ComEd

Grant Report 2019

IMSA Innovation Center Programs

The Steve and Jamie Chen Center for Innovation and Inquiry (IN2) features a 6,400 square foot state-of-the-art transformational center. The center provides collaborative programming and events in Science, Technology, Engineering, and Mathematics (STEM), Makerspace and Entrepreneurship programs for middle and high school students.

The IN2 team follows methods in its programming which provides: Design Thinking, Experience Design, Practice-based Participatory Learning and the Lean Startup methodology (build, measure, and learn) and iterates program ideas from ideation to growth.

The center's programs and activities ignites collaboration among students, educators, businesses and communities to advance the human condition through innovation and entrepreneurship.

Timeline

January 2019-November 2019

Grant Amount

$25,000.00

Duration

Each of the ComEd funded projects vary in duration because of the school year, but all funds will be expended by the end of 2019 (or by February 2020).

Summary

The 2019 ComEd grant in the amount of $25,000 was used for five separate IN2 programs:

1. ComEd Energy Seed Fund for IMSA projects
2. STEM Pathways/Girls IN2 STEM Career Fair
3. IN2 Maker Faire
4. ComEd Energy IN2 Idea Bar Sponsorship
5. ComEd & IN2 Energy Event: PowerUp- Lights Out Design Challenge

The report below provides detail for each of the five projects.

Management

Dr. Kelly Page, former IMSA Chief Innovation Officer (CIO), was the project manager for the grant from September 2018-August 2019. Dr. Norman Storm Robinson III, Ph.D., Executive Director for the Center of Teaching and Learning currently oversees the operations and programming at IN2. The IMSA Fund for Advancement of Education (IMSA Fund) received 10% ($2,500) of the grant for administration fees.

Project Description

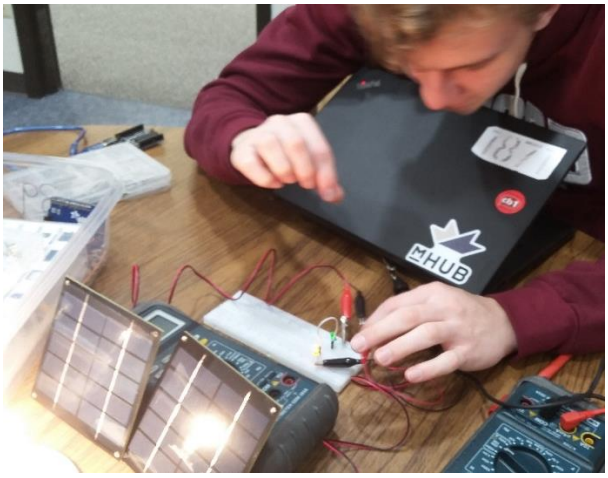
I: ComEd Energy Seed Fund for IMSA Projects: $7,500

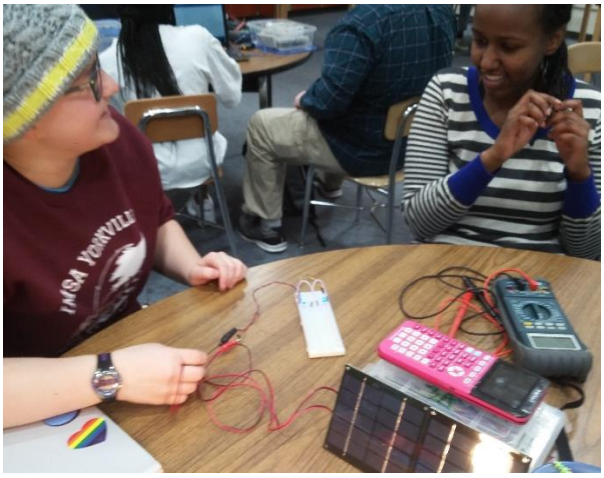
The Center for Innovation and Inquiry awarded four seed grants to IMSA faculty and staff for energy projects in the Fourth Annual ComEd Energy Seed Fund Program. Awards totaled $7,500 used for energy curriculum, research, projects and resources.

Grantee: Dr. Mark Carlson & Dr. Pat Patankar
Project Title: Visual Microcontroller Solar Charger/$2,500
Project Summary:

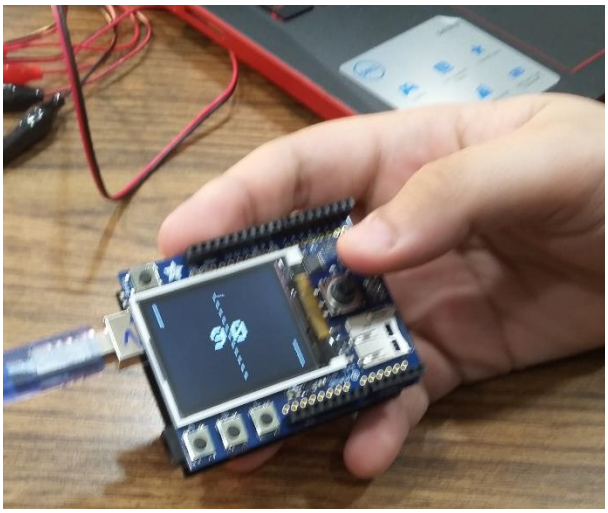
A classroom set of color graphical display shields (for Arduinos) and durable solar panels were sought for a team taught interdisciplinary course, Microcontroller Applications. (Currently, enrollment is roughly 25 to 30 students a year.) These items constitute the critical components necessary for a project to create an Arduino controlled solar charger with graphical display. Ancillary components such as DC-DC converters, pin headers, etc. are also included.

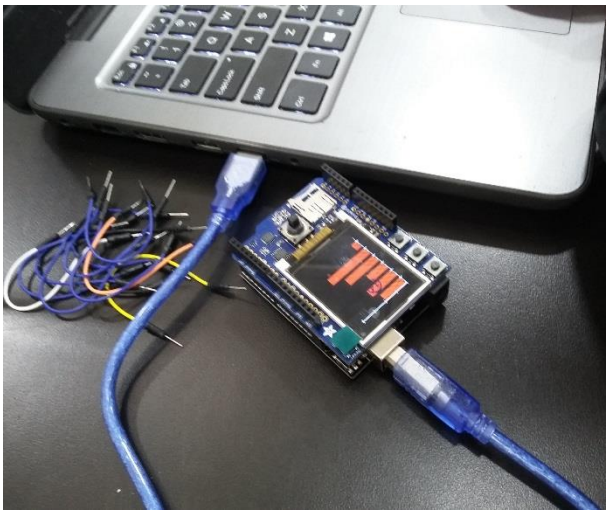
At the time of this report, the students have completed an exploration of the properties of solar panels which are quite different from that of typical EMF sources like batteries. The voltages generated and the currents supplied do not follow simple series and parallel rules when subjected to even modest resistive loads. Since modern consumer lighting favors LED's, the non-Ohmic nature of these devices has been investigated by the students as well.





At this point in the semester, the students have the background to utilize the graphical displays and have begun programming them, using libraries they have created as well as those available from other sources.





Subsequently, students can combine these elements toward their intended goal, including projects of their own design, with real world application.

Grantee: Dr. Sowmya Anjur & Erik Swanson
Project Title: ATP Synthase Energy Project/ $2,500
Project Summary:

ATP synthase is an important enzyme that creates adenosine triphosphate (ATP) from adenosine diphosphate (ADP) and inorganic phosphate in the electron transport chain

in mitochondria of cells during cellular respiration and thylakoid membranes of chloroplasts in plants during photosynthesis. ATP synthase works by coupling the energy of the spontaneous proton gradient to feed the non-spontaneous conversion of ADP to ATP, which requires energy. Dr. Anjur proposed to 3D print several structures of ATP synthase for the Scientific Inquiries Biology (SI Bio) and Advanced Biological Systems (ABS) classes to help students understand the complex nature of this enzyme, without which organisms will die. This structure will help students understand about the importance of energy (ATP) in cellular processes.

The energy related project will help students understand how ATP synthase creates ATP which provides energy to cellular processes. From Dr. Anjur's experience, students have a hard time understanding the complex nature of this enzyme, and the 3D printed models will help them tremendously, especially the visual learners.

The current goal is to create the models and an accompanying worksheet for the classes for the year 2020-2021.

Thus far Dr. Anjur has purchased Formlabs resin (pictures above) and are waiting on some other materials to make the products, after which the worksheet will be created.

Grantee: Club Terra
Project Title: Green Ambassador Program/$2,000
Project Summary:

The Green Ambassador Program through Club Terra is an outlet through which the students of Illinois Mathematics and Science Academy are trained to educate younger children in their hometown libraries about environmental programs helping to ignite passion, change and action statewide. Teaching children from a young age to prioritize the Earth's health will ensure that they carry the ideals of sustainability throughout their lives.

An array of supplies were purchased including an acid rain kit, a paper recycling kit, multiple wind turbines kits, multimeters, a water filtration kit, a lead testing kit, a generator, a large solar car.

Club Terra used both the paper recycling kit and the wind turbine kits. The paper recycling kit served as a simulation to guide kids through the paper recycling process and educate them on the importance of recycling. The wind turbine kits were used to teach about why renewable energy is the future of our planet as well as it sustainability, which exceed that of current resources like coal and fossil fuels.

They also attempted to use the water filtration kit and solar cars, though they were unable to as no children of the appropriate age level to use these tools attended the events.

Club Terra will continue to purchase kits and supplies to complement their curriculum for the Green Ambassador Program.

Grantee: Christine Moskalik
Project Title: What's the Buzz? A Unique Hands-on Learning Experience for K-8 Educators and Students/$500
Project Summary:

This activity was originally developed as an outreach program for a group of 20 2nd graders in April 2019. Ms. Moskalik wanted to share the activity with teachers, who could then facilitate the activity with their own students. She submitted two conference presentation proposals: 1) The Northern Illinois Science Educators (NISE) conference, which was accepted and was conducted on November 18, 2019 with 20 k-8 teacher participants and 2) The National Science Teaching Association (NSTA) annual

conference, which was accepted and will be conducted in April 2020 in Boston, MA. Up to 99 teachers can participate in the workshop during her NSTA session.

These funds allowed her to obtain the materials needed to conduct these hands-on workshops where teacher participants can learn how to do the activity and take the materials home with them.

These funds also allowed her to procure enough materials to conduct the activity in another 2nd grade outreach program which is to be held in April, with up to 24 2nd grade students.

Finally, Ms. Moskialik submitted a manuscript that describes these activities to NSTA's Science and Children journal and recently learned that it was accepted. This manuscript could have additional (indirect) impact if teachers who read that journal do the activities with their students. In fact, one of the manuscript reviewers commented "Great work. I really enjoyed your article and am planning to try this with my students! Thank you."

While these funds were not used to write or publish the manuscript, in addition to her funded hands-on workshop-style presentation/s and the 2nd grade outreach event in April 2020, there will be a greater reach for this activity, promoting energy-related content with students on a national scale.

The described activity being facilitated with original group of 2nd graders in April 2019.

II: STEM Pathways/ Girls IN2 STEM Career Fair: $5,000

1) IEEE Women in Engineering AI Conference:

On September 20, 2019, the STEM Pathways/Girls IN2 STEM program sponsored a group of 14 students to attend the annual IEEE Women in Engineering AI, conference at the Nokia Center in Naperville, Illinois. The purpose of this trip was to provide a career exploration experience for students interested in pathways for Engineering, Energy, Machine Learning, and Artificial Intelligence. Students were engaged in a forum designed for women students, researchers, teachers, engineers and leaders as well as disruptors who shared their unique point of views on AI through real-life projects and experiences, discuss lessons learned, identify its challenges and limitations, and their collaborations on critical skills needed to accelerate the industry movement. Students attended lectures including topics such as Impact of AI on Medical Imaging and Healthcare, Jumpstarting your ML journey in Cyber Security, AI in Sports, Ethics in AI and AI in the Electric Energy Sector.

2) Aurora Smart Cities Design Challenge:

In partnership with City of Aurora's 605 Innovation District, IMSA is a key partner in developing a Smart Cities Youth Board consisting of 24 middle schools, high schools and colleges (youth ages 14 - 20) to integrate youth into their initiative to build a Smart City. A city youth board is designed to activate the community to build connections, advise on youth concerns and interests and collaborate on Smart Cities initiatives in a variety of learning/working groups inspired by our programs. The sustainability of the smart city necessitates that children and youth be provided opportunities to pursue (STEM) careers, as well as be provided access to the same information and communication technology that will become the foundation of tomorrow. The Aurora Smart Cities Youth board will host the first annual City Youth Design Challenge between November 2019 and April 2020 at IMSA's Center for Innovation and Inquiry.

As defined by the United Nations “a smart sustainable city is an innovative city that uses information and communications technology and other means to improve quality of life, efficiency of urban operation and services and competitiveness, while ensuring that it meets the needs of present and future generations with respect to economic, social and environmental aspects” Today’s youth are the smart city citizens of tomorrow.

III: IN2 Maker Faire: $5,000

IMSA Making for Social Change, Making a better community UN17SDG Maker Faire
Date: February 8, 2020, 8:00am-4:00pm
Location: IN2

The Maker Faire will showcase innovation, new technologies and ways to address grand challenges based on the United Nations 17 Sustainable Development goals. The event will celebrate and share the many ways of Making to promote experimentation, play and creativity. Participants will have the opportunity to share their making processes and/or products, learn about a certain "Maker" aspect or technology and/or how to incorporate Making into a learning experience.

The Faire will begin with a Keynote Speaker who will give the participants insight into how innovation and creativity can be used to solve the Grand Challenges of our community. During the Keynote Presentation, new technologies will be introduced along with a forward look into the grander purpose of making. The speaker will be a prominent leader in the field of Making.

After the keynote Speaker, there will be various breakout workshops that will showcase and train the participants on the technologies and process of making. Participants will gain insight and knowledge on how to maximize 3-D printing to produce prototypes, manufacturing process that help with creating solutions, entrepreneurial thinking workshops, and more. Training will be given to educators on how to use making as an instructional tool to enhance problem based teaching and learning.

The exhibit area will allow a showcase for makers to present their work and see other maker's projects. Rich dialogue and collaboration can occur organically to promote creativity and inspiration. A closing program at the end of the day will be held to allow selected Makers to present their products and discuss how they help towards the UN17 SDG grand challenges.

IV: ComEd Energy IN2 Idea Bar Sponsorship: $1,000

The IN2 Idea Bar sponsorship includes a highly visible check-in station at IN2 where community volunteer idea baristas and IN2 staff assist students and guests with questions and provide mentoring.

1. Sponsorship of the IN2 Idea Bar – supplies and support of IN2's concierge station and home base for volunteer Idea Baristas.

2. Daily access to IN2, programs and Makerspace access for ComEd employees.

3. Recognition on IN2 Idea Log and Doodle pads (given away at no cost to guests and program participants).

4. Recognition of ComEd on the Idea Bar (logo) and Media Wall (logo) as well as mentions as part of every guest tour of IN2.

V: ComEd Energy Event: $4,000

Grantee: Betty Hart - IN2 Program Manager
Program Title: Power Up-Lights Out Design Challenge

In partnership with Department of Homeland Security CISA and FEMA, City of Aurora and Chicago Emergency Management, IN2's Girls IN2 STEM program is leading the community with an online Design Challenge "Power Up – Lights Out". The program invites middle school students and parents who would like to participate alongside local Emergency Management Agencies as "power players" to help get the Power Grid back online after a simulated cyber-attack. Power UP Design Challenge "Lights Out," in recognition of Careers in Energy and National Cybersecurity Awareness Month, is focused on the following goals:

1) Empowered diverse youth to lead and impact STEM Design Challenges

2) Introduced participants to the roles of Energy, Cybersecurity and Emergency Management careers and partnerships.

3) Educated participants on importance of Disaster Preparedness and Community Collaboration.

The online challenge commenced on October 20, 2019 and participants will return to IN2 in January 2020 to meet their mentors and share their solutions.