

# SCOPE SUMMIT 2022-2023



## SCOPE Senior Capstone Projects

**Amazon Robotics**

**Blue Origin**

**Bose**

**Boston Scientific**

**Brandeis University Rosbash Lab**

**Dassault Systemes**

**Fidelity Center for Applied Technology**

**Ford Motor Company**

**GE Healthcare**


**Giner Labs**

**Pfizer**

**Santos Family Foundation / Volpe Center**

**Watts Water Technologies**



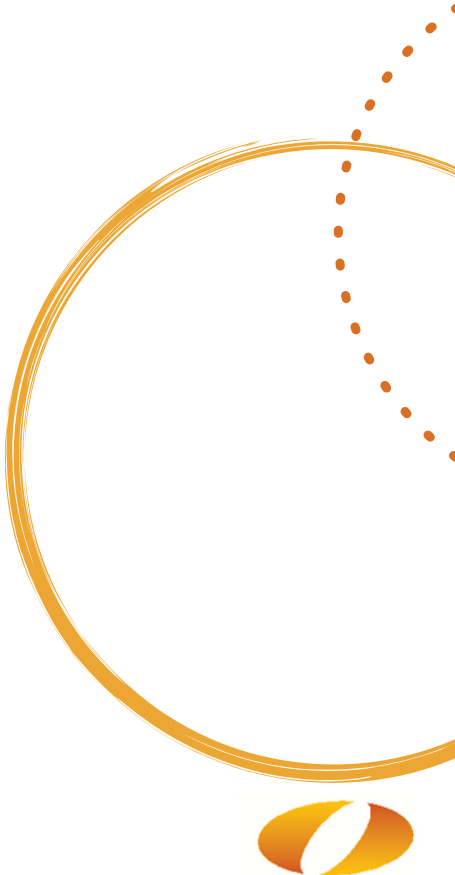


Hello and welcome to SCOPE Summit!

Today we're gathered to celebrate the 61 Olin seniors who are presenting their work as part of the Senior Capstone Program in Engineering (SCOPE). We're so glad that you're with us today to participate in our Summit, both in person and via livestream.

SCOPE is the culmination of the students' Olin experience. In it, students put into practice everything they learned at Olin about problem solving, technical and design skills, collaboration and team building. SCOPE teams work together for a full academic year to solve challenging, real-world problems. You'll hear about projects representing a broad range of topics across different industries: students designed and built things, coded software, developed expertise in new domains and applied human-centered design methods while also sharpening their skills in project management, team dynamics, budgeting and tackling unforeseen challenges. They grew personally and professionally, collaborating with sponsors and faculty. Students: we're proud of you. You made it!

SCOPE had its own milestone this year. We moved from shared modified classroom areas into a permanent SCOPE-dedicated space in Milas Hall. Although several teams decamped to our Large Project Building for a good part of the year, we are grateful for this communal space for our teams and faculty. We thank the broader community – both inside and outside Olin – who have supported SCOPE teams.



We wish to thank our sponsors for 13 amazing projects. You provided us with projects which were important to your organization and challenging for our students, projects which matched the technical skills and interests of our students. Most of the outcomes you'll hear about today will be taken up and applied by you, our sponsors. This resulted in a meaningful and exciting experience for our students, which will impact them for years to come.

We want to offer a special thank you to the individuals who made this work possible - - the liaisons from each sponsor who supported and mentored the teams throughout the year and the Olin faculty advising team and subject matter experts who mentored and coached teams.

We hope you enjoy this year's SCOPE Summit!

**Sarah Bloomer**

Academic Director of SCOPE,  
Visiting Professor of Design

**Alessandra Ferzoco**

Assistant Professor of  
Measurement Science

**Ruth Levine**

Director of Strategic  
Industry Partnerships

**Lawrence Neeley**

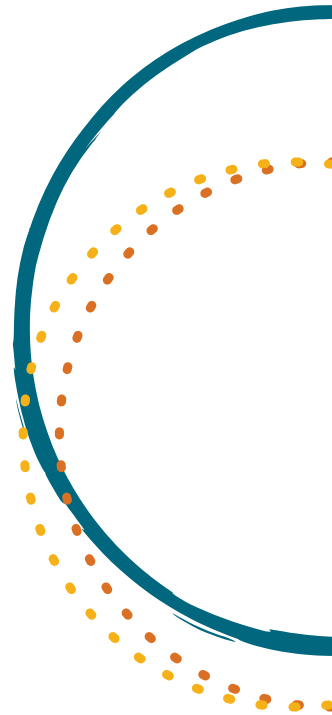
Associate Professor of  
Design and Entrepreneurship

**Jessica McCarthy**

SCOPE Program Director

**Lynn Andrea Stein**

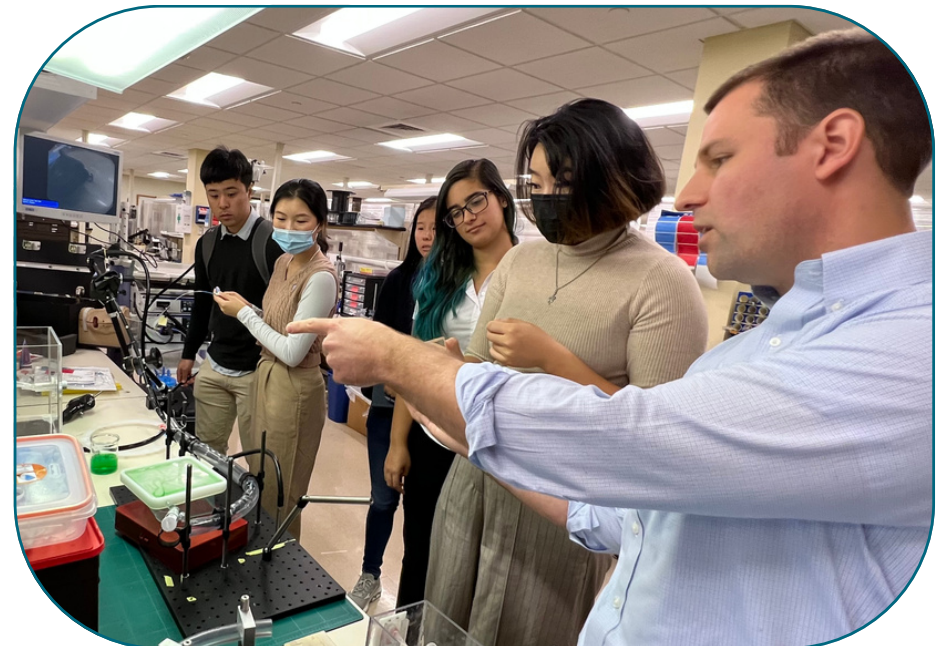
Professor of Computer  
and Cognitive Science



# SCHEDULE OF EVENTS

WEDNESDAY, MAY 10, 2023

- 12:30–1:00 PM**     **Registration**  
Milas Hall Lobby
- 1:00–1:10 PM**     **Welcome from Olin Leadership**  
Norden Auditorium, Milas Hall
- 1:10–2:15 PM**     **Presentations by SCOPE Teams**
- 2:15–2:30 PM**     **Break**
- 2:30–3:30 PM**     **Presentations by SCOPE Teams**
- 3:30–4:30 PM**     **Poster Session & Concurrent Reception**  
Tent in the Oval



## AMAZON ROBOTICS

# The Automated Lift Object System

This year's SCOPE team built off a perception system for remote control of a robot developed by last year's team. They created a smoother, more intuitive control model for manipulation, and increased the environmental awareness in the system. The improvements make the robot more robust to real-life applications, and will provide Amazon with increased manipulation efficiency and reduce onboarding duration and complexity for operators.

### Team Members

Efe Gulcu

Joon Kang

Loren Lyttle

SeungU Lyu

HK Rho

### Faculty Advisor

Alessandra Ferzoco

### [Project Poster](#)



BLUE ORIGIN

## Blue Origin Safe Avionics-Lifting Lab Equipment

In Blue Origin's quest to improve human access to the resources of space, its highest priority is safety. This commitment is evident at every level of Blue Origin's process, from the first package that arrives at the warehouse to the recovery of materials post-launch. Our SCOPE team's project was to design equipment for safely transporting small boxes of delicate avionics. These materials need to be rotated between testing, maintenance, and storage locations frequently, but are too hazardous to lift by hand as they weigh up to 100lbs. In order to ensure the safety of the technicians working with the avionics, our equipment must be both robust and easy to use, as it can't prevent injuries if it is not utilized. Our solution was to create an elevator cart that can lift and transport up to two boxes at a time and can also be used as a testing station. This design streamlines the workflow and prevents injuries.

### Team Members

Jay Chomowicz  
Kei Chua  
Tigey Jewell-Alibhai  
Simon Kemp  
Braden Oh

### Faculty Advisor

Lawrence Neeley

### Project Poster



**BLUE ORIGIN**



BOSE

## Circularity and Repairability of Bose Products

For nearly 60 years, the Bose brand has been synonymous with great sound. As the world moves farther and faster toward embracing environmental, social, and corporate governance (ESG), Bose is committed to supporting that shift through advances in efficiency and repairability. The 2022-23 Bose SCOPE team worked with Bose to infuse sustainability and product circularity across its global business operations.

### Team Members

**Izzie Abilheira**  
**Caitlin Kantor**  
**Celvi Lisy**  
**Bahar Maghbouleh**  
**Dianna Sims**

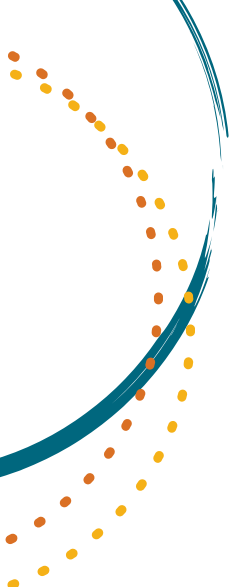
### Faculty Advisor

**Sarah Bloomer**

### [Project Poster](#)

***BOSE***





BOSTON SCIENTIFIC

## Improving Cancer Diagnostic Accuracy During ERCP Procedures

Endoscopy is a medical procedure in which surgical tools are inserted into a patient's gastrointestinal tract using an endoscope to reach the site of interest. Once positioned, tools are advanced down the endoscope to perform minimally invasive procedures. Endoscopic retrograde cholangiopancreatography (ERCP) is a specialized form of endoscopy, which involves the use of a duodenoscope to perform procedures in the pancreatic and biliary ducts via the duodenum. In this region, cell samples can be collected for the diagnosis of biliary strictures. Current clinical procedures involve the use of cytology brushes, which are used to collect cellular samples for diagnosis. Although the method of brushing the area of interest and visually detecting abnormalities in the cells is seen as one of the quickest and most economical methods to achieve a diagnosis due to its high specificity (low rate of false positives), it is found to have a rather low sensitivity (high rate of false negatives).

Boston Scientific (BSC), a leader in the medical device industry, currently manufactures cytology brushes including for use in the ERCP procedure. Boston Scientific tasked the 2022-2023 BSC SCOPE team with the challenge of improving the current state of their cytology brush and creating a more accurate and efficient tool for physicians.

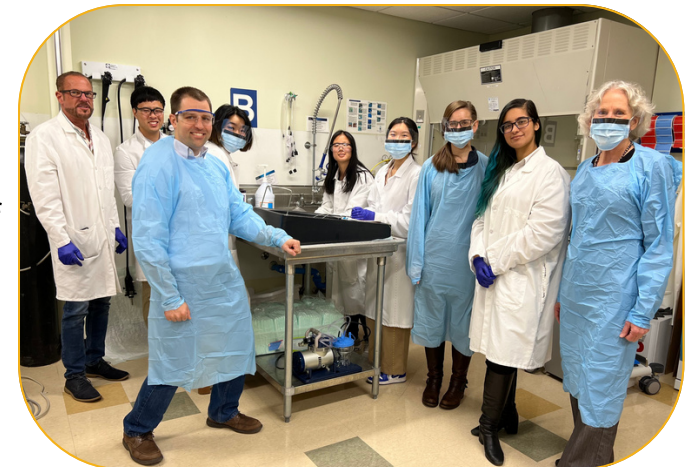
### Team Members

Linda Hu  
Cory Knox  
Maya Sivanandan  
Brent Usui  
Emily Wan

### Faculty Advisor

Lynn Andrea Stein

### [Project Poster](#)



**Boston  
Scientific**

Advancing science for life™





## BRANDEIS UNIVERSITY ROSBASH LAB

# Brandeis Rosbash Lab FlyBox Redesign

Originally developed by the Rosbash Lab at Brandeis University, the FlyBox was designed to track the behavior of genetically modified fruit flies over multiday periods. The device supersedes existing methods of fruit fly behavior observation, offering more detailed and accurate data at a lower cost. The FlyBox was created to continue Nobel Prize-winning research on the circadian rhythm, but it lacked the durability needed for repeated use.

This year, we overhauled the FlyBox's hardware, assembly, and software, creating a robust and polished tool. The redesigned box structure delivers reliable experiment conditions, and custom printed circuit boards streamline wiring and simplify troubleshooting. Detailed instructions, including photos of each assembly step and engraving on frame parts, make it easy for a scientist to assemble their own FlyBox. Lastly, the brand-new software workflow for creating FlyBox tests is intuitive yet feature-rich. With the improved FlyBox, researchers from the Rosbash Lab and beyond can conduct optogenetics research with ease and consistency.

### Team Members

**Christopher Allum**  
**Olivia Jo Bradley**  
**Mack McAneney**  
**Florian Schwarzwinger**  
**Zachary Sherman**

### Faculty Advisor

**Lawrence Neeley**

### [Project Poster](#)



DASSAULT SYSTEMES

## Dassault Systemes Customer Adoption Experience

The 3DEXPERIENCE Works portfolio of cloud solutions bring key stakeholders together on a single collaborative platform, allowing clients to seamlessly move from ideation through delivery for continuous development. When a client lands on 3DEXPERIENCE Works, they are presented with a powerful platform that provides many options to meet their needs. Our team is researching user journeys and creating prototypes to reduce the complexity and provide a more seamless onboarding and discoverability experience for current and future customers.

### Team Members

**Regan Mah**  
**Prisha Sadhwani**  
**Isabel Serrato**  
**Walter Villa**

### Faculty Advisor

**Lawrence Neeley**

### Project Poster



**DS** DASSAULT  
SYSTEMES

# FIDELITY CENTER FOR APPLIED TECHNOLOGY

## Coin-Test: Open-Source Risk Evaluation for Cryptocurrency Investments

With the proliferation of algorithmic trading strategies, there is a pressing need for reliable and robust tools to test and validate strategy performance. Unfortunately, many existing tools fall short in accurately assessing the risk involved in executing these strategies. To address this issue, our team developed Coin-Test, a publicly available, open-source Python library that provides a novel approach to evaluating cryptocurrency trading strategies. By using simulated data and statistical analysis, Coin-Test offers a more comprehensive perspective on the performance of these strategies. This approach enables investors, including those who may not have a background in finance or data analysis, to better understand the risks and potential rewards of their trading decisions.

### Team Members

**Gati Aher**

**Nathan Faber**

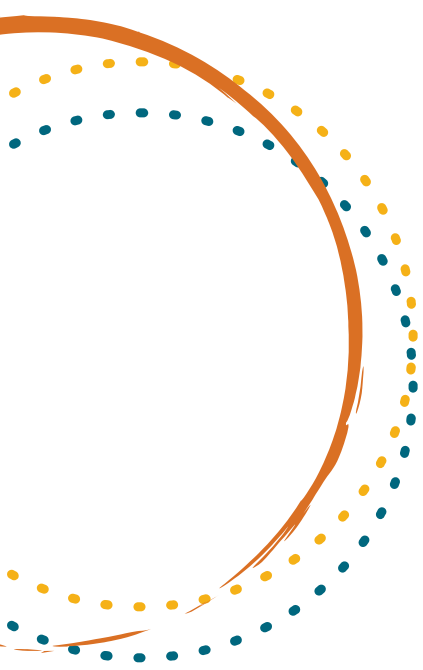
**Eamon Ito-Fisher**

**Andrew Mascillaro**

### Faculty Advisor

**Lynn Andrea Stein**

### [Project Poster](#)



# FORD MOTOR COMPANY

## Digitizing Ford

As the world grows more digital, Ford aims to become "digital-first" in a way that is authentic to the company's reputation to better engage with communities. Our team chose to focus on women in motorsports, with an emphasis on connecting with and building a future community among aspiring women in racing through digital channels.

**Team Members**  
**Sree Chalimadugu**  
**Ivonne Munoz**  
**Tolu Oshinowo**  
**Rishita Sarin**

**Faculty Advisor**  
**Sarah Bloomer**

[Project Poster](#)



GE HEALTHCARE

## Improving CT Scanner Alignment During Installation

GE Healthcare (GEHC) is a global leader in the production of Computed Tomography (CT) machines. These machines provide high-quality images that doctors rely upon every day to diagnose patients. With many newer advances in CT scanner technology, the alignment of the table is becoming a more noticeable factor in good image quality. GE has a desire to meet even higher standards for the installation alignment of the CT scanner gantry and patient table because misalignment could cause artifacts in the image. This year's SCOPE project helped improve image quality by creating a tool or process that will allow CT scanner installation technicians to achieve increased alignment precision.

### Team Members

**Jules Brettle**

**Oscar De La Garza**

**Nabih Estefan Diaz**

**Alana Huitric**

**Patrick Ogunbufunmi**

### Faculty Advisor

**Alessandra Ferzoco**

### [Project Poster](#)



GE HealthCare



GINER LABS

## Developing a Compact Fluid Management Module for Aerospace Electrolyzers

Crewed module life support systems need safe, simple, robust, reliable oxygen generation to maintain a livable atmosphere. The systems currently in use are older designs with bulky and heavy parts. Sending payloads to space is costly, around \$10,000 per kilogram, and physical space is at a premium. Our SCOPE team collaborated with Giner Labs to improve the weight and volume of their proprietary electrolyzer oxygen generation system to lower costs and take up less valuable cargo room while maintaining a high degree of safety and reliability.

### Team Members

**Julia Hunt**

**Markus Leschly**

**Nia Maywar**

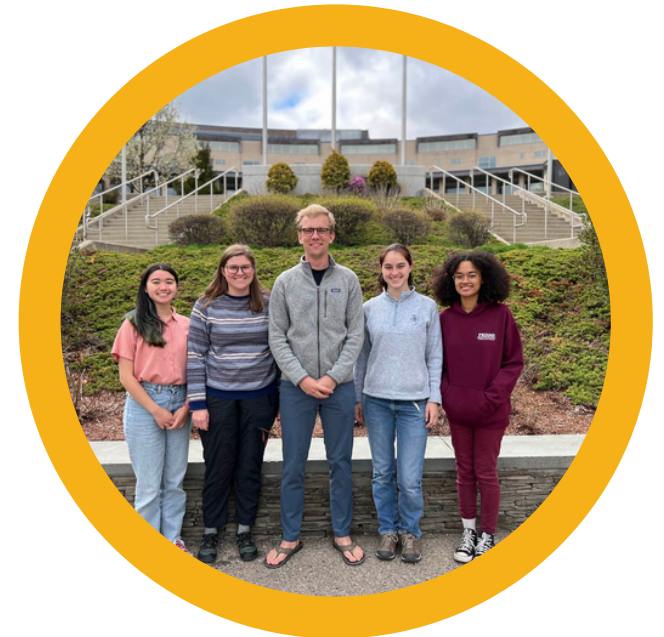
**Laurel Rodriguez Mitton**

**Caroline Rausch**

### Faculty Advisor

**Alessandra Ferzoco**

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 GINER LABS

PFIZER

## Pfizer Clinical Trial Assistant

Pfizer is a global biopharmaceutical company focused on research and development of vaccines and medicines to deliver breakthroughs that change patients' lives. To support this work, Pfizer's Global Clinical Supply Team manages and supports hundreds of clinical trials at any one time. It is common for clinical trial sites to have questions when handling the Investigational Product (IP). We built a prototype that augments the information search capabilities of Pfizer clinical research colleagues when responding to IP handling queries from clinical trial sites, thereby minimizing wait times for patients.

### Team Members

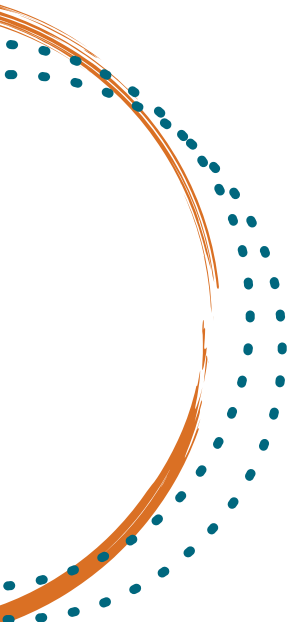
**Caitlin Coffey**  
**Sam Coleman**  
**Jonas Kazlauskas**  
**Hazel Smith**

### Faculty Advisor

**Lynn Andrea Stein**

### Project Poster





# SANTOS FAMILY FOUNDATION / VOLPE CENTER

## National High-Injury Network Analysis Tool (NHAT)

Traffic crashes are the leading cause of death in the U.S. for people of ages 1-54. A High Injury Network (HIN) is a map that highlights streets which account for a disproportionately high rate of fatalities and serious injuries. Communities can use this information to prioritize streets with the highest need for infrastructure improvement funding.

Partnering with the Santos Family Foundation and the Volpe National Transportation Systems Center, we created a free national tool that allows communities to generate interactive HIN maps and understand the relationship between safety, equity, and other contextual factors.

Our tool uses national and state crash datasets to generate the HIN map with weights for attributes such as crash severity, lighting, and pedestrian involvement. Communities have the option to either accept the default weights or customize the weights. Additionally, using Justice 40 data, we highlight areas that are historically disadvantaged with an equity overlay on the map and equity weighting to the HIN.

The output is a HIN map that highlights the street networks that need proactive, systemic safety interventions.

**Team Members**  
**Samuel Cabrera Valencia**  
**Mira Flynn**  
**Lilo Heinrich**  
**Mari Kang**  
**Jackie Zeng**

**Faculty Advisor**  
**Lynn Andrea Stein**

[Project Poster](#)





# WATTS WATER TECHNOLOGIES

## Energy Harvesting from Water Flow

The goal of this project was to understand manufacturability and control of a device used to generate electrical power from water flow in pipes to power sensors for smart water networks. The team developed and tested the feasibility of a control system to optimize the amount of energy we generate to provide consistent and robust power for WATTS's needs. The work will enable access to electrical power for WATTS's sensing devices, and will help with inexpensive and low-maintenance data collection.

### Team Members

**Daniel Arnott**  
**Jack Greenberg**  
**Xander Hughes**  
**Aydin O'Leary**  
**Leopoldo Sanchez**

### Faculty Advisor

**Alessandra Ferzoco**

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