CADSTI-NE Newsletter

Empowering Caribbean youth through science & engineering experiences

NOVEMBER 2023

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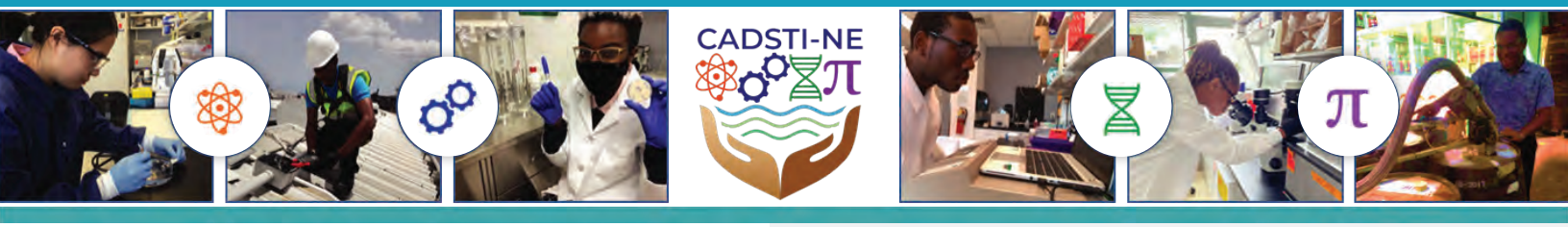

President's Message

Dear Friends and Supporters of CADSTI-NE,

Dinah Sah - President

It's a tremendous pleasure to share with you the highlights of the 2023 CADSTI-NE summer internship program, which was a success! We organized 5 student internships in biotech and high tech this year. Our SPISE graduates from the Caribbean were hosted by 4 organizations in Massachusetts and Barbados: Emera Caribbean, Foursquare Rum Distillery, Ocular Therapeutix and TraceLink. In total, CADSTI-NE has now organized 65 internships for Caribbean youth since 2014! The CADSTI-NE organizing committee again worked diligently throughout the year, meeting on-line nearly every Sunday morning to plan, coordinate and implement the internships. All of this was made possible by your support and the contributions of the host organizations, both financial and in-kind. A huge thank you to our donors and host organizations for sharing in our vision to provide these transformative experiences in STEM for our very gifted Caribbean students!

Sincerely yours,

Dinah Sah

Dinah Sah, PhD
President, CADSTI-New England, Inc.

About CADSTI-NE

CADSTI-NE is a U.S.-based 501(c)(3) non-profit organization launched in 2014 that focuses on empowering Caribbean youth through science and engineering experiences. Our major projects are to:

1. Coordinate and finance the summer internship program for graduates of the Student Program for Innovation in Science and Engineering (SPISE). SPISE is an annual intensive residential (or virtual) summer program launched in 2012 by the Caribbean Science Foundation for gifted Caribbean high-school students 16-17 years of age who are interested in studying and exploring careers in science and engineering. SPISE is modeled after MIT's MITES Program, and a major goal is to help groom the next generation of science, engineering, and business leaders in the Caribbean. CADSTI-NE's student internship program provides opportunities for SPISE graduates to experience first-hand the application of STEM to research and development within biotech, high tech and other organizations in the U.S., Canada, UK and Caribbean.

2. Support SPISE

CADSTI-NE Leadership Team

Karen-Leigh Edwards, PhD, MBA
Lori Fitz, PhD
George Marecheau
Paul McLean, PhD
Dinah Sah, PhD
Joshua Sheldon, MBA
Cardinal Warde, PhD

In This Issue:

Biotechnology

Khahill-Akil Richards

Khahill-Akil Richards (Dominica)

- Second year Integrated Biomedical Engineering and Health Sciences major at McMaster University, Hamilton, Ontario, Canada
- Ocular Therapeutix, Bedford, Massachusetts, USA

Khahill participated in a 10-week Product Development internship at Ocular Therapeutix. Ocular Therapeutix is a biopharmaceutical company that specializes in the treatment of eye diseases through an innovative hydrogel-based delivery system that provides sustained and localized drug delivery. Its products reduce the need for repeated manual application of ophthalmic drugs.

Upon entering this internship, Khahill hoped to gain insights into the biopharmaceutical industry as well as learn more about technical operations, scale up and late-stage process development. Furthermore, as a biomedical engineering student, he hoped to better understand the various ways in which engineering is being used in the pharmaceutical field. Khahill was part of the Product Development team. He was also able to take on his own project, creating and designing a visual system to be used by the late-stage development as well as the manufacturing teams. While at the company, Khahill participated in various meetings, gaining insight into company-wide cross functionality.

Khahill learned a wide range of new skills. His position on the Devices sub-team gave him access to SolidWorks as well as 3D printers, enabling him to learn about the design process and iteration. He was also able to acquire various laboratory skills such as cleanroom gowning, and working with an inert gas glove box and other apparatuses in a Good Manufacturing Practice setting. He learned several skills from other engineering disciplines such as wiring and grounding of electronic devices. The ability to meet with senior engineers and scientists allowed Khahill to gain insight into their career paths and the multiple opportunities in the biopharmaceutical field.

At the end of the internship, he presented at the company town hall describing the work he had done including the system he created. Additionally, he gave a more in-depth presentation to his department detailing his accomplishments.

Overall, this internship served as a great learning experience for Khahill. He gained skills across multiple engineering disciplines, and participated in and observed the application of STEM to developing products in an industry setting, all of which will be very useful in his future academic and career journey.

Chemical Engineering

Pryla Pamphile

Pryla Pamphile (Dominica)

- Gap year; Biology, Chemistry, and Physics major at Dominica State College, Dominica
- Foursquare Rum Distillery, Barbados

Pryla participated in a 4-week internship at Foursquare Rum Distillery. Foursquare Rum Distillery manufactures rum with state-of-the-art equipment and systems. It also bottles distilled water and recovers carbon dioxide (CO_2) produced by yeast during the fermentation of molasses for rum production. The CO_2 is converted to dry ice by a standard industrial process for sale locally.

Pryla's internship goals were to experience putting STEM principles that she had learned at school into use, and to network and be mentored by professionals in the chemical engineering industry. She came into the internship expecting it to only be about chemistry; however, she found it eye-opening to see how multiple STEM disciplines are integrated to produce a product. For example, physics principles were applied in using a refractometer to determine sugar content in cane juice and molasses, and microbiology knowledge was used to identify different strains of yeast and bacteria that are integral to the fermentation process. Pryla also observed the various machinery utilized not only in the manufacturing of rum but also in the bottling of distilled water and helped ensure that the machinery was working properly. Most of her time was spent with the chemist who impressed upon Pryla the value of adaptability and being willing to learn and conduct research to address new challenges and problems that arise.

Pryla's prior experience with chemistry such as performing titrations and her fundamental knowledge of esters and acid-base reactions provided the foundation for her understanding of new concepts and allowed her to confidently take on responsibilities in the lab. This internship has affirmed that a STEM career is the optimum career path for Pryla and she is now interested in minoring in a STEM area such as chemistry or physics in addition to majoring in biomedical engineering when she enters university.

Energy Industry

Nia Belle

Nia Belle (Dominica)

- Second year Electrical Engineering major at Louisiana State University, Baton Rouge, Louisiana, USA
- Emera Caribbean, Barbados

Shola Ismail

Shola Ismail (Jamaica)

- Second year Chemical and Process Engineering major at The University of the West Indies, St. Augustine, Trinidad
- Emera Caribbean, Barbados

Emera Caribbean is the sole provider of electricity in Barbados and includes Barbados Light and Power Co. (BLPC) and Emera Caribbean Renewables Ltd. (ECRL).

Two interns, Nia Belle and Shola Ismail each participated in a 6-week engineering internship at Emera Caribbean. The goal of the internship was to experience the realities of working in a STEM-related field and more specifically, to gain an overview of STEM as applied to electrical power generation and supply/distribution. The rotations through different departments at Emera Caribbean provided opportunities to learn firsthand from field engineers and other professionals about energy generation including renewables and energy distribution. The interns saw how theoretical concepts previously learned through the SPISE electronics program, engineering books and other lessons, were connected to practical applications. Although Nia and Shola spent their internship together most of the time, they each had a unique perspective on their experience.

Energy Industry

Nia's Experience

Nia was excited to intern at Emera since she is most interested in a career path in Power Engineering. She considered the internship to be a great opportunity to see the industry from within even before completing her studies in electrical engineering. One of the first things she noticed was how important safety was to the company. A favorite activity during the internship was the "7 minutes of safety" talk done every morning by different departments. Nia was most interested to learn about how Emera has been implementing renewable energy on their grid and the challenges faced by a small island. Often, renewables are painted as very easy to implement and the cheapest option, but she learned that this is not the case. Not only is the initial installation costly, but so is the maintenance. Nia was particularly interested in the in-depth explanation about the steam, diesel, and gas engines in the plant. She appreciated the interaction of the employees and their willingness to explain concepts. Nia was also involved when the team was investigating an issue with compressors which were not working properly. This provided an opportunity for her to see the electrical plans and how they are used to identify problems and develop solutions. Nia was also most excited when she had the chance to see some industry function boxes with NOR, OR, and AND gates which she had been learning about at university.

Nia's takeaway from this internship was how multi-disciplinary and varied the job of a Power Engineer is, incorporating both electrical and mechanical engineering. Overall, the Emera internship was a tremendous opportunity for Nia to see her theoretical knowledge from university applied on a large scale in industry to address real-world needs. The experience has made Nia more confident about her chosen career path in Power Engineering.

Shola's Experience

Shola describes her opportunity to intern at Emera as rewarding. She gained an understanding of power generation distribution in conjunction with photovoltaic (PV) systems which is particularly relevant to her intended career in sustainable energy.

During the 6-week period, Shola rotated throughout the company and was exposed to key operations. First, she joined the Distribution team for a week and travelled on the truck with the linesmen, setting up pre-cautionary measures before hot wire jobs. Next, when placed on the Supervisory Control and Data Acquisition team, Shola answered internal maintenance calls as well as monitored the energy frequency produced by the plant. Later, the rotation at the generation sites included visiting the PV plant, which is outfitted with more than 44,000 panels to produce 10 megawatts of power, and getting a closer look at the 3 main types of power turbines: gas, Av-jet and diesel. She also developed new laboratory skills while working with the quality assurance analysts for 2 weeks. Shola believes that the mandatory electrical engineering undergraduate course that she had taken prior to the internship aided her significantly in understanding the technical terms used at Emera.

In addition, Shola developed key networking skills as she worked with engineers of diverse backgrounds. This is particularly important as she aspires to a managerial role on a plant as a chemical engineer.

Shola highly recommends this internship to anyone who would like to gain insight into working as an engineer as well as begin developing skills and observing best practices in the field of power generation.

Computing and Data Sciences

Jhonelle Moore

Jhonelle Moore (Jamaica)

- Second year Electrical and Computer Engineering major at Princeton University, Princeton, New Jersey, USA
- TraceLink, Wilmington, Massachusetts, USA

Johnelle participated in an 11-week software engineering internship at TraceLink. TraceLink is the world's largest integrated digital supply network, providing real-time information sharing for better patient outcomes by delivering complete global connectivity, visibility, and traceability of pharmaceuticals from ingredient to patient.

Jhonelle's primary objective was to broaden her understanding of the software engineering industry and acquire proficiency in new programming languages. Her internship encompassed a wide range of experiences, including close collaboration with her team, through debriefs and presentations, and receiving encouragement and support from colleagues across the organization. A key moment in her internship was her participation in TraceLink's global summit, which gave her the opportunity to learn about the company's different teams, product offerings and future goals.

One of Jhonelle's notable projects was the development of an application metrics dashboard. This endeavor required proficiency in using Grafana, an analytics software, and TraceLink's core database. Through the internship, she refined the dashboard's appearance and functionality, transforming it into an important tool for monitoring purposes. Additionally, she collaborated with various teams to compile a list of tests and then developed a Python script to assess the health of a development environment. These projects deepened her understanding of software testing, Python programming, and JSON queries, and underscored the importance of collaboration and feedback within a professional setting. Furthermore, her prior Python projects during her time at SPISE proved to be useful background, providing an important foundation for the language as she embarked on relearning Python during the internship.

Jhonelle's collaboration with different teams at TraceLink exposed her to various areas of Software Engineering such as platform engineering, machine learning, development operations, and quality assurance. This exposure encouraged her to maintain an open mind and continue exploring different facets of the industry. Jhonelle's time at TraceLink allowed her to appreciate the multifaceted nature of software development and see how diverse teams with distinct skill sets can collaborate effectively. At the end of the internship, she felt a sense of accomplishment, having contributed to vital tools used across TraceLink. She also gained a renewed enthusiasm for pursuing a career in Software Engineering, with a commitment to embracing new challenges and expanding her areas of expertise.

SPISE 2023

The **Student Program for Innovation in Science and Engineering** (SPISE) is an intensive 5-week summer program in science and engineering, offered by the Caribbean Science Foundation for the most promising and gifted Caribbean high school students 16 and 17 years of age. Dr. Dinah Sah and Professor Cardinal Warde are the Directors of SPISE which is modelled after the MITES program at MIT, for which Professor Warde also serves as the Faculty Director. SPISE students are totally immersed (24/7) in university-level calculus, physics, biochemistry, computer programming (Python), entrepreneurship, and hands-on projects in electronics. The SPISE environment discourages rote learning and teaches students how to focus on understanding and applying the fundamentals to achieve mastery of the material, and thus be able to solve complex problems. Instructors and lecturers include university professors from the Caribbean and the Diaspora (including MIT), and senior management professionals from leading biotechnology companies in the Diaspora. The students also benefited from career seminars by luminaries in their respective fields and received valuable guidance through workshops that focused on time management, the college application process and effective CV preparation.

To date, the Caribbean Science Foundation has been able to serve a total of 225 graduates, including a class of 19 students in SPISE 2023. The aims of the program are being realized, with SPISE graduates attending top-tier universities in the US, Canada, the UK and the Caribbean, including MIT, Caltech, Harvard, Stanford, Princeton, Yale, Dartmouth, Columbia, Cornell, U Penn, Howard, McMaster University, and UWI, where they pursue bachelor's, master's and doctorate degrees in a range of STEM-based subjects. This achievement could not have been accomplished without your support, for which we are extremely grateful.

Further details can be found at *https://caribbeanscience.org/spise/*.

Where are the Interns Now?

We are delighted to feature 2 former CADSTI-NE interns in this newsletter: Desmond Edwards and Abigail Scott. Other former interns will be highlighted in future newsletters.

Desmond Edwards

Ph.D. candidate, Microbiology and Immunology, Stanford University

SPISE 2017 Caribbean Development Bank Scholar
Internship: Voyager Therapeutics (2018), Cambridge, Massachusetts
B.S. Biological Engineering and Biology, Massachusetts Institute of Technology
Cambridge, Massachusetts

My name is Desmond Edwards, and I was a SPISE 2017 Caribbean Development Bank Scholar from Jamaica. I am now a 2nd year PhD student in Microbiology and Immunology at the Stanford School of Medicine in the lab of Professor Taia Wang. Broadly interested in infectious disease, I am currently conducting research at the interface of immunology and virology. More specifically, my projects include interrogation of the signalling requirements for antibody-dependent enhancement of dengue virus infections, as well as investigation of the mechanisms by which antibodies with different sugar modifications impact the course of viral disease. In the long-term, I want to lead a scientific career that includes not only ground-breaking contributions to academic research, but also involvement in ensuring that the fruits of this research have their maximal benefit to society through public policy, outreach, and education. My time in SPISE and as a CADSTI-NE intern at Voyager Therapeutics were instrumental in helping to clarify my career goals, as well as supporting me on the path to achieve them.

When I started at Voyager in summer 2018, I was right out of high school and had never so much as held a micropipette before, much less conducted any scientific research. Though I had a strong theoretical foundation from academic classes, I had no practical exposure to what it actually meant to be a scientist and do biomedical research. Voyager, however, allowed me to grow exponentially, exposing me to basic yet powerful techniques such as polymerase chain reaction (PCR), enzyme-linked immunosorbent assay (ELISA), and immunohistochemistry, to name a few. More than simply being a survey of protocols, my internship showed me the beginnings of not only how to consider scientific questions and design the most appropriate experiments to answer them, but also how to think about and evaluate the work done and published by others as a part of the scientific corpus. Good science, however, is not the only important consideration when developing novel therapeutics for eventual use by the public. Being at Voyager also gave me first-hand exposure to the non-scientific aspects of drug development: from crafting reasonable business strategy to navigating the regulatory process, from securing funding for ongoing and future research to forging key corporate partnerships; I gained a holistic understanding of what it takes to bring a drug from bench to bedside. Finally, the funding provided by my internship stipend significantly improved my financial situation, helping ease the financial pressure of my first year and supporting me until I secured on-campus jobs and beyond.

SPISE and CADSTI-NE have been invaluable contributors to my journey thus far. The professional connections I have made, the skills I have learnt, and the friends I have met have served to prepare me for my future career, and it is unlikely that I would be where I am today without this continued support. Many thanks to CADSTI-NE and all its partners for the good work that has been done, and I look forward to being able to pay it all forward many orders of magnitude over!

Where are the Interns Now? (cont'd)

Abigail Scott

Ph.D. candidate, Chemistry and Chemical Biology, Harvard University

SPISE 2016 Kerosene Lamp Foundation Scholar
Internships: Trinidad Systems Limited (2017), Port-of-Spain, Trinidad
B.S. Chemistry, Massachusetts Institute of Technology
Cambridge, Massachusetts

I am a second-year Ph.D. student and Herchel Smith Fellow in the Department of Chemistry and Chemical Biology at Harvard University. Here, I study relatively unexplored E3 ubiquitin ligases, proteins that target specific substrates for proteasomal degradation, under the guidance of Professor Christina Woo.

In 2017, I obtained my first real job experience at Trinidad Systems Limited (TSL) through the CADSTI-NE internship program. While at TSL, I refreshed my coding skills in Python and tackled coding in C, an older programming language. Through multiple rounds of debugging code, I significantly improved my troubleshooting capability and learned when and how to ask for help - soft skills critical to conducting research. Ultimately, this internship experience inspired me to take an introductory programming class during my first year at the Massachusetts Institute of Technology (MIT). These coding skills were useful to me in my undergraduate research in Structural Biology, enabling me to receive the Merck Prize for outstanding research and academic performance in biophysical or bioinformatics sciences.

I am extremely grateful to SPISE and the CADSTI-NE team for their investment in my development as a scientist. I would certainly not be where I am today without their continued support.

2023 Internship Hosts and Sponsors

Sincere thanks to our partner organizations, who devoted time and resources to plan for, on-board and mentor the student interns.

Host Organization	Location	Company Focus	Student Intern
Emera	Barbados	Energy company that provides electrical power for several Caribbean islands, including renewable energy.	Nia Belle Shola Ismail
FOURSQUARE RUM DISTILLERY	Barbados	Small company that manufactures rum with state-of-the-art equipment and systems.	Pryla Pamphile
Ocular Therapeutix™	Bedford MA, USA	Biopharmaceutical company that specializes in the treatment of eye diseases through an innovative hydrogel-based delivery system that provides sustained and localized drug delivery.	Khahill-Akil Richards
tracelink® NETWORK FOR GREATER GOOD	Wilmington MA, USA	World's largest integrated digital supply network, providing real-time information sharing for better patient outcomes by delivering complete global connectivity, visibility, and traceability of pharmaceuticals from ingredient to patient.	Jhonelle Moore

Caribbean Diaspora for Science Technology & Innovation New England

Empowering Caribbean youth through science & engineering experiences

Thank You!

CADSTI-NE Leadership Team

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Lori Fitz, PhD
Treasurer and Director

George Marecheau

Paul McLean, PhD
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