

The Jacobs Institute Newsletter

A Dose of Medical Innovation

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Where to find the latest developments emerging at the Jacobs Institute in Buffalo, New York.

A Forward-Looking Internship: Blueprinting the Future



This summer, the Jacobs Institute (JI) had the good fortune to hire six talented interns, from diverse fields. All the students hailed from Western New York and brought energy and creative problem-solving to their challenging projects. Each project was key to moving various aspects of the JI forward.

Kristen Benson, a rising senior studying biomedical engineering at University at Buffalo (UB), created a 3D-printed replica of a heart and wired it with Arduino circuitry to mimic the electrical signaling problems associated with atrial fibrillation (AFib). She also used a mapping catheter to test the accuracy of the model's circuitry. This project is critical to JI's ability to create realistic models for

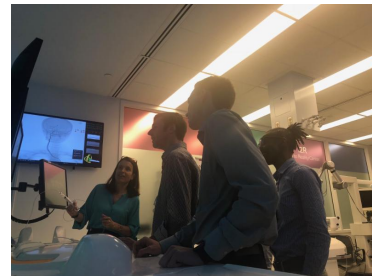


industry and physicians coming for clinical immersion programs, to understand the intricacies of AFib and practice deploying devices such as pacemakers in order to regulate it.

Liam Christie, a rising junior studying electrical engineering at UB, evaluated external sensors applied to JI's 3D-printed models of brain arteries to provide measurable data on pressure and flow. The other portion of Liam's project centered on setting up and installing LabView software to measure other aspects of the 3D-printed models and provide the data in a clearer and user-friendly manner. This is critical to assisting JI engineers in summarizing data for industry and start-up customers that conduct product testing sessions at the JI.

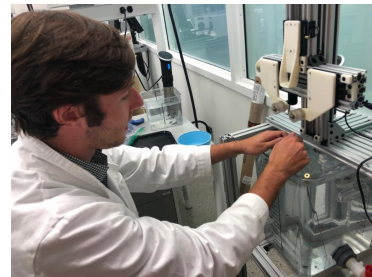


Rachel Loecher, a master's of business administration student at UB, conducted a case study relating to the global distribution of 3D-printed models. She worked with JI industry partners to determine the feasibility of expanding distribution of JI's models for clinical training, product testing, and surgical planning.



David Maher, a rising senior in biomedical engineering at Duquesne University, collaborated with JI engineers and UB professor Vojislav Kalanovic. Together, they envisioned and created product specifications for a next-generation 3D printer that would meet JI's need for more accurate, cost-effective, clinically-relevant models. He explored material characteristics of our current models and determined the ideal-state, as well, while researching possible technologies that could simplify and enhance the printing process, while saving cost on superfluous printing material.

Tom Mancuso, a rising junior at The Ohio State University studying biological engineering, constructed and used equipment to test the robustness of the 3D-printed models. In particular, he studied the resilience of the models to withstand stretching and poking and the models' current levels of friction when deploying intravascular devices inside of them for a variety of uses.



Maya McDaniel, a masters student in data science at UB, worked with UB's Center for Computational Resources director, Tom Furlani, and JI's research director, Dr. Jason Davies, to analyze a large data set in order to create a model for predicting stroke in patients. A group of students, led by McDaniel, gained access to and mined a 40,000-person database from Beth Israel Deaconess Medical Center's intensive care unit (ICU) in Boston, MA. The group looked at the data, made requests of the data, and the results went in to feed the new model. They then tested the new model on the data set to validate the model. At 76% accuracy, the model was a great step forward and also established a new JI partnership with CCR moving forward to strengthen the predictive model.

In conjunction with projects, the JI provides interns with additional opportunities to network. Interns spent time with professionals across the Buffalo Niagara Medical Campus, including Roswell Park Comprehensive Cancer Center, UB's Center for Computational Resources, 43North, UB's



School of Engineering, and more. It is a chance to learn the recipe for professional success and build a professional network. Interns also had time for fun, joining the rest of the JI staff for a beach BBQ. The JI continues to provide a special summer experience unlike any other.

To watch the intern' presentation, click here. <https://youtu.be/Wp3Sx29hSDg>

For more information on the internship program, click here <https://jacobsinstitute.org/programs-services/internships/>

BNMC SummerSTEM: Curious Minds at Work

JI Participates in campus-wide educational outreach



Buffalo Niagara Medical Campus (BNMC) institutions hosted 11 incoming freshman from two Buffalo Public Schools, in a two-week inquiry-based educational program designed to reinforce key math and science concepts that they need to be successful in 9th grade. Students also gained a better understanding of what each entity on the BNMC does, as well as the career possibilities that exist.

The JI hosted students for a full day, which incorporated hands-on activities and a lunchtime career panel with JI summer interns. Students used the Mentice medical simulator and 3D-printed blood vessels to practice using medical devices to remove "clots" to understand stroke interventions used by surgeons in Kaleida Health's Gates Vascular Institute.

Next, children were excited to try a biomedical engineering activity, where they used plastic tubes to simulate blood vessels and Play-Doh to simulate clots. Students then used common items-such as straws, paper clips, party balloons, and pipe cleaners-to create a 'medical device' to remove the clot.



Liam Christie, a University at Buffalo (UB) electrical engineering student who was one of our summer interns, led another activity with the students. He discussed biometrics-the analysis of unique physical characteristics such as fingerprints, especially as a means of verifying personal identity. Liam discussed his research creating highly realistic silicone replicas of fingers to hack into smartphones and test the security of such devices. Students enjoyed learning and creating the replicas, excited to take the fingers home to show friends and family.

JI also hosted a lunchtime speaker panel with our six summer interns and Adam Sparks, senior mechanical engineer at the JI. Students interacted with Adam and the interns. They asked the panel questions about school,

how they chose to study their field, and their professional goals.

The BNMC SummerSTEM program was coordinated by lead organizations: BNMC, Buffalo Manufacturing Works, UB NYS Center for Excellence in Bioinformatics and Life Sciences (CBLS), and the Jacobs Institute. The lead



organizations were awarded a grant from the Cullen Foundation for the program, which was free to students. The program, which is in its third year, leveraged the resources of many BNMC institutions, in this collaborative community outreach initiative. Participating institutions included the Buffalo Niagara Medical Campus, Inc., Buffalo Manufacturing works, Hauptman-Woodward Medical Research Institute, Jacobs Institute, Kaleida Health, Roswell Park Comprehensive Cancer Center, University at Buffalo's Jacobs School of Medicine and Biomedical Sciences, and UNYTS.

The Jacobs Institute mission is to accelerate the development of next-generation technologies in vascular medicine through collisions of physicians, engineers, entrepreneurs, and industry.

Our vision is to improve the treatment of vascular disease in Western New York and the world, while fostering local economic development, and honoring the memory of Lawrence D. Jacobs, MD.

Located in the heart of the Buffalo Niagara Medical Campus (BNMC) in downtown Buffalo, the Jacobs Institute is positioned between University at Buffalo's Clinical and Translational Research Center (CTRC) and Kaleida Health's Gates Vascular Institute (GVI). The JI is uniquely positioned to foster collaboration of our key partners.

We have the right people in the right place at the right time.

Please visit [the JI web site](#)

Sincerely, The Jacobs Institute

