack motivation and are not taught the importance of learning itself, they drop like flies out of their would-be path to an educated lifestyle, or fail to fully utilize their learned skills and knowledge in the jobs they work.

It is, therefore, very important to improving school retention rates to adequately stimulate children's minds by teaching them how to question the world around them, develop an inquisitive mind in them such that learning becomes almost an addiction, and thus increase their motivation to go to school. This is why inquiry-based and project-based learning models can drastically help improve the general quality of education as well as the success of new schools in areas without proper access to education.

Of course, this all sounds very ideal, so it is important to consider that the inquiry-based and project based learning (IBL and PBL, respectively) methods normally don't work amazingly well because they are implemented incorrectly. Learning through inquiry must be taught to students gradually starting at the inception of a child's schooling, and it should be catered to the specific

situational needs of the children in various regions and environments. Banchi and Bell have determined from teaching experiments that gradually developing an inquisitive mindset in students requires first teaching the youngest kids with traditional methods, and as they get older, exposing them to guided inquiry, then more open inquiry, and then full-on independent research and projects with only guidance from the teacher (2008).

**My vision is** to develop a full K-12 curriculum specifically designed for developing countries for all subjects (from language and literature to math and physics to robotics, engineering, and art) that is adaptable or provides options for alternative lessons for students from different situations. For example, students in Laksmipur, Bangladesh, are often affected by flooding. It would be useful to utilize this knowledge to teach students about why this flooding happens in their coastal region and how their parents' farms are affected by it. This means that their math problems and environmental science discussions and experiments can be taught from a flooding and agriculture perspective. When older, they can build mini-devices to try to prevent small-scale simulated flooding. As another simple example, cooking is a big part of Bengali culture, and different types of cooking can be used to explain certain chemical reactions as well as the effect of heat on chemical reactions. When exposed to adaptive curriculum catered to address cultural, societal, and regional needs or desires, children are much more likely to want to learn and perform well in school.

This curriculum development is a huge commitment and a large endeavor, and I want to be able to do this right, so this 5 week program I am proposing is extremely crucial. My teaching during this trip will allow me to field test a few inquiry-based/project based lessons I have in mind (and will plan in full detail should I obtain funding and finalize my plans). I will also attempt to tune my lessons appropriately to each village I visit. From my teaching, I hope to develop a preliminary understanding of the effectiveness of my proposed teaching styles, as well as determine how to change it to better meet the needs of Bengali children. See the **Appendix** for other important considerations not mentioned here.

### **Creating Media**

Nowadays, media is the fastest, most effective, and some may argue, most efficient, way to disseminate information, spread ideas and realizations, and instill passions in people. Thus, I will create a summary video, and perhaps also a series of videos, to showcase (1) the education situation in Bangladesh, (2) what is currently being done to help mend the issues, (3) what traditional teaching methods look like, (4) what teaching methods I used look like and how the students responded to them, and (5) what MIT students are interested in doing for Bangladesh, which would include not only my endeavors, but also the dreams of several of my Bengali friends who have expressed much interest in working in education in Bangladesh (I would film them talking about what they wish to do in Bangladesh).

With the professional video content that I will create, I hope to accomplish three agendas:

- (1) help MISTI South Asia gain funding from Bangladeshi companies, schools, and organizations to spur future MIT involvement in the country,
- (2) inspire other people to intern and teach in Bangladesh, which would also help reverse the brain drain phenomenon, and

- (3) gather interested people to help me build, obtain funding for, maintain, and teach in the private schools and the mentor-student connection organizations I hope to start after I graduate from MIT.

## Logistics

I have contacted the JAAGO Foundation, a non-profit organization that won a 2015 “Top-Ranking Organization” Award from the Global Giving foundation. JAAGO is an amazing organization whose purpose is to provide schooling free-of-charge to students without access to education in Bangladesh. On their website, they state: “One of our principal programs is “Education Program” that aims to provide free of cost international standard education to the under-privileged children from the disadvantaged families. There are currently around 1800 students studying in 13 schools and 1 orphanage across Bangladesh.”

After contacting JAAGO about my interest to visit their 13 schools to interact with teachers and students and to teach there, Mr. Nazmus Saleh Sakib, the Communications Officer from the JAAGO Founder’s Office, replied to me in the positive, asking for a more detailed schedule and plan, which is provided below. Mr. Sakib also asked for a letter from MIT that mentions that I am willing to volunteer for JAAGO Foundation, which I would be very grateful to receive from MISTI South Asia. I am also awaiting a letter from JAAGO schools endorsing my plan to volunteer, so as to help the MISTI South Asia process.

**Farita Tasnim India/Bangladesh Plan**

August 13 to September 16, 2017	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
08/13/17 - 08/19/17	Flight lands in India	Kolkata school 1 - Goutam Biswas	Kolkata school 2 - Goutam Biswas	Kharagpur school 1 - DAV Model School - Goutam Biswas	WB gram school - Balarampur, Shonamukhi Jhuli - Goutam Biswas, Meghna Sengupta	Kharagpur school 2 - St. Agnes High School - Goutam Biswas	Kolkata
08/20/17 - 08/26/17	Fly to Dhaka	Dhaka JAAGO 1 - Rayer Bazar - Rasib Been Sarowar	Dhaka JAAGO 2 - Banani - Salim Murshed	Dhaka North South University - Mallik Ahmed, Touhid Ahmed	Dhaka public school - Rifat Mursalin, Bristy Sikder	Gazipur JAAGO - Jaman Market - Milon Sharif	Dhaka
08/27/17 - 09/02/17	Travel to Gaibandha	Gaibandha JAAGO - Purba Para - A.F.M. Sazzadur Rahman	Rangpur JAAGO - Kawniya - K.M. Mehedi Hassan	Dinajpur JAAGO - Shundorban - Uzzal Roy, travel to Rajshahi	Rajshahi JAAGO - New Koloni - MD. Moynul Islam	Travel to Khulna	Khulna
09/03/17 - 09/09/17	Khulna	Khulna school 1 - Khulna Zilla School - Raana Ahmed	Khulna school 2 - Raana Ahmed	Madaripur JAAGO - Ukilpara - Humaiun Kabir	Lakshmipur JAAGO - Ramgati - Mohammad Main Uddin	Travel to Chittagong	Chittagong
09/10/17 - 09/16/17	Cox Bazaar	Teknaf JAAGO - Moheshkhali - MD. Saidul Islam	Chittagong JAAGO - Lalkhan Bazar - Mohammed Islam	Chittagong Grammar School - Bristy Sikder, Travel to Sylhet region	Habiganj JAAGO - Etakhola - MD. Mahiuddin Ahammed	Sylhet school - Mallik Ahmed, Touhid Ahmed	Travel to Dhaka, Flight back to Boston

*Figure 1: Projected Schedule, Timeline of Locations, and Contact List*

## Schedule

My plan is to visit primary and secondary schools in Kolkata, Kharagpur, rural villages called Balarampur and Shonamukhi-jhuli, each of the 13 JAAGO teaching locations, as well as Khulna, and one university - North South University.

I have established contacts in each of the locations where I want to visit schools. For the areas in West Bengal (Kolkata, Kharagpur, Balarampur), my contacts, whom I visited in December 2016 and whom I know well, are retired university professor Goutam Biswas, and current university professor Sudeshna Sarkar. I also have a friend, Meghna Sengupta, who taught at a school in the gram of Shonamukhi-jhuli and she is connecting me to that school.

For the 13 JAAGO schools in Bangladesh, there are program leaders, and I have their full contact information, which is also directly available on their [website](#). For the schools in Khulna and Sylhet as well as North South University, a private university in Dhaka, my contacts are my father, Mallik Ahmed, one of my uncles, Touhid Ahmed, and another one of my uncles, Raana Ahmed. In Khulna, I will be visiting and teaching at my cousins' schools, including the Khulna Zilla School. My dad's side of the family lives there and attend school and work there as well.

My mother intends to accompany me for the full time on my trip, which helps increase my safety and know-how for traveling and getting around in all the various regions in Bangladesh. Her expenses will be paid for by my father, but I really hope to be funded by MISTI in order to ease the financial stresses on my father.

In each of the schools I will visit, (1) I will interact with students and teachers, and (2) I hope to get to know at least a few students well enough to also visit their families and get to talk to them. Furthermore, (3) I will teach one or two, or, if time permits, more, inquiry-based lessons. (4) I will videotape interviews and my lessons. In addition to filming in Bangladesh, I will film, this Spring 2017 semester, my Bengali friends who have expressed interest in shaping education in Bangladesh. My projected schedule, with contacts included, is displayed in Figure 1. I will confirm my desired dates with my contacts in each location, and settle in the coming months all the details of what/when I can teach.

## Budget

Shown in Figure 2 is my projected budget for the trip. The total including a one-way flight (my internship from Microsoft will pay the flight from Seattle to Kolkata as part of their job benefits) comes out to about \$2000.

FARITA TASNIM ESTIMATED INDIA/BANGLADESH BUDGET FOR 5 WEEK TRIP

Yes/No	Description	Itemized Amount	Quantity	Amount
<input checked="" type="checkbox"/>	Flights (This is one-way Dhaka - BOS, Microsoft will pay SEA to CCU)	\$800.00	1	\$800.00
<input checked="" type="checkbox"/>	Transportation within Bangladesh and India (train, car [mostly], rikshaw)	\$350.00	1	\$350.00
<input checked="" type="checkbox"/>	Accommodation, on the days I am not staying with relatives or friends	\$25.00	24	\$600.00
<input checked="" type="checkbox"/>	Food, bottled water	\$6.00	35	\$210.00
	Total			\$1,960.00

Figure 2: Estimated Budget for the 5 week West Bengal/Bangladesh Trip

### **Video Equipment**

In order to produce quality video, of course I need quality video equipment. I have a personal Go Pro that takes 720p video. I have used it to make professional-caliber videos for my ocean wave energy harvesting and instrumentation project as well as my solar tracker and energy instrumentation project, and can continue to use it for filming in Bangladesh.

Furthermore, I hope to ask MIT for video equipment donations as I will likely need 1-2 more video cameras, tripods, and so on. What I don't receive, I am happy to pay out of pocket.

### **Appendix**

#### **Impact of Short-Term Seminars**

For a country to progress well, a well-developed manufacturing sector is still necessary in conjunction with high-tech and academia job expansion. Thus, it is important to note that while my focus for this trip and for my future career is to improve primary and secondary education which leads students to work in jobs that require much technical skill and knowledge, this idea ignores that there are still many jobs that still need workers but would require less schooling. These jobs can also be fulfilled by providing short term (2-3 years long) seminars to older people that teach them how to be mechanics, or work in fabric factories, etc. (Nomura et al. 2015). Short-term seminars can also provide valuable workforce improvement with fewer resources and less time commitment.

#### **The Role of Technology**

Though I have not mentioned it in my proposal, the role of technology will be very important in developing a scalable inquiry-based learning school. Ensuring that the villages and cities have electricity and wifi, computers, hard drives with captures of part of the Internet such as all of Wikipedia, as well as hard drives that store e-textbooks, and so on will be crucial to replacing the expense and burden of providing textbooks for all children. Part of the reason that rote memorization is so popular is because of the cost and weight of textbooks. Saving textbooks online and providing students with access to the the internet or at least cached versions of the Internet can be a rather low cost and scalable way of imparting the knowledge of physical textbooks to students.

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**farita.me**  
Farita Tasnim

## High Efficiency, Nanopower Voltage Step-Up Converter

Current Endeavor: Creating MIT HackFashion

### Ordering Information

East Campus W309, Cell: (512) 945 2373  
3 Ames Street [farita@mit.edu](mailto:farita@mit.edu)  
Cambridge, 02139 U.S. Citizen

### Electrical Characteristics, cont.

**NASA Space Program & High Altitude Balloon:** Sep 2011 - May 2015, 1,100+ hours: Lead systems engineer of a team of 15-20 students. Sent payloads equipped with custom APRS trackers and data loggers over 100,000 feet into the atmosphere to obtain data of the effect of rising altitude on physical and biological phenomena. Prepared to launch a 10 cc. nano-satellite to gather data on solar winds and sunspots for the NASA CubeSat program.

**Independent Laboratory Construction:** Constructed a microelectronics laboratory in my room in which I can design, manufacture, test, and debug professional caliber PCB's. Made my own reflow soldering oven, fixed a broken \$50 Tektronix 2440 oscilloscope, bought a boomscope.

### Teaching Experience

**6.101 Lab Assistant:** Feb 2017 - : Teaching students taking Introduction to Analog Electronics how to design, test, and debug circuits. Also helping them complete their final design projects.

**MIT MISTI GTL Israel:** Jan 2017: Taught college students with understanding datasheets and debugging circuits. Helped 10th graders build a miniature ocean wave energy harvester.

**6.169 Lab Assistant:** Sept - Dec 2016: Taught MIT students taking the Intro Circuits and Electronics lab class how to design, test, and debug circuits.

**6.01 Lab Assistant:** Feb - May 2016: Taught MIT students taking Intro to EECS how to break down complex electronics and programming problems into do-able chunks. Helped run lab sessions and shape teaching methods.

**Girls, Inc:** June 2013 - June 2015: Taught underprivileged kids, often minorities, various topics in math and science. Helped coach their FLL Robotics team as well.

**FIRST Robotics Training:** Aug 2012 - May 2015: Taught high school peers how to design robots in CAD software, program in Java, create electronic circuits, and use shop machines.

### Accolades

NCWIT Collegiate Award Honorable Mention (\$2.5K)	Georgia Governor's Honors Program: Mathematics
22 Under 22 Most Inspiring College Women	National Merit Scholar Semifinalist
Microsoft Scholarship (\$10K)	Research Science Institute Scholar (3% acceptance rate)
Proton Onsite Energy Scholarship Winner (\$36K)	Georgia ARML Team
Regional STAR Student	MIT THINK: Ntl. Runner Up
FIRST Robotics Regionals, First Place Alliance Captain and Regional Winner	FLAG French Foreign Language Spoken Contest Perfect Score
NCWIT Aspirations in Computing National Runner Up and State Winner	SAT Score of 2380 in 9th grade
Math Prize for Girls	FIRST Robotics Rookie-All Star Award
	Georgia MATHCOUNTS, 1 <sup>st</sup> Place Overall

### Features

Massachusetts Institute of Technology  
Major: Electrical Engineering  
Class of 2019; In-Major GPA: 4.9

Columbus High School  
Valedictorian  
Class of 2015

### Maximum Ratings

### Courses

PCB Design	●●●●●	Adobe Photoshop	●●●●●	6.334	<b>G</b>
PCB Layout	●●●●●	Adobe Illustrator	●●●●●	6.003	
SolidWorks	●●●●●	Autodesk Inventor	●●●●●	6.301	
PTC Creo	●●●	Ham Radio	●●●●●	6.525	<b>G</b>
C	●●●●●	Objective-C	●●●	6.101	
Java	●●●●●	LTSpice	●●●●●	6.009	

### Electrical Characteristics

**Electrical/Energy Engineering Intern, Microsoft Research:** June - Aug 2017: Working on developing body energy harvesting solutions as well as low power sensors in order to reduce form factor and energy needs of wearables.

**MIT HackFashion:** Sep 2016 - : Starting a new club whose purpose is to enable students to take part in fashion engineering by creating wearables or technology-inspired clothes and by developing an end-to-end fashion design software.

**Electrical Engineering Intern, Microsoft Hololens:** June - Aug 2016: Developed a flexible PCB for the bring-up and testing of internal Hololens motherboards. Involved digital circuitry design, PCB layout, system integration.

**Analog Electronics Lab Final Project:** March - May 2016: Developed a custom, high precision fluxgate magnetometer made with an amorphous metal core and its accompanying instrumentation circuit which gathers data on magnetic field using phase demodulation and can be used as an ammeter.

**Electrical/Energy Engineering Intern, Intel Corporation, New Devices Group:** June - Sep 2015: Created PCB's, firmware, and an integrated product to harvest and analyze natural sources of energy from action sports to a) charge phone batteries and b) power sensors without batteries, which reduces form factor, maintenance, and market advantage.

**Independent Research for Harvesting Ocean Wave Energy:** Aug 2014 - May 2015, 730+ hours: Developed a novel adaptive energy harvesting system. Designed and built the mechanical structure and PCB's, programmed in C. Device calculates raw input energy of waves and converts the generator's AC power into usable energy in one of three selectable modes: 1) battery charging, 2) electrolysis, and 3) resistor load. Sends the data via WiFi to a custom iPhone app.

**Independent Research for Increased Solar Energy Harvesting Efficiency:** Oct 2013 - present, 600+ hours: Constructed a compact solar site surveyor device (PCB, C firmware, and mechanical structure) that tracks the sun, measures the solar current generated for any given spot, and communicates via Bluetooth to an iPhone app to track solar output of different locations, helpful in determining the optimal placement of solar cells in cities.

**FIRST and BEST Robotics:** Jan 2012 - May 2015, 2,000+ hours: Captain of a team of 15-20 students. Every year, we created a 120-pound robot in 6 weeks in the spring and a 24-pound robot in 6 weeks in the fall. Instilled infallible work ethic and dedication in team members, ensured effective CAD design, wired the electronics, and wrote code in Java and C for sensor input, actuator control, vision processing, automated sequences, and joystick control.