I. Renewal Document

Faculty Advisor: [redacted]
Teaching Professor
UC San Diego

Core Student Members:

Name	Chapter Position	Email Address Associated with BMES profile
[redacted]	Co-President	[redacted]
	Co-President	
	Vice President Internal	
	Vice President External Finance	
	Project Team Co-Chair	
	Lab Expo Co-Chair	
	Social Co-Chair	
	Bioengineering Day Co-Chair	
	Outreach Co-Chair	
	Bioworks Co-Chair	

Student Chapter Website Link: https://bmesatucsd.org/

Student Information For Free Membership:

New or Renewal?	Email	Name	Graduation Year	Chapter Position
Renewal	[redacted]	[redacted]	[redacted]	VP External Finance

II. Executive Summary

Biomedical Engineering Society at the University of California, San Diego

For the 2025-2026 Academic Year

The Biomedical Engineering Society student chapter at UC San Diego aims to work with the Shu Chien-Gene Lay Department of Bioengineering to bring attention to the biomedical field, emphasizing multidisciplinary involvement and fostering a welcoming and supportive environment. We encourage students to grow academically, interpersonally, and professionally through a wide variety of opportunities. By using our resources, we aim to positively impact students of all backgrounds by increasing access to technical workshops, professional events, and career advice. Our overarching goal is to ensure that any student can utilize these opportunities to succeed at UC San Diego and beyond.

This year, our Chapter expanded substantially, with increased student participation at all events. Our 25-person Officer Board readily accommodate the influx of students, leading seven committees offering countless opportunities for technical and professional development. These committees held educational workshops, provided valuable mentorship, and introduced ample networking opportunities. Additionally, our chapter increased our collaboration with other student organizations at UC San Diego, providing members with opportunities to apply their knowledge through various design challenges. We are proud that we have built upon the legacy that previous years' members have worked so hard to achieve, and strive to do the same for the future.

Corresponding Author

[redacted]

Faculty Advisor

[redacted]

UNIVERSITY OF CALIFORNIA, SAN DIEGO UCSD

BERKELEY • DAVIS • IRVINE • LOS ANGELES • MERCED • RIVERSIDE • SAN DIEGO • SAN FRANCISCO SANTA BARBARA • SANTA CRUZ

[redacted]
TEACHING PROFESSOR
SHU CHIEN-GENE LAY DEPARTMENT OF BIOENGINEERING
[redacted] [redacted]

To the Student Chapter Award Committee,

The University of California San Diego Chapter of the Biomedical Engineering Society has continued to work diligently towards its primary mission: to collaborate with the Shu Chien-Gene Lay Department of Bioengineering to build and support the biomedical engineering community by promoting knowledge exchange and fostering professional development in an inclusive and welcoming environment. All events hosted by the BMES Chapter at UC San Diego are planned, resourced, and hosted by undergraduate students. This Chapter Development Report describes the events, both annual and novel, that highlight the hard work and notable dedication of the many BMES officers that dedicate their time to serving UC San Diego students and the greater San Diego community.

This year, the chapter held two large symposiums: Lab Expo and Medical Innovation Conference. Each attracted an audience of over one hundred attendees and provided opportunities to learn about research in many different laboratories, understand how products are developed in startups and industry, and network with experienced professionals. The chapter is actively planning our annual Bioengineering Day event, to be held on May 21st, 2026. This is a tremendous professional development event for students; bioengineering undergraduates have the opportunity to speak, learn, network during the senior capstone project poster sessions, hear a special Keynote Address, and enjoy the annual Quiz Bowl. This year, they are also including Master's teams in the event, which serves as a key motivator for the students and a formative professional development opportunity.

The chapter's efforts this year were driven by a commitment to fostering a supportive and inclusive community within the bioengineering department and beyond. Social events were designed not only to bring students together, but to strengthen a sense of belonging and connection among peers. The mentorship program and New Student Committee aimed to ease the transition for recently-admitted students, offering guidance and support from more experienced members to help them grow both academically and personally. The Outreach Committee continued its mission to inspire and educate the broader San Diego community about bioengineering. Through participation in events such as Light the Night, a fundraiser for leukemia and lymphoma, and the creation of an interactive stent model for the San Diego Festival of Science and Engineering, they worked to make science accessible and engaging to learners of all ages. Additionally, their Lab Crawl sparked early interest in research by giving high school students firsthand exposure to university laboratories and ongoing bioengineering projects.

This year, the BMES chapter focused heavily on creating opportunities for technical development through hands-on experiences with real-world applications – essential components of preparing students for careers in bioengineering. They developed a new Bioworks committee, which held weekly workshops that introduced students to foundational wet-lab skills. This committee also worked with research labs across many fields to provide undergraduate research positions to members of the organization. Simultaneously, the Project Team organized technical workshops on Arduino and CAD modeling as part of their year-long biomedical design project to give students hands-on experience with device engineering and mechanical design. Their year-long project is to design and fabricate a robotic arm controlled by a haptic glove, aiming to simulate a full engineering design cycle. The successes of the above initiatives are reflected in their strong member engagement, alongside the technical and collaborative experience gained by all participants.

The UC San Diego chapter of the Biomedical Engineering Society continues to push the envelope in its mission to increase opportunities for students within the biomedical field, all while creating a community of innovation and support. The BMES community at UC San Diego hopes that their tremendous dedication, hard work, and passion are clearly evidenced within this chapter development report. I am extremely proud of this organizations' dedication and energy, which exceeds even prior years, and I hope they can be recognized.

Respectfully Submitted:

[redacted]

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V. Administrative Report

The administrative organizational structure of the 2025-2026 BMES at UC San Diego is slightly different from previous years. At the end of the previous academic year, six Executive Members were elected by popular vote: two Co-Presidents, Vice President Internal, Vice President External, Vice President Internal Finances, and Vice President External Finances. Previously, only one Vice President Finance role was established – however, integrating feedback from previous Executive Board Members encouraged the division of this role into two more specialized ones. All paid members are permitted to vote in the Executive Board elections. Officers were chosen at the end of the previous academic year by the newly elected Executive Board Members, with the exception of the Lab Expo Co-Chairs. The only requirement for candidacy for the Executive and Officer positions is a paid membership for BMES at UC San Diego.

All Officers are paired as Co-Chairs depending on which committee they oversee. Committees typically meet weekly each quarter, although the large chapter event committees (Lab Expo, Medical Innovation Conference, and Bioengineering Day) typically cease meetings after their event has concluded. The exception to this is Webmaster, which is a position held by one student and has no committee. Officers of committees are allowed to elect their own sub-leads to aid with the planning of events. The general responsibilities of each committee are outlined in **Figure 5.1**.

General members are encouraged to participate in committee meetings and activities that they are interested in, regardless of whether they are paid members. In addition to weekly committee meetings, BMES at UC San Diego also holds three General Body Meeting (GBM) each quarter, totaling to nine each academic year. Alongside these events, BMES at UC San Diego regularly collaborates with several other organizations at UC San Diego to host a variety of social events and educational experiences.

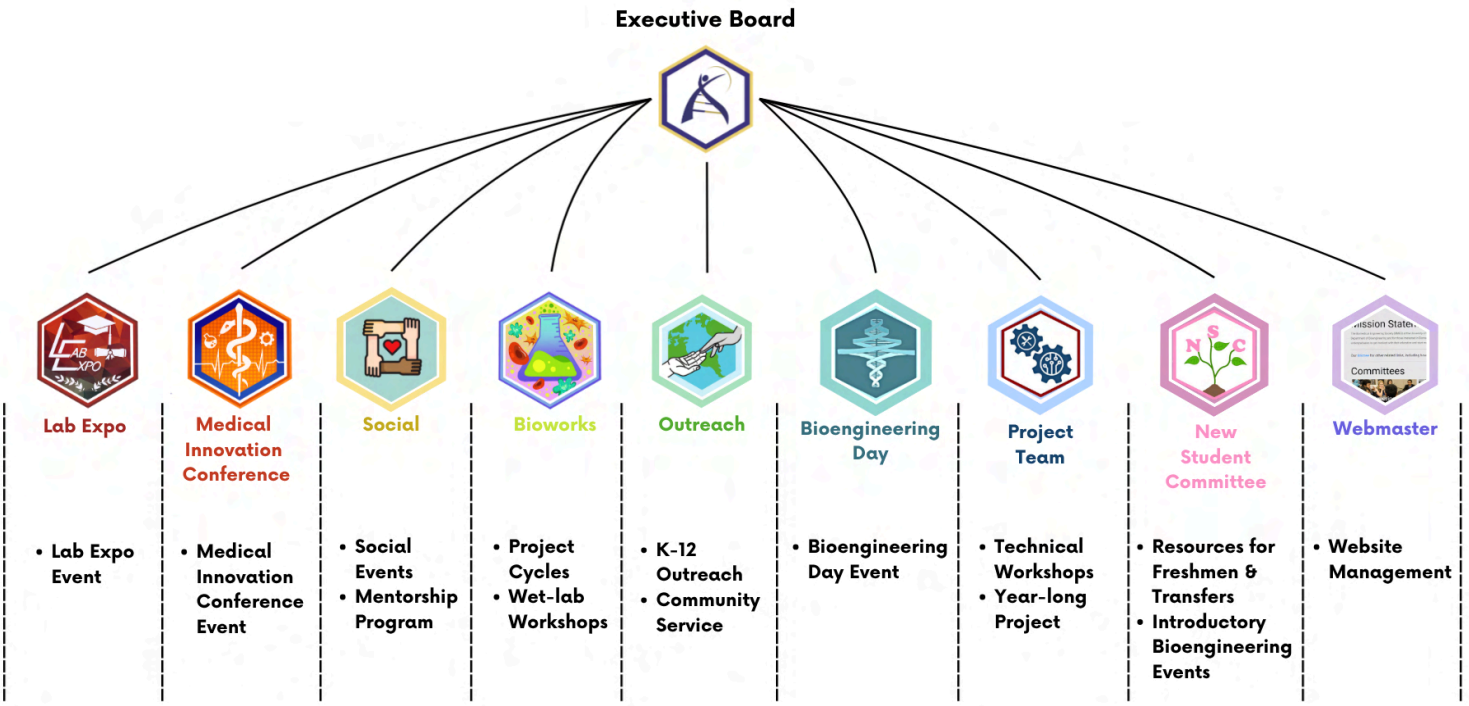


Figure 5.1. Diagram outlining officer board leadership roles and primary responsibilities. All Executive Board members work together to support and guide members of the Officer Board.

V.I Executive Board

As mentioned above, the Executive Board for BMES at UC San Diego is selected by election during the Spring Quarter of the previous academic year. All paid, non-graduating members of BMES at UC San Diego are able to participate in the election. This Executive Board for the 2025-2026 academic year was chosen through election during the Spring Quarter 2025, their responsibilities are outlined below:

Co-Presidents: [redacted]

Chief Executive Officers: Coordinates all operations of the chapter and streamlines communication with the Shu Chien-Gene Lay Bioengineering Department and the undergraduate Bioengineering population. Organizes and leads official UC San Diego BMES meetings such as General Body Meetings and official student volunteering. Ensure the mission and vision of the UC San Diego BMES chapter is seen through all events and committees.

Vice President Internal: [redacted]

Communications and Logistics Coordinator: Provides weekly communications containing a summary of organization information and events through email and social media to the entire organization. Organizes weekly officer meetings. Manages the branding and publicity of BMES at UC San Diego. Facilitates communication between committees.

Vice President External: [redacted]

Professional Development Manager and Industry Liaison: Handles outward communications involving the UC San Diego Chapter of BMES. Maintains connections with industry and company representatives in order to provide professional opportunities for students, fosters an inter-chapter network, conducts outreach to external volunteer opportunities, oversees official BMES meetings, upholds the overall vision and mission of BMES at UC San Diego.

Vice President Internal Finance: [redacted]

Manager of Internal Finances: Oversees financial transactions initiated within the UC San Diego Chapter of BMES. Collects membership dues and maintains member roster. Submits funding applications to the university on behalf of the organization. Assists in financial planning and purchasing of materials for all committees within the Chapter.

Vice President External Finance: [redacted]

Manager of External Finances: Oversees financial transactions initiated from outside the UC San Diego Chapter of BMES. Processes finances from external sponsors and acts as primary contact for sponsorships. Works with event committees to manage financial planning and logistics. Works with all committees to organize fundraisers.

The 2025-2026 Executive Board holds weekly officer meetings led by the Vice President Internal. This meeting serves as as a planning event for all of the officers and the executive board for the week going forward. All officers and executive members give updates as to their progress on their various responsibilities.

V.II Officer Board

All paid, non-graduating members of BMES at UC San Diego are eligible to apply to be an Officer. Applications are opened during the Spring Quarter of the previous academic year (Spring 2025). Seventeen of the nineteen total Officers are selected from this application by the newly elected Executive Board. The exceptions to this are the Lab Expo Co-Chairs, which are chosen by the Lab Expo Co-Chairs of the previous academic year after the conclusion of the Lab Expo event (Winter 2025). The selected candidates then serve as the "Lab Expo Interns" through the end of the academic year, becoming the official Lab Expo Co-Chairs once the rest of the Officer Board is selected in the spring. This process is undertaken for the Lab Expo committee due to how early planning must start for Lab Expo, as it occurs early in the academic year.

After the elections for the Executive Board have concluded, the newly elected Executive Members review the applications of and interview the candidates for each Officer Position. After interviews are concluded, the Executive Members deliberate to determine which candidates they see fit for each position. The Officer Board (with the exception of the Lab Expo Co-Chairs) for the 2025-2026 academic year were chosen based on a consensus among the six Executive Members in Spring 2025.

Every quarter, weekly Officer Board Meetings are held to ensure that all members of the Officer board are updated on other committee activities and that the Executive Board is updated on Officer activities. Meetings are held virtually to accommodate Officer and Executive Boards' schedules, and a new meeting time is selected each quarter (see **Table 5.1**). Although the meetings are scheduled to be one hour, they typically conclude after 30 minutes. During the meeting, Officers and Executive Board Members announce the activities they have completed since the previous meeting, along with relevant action items for the future. The Officer Board Meeting agenda can be found below in **Table 5.2**.

Table 5.1. Schedule of weekly officer meetings for each quarter.

Officer Meetings	Fall Quarter 2025	Winter Quarter 2026	Spring Quarter 2026
Day and Time	Thursdays, 8 - 9 PM	Wednesdays, 7 - 8 PM	Tuesdays, 8 - 9 PM

Table 5.2. Officer Board Meeting Agenda

Estimated Duration	Agenda	Description
~ 5 minutes	Introduction	Vice President Internal commences meeting, announces future events. See **Figure 5.1.**
~15-30 minutes	Committee Updates	Each committee presents a single slide detailing completed tasks and future action items. Committee members may also ask Executive Board Members questions during this time.

~10 minutes	Executive Board Updates	Executive Board members present a single slide detailing completed tasks and future action items.
~ 5 minutes	Conclusion	The meeting concludes, with any important reminders or announcements. Officer Board Members are free to stay behind to speak with the Executive Board 1:1.

Figure 5.1. Screenshots of Officer Meeting introduction slides summarizing future events from Winter Quarter, Week 5 (top), and sample committee updates slide from Bioworks in Winter Quarter, Week 4 (bottom).

V.III Committee Organization

All members of BMES at UC San Diego, paid or non-paid are permitted to participate in committees. Members are encouraged to learn about the committees during the General Body Meetings (GBMs) and those that interest them. Each committee has its own mission statement which is presented at all of the GBMs to provide members with a clear idea of what the committee's goals are. Our wide variety of committees allows students with different goals and interests to find their own niche in the BMES community. Committee meetings are usually held in-person, and it is up to the discretion of the Officers running the committee. If they are held in-person, we work with the Bioengineering Department to reserve a room in the Powell-Focht Bioengineering Hall to host the meetings.

Officers may choose to create subcommittees and hold applications to select subcommittee leads; the creation of and number of subcommittees is up to the discretion of the Officers. The subcommittee lead position is an opportunity for members to hold a leadership position within the organization. Their roles vary by committee, but often involve aiding the officers in the planning and preparation of events and projects. Oftentimes, Officers were previously subcommittee leads in one or more committees. As of this academic year, all of our functioning committees with the exception of the webmaster have sub leads.

V.IV Membership

BMES at UC San Diego offers both a paid and non-paid membership option, with the paid membership option decreasing in price as the academic year proceeds. Our paid membership comes in two tiers; our basic $15 membership, and our $30 membership that includes an organization T-shirt. The membership dues make up a significant portion of our revenue and allow us to pay for professional and social events throughout the year. Members must be paid in order to run for Executive or Officer positions. Other incentives for paid membership are participation in the membership program, access to project cycles, and participation in annual elections. Details about the benefits of paid membership can be found in **Figure 5.2**. Being a paid member is not required to participate in the organization, and there is never a charge to attend individual events hosted by BMES at UC San Diego.

Figure 5.2. Diagram detailing the differences between paid and non-paid memberships

This academic year, there were a total of 140 paid members. Of the paid members of the organization, 12 are National BMES Members – these members attended the National BMES Meeting in San Diego in October 2025. The demographics of paid members can be found in **Figures 5.3** and **5.4** below. While a majority of paid members are bioengineering students, many are studying different disciplines of engineering or biology. Another positive trend is the large number of first years involved in the student organization. We hope that both of these trends continue in future years as we continue to foster an inclusive and supportive environment

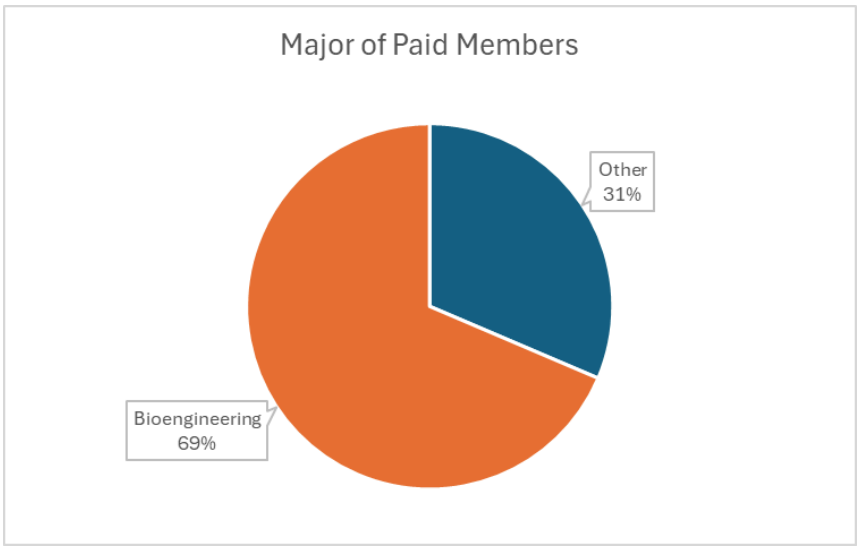


Figure 5.3. Distribution of the majors of paid members

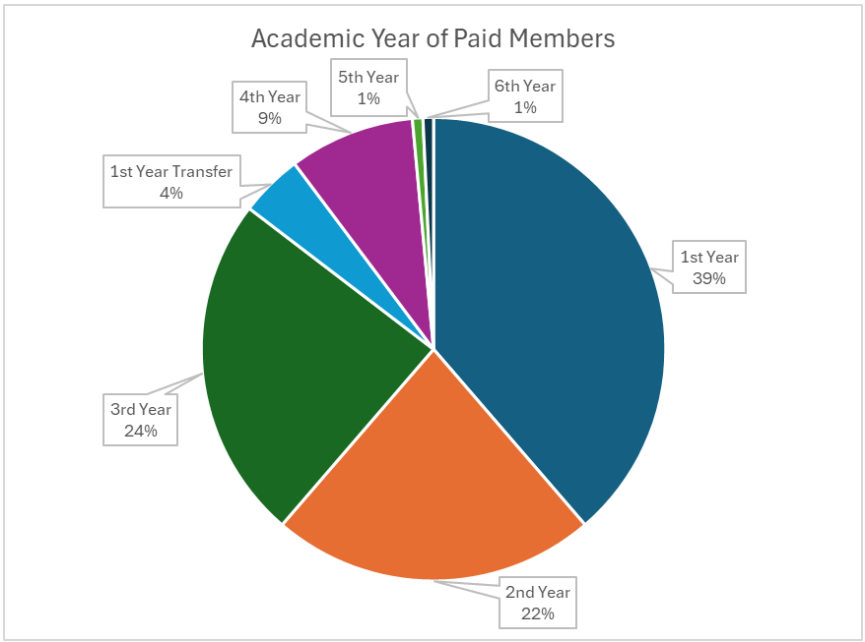


Figure 5.4. Distribution of the academic year of paid members

V.V General Body Meetings (GBMs)

General Body Meetings (GBMs) are open to both paid and unpaid members of BMES at UC San Diego, and are an opportunity for members to be updated on the activities and events of the organization. This academic year, Executive Board Members chose to host 3 GBMs each academic quarter due to increased student engagement last year. The third GBM of each quarter deviates from the traditional format detailed below, aiming to be a social gathering where officers and members form meaningful connections.

The components of traditional GBMs are outlined below:

- Pre-GBM Meet and Greet
    - Check in with online sign-in form
    - Refreshments and food served
    - Socialization amongst members
- General BMES Overview by Executive Board Members
    - BMES at UC San Diego mission statement
    - Executive Board introductions
- Officer and Committee Updates* by Officer Board Members
    - Officers' introductions
    - Committee mission statements
    - Overview of their events and opportunities for the quarter
    - Updates on progress and announcements on future activity

      *This process is repeated by each committee and the Webmaster
- Organization-Wide Updates by Executive Board Members
    - How to stay connected with BMES at UC San Diego
    - Upcoming organization-wide events
    - Paid membership logistics
- Post-GBM Wrap-Up
    - Membership and T-shirt sale
    - *Optional:* Post-GBM Social or activity. Many fundraisers occur after GBMs. Additionally, the Bioengineering Day Committee hosts practice and competitive Quizbowl rounds.

Table 5.3. List of GBMs held during the academic year

Date and Time	Event Name	Attendance
Wednesday *10/1/25* 7:00 - 9:00 pm	Fall GBM #1	123
Thursday *10/23/25* 7:00 - 9:00 pm	Fall GBM #2	45
Thursday *12/4/25* 7:00 - 9:00 pm	Fall GBM #3: BMES Holiday Party	45

Wednesday *1/7/26* 7:00 - 9:00 pm	Winter GBM #1	85
Thursday *1/29/26* 7:00 - 9:00 pm	Winter GBM #2	56
Thursday *2/26/26* 7:00 - 9:00 pm	Winter GBM #3: BMES Game Night	31
Thursday *4/9/26* 7:00 - 9:00 pm	Spring GBM #1	49
Thursday *4/23/26* 7:00 - 9:00 pm	Spring GBM #2: Executive Board Elections	TBD
Friday *5/8/26* 5:00 - 7:00 pm	Spring GBM #3: The Bioengineering Experience	TBD

Figure 5.5. Image of record student attendance at Fall GBM #1!

V.VI Affiliations

1. **The UC San Diego Shu Chien-Gene Lay Department of Bioengineering**
   BMES at UC San Diego has historically worked with the Shu Chien-Gene Lay Department of Bioengineering, establishing a relationship that encourages development for both parties. Our officers have been trusted with the responsibility as the liaison between the undergraduate population and the department and faculty. Among some of our collaborations, we host Bioengineering Day with their support to present the Senior Design capstone projects, organize quarterly Town Halls to raise bioengineering undergraduate concerns to the department faculty and administration, represent the Department on a national level at a BMES Annual Meeting, plan the annual Bioengineering Networking and Career Fair, and distribute the graduation stoles to outgoing seniors. Additionally, BMES is given representation in student affairs meetings and the Industrial Relations Board, and the industry network resources from the department are provided to BMES and the bioengineering undergraduates.

2. **Triton Engineering Student Council (TESC)**
   TESC is an undergraduate-run student council made up of many campus engineering organizations, which was created by the Jacobs School of Engineering at UC San Diego. BMES at UC San Diego and all other members of the TESC council have the right and responsibility to discuss and vote on policies regarding the status of engineering student organization, School of Engineering student affairs, and resource or fund allocation for these student groups.

3. **The UC San Diego Center for Student Involvement (CSI)**
   The Center for Student Involvement has a responsibility to oversee and represent all student organizations on campus, including BMES. By maintaining our status with CSI, we are able to apply for funding, reserve event venues, and rent equipment or facilities provided on campus.

4. **The Associated Students at UC San Diego (AS)**
   Associated Students is UC San Diego's undergraduate student government which aims to act as representative and advocate for the student body. AS provides funding for student organization events.

5. **Whitaker Center for Biomedical Engineering - Institute of Engineering in Medicine**
   The IEM Whitaker Center for Biomedical Engineering (WCBE) was established to create connections between IEM, the UC San Diego Shu Chien-Gene Lay Department of Bioengineering Department, and Industry. The guiding principle of the WCBE is to enrich the education and training of students for greater success in their future careers. The WCBE has representation on the Industrial Advisory Board (IAB) and also has Industrial Affiliate Member companies. The IAB comprises a forum for advising and informing the WCBE regarding policies that benefit students, faculty and industry. The IAB provides its member companies with specialized access to students for internship and career opportunities, allowing us the resources to encourage professional growth among our members. Additionally, IEM gives us extra funding and connections with industry members, enabling us to improve upon the networking opportunities and industry events for our student members.

VI. Treasury Report

The following section summarizes the Treasury Report: the expenses and revenue generated by the UC San Diego chapter of Biomedical Engineering Society in this past academic year, and projected expenses and revenues for the remainder of the Spring Quarter. The management of funds is overseen by the Vice Presidents of Finance, Internal and External. BMES at UC San Diego receives funding from multiple sources, including membership dues, Associated Students (AS) at UC San Diego programming funding, the Shu Chien - Gene Lay Department of Bioengineering, the Institute of Engineering in Medicine (IEM) at UC San Diego, the Jacobs School of Engineering, and the Triton Engineering Student Council (TESC). Restaurant fundraisers also help generate additional funds to support our operations.

This academic year saw a substantial expansion of our chapter's operations, with increased attendance at our events and a corresponding increase in programming expenses. We were successfully able to request an allocation increase in Associated Students (AS) programming funds to support growing expenses. In addition, we obtained funding from the Bioengineering Department to offset the cost of ordering graduation stoles. We were also fortunate to add a new source of funding to our repertoire: $6000 pledged by the Jacobs School of Engineering to support the engineering design track at DataHacks, a collaborative multi-disciplinary hackathon. However, the Data Science Student Society (DS3) at UC San Diego is the main host for the event and is responsible for the management of its finances. As such, this event has been excluded from our financial summary.

In the future, we hope to secure industry funding to support our outreach and technical projects, as well as proposed wet-lab skill workshops hosted at the Bioengineering Department's new instructional laboratory. Additionally, we hope to leverage a fund matching program offered by the IDEA Center at the Jacobs School of Engineering.

Table 6.1. Chapter balance sheet representing revenue and expenses aggregated by quarter.

	Fall Quarter 2025	**Winter Quarter 2026**	**Spring Quarter 2026** *(As of April 10th)*
Starting Balance	[redacted]	[redacted]	[redacted]
Revenue	[redacted]	[redacted]	[redacted]
Expenses	[redacted]	[redacted]	[redacted]
Ending Balance	[redacted]	[redacted]	[redacted]

Table 6.2. Overview of chapter revenue aggregated by source of funds

Source	Revenue
Membership dues and t-shirts	[redacted]
AS reimbursements	[redacted]
Sale of graduation stoles	[redacted]
Restaurant fundraisers	[redacted]
Department of Bioengineering Sponsorship	[redacted]

Table 6.3. Overview of chapter expenses and corresponding revenue aggregated by responsible committee

Category	Sub-Category /Committee	Expense	Corresponding Deposits		
			Associated Students' Funds	Other External Funds	Internal Sale Revenue or Membership Dues
General - *Allocated to Executive Board*	T-Shirts	[redacted]	[redacted]	[redacted]	Balance
	Graduation Stoles	[redacted]	[redacted]	[redacted]	Balance
	Marketing and Administrative	[redacted]	$0	$0	Balance
	General Body Meetings (GBMs)	[redacted]	[redacted]	[redacted]	Balance
	Other Professional Development Activities	[redacted]	[redacted]	[redacted]	Balance
Social & Professional Development - *Allocated to Individual Committees*	Social Committee Events	[redacted]	[redacted]	[redacted]	Balance
	Bioworks Committee Events	[redacted]	[redacted]	[redacted]	Balance
	Project Team Committee -	[redacted]	[redacted]	[redacted]	Balance

	Events and Project Materials				
	Outreach Committee - Events and Project Materials	[redacted]	[redacted]	[redacted]	Balance
	New Student Committee - Events	[redacted]	[redacted]	[redacted]	Balance
	Lab Expo - Events	[redacted]	[redacted]	[redacted]	Balance
	Medical Innovation Conference - Events	[redacted]	[redacted]	[redacted]	Balance
	Bioengineering Day	[redacted]	[redacted]	[redacted]	Balance

Additional Notes:

Funds from the Institute of Engineering in Medicine (IEM) offset the cost of events through direct travel reimbursements for speakers and payments to vendors. Since our chapter is not involved in this process, these amounts are not included in our financial summary.

Additional AS programming funds offset the cost of events through internal university payments for A/V tech fees. These amounts are not included in our financial summary, but have been accounted for in the calculation of total event costs in succeeding sections.

VII. Chapter Activities

The activities described in this section are the ones hosted by BMES at UC San Diego. These are the annual events which are hosted by our organization and which fall into the “event planning” category of officer responsibilities, which involve the endeavors of a committee and months of work to see the realization and success of their efforts. Information regarding other significant activities by BMES at UC San Diego (Outreach, Social, etc) can be found in subsequent sections.

VII.I Lab Expo

Lab Expo is an annual research symposium hosted on the University of California, San Diego's campus, which is run by students with the focus of helping students. This event had four key sub-events which occurred throughout. The day began with a Graduate Student Panel, during which the five person panel of graduate students answer questions asked by attendees and give them various advice. This panel aims to help undergraduate students gain a greater perspective into graduate student life and the process of getting into graduate school. Our mission statement for this year was to: Develop Scientific Literacy, Promote Interdisciplinary Collaboration, and Encourage Scientific Advocacy. We accomplished this over the course of the year through the help of our 14 person committee of sub-leads, each working hard to ensure that the event ran smoothly and that each sub-event was fully planned out. We held committee meetings once a week for 12 weeks, during which groups of sub-leads were tasked to plan each sub-event, reach out to relevant students and faculty, and work together to help create such a large scale event.

Lab Expo's target audience are undergraduate students who want to learn more about labs on campus and the research which they conduct. We aim to attract our event to the students who are willing to engage with presenters and the keynote speaker. We want these individuals to be able to leave our event with more knowledge and feel more prepared to enter a career in any research setting.

Presenters at our event are from various departments on UC San Diego's campus that are conducting research. Presenters each come from a mix of academic levels, ranging from undergraduate to graduate students. Each participant is able to share their experiences and research, while also expanding upon their networking and presentation skills. Our Keynote Speaker, Dr. Ashley Buckle, is a pioneer in his field, who has had insightful experiences in his scientific career ranging from academia to industry. Our Keynote Speaker serves to give curious students advice and help them learn from his journey in research.

Graduate Student Panel:
The graduate student panel was composed of students from a range of departments across campus, including bioengineering and biology. The panelists offered varied perspectives on academic and professional pathways, including transitions from master's programs to PhD tracks, as well as experiences in REU programs. Panelists provided thoughtful insight into both the application process and the realities of graduate student life. The event itself went well with consistent audience engagement.

Figure 7.1. Image of the Graduate Student Panel

Keynote Speaker:

The keynote speaker for this year was Dr. Ashley Buckle. As a translational scientist and entrepreneur, he shared practical advice alongside insights from his extensive career in protein engineering and structural biology. With over 35 years of experience, his work has focused on understanding protein function and engineering therapeutic applications. He earned his PhD in Biochemistry from the University of Cambridge and later established a research program at Monash University, leading work in protease biology, T-cell receptor–MHC interactions, engineered monobodies, and autoimmune disease mechanisms. Dr. Buckle has since transitioned into industry, serving as Vice President and Head of Protein Engineering and Structural Biology at Replay. He currently serves as Chief Technology Officer and co-founder of a biotech startup focused on advancing gene therapy platforms.

Figure 7.2 Images of Dr. Buckle's keynote speech (left) and a picture of Dr. Buckle with Co-Chair Anika Yogi (right).

Networking Luncheon:
The networking lunch provided participants with the opportunity to engage in more personal conversations with representatives at the event. This included our keynote speaker, Dr. Ashley Buckle, who offered additional insight to students in a more informal setting. Members of the UCSD Bioengineering Alumni Board spoke with students, offering valuable perspectives on career pathways and professional development. Catering was provided by The Kebab Shop.

Poster Session:
There were a total of 30 presenters, evenly distributed across two poster sessions. Presenters represented a wide range of departments across the UC San Diego campus and spanned multiple academic levels, from undergraduate to graduate students. Each participant contributed by sharing their research and personal experiences while further developing their presentation and networking skills. Bioengineering faculty members served as judges during the poster sessions, providing thoughtful feedback and evaluation.

Figure 7.3. Images of attendees networking during the poster session

Attendance / Closing Remarks:
Due to the day-long nature of Lab Expo, attendees arrive throughout the day at various points, leading to some events having more attendance than others. Overall, we maintained at least 30 attendees at each portion of the event, however in the future we hope to increase these numbers and have attendees stay longer throughout the day. We learned that attendees enjoy the networking hour and being able to connect with Bioengineering Alumni, moving into the future we hope to plan for this and create a more structured networking hour. Overall, the event ran smoothly and was a great success, all participants enjoyed the opportunity to present their research and all attendees enjoyed learning more about labs at UCSD.

Figure 7.4. The Lab Expo Committee team!

Lab Expo 2026	01/16/2024 10:00 AM - 5:00 PM	Total Attendance: 187 *(155 attendees, 1 keynote speaker, 30 poster presenters, 5 panel presenters)*	Cost: $1766.72

VII.II Medical Innovation Conference

The Medical Innovation Conference (MIC), formerly Translational Medicine Day (TMD), is an annual event hosted by the Biomedical Engineering Society (BMES) at UC San Diego that connects students with leaders across academia, industry, and medicine. MIC aims to provide a comprehensive view of translational medicine and biomedical innovation while equipping students with the knowledge and connections needed to pursue careers in these fields. This year, MIC expanded on previous iterations by emphasizing interdisciplinary collaboration and real-world application of biomedical engineering. The event featured six core sessions: a graduate pathways panel, keynote address, startups panel, industry demonstrations, and two networking sessions. Through these sessions, students gained insight into graduate education pathways, startup development, industry trends, and clinical translation. Our mission this year was to create a more interactive, engaging, and accessible experience for attendees. This was accomplished by restructuring the event schedule to allow for more networking opportunities, introducing a mini networking session, and curating a diverse group of panelists across different sectors of translational medicine. As a result, MIC 2026 fostered meaningful connections and provided attendees with valuable exposure to career pathways in biomedical engineering and beyond.

Figure 7.5. Co-Chairs Theodore Hirsch (Left) and Aiden Burgueño (Right) for MIC 2026

Graduate Pathways Panel:
The graduate pathways panel provided students with insight into pursuing advanced degrees including Master's, PhD, MD, and MD-PhD programs. This year, the panel featured Dr. Daniel Enterria-Morales, a physician and clinical researcher at UC San Diego Health; Dr. Debashis Sahoo, Associate Professor of Pediatrics and Computer Science at UC San Diego; Andrea Rivera, a graduate student in bioengineering at UC San Diego; and Dr. Daniela Valdez-Jasso, Associate Professor of Bioengineering at UC San Diego. Students had the opportunity to learn about the admissions process for competitive graduate programs, strategies for becoming strong applicants, and the diverse career paths available following advanced degrees. Panelists also shared their personal experiences navigating academia, research, and clinical training, providing valuable insight into the realities of graduate education.

Figure 7.6. Panelists presenting on-stage for the Graduate Pathways Panel session.

Keynote Speaker:
We were honored to host an inspiring keynote address from Dr. Mireille Kamariza, an Assistant Professor of Bioengineering at UCLA and founder of OliLux Biosciences, whose work focuses on developing biosensing tools for infectious diseases. She spoke about her journey from UC San Diego to earning her Ph.D. at Stanford and ultimately translating her research into a startup, emphasizing the importance of bridging scientific discovery with real-world impact. Dr. Kamariza also highlighted her work on developing a novel diagnostic tool for tuberculosis, demonstrating how innovation in biomedical engineering can address critical global health challenges, while encouraging students to pursue their ideas and recognize their potential to make a meaningful difference.

Figure 7.7. Keynote speaker, Dr. Mireille Kamariza, concluding her speech.

Startups Panel:
The startups panel featured founders and executives from biotechnology companies who discussed the process of building and scaling startups in the biomedical space. This year, the startups panel included Dr. Aedeel Akhtar, CEO & Founder of PSYONIC; Dr. Debbie Chen, CEO & Founder of Hydrostasis; and Dr. Kim Albizati, VP at Molecular Assemblies & Senior Director at BioAge Labs. Panelists shared insights on funding, product development, regulatory challenges, and the evolving biotech landscape, helping students better understand the intersection of innovation and entrepreneurship.

Figure 7.8. Panelists presenting on-stage for the Startups Panel session, with dramatic camera filter (left) and standard camera filter (right).

Industry Demonstrations:
Industry demonstrations included interactive booths from companies such as Medtronic, Orthofix, Philips, and NMDP. These demonstrations allowed students to engage directly with cutting-edge technologies and learn about industry roles, providing valuable exposure to career opportunities in biomedical engineering.

Figure 7.9. Students walking around to tabling presenters for the Industry Demonstrations session.

Networking Sessions:
Two networking sessions were integrated into the event schedule, including a networking lunch and a mini networking session following the startups panel. These sessions created a more informal environment for students to connect with panelists, industry representatives, and peers, significantly enhancing engagement and interaction.

Medical Innovation Conference 2026	02/11/2026 11:00 AM — 6:30 PM	Total Attendance: 175 (*163 attendees, 12 Presenters*)	Cost: $2,371

Significant Observations and Improvements for Next Year:
MIC 2026 saw a substantial increase in interest and participation compared to previous years, with 275 RSVPs and 175 attendees. This was likely due to the transition from the previous event name, Translational Medicine Day, to the Medical Innovation Conference. This rebranding appeared to improve visibility and better communicate the scope of the event to students. Attendance was strongest during the morning sessions and keynote but declined slightly during later sessions, particularly during the Industry Demonstrations portion, suggesting that future iterations may benefit from a slightly shorter program timeline or redistribution of high-interest sessions throughout the day.

Networking sessions were among the most successful additions this year and significantly improved student interaction with speakers and panelists. However, the second networking session also contributed to earlier departures after the startups panel, indicating that placement and structure of networking blocks should be carefully considered in future schedules.

Earlier outreach to industry representatives and startup panelists is strongly recommended, as delayed recruitment limited the number and diversity of presenters. Expanding industry participation remains one of the clearest opportunities for strengthening the conference's impact. Similarly, diversifying representation on the graduate pathways panel (including MD, MS, and postdoctoral perspectives in addition to PhD pathways) would provide a more comprehensive view of academic trajectories.

Additional logistical improvements include increasing the quantity of catered warm food, clarifying in promotional materials that attendees are not required to remain for the entire event duration, and continuing early-quarter advertising efforts that leverage departmental newsletters and faculty outreach, which were among the most effective recruitment strategies this year.

VII.III Bioengineering Day

Bioengineering Day (BE-Day) is UC San Diego Bioengineering Department's flagship annual event celebrating the innovation, research, and community of its top-ranked bioengineering program. It is scheduled for May 21, 2026, at the Price Center Ballroom West. BE-Day brings together over 400 students, faculty, and industry professionals for a full day of academic exchange and networking. This event highlights year-long capstone projects from senior undergraduate, BS/MS, and graduate students. They will present their work through two poster sessions evaluated by industry judges, faculty, and peers.

In addition to project presentations, BE-Day features a keynote speaker, the final round of a student quiz bowl, and multiple opportunities for informal engagement over provided meals and refreshments. The 2026 event is especially significant as it coincides with the 60th anniversary of UCSD's Bioengineering Department, marking a milestone in its history of research excellence and impact.

Keynote Speakers:
Bioengineering Day 2026 provides the unique opportunity to hear from two distinguished individuals in the Bioengineering field. Professor Shu Chien, for whom the department is named, and Professor Rob Knight of UCSD will present on their research, the future of the field, and a few words of wisdom for the graduating class. Their presentations align with our theme for BE Day, "To celebrate 60 years of UCSD Bioengineering."

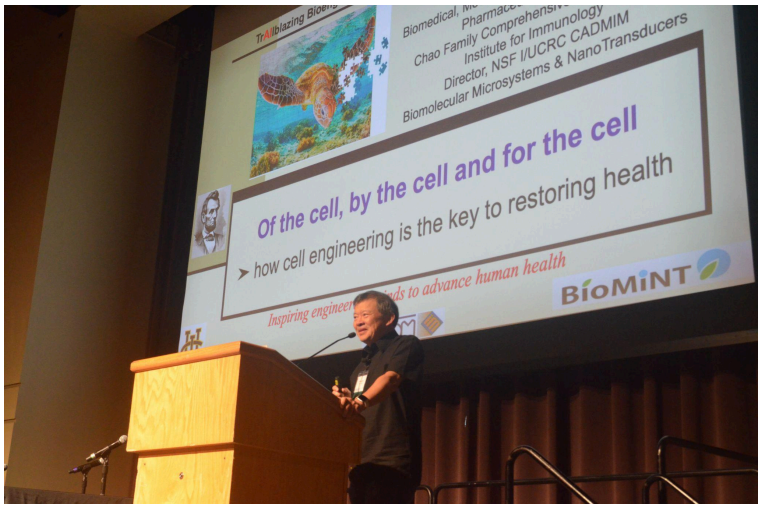


Figure 7.10. Picture taken during BE-Day 2025's (previous year) keynote speaker session.

Quizbowl:
Facilitated by the BE Day committee, the annual Quizbowl tournament is a yearly tradition, with its final round culminating at BE Day. Players are tested on a variety of STEM and general topics, with a monetary prize awarded to the winning team. Leading up to the final round, there are several rounds played, which help form community and build knowledge in the realm of bioengineering.

Date	Event	Participants
1/7/26	Mock Quizbowl (At Winter GBM #1)	2 teams of 4 officers and 4 attendees from the crowd
2/17/26	Quizbowl Round 1	7 teams of 4 undergrads (28)
4/19/26	Quizbowl Round 2 (At Spring GBM #1)	4 teams of 4 undergrads (16)
5/21/26	Quizbowl Final Round	2 teams of 4 undergrads (8)

Figure 7.11. Pictures taken during student quizbowl rounds prior to the finals, which will be held at BE-Day 2026

Poster Presentations:
The crown jewel of BE Day are the poster presentations. The senior class presents their capstone project posters in groups of 1-4, where they are judged on their presentation and projects by industry judges, faculty, and bioengineering students and staff. Awards are given based on varying criteria from that judging data. During these two poster sessions, teams of Masters students, BS/MS students, and various student organizations will present their research and projects via posters as well.

Figure 7.12. Pictures taken during BE-Day 2025's (previous year) poster sessions

Audience:
The audience for Bioengineering Day (BE Day) 2026 primarily consists of the current UC San Diego Bioengineering community, along with industry representatives and alumni. We anticipate the following approximate numbers:

- ~150 Senior Undergraduate Students
- ~150 Junior Undergraduate Students
- ~100 Other Undergraduate Students
- ~20 Graduate Students
- ~ 15 UC San Diego Faculty
- 2 Keynote Speakers
- ~30 Industry Representatives
- ~10 BioE Alumni.

Note: these estimated numbers are determined based on previous years' attendance and current discussions.

Table 7.3. Summary of Bioengineering Day

Bioengineering Day	May 21st, 2026 9:00 am-4:00 pm	Estimated Attendance: ~461	Estimated Cost: ~$7500

VIII. Social and Other Activities

BMES takes pride in hosting social events in order to foster a community amongst all students interested in biomedical engineering. These events not only provide our members with opportunities to form friendships, but also serve to aid students in networking within academia and beyond.

Our social committee is entirely dedicated to the planning and execution of social events in order to promote friendships and networking between officers and general members. The social committee often works alongside other committees, thus ensuring friendly connections between the many sub committees of BMES at UCSD. These events have proven to be invaluable in their ability to foster an inclusive community within our organization, and have greatly increased member retention over the year.

Over the course of this year, Social has successfully promoted our goals of fostering a community within the organization. Our mentorship program alongside our many social events have brought many new students into the organization, with many going to join committees as sub leads. In addition, our mentorship program has proven to be successful, with many mentees reporting that their mentors have massively aided them in integrating into bioengineering at UC San Diego.

VIII.I BMES Officer Retreat

In order to strengthen connections among the new Officer Board, we hosted an Officer Retreat at the beginning of the school year. This year, our retreat was at an Airbnb in Julian, California. Officers explored the town and took part in various team bonding activities, ensuring a strong foundation for collaboration throughout the year. This opportunity allowed members to get to know one another in a relaxed setting, making future teamwork more efficient and enjoyable.

Officer Retreat	09/27/26 - 09/28/26	Total Attendance: 20	Cost: $70 per person

Figure 8.1: Pictures from Officer Retreat 2026

VIII.II BMES Beach Day

The Social Committee hosted a Beach Day to introduce our organization to prospective members and new students. We supplied snacks and games and spent the afternoon at a local beach near campus.

Beach Day	10/04/26	Total Attendance: 40	Cost: $40

Figure 8.2: Promotional Flyer for BMES Beach Day; posted on Instagram and Discord

VIII.III BMES Halloween Party

Our organization hosted a Halloween themed social where members could socialize with friends and destress from midterms. Members brought in various Halloween themed treats and played games like poker and Mario Kart. Members also dressed up in costumes in the spirit of the holiday.

Halloween Party	10/26/26	Total Attendance: 26	Cost: $0

Figure 8.3: Pictures from BMES Halloween Party

VIII.IV BMES Social Fundraisers

To raise money for BMES Social events, we organized two Tapioca Express fundraisers (on October 1 and January 29) and one Yogurt World fundraiser (on January 7). Tapioca Express and Yogurt World are on UC San Diego's campus and they partner with student organizations to host fundraisers. Not only did the fundraisers help us to fund future social events, we encouraged BMES members to take a break from classes and get food at a discounted price. All fundraisers were scheduled for after General Body Meetings to encourage members to continue to socialize or meet new members after events. 20% of the yogurt sales and 15% of TapEx sales went to BMES for future events.

Tapioca Express Fundraiser 1	10/01/26	*Total Attendance:* 15	*Money Raised:* $65
Yogurt World Fundraiser 1	01/07/26	*Total Attendance:* 36	*Money Raised:* $110
Tapioca Express Fundraiser 2	01/29/26	*Total Attendance:* 22	*Money Raised:* $35

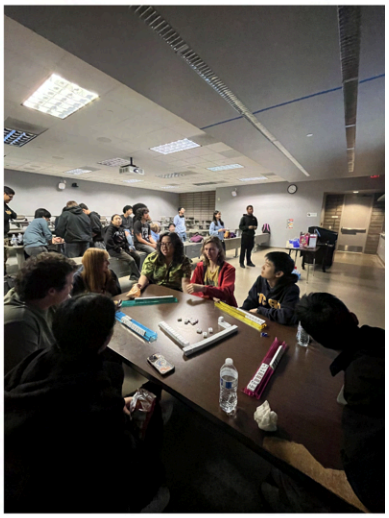
Figure 8.4: Promotional Flyers from Tapioca Express and Yogurt World Fundraisers, posted on Instagram and Discord

VIII.V Joint Social Events

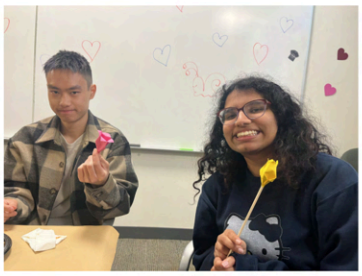
BMES collaborated with other engineering organizations throughout the year at UC San Diego so that BMES members could meet students outside of the Bioengineering department. During the Game Night Social, members brought both video and board games to play. We made paper flower bouquets at the Valentine's Day Social, and at the Pi Day Social, we provided pies and math trivia, and facilitated a pie-the-officers fundraiser.

Game Night w/ Triton Unmanned Aerial Systems	11/14/26 8:00 - 10:00PM	*Total Attendance:* 29	*Cost:* $0
Valentines Day Social w/ Society of Women Engineers	02/12/26 5:00-6:00PM	*Total Attendance:* 32	*Cost:* $265
Pi Day Social w/ Institute of Electrical and Electronics Engineers	03/05/26 6:00-8:00PM	*Total Attendance:* 31	*Cost:* $30


GAME NIGHT
TUAS X BMES
GAMES
SNACKS
JOIN US FOR A NIGHT OF GAMES AND FUN WITH TUAS AND BMES!
WHEN: NOVEMBER 14, 8-10PM
LOCATION: PCYNH 121




BMES X SWE
JOIN US FOR A
VALENTINE'S
Social
FEBRUARY 12
5-6PM
COME MAKE SOME CUTE PAPER FLOWER BOUQUETS & ENJOY FREE ITALIAN FOOD!
XOXO
swe
AS




SENIOR


EWH
IEEE
BMES
PI DAY
Come enjoy a wide variety of pie and play some fun Trivia with us!
05
MARCH
6-8 P.M.
@ Henry Booker Room
Jacobs Hall 2512

Figure 8.5: *Top:* Promotional flyer and pictures for the BMES x TUAS Game Night.
Middle: Promotional flyer and pictures for the BMES x SWE Valentines Social.
Bottom: Promotional flyer and pictures for the BMES x SWE Pi Day Social

IX. Inter-Chapter Activities

This past year, BMES at UC San Diego was not involved in any inter-chapter activities. One of our future goals is to foster more activities between BMES Chapters in the Southern California region (see **XV. Future Direction** for more information).

X. Outreach Activities

In the 2025-2026 school year, the BMES at UCSD Outreach Committee has worked to build upon its previous efforts to advance community STEM outreach across San Diego. Rooted in the belief that biomedical engineering is uplifted by equitable access to STEM education, Outreach has executed events spanning community service, K-12 STEM education, and mentorship. We volunteered at the Feeding San Diego Food Pantry where we helped feed over 1,000 families and participated in Blood Cancer United's Light the Night Walk. We hosted virtual Q&A panels with high school BMES chapters, sharing undergraduate research and college application experiences with prospective bioengineering students. In collaboration with EDGE, we delivered Arduino coding and CAD workshops to over 75 high schoolers. Our annual BEGS Lab Crawl brought Helix Charter High School students to tour ten research labs and the UCSD Makerspace. Our flagship accomplishment this year was the Continuing STEM Education Project which included an interactive stent demonstration model along with the previously curated circulatory models and preserved porcine hearts, presented at the San Diego Festival of Science and Engineering and Comienza con un Sueño. With the overwhelming enthusiasm of our committee members and volunteers, we have been able to organize eleven events thus far, including our long-term project workshop, and have five spring quarter events still ahead. We are grateful for the growth that we have been able to accomplish since last year and look forward to expanding our impact in the years to follow.

X.I Feeding San Diego Food Pantry

Audience: *Low income individuals and families in San Diego supported by Feeding San Diego through the distribution and accessibility of fresh produce.*

Volunteers: *Members of our chapter interested in volunteering and engaging in community service in the greater San Diego area.*

This community service event provided volunteers with the opportunity to make a meaningful impact on local San Diego families outside of an academic setting. In collaboration with Feeding San Diego, volunteers packed, sorted, and bagged apples to feed low income families who are facing food insecurity. In total, volunteers packed over 5000 lbs of apples, which is equivalent to feeding 1,368 families in the greater San Diego area.

Feeding San Diego	Tuesday 10/21/25 6:00 PM - 9:00 PM	*Total Attendance:* 11 Volunteers	*Cost:* $0

Figure 10.1. *Left Image:* Volunteers sorting and bagging apples. *Right Image:* Outreach Co-Chairs pose with a "Proud Volunteer" sign after a successful event at Feeding San Diego!

Figure 10.2. Group photo of BMES volunteers next to emptied boxes after bagging apples.

X.II Blood Cancer United's Light The Night

Audience: *Individuals and families affected by blood cancers who are supported through community awareness, advocacy, and fundraising efforts.*

Volunteers: *Members of our chapter passionate about raising awareness and advocating for blood cancer research and cures through community outreach and volunteering.*

Light The Night is an annual event held in collaboration with Blood Cancer United that aims to raise awareness and promote funding for blood cancer research. Volunteers assisted with the initial setup of the event, including arranging the lantern pickup stations, sponsor tables, and other decorative tasks. Here, our members were able to connect with the community of people affected by blood cancer and develop a deeper understanding of the impact it has on them. We spoke with other independent volunteers with direct connections to the blood cancer community, including a recent survivor. This put a real human face to a life-altering condition and demonstrated to our members the gravity of biomedical engineering's role in treating diseases like blood cancer.

Light the Night	Saturday 11/01/25 12:00 PM - 5:00 PM	*Total Attendance:* 20 Volunteers	*Cost:* $0

Figure 10.3. *Left Image:* Group photo of BMES morning shift volunteers in front of lantern pick-up booth after completing event assembly. *Right Image:* Outreach Co-Chairs pose with red lanterns, representing support for the blood cancer community.

Figure 10.4. *Left Image:* BMES volunteers setting up the t-shirt pick-up booth. *Right Image:* A BMES volunteer assembling yellow lanterns for event attendees honoring loved ones lost to blood cancer.

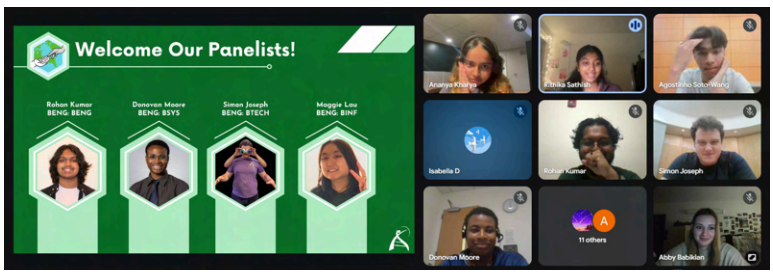
X.III UC San Diego x Franklin High School BMES Chapters Q&A Event

Audience: *Members of the Franklin High School BMES Chapter interested in learning more about college applications and what it's like to be a biomedical engineering student.*

Volunteers: *Members of our chapter who wanted to share their experiences in UCSD Bioengineering programs and provide college/career insight to potential future bioengineering students.*

This virtual collaboration between BMES at UCSD and the chapter at Franklin High School aimed to provide high school students with a better understanding of the biomedical engineering field and related opportunities at UCSD. One upperclassmen undergraduate student from each of the four bioengineering majors at UCSD explained the focus of their studies and presented a summary of their research experience. This was followed by a Q&A session, where high school students asked questions about applying to UCSD Bioengineering, deciding between colleges, and how to get involved in research.

Franklin HS Q&A	Tuesday 11/18/25 6:00 PM - 7:00 PM	*Total Attendance:* 8 Volunteers 20 Students	*Cost:* $0



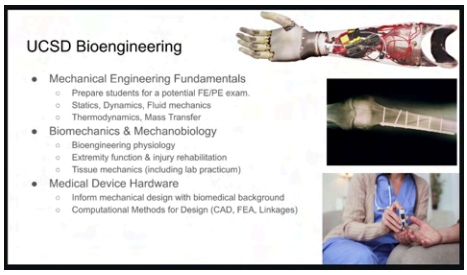


Figure 10.5. *Left Image:* Screenshot of undergraduate bioengineering students introducing themselves. *Right Image:* Screenshot of an example of the slides presented to high school students about bioengineering.

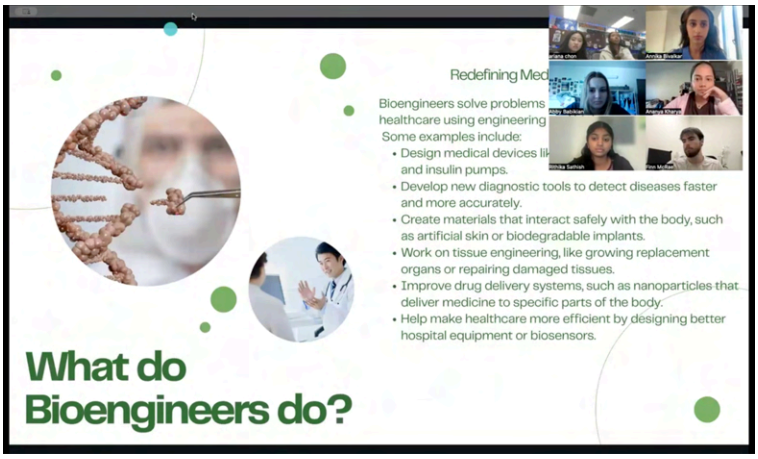
X.IV UC San Diego BMES x Eastlake High School BME Club Q&A Event

Audience: *Members of the Eastlake High School BME Club interested in learning more about college applications and what it's like to be a biomedical engineering student.*

Volunteers: *Members of our chapter who wanted to share their experiences in UCSD Bioengineering programs and provide college/career insight to potential future bioengineering students.*

This virtual collaboration between BMES at UCSD and the Biomedical Engineering Club at Eastlake High School aimed to provide high school students with a better understanding of the biomedical engineering field and related opportunities at UCSD. An upperclassmen undergraduate student explained the focus of their studies and presented a summary of their research experience. This was followed by a brief Q&A session, where high school students asked questions about applying to UCSD Bioengineering, deciding between colleges, and how to get involved in research.

Eastlake HS Q&A	Wednesday 11/19/25 1:00 PM - 1:30 PM	*Total Attendance:* 5 Volunteers Members of Eastlake HS BME club	*Cost:* $0



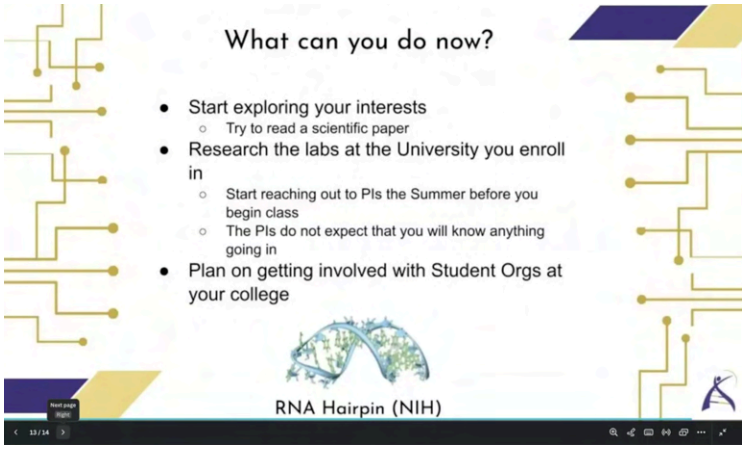


Figure 10.6. *Left Image:* Screenshot of undergraduate bioengineering explaining to students what bioengineers do and the importance of their work. *Right Image:* Screenshot of an example of the slides presented to students about steps they can take in high school to transition into research.

X.V Arduino Workshop with EDGE

Audience: *High school girls interested in learning the basics of Arduino programming and its applications to bioengineering using the Arduino IDE and physical Arduino components.*

Volunteers: *Members of our chapter interested in mentoring and supporting high school students by facilitating the workshop and answering questions students had regarding the workshop itself, navigating high school, and applying to college.*

The Arduino workshop was a collaboration between Outreach and EDGE at UCSD to expose high school girls to engineering concepts to set them up for success on their STEM undergraduate journeys. The attendees learned how to program in Arduino C using the Arduino IDE and also learned how to use the physical Arduino components to build working circuits. The workshop had multiple levels, starting from beginner and ending with a challenge level. The attendees learnt the basics of programming and circuit-making which was then followed by a panel of Bioengineering upperclassmen who volunteered their time to talk about their college experience and answer questions.

Arduino Workshop	Saturday 01/24/26 10:00 AM - 1:00 PM	*Total Attendance:* 11 BMES Volunteers 60 High Schoolers	*Cost:* $0

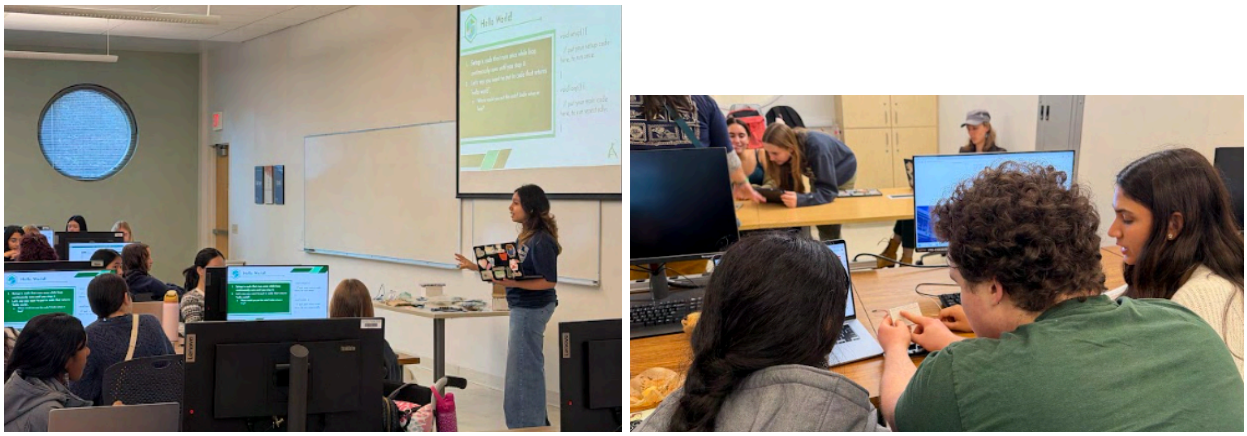


Figure 10.7. *Left Image:* An Outreach Co-Chair guiding the audience of girls through the workshop. *Right Image:* BMES volunteers explain Arduino assembly to students.

X.VI EDGExBMES Outreach CAD Workshop

Audience: *High school girls interested in learning the basics of computer-aided design (CAD) and its applications to bioengineering using Fusion's TinkerCAD software.*

Volunteers: *Members of our chapter interested in mentoring and supporting high school students, by facilitating the workshop and answering questions students had regarding the workshop itself or college.*

In collaboration with EDGE, Outreach hosted a CAD workshop introducing the basics of 3D modeling and design using TinkerCAD. Attendees learned how to model a simple 3D cell design and flexi hand design. The workshop also featured a Q&A panel led by bioengineering upperclassmen where attendees were given the opportunity to ask questions about the importance and applications of CAD, particularly bioengineering applications, in academic and professional settings.

CAD Workshop	Saturday 01/31/26 10:00 AM - 1:00 PM	*Total Attendance:* 12 BMES Volunteers 25 High Schoolers	*Cost:* $0

Figure 10.8. High school students in the process of creating 3D models with CAD.

Figure 10.9. *Left Image:* High school girls participate in a Q&A panel with bioengineering and mechanical engineering undergraduate students. *Right Image:* Example of CAD model of a cell, which was the final product of the workshop.

X.VII UC San Diego BEGS (Bioengineering Graduate Society) x BMES Lab Crawl

Audience: *High school students in the biotechnology pathway at Helix Charter High School.*

Volunteers: *BMES chapter members who wanted to share their undergraduate experience and advice with like-minded high school students.*

Lab Crawl is an annual event, organized in conjunction with BEGS, where students from Helix Charter High School and North County Trade Tech High School visit UCSD to learn more about our campus and bioengineering department. The day consists of lab tours, an info panel, and campus tours. This year, nine research labs and the Makerspace participated in lab tours, where rotating tour groups watched demos and learned about the variety of biomedical research taking place on campus. Each group rotated every 12-15 minutes over the two hour period, so each group of students was able to visit 6-8 locations. This was followed by an informational panel about the UCSD bioengineering department and college application process. The panel also included a Q&A session for high schoolers to ask undergraduate students for advice on college, career, and research. The day concluded with tours of the central campus area of UCSD. These three components of the event help provide students with a more well-rounded understanding of the bioengineering undergraduate student experience at UCSD and encourage their aspirations in our department.

Lab Crawl	Wednesday 02/04/26 9:15 AM - 2:15 PM	*Total Attendance:* 20 Volunteers	*Cost:* $0

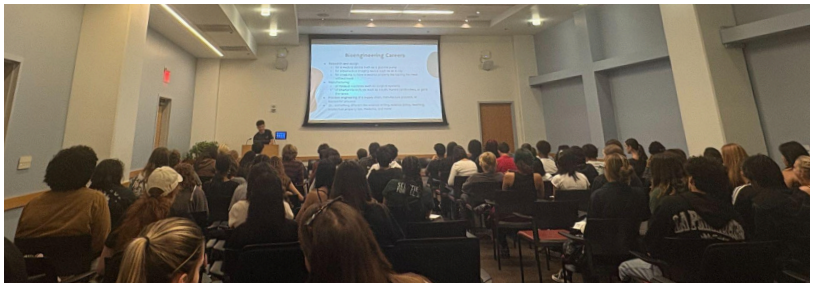


Figure 10.10. *Left Image:* High school students watching an informational presentation about bioengineering at UCSD. *Right Image:* Students watching a demonstration in the DVJ Lab during lab rotations.

X.VIII Father Joe's Villages

Audience: *Families and single adults facing homelessness and food insecurity in downtown San Diego.*

Volunteers: *BMES chapter members wanting to give back to their San Diego community by helping people facing food insecurity.*

Father Joe's Villages is an organization that operates across San Diego to help people experiencing homelessness by meeting basic needs, prioritizing physical and mental health, and emphasizing self-sufficiency development. At their location in downtown San Diego, members of our BMES chapter volunteered at the Paul Mirabile Center, a shelter for single adults, and the Joan Kroc Center, a shelter for families. Here, our volunteers served free, nutritious meals fresh from the kitchen.

Father Joe's Villages	Tuesday 02/10/26 4:00 PM - 6:00 PM	*Total Attendance:* 7 Volunteers	*Cost:* $0

Figure 10.11. *Left Image:* Group photo of BMES volunteers at Father Joe's Villages. *Right Image:* Group photo of the Paul Mirabile Center volunteer group in the kitchen after their shift.

X.IX Continuing STEM Education Project (CSEP)

The Continuing STEM Education Project collectively refers to the different components of our educational cardiovascular system display. The CSEP originated as the project developed with the 2024-2025 Outreach Committee for the 2025 San Diego Festival of Science and Engineering. Last year's committee created a multi-component project around the theme of the cardiovascular system and circulatory physiology. The project was incredibly popular at last year's festival, resulting in several invites from local STEM educators to share it with students at other community education events. Therefore, the objective of the CSEP is to make biomedical innovation more interactive and accessible to students of all ages, as well as their families and educators.

This year, we decided to add new components to the existing project and expand its theme to include cardiovascular health and disease. We used this opportunity to shine light on the advancements made in the field of cardiac health, made possible by biomedical engineering. Therefore, we added a Stent Demonstration Model to our repertoire. In addition to the model, we also created physical flyers containing information about cardiac health and the role of stents to give out to the attendees.

The components of the updated CSEP are:

1. **Stent Demonstration Model:** An interactive model that demonstrates the difference in blood flow between plaque-obstructed arteries and arteries with stents inserted. The model can be refilled by pressing a button to activate the pump.
2. **Circulatory Model:** A stylized circulatory system model with interactive syringe pumps to visualize the flow of blood between the heart, lungs, and body. The front of the 3D-printed heart detaches to reveal the tubing inside.
3. **Pig Hearts:** Non-toxic, preserved porcine hearts for event attendees to interact with.

Project Funding:
The funding for this project primarily came from the chapter membership dues and funding from the Bioengineering Department that the chapter allocated to this committee. The cost of the printed educational brochures were reimbursed from the UCSD Associated Students funds.

Table 10.1: Categorized Continuing STEM Education Project Budget, with Funding Sources

Category	Cost
Power & Button Materials	$37.12
Submersible Aquatic Pump	$17.99
Lumber	$63.58
Acrylic Sheet	$80.09
Vinyl Tubing	$31.99

PVC Pipe & Adapters	$68.88
Adhesives & Clamps	$66.39
Decorative Components (paint, spring, clay, food dye)	$50.52
Child-sized Disposable Gloves	$12.90
Supplies for Repairing Last Year's Model	$18.56
Total Chapter Funds Used	**$448.02**
Printed Brochures	$39.44
Total Reimbursed from AS Funds	**$39.44**
Total Project Cost	**$487.46**

Project Design Process and Results:
The primary addition to the CSEP this year was the Stent Demonstration Model. The model consists of two acrylic reservoirs for simulated blood (water colored with red food dye) supported on a custom-built wooden backboard. The left reservoir is elevated about two feet higher than the right reservoir, and both are connected by two vinyl tubes on the front of the model and one behind the backboard. Of the two front tubes, one simulates blood flow obstructed by plaque buildup (modelled by compressing the tube) and the other shows unobstructed flow due to the insertion of a stent (modelled by a spring). Fluid flows from the upper reservoir through the vinyl tubing and drains into the lower reservoir. However, the unobstructed tube drains faster than the tube obstructed by the plaque, demonstrating the effectiveness of a stent in restoring blood flow. Fluid is pumped back to the upper reservoir using a submersible aquatic pump, controlled by a button for another interactive component.

The ideation of this project was largely carried out by the Co-Chairs, aided by the expertise of previous Co-Chairs and Co-Chair of the BMES Project Team. The execution of the project was an approximately two month-long process and was enabled by the consistent efforts of the co-chairs, committee subleads, and other volunteers from our BMES chapter. The entire building process, from the beginning to the end, was an ongoing workshop-style effort that maximized use of the UCSD Makerspace's operating hours. We welcomed chapter members with all levels of skills and interests to participate in our workdays. In the process, our volunteer team familiarized themselves with the Makerspace, gained experience with power tools in the Woodshop, and utilized the ECE Makerspace, as well as the Laser Cutting Studio. They also pitched in ideas, participated in discussions, and took responsibility over individual components of the project.

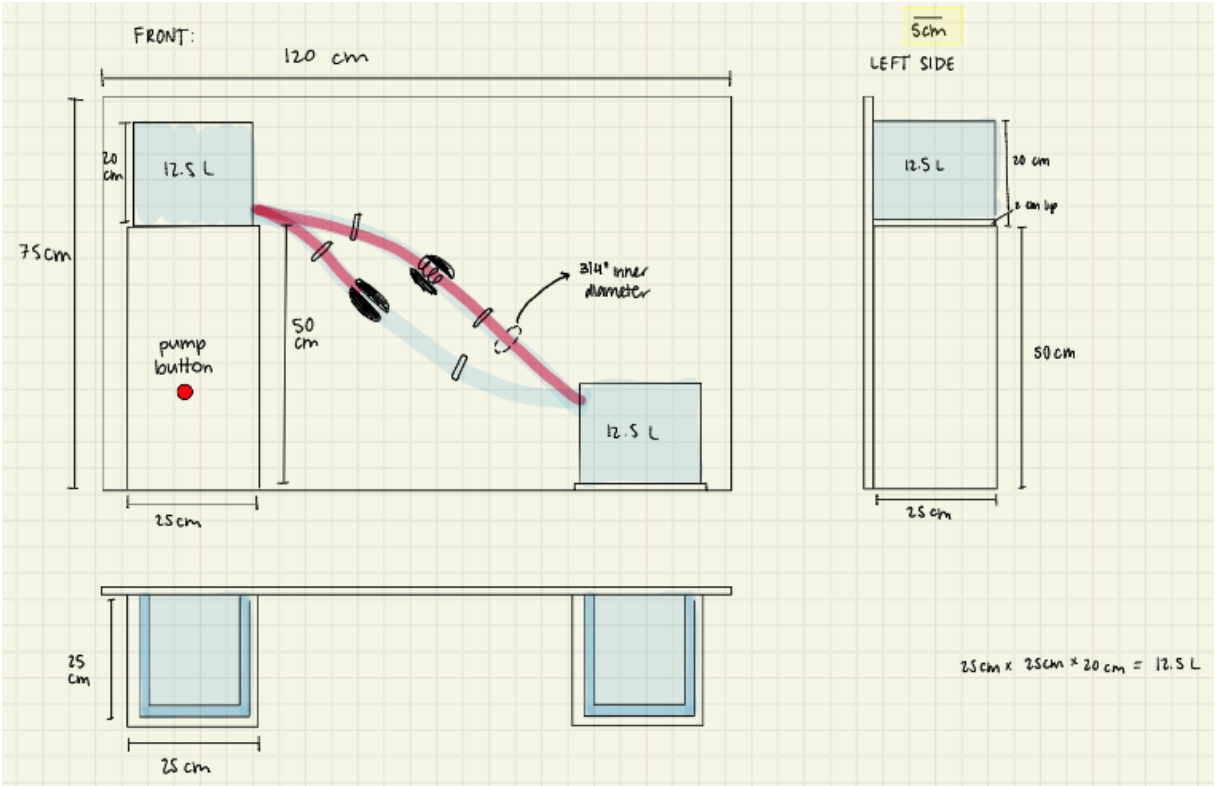


Figure 10.12. Early schematic of Stent Demonstration Model design.

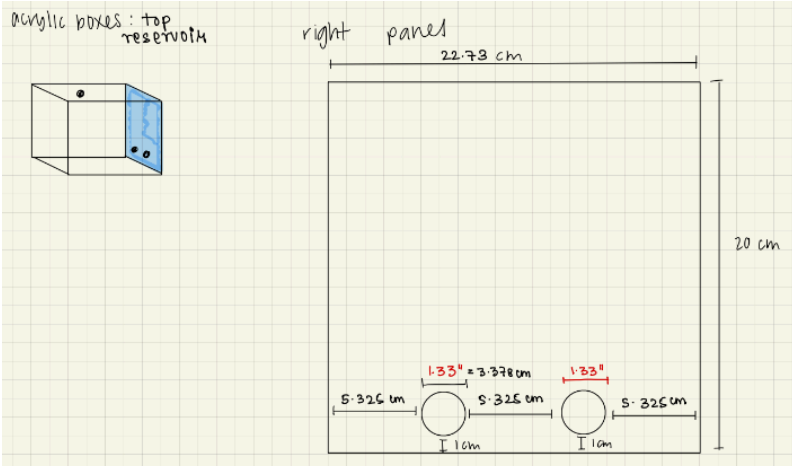


Figure 10.13. Schematic used to create laser cutting patterns for acrylic reservoirs.

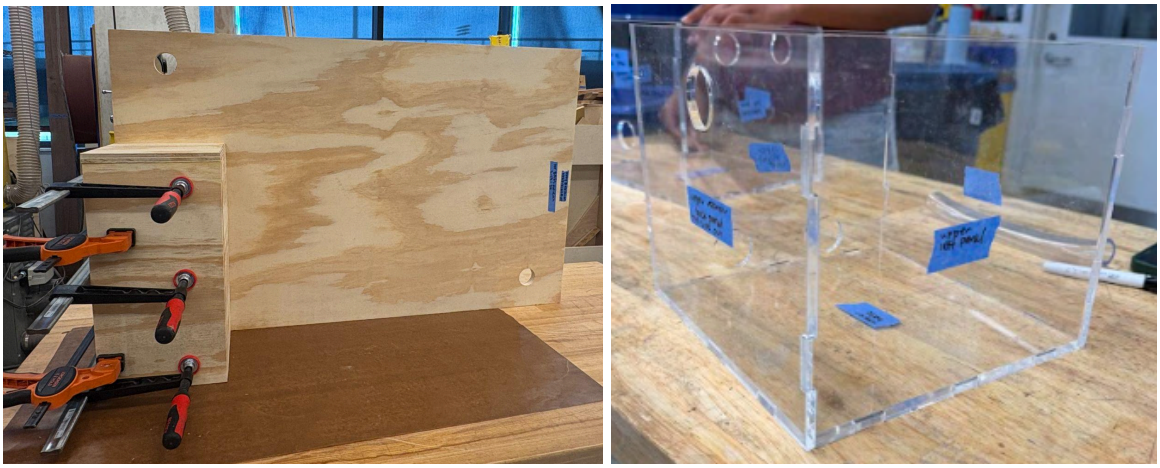


Figure 10.14. *Left Image:* Assembled wooden backboard. *Right Image:* Assembled acrylic reservoir.

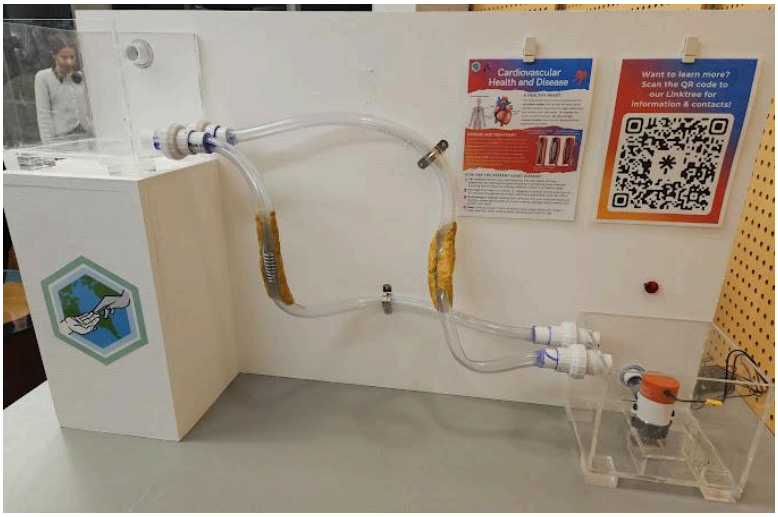


Figure 10.15. Fully assembled Stent Demonstration Model before being filled with simulated blood.

Extended CSEP Workshop:

The extended workshop for the CSEP aimed to provide our chapter members with opportunities to gain a variety of technical skills they can apply in their STEM careers, club endeavours, and personal projects, while also resulting in an educational model to be presented at the San Diego Festival of Science and Engineering. Volunteers from our chapter were invited to join us in the Makerspace at their convenience, allowing them to balance their academic and extracurricular schedules, while we maximized the time we spent in the Makerspace. Our volunteer team gained experience drawing schematics, wood working, building electrical circuits, laser cutting acrylic, creating watertight seals, graphic designing, and using many miscellaneous tools in the Makerspace. It was also an excellent team-building experience between our members and provided our committee's subleads with opportunities to showcase their unique skillsets. Certain subcomponents of the project were delegated to members with corresponding skills or interests, giving them more creative and technical independence. The extended CSEP workshop strongly aligns with Outreach's focus on making STEM education more interesting, interactive, and accessible.

Figure 10.16. *Left & Center Images:* Cutting lumber for assembly of the backboard. *Right Image:* Gluing and clamping pieces of wood together to create supports for the acrylic reservoirs.

Figure 10.17. *Left Image*: Group photo of Extended CSEP Workshop volunteers in the Makerspace's woodshop. *Right Image*: Planning the placement of the vinyl tubing.

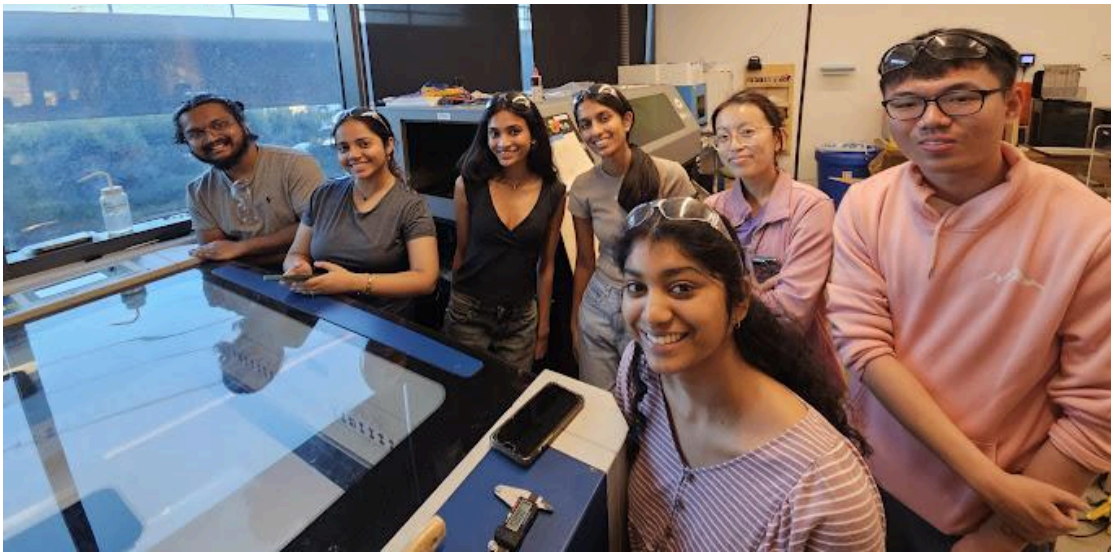


Figure 10.18. Group photo of Extended CSEP Workshop volunteers in the Makerspace's Laser Cutting Studio, observing the acrylic reservoir panels be cut.

Extended CSEP Workshop	01/12/26 - 02/06-26 Intermittent Hours	*Total Attendance:* 14 Volunteers	*Cost:* Project Budget

X.X San Diego Festival of Science and Engineering

Audience: *K-12 students, families, and educators of the greater San Diego community interested in learning more about STEM topics, like the cardiovascular system.*

Volunteers: *BMES chapter members and officers wanting to share their passion for STEM with members of their community.*

The San Diego Festival of Science and Engineering is an annual STEM education event held at Petco Park. A wide range of STEM organizations provide demonstrations and interactive opportunities to encourage interest in STEM among K-12 students, families, and educators of our San Diego community. This year, BMES presented our Continuing STEM Education Project, building upon our display from last year and maintaining our theme of the cardiovascular system. BMES and BEGS collectively represent UC San Diego Bioengineering at our committee's largest event of the year, and one of Outreach's flagship events. SDFSE is our most effective opportunity to facilitate STEM outreach to thousands of community members and allows STEM educators to connect with us for future Outreach events.

SDFSE	Saturday 03/07/26 8:00 AM - 6:00 PM	*Total Attendance:* 28 Volunteers	*Cost:* Project Budget

Figure 10.19. *Left Image:* A volunteer showcasing the stent model to an attendee. *Center Image:* A volunteer explaining heart anatomy and physiology to an attendee using a preserved porcine heart. *Right Image:* A volunteer posing with the interactive circulatory model.

Figure 10.20. *Left Image:* Group photo of the morning volunteer shift at SDFSE, many of whom stayed the entire day. *Right Image:* Co-Chairs proudly posing for a photo after the successful completion of the stent model at SDFSE!

X.XI UC San Diego's Comienza con un Sueño (It Begins with a Dream) Event

Audience: *High school and middle school students, along with their families, who are interested in learning about and exploring pathways to higher education and gaining access to college opportunities at all levels.*

Volunteers: *Members of our chapter who are passionate about engaging with students and sharing the importance of science, specifically bioengineering, by highlighting the educational resources for science learning in college.*

Comienza con un Sueño is a community STEM outreach event aimed to inspire middle school and high school students and their families, often from underrepresented backgrounds, to pursue higher education. Volunteers showcased the circulatory model from the CSEP and engaged with students by highlighting the importance of bioengineering and cardiovascular health. Volunteers also provided insight into academic opportunities, college preparation, and campus resources available to support student success.

Comienza con un Sueño	Saturday 03/14/26 8:00 AM - 1:00 PM	*Total Attendance:* 10 Volunteers	*Cost:* $0

Figure 10.21. *Left Image:* Group photo of BMES volunteers posing for a photo alongside the circulatory model. *Right Image:* Volunteers conversing with a community member interested in learning more about the circulatory model.

X.XII Planned Outreach Events

Date	Time	Event	Event Description	Estimated Volunteer #
Saturday 04/25/26	9:00 AM - 3:30 PM	EDGE x BMES Girls Day Out	An Arduino workshop based on object-oriented programming meant for High School girls interested in STEM and higher education in engineering.	10
Saturday 05/02/26	9:00 AM - 12:00 PM	Imperial Valley STEAM Day	An opportunity to showcase the CSEP and share it with a different set of audience	5
Tuesday 05/05/26	4:30 PM - 6:30 PM	Community Resource Fair @ Escondido	Another opportunity to showcase the CSEP at a K-8 STEM fair.	5
TBD	TBD	UC-wide BMES Outreach Mixer	A beach gathering of representatives of the various UC Chapters of BMES Outreach meant for networking and building collaborations.	TBD
TBD	TBD	Info Session @ San Diego City High School	An in-person info session for high school students featuring a panel of UCSD Bioengineering students to discuss topics of college, applications and career-advice.	5

XI. Mentoring Activities

In addition to planning social events, the Social Committee also hosts our chapter's membership program.This program aims to pair newer students like lower classmen and transfers with experienced students within the bioengineering department, providing direct mentorship on things such as how to get into research, how to obtain internships, and what classes to take to ensure success. Our mentorship program experienced a 40% increase from last year in total members, and has stayed strong through the implementation of multiple mentorship mixers throughout the year to promote continued correspondence

Participants in the mentorship program are divided into four mentorship families. These families create smaller, tight-knit groups within the larger BMES community that encourage closer relationships in the spirit of competition. Throughout the year, families compete in various activities to accumulate points. The family with the most amount of points earned a prize at the end of the year

Membership in the Mentorship Program is exclusive to paid BMES members, which incentivises students to become full members. This year, over 60 mentees applied to our mentorship program. Our organization hosted events like our field day, various cook outs, and our annual assassins game.

XI.I BMES Mentorship Mixers

The BMES Mentorship program is organized and run by the Social Committee, and this year, we had 3 Mentorship Mixers so that prospective mentees could interact with prospective mentors. At each Mentorship Mixer, we facilitated games and activities that encouraged professional networking, like icebreakers, question prompts, and conversation bingo. Mentorship Mixer 2 was an event in collaboration with BMES New Student Committee, where we bought the ingredients for burgers and barbecued at the grills on campus. After each Mentorship Mixer, we provided a link to a form for prospective mentors and mentees to fill out to sign up for the BMES Mentorship Program and request a mentor/mentee based on their interactions at the mixers.

Mentorship Mixer 1	10/08/26 6:00 PM- 7:00 PM	*Total Attendance:* 33	*Cost:* $0
Mentorship Mixer 2 (Barbecue w/ NSC)	10/18/26 12:00-2:00 PM	*Total Attendance:* 24	*Cost:* $120
Mentorship Mixer 3	10/28/26 11:00 AM - 9:00 PM	*Total Attendance:* 25	*Cost:* $10

Figure 11.1. Promotional Flyers for each Mentorship Mixer Event

XI.II BMES Field Day/Mentorship Reveal

At our Field Day, we announced the mentor/mentee pairings and facilitated team bonding activities like relay races and tug of war to allow mentors and mentees to get to know each other.

Field Day (Mentorship Reveal)	11/08/26 3:00-5:00 PM	*Total Attendance:* 20	*Cost:* $0

Figure 11.2. Pictures from Field Day/Mentorship Reveal

XI.III BMES Mentorship Mashup

At the Mentorship Mashup event, we divided the mentor/mentee pairs into families and had a craft night where each family made their own flag out of felt and other craft supplies.

Mentorship Mashup	11/19/26 6:00-7:00 PM	*Total Attendance:* 15	*Cost:* $40

Figure 11.3. Promotional Flyer for Mentorship Mashup Event, Posted on Instagram and Discord

XI.IV Mentorship Assassins Game

Over the course of the quarter, BMES members from the four Mentorship Families played in the game Assassins. Participation was exclusive to members of the Mentorship Program which encouraged general BMES members to sign up for paid membership and play. Each family was assigned a “target family” and in order to “assassinate” a member of their target family, they had to stealthily spray their target with a provided water gun. If successful, the “assassin” could gain a point for their family. Each week, the “target families” were switched, and the game went on for 4 weeks. Assassins promoted teamwork as family members collaborated to track down targets, aiming to strengthen bonds and enhance friendship among family members.

Mentorship Assassins	02/02/26 - 03/06/26	*Total Participation:* 60	*Cost:* $18

Figure 11.4. Pictures from Assassins Game and Mentorship Families Slide

XI.V New Student Committee Events

The New Student Committee is dedicated to connecting and engaging freshmen and first-year transfer students with their peers, BMES, and the broader bioengineering community. Through workshops, socials, and large-scale events, our committee helps students build lasting connections, develop valuable skills, and gain exposure to the field of biomedical engineering. We also provide numerous opportunities for professional development and networking.

During the Fall and Winter quarters, we hosted course selection workshops to guide students through the registration process. These sessions had strong attendance and provided students the opportunity to receive advice and insights from upperclassmen.

Additionally, NSC will organize The Bioengineering Experience, a networking event featuring a keynote speaker and roundtable discussions. This event aims to connect students with bioengineering alumni, introduce them to local biotech and pharmaceutical companies, and help them explore academic and career pathways within the field.

Table 11.1. New Student Committee Workshops

Date	Event Timeline	Event Title	Event Description	Estimated Volunteer #	Estimated Attendance
Nov. 12	5-6 PM	Winter Quarter Course Selection Workshop	Presented resources and course enrollment to students; Student Q&A session was facilitated to help underclassmen plan their classes and organize their academic plan	5	4
Feb. 17	6-7 PM	Spring Quarter Course Selection Workshop	Presented resources and course enrollment to students; Student Q&A session was facilitated to help underclassmen plan their classes and organize their academic plan	6	5
May 8th	5-7 PM	BE Experience	An event oriented to connect the UCSD Bioengineering community to alumni and industry professionals through a round-table networking session; Keynote speaker, Dr. Aaron Meyer will in attendance	5	~50

XI.VI Switching Into Bioengineering Event

The Switching into Bioengineering (SWIB) event, also hosted by the New Student Committee, featured a presentation by distinguished keynote speaker Dr. Bruce Wheeler, and Adjunct Professor of Bioengineering at UC San Diego. He provided students with an insightful overview of the field and introduced the diverse areas within bioengineering, highlighting the wide range of opportunities available from developing innovative technologies to addressing complex diseases. Dr. Wheeler also discussed the various career paths within bioengineering and emphasized the importance of both technical and soft skills in preparing for the field.

Afterwards, informational slides were presented to help students better understand the bioengineering major. These covered the different tracks within the program, the point-based system for switching into the major, and the required coursework, providing a clear roadmap for students interested in pursuing bioengineering.

The event also included a student panel featuring speakers from each track in the major. The students shared their experiences transitioning into bioengineering and discussed their time at UC San Diego, including their involvement in lab research, academic journeys, and future career or educational goals. They also highlighted valuable campus resources and shared advice for new students navigating the major. The panel concluded with an open Q&A session, fostering an engaging and supportive environment for attendees.

Overall, the event successfully achieved its intended goal of engaging students interested in switching into bioengineering, as the audience largely consisted of individuals actively exploring the major.

Date	Event Timeline	Estimated # of Volunteers	Estimated Student Attendance
Nov. 6	7-9 PM	5	25

Figure 11.5. Image of student panel at Switching Into Bioengineering Event

XII. Industry or Professional Development Activities

In addition to encouraging the development of interpersonal skills and academic excellence, BMES at UC San Diego is dedicated to helping our members grow professionally, providing students with a variety of career opportunities and industry exposure. This year, BMES at UC San Diego focused heavily on cultivating opportunities for technical and professional development – skill development workshops, expositional events, and career fairs were hosted by the different committees and officers. The Executive Board introduced a new committee, Bioworks, focused on providing new students the necessary skills to pursue research in a wet-lab environment. The Project Team continued to host events that provided students with hands-on engineering experience, which allowed members to translate what they learn in their courses into real world applications. Additionally, the Vice President External obtains industry connections and works with company representatives to help students find career opportunities for internships, full-time work, or research positions, giving undergraduates a view into what prospects await them post-graduation.

Every year, BMES at UC San Diego works in conjunction with the Shu Chien - Gene Lay Department of Bioengineering to organize the annual Bioengineering Networking Career Fair, where company representatives come to present their mission and recruit bioengineering undergraduate and graduate students for jobs or internships. Regardless of whether students plan to go into academia or into industry, BMES at UC San Diego provides various kinds of opportunities and resources to prepare its members for the workforce or graduate school and succeed during and after their college career.

XII.I Bioworks Committee Workshops

Developed this year, the BioWorks Committee is dedicated to connecting students with Academic Research Labs and providing them with the skills and knowledge necessary for success in the Academic Lab environment. Our Workshops are meant to teach students techniques and concepts that will help them succeed in research labs. During the Fall quarter, the Workshops focussed on soft skills, including how to find research opportunities on campus, how to read scientific papers and an Industry Panel. Workshops during the Winter Quarter were focussed on essential Wet Lab skills including plasmid cloning, sequencing, and protein gel electrophoresis. Bioinformatics workshops will take place in the Spring Quarter.

Fall Quarter:

Workshop Title	Date	Attendance	Description
Tips for joining a research lab	10/14/25	42	Described how to find and evaluate lab websites. Demonstrated an example of a cold email for a lab of interests. Informed students of various research programs available to UCSD undergrads.
Project cycle mentor mixer	10/21/25	42	Graduate students from labs participating in Project Cycles presented their research and met with attendees. Shi and Xi lab members presented.
Introduction to Journal Clubs and how to read scientific literature	10/28/25	32	Outlined the basics of scientific literature including original research vs. reviews and published vs. pre-print papers. Taught students how to critically analyze scientific research papers. Co-Chairs each gave a 10 min Journal Club Presentation on a recent paper.
Industry Panel featuring Illumina, IAVI, Phillips, and Thermo Fisher	11/04/25	32	Representatives from Illumina, IAVI, Phillips, and Thermo Fisher were asked questions regarding their advice and journey to their current positions by Co-Chairs. A Q&A session with the audience then followed.
Thanksgiving Social	11/18/25	32	Attendees were encouraged to bring their favorite Thanksgiving dishes. A BioTechnology-related Quiz game took place.
Journal Club	12/02/25	27	Four subleads gave Journal Club Presentations. The first on islet organoids, the second on bacteria-induced DNA damage, the third on viral fusogens, and the last on CAR-T cells.

Winter Quarter:
Each committee meeting began with a 10 minute journal club presented by a BioWorks committee sublead, followed by a slideshow presentation and hands-on workshop led by subleads.

Workshop Title	Date	Attendance	Description
Restriction Enzyme Digest & Gel Electrophoresis	01/13/26	27	Subleads detailed the procedure for cleaving DNA with restriction enzymes and validating the size of DNA fragments with an agarose Gel. Additionally, a sublead gave a journal club presentation on a bioinformatics approach for understanding autism-associated genes.
Gibson Cloning & Bacterial Transformation	01/20/26	27	Subleads detailed the Gibson Assembly technique in which multiple linear DNA fragments are fused into a plasmid as well as the process of transforming and growing plasmids in a bacterial culture. A sublead gave a Journal Club presentation on a stem cell platform for bone repair.
Primer/Geneblock Design	01/27/26	27	Subleads outlined the methodology behind designing primers for PCR and also how gene blocks are synthesized and how to order them. A sublead gave a Journal Club presentation on cytosine base editing.
SDS Page Gel	02/03/26	5	Subleads described how protein size is validated with an SDS PAGE Gel including the preparation and the mechanism of action. A sublead gave a Journal Club presentation on using Algae to degrade chemical warfare agents.
Polymerase Chain Reaction	02/10/26	27	Subleads outlined the PCR method including the reagents required as well as the stepwise molecular process that allows for amplification of DNA. A sublead gave a Journal Club presentation on spinal cord organoids.
Western Blotting	02/17/26	22	Subleads explained how specific proteins are identified with Western Blots including the sandwich procedure and antibody production. A sublead gave a Journal Club presentation on generating artificial matrix for articular cartilage repair.

DNA Extraction & Sanger Sequencing	02/24/26	15	Subleads gave a presentation on how DNA is extracted from various sources and how it is sequenced. This included a demonstration in which attendees extracted DNA from a strawberry with household reagents. A sublead gave a Journal Club presentation on p53's role in promoting lipid metabolism.
Monoclonal & Polyclonal Antibodies	03/03/26	12	Subleads summarized how antibodies bind to specific targets, how they are produced in vivo, and how they are produced at scale for biotechnology applications. A sublead gave a Journal Club presentation on using bacteriophages for detection of bacteria.
Journal Club	03/10/26	6	Two subleads gave Journal Club presentations; one on using a nanoparticle for detection of traumatic brain injury and another on DNA-laden hydrogels for growing bone organoids that improve bone regeneration.

Spring Quarter:

Workshop Title	Date	Attendance	Description
Introduction to Bioinformatics	04/01/26		A brief introduction to bioinformatics and what it can be used for with a quick example.
Data Structures + Coding Intro Part 1	04/08/26		CoLab will be utilized in order to go through a coding example that pertains to reverse complements in DNA.
Data Structures + Coding Intro Part 2	04/15/26	TBD	CoLab will be utilized in order to go through a coding example that pertains to reverse complements in DNA.
Running a Python Bioinformatics Tool	04/22/26	TBD	Hands-on workshop with Python BLAST to simulate database analysis.
Using a Bioinformatics Tool	04/29/26	TBD	Bioinformatics Pipelines will be gone over in addition to an example.
AlphaFold Protein Folding	05/06/26	TBD	Overview of modern bioinformatics applications in protein folding with AlphaFold3, alongside hands-on demo.
Intermediate Coding Workshop	05/13/26	TBD	Workshop will build on basic coding skills covered previously, and cover a topic of interest voted on earlier in the quarter.
Current/Future tools of Bioinformatics	05/20/26	TBD	Coverage of direction of Bioinformatics applications in industry, recent advances in RF Diffusion, living system modeling, and AI.

XII.II Bioworks Project Cycles

The BMES project cycles seek to connect highly motivated undergraduate students to research labs on campus at UC San Diego and at research institutes in the greater La Jolla area, to provide meaningful opportunities for active research involvement and mentorship. The goal is 2-fold: 1) to make research opportunities more accessible to undergraduate students, and 2) to streamline the recruitment process for research labs, by recommending the top candidates to the labs for further consideration. We connect with labs interested in mentoring undergraduate researchers and work with them to craft descriptions and applications that align with their research needs, advertise positions to a large and motivated pool of students, and screen and interview candidates. This year, we worked with 13 labs at UC San Diego Jacobs School of Engineering, Salk Institute, La Jolla Institute for Immunology, and Sanford Burnham Prebys. 18 undergraduate students participated in these project cycles, and many of the students will continue in their lab position after this academic year. A majority of the students were freshmen or first-year transfer students and the project cycle program has enabled them to pursue undergraduate research beginning in their first year at UC San Diego. Below is information regarding each project cycle, including the research description, selection rate, and select student testimonials.

Metallo Lab (Salk Institute) - Dr. Christian Metallo

12 **Applicants**	1 **Student Selected**

Project Recruitment Description:

The Metallo lab studies how metabolism contributes to human disease. The undergraduate student will be working with a postdoctoral fellow and research would involve cell culture, western blots, processing cells for immunostaining and microscopy, and possibly extracting cells for mass spec analysis.

Shi Lab (Shu Chien-Gene Lay Department of Bioengineering) - Dr. Lingyan Shi

20 **Applicants**	2 **Students Selected**

Project Recruitment Description:

The Shi Laboratory develops and applies advanced multimodal optical imaging technologies (e.g., SRS, FLIM, multiphoton microscopy, SHG) to study metabolism, aging, neurodegeneration, and cancer. These projects are highly interdisciplinary, and undergraduate trainees have the opportunity to gain hands-on experience while contributing meaningfully to ongoing research.

This is an incredibly valuable opportunity to:

- gain hands on experience in advanced microscopy and spectroscopy techniques
- receive training in cell culture, tissue processing, and imaging analysis
- contribute to ongoing NIH and NSF-funded projects
- receive mentorship in scientific communication (presentations, manuscripts, fellowship applications, etc.)

- work in a collaborative, interdisciplinary research environment and build connections with graduate students, postdocs, and international collaborators.

Xu Lab (Aiiso Yufeng Li Family Department of Chemical and Nano Engineering) - Dr. Sheng Xu

17 **Applicants**	2 **Students Selected**

Project Recruitment Description:

To address the growing intensive health-care needs of an aging population body-integrated electronic devices capturing clinical-quality biological data with long-term monitoring capabilities are becoming essential tools for prevention, diagnosis, and treatment. While current wearable electronic systems primarily focus on surface-level parameters, the Xu group's wearable ultrasound team leverages ultrasound's deep penetration and biocompatibility to develop devices that capture biological signals embedded beneath the skin.

The research is interdisciplinary, including topics such as ultrasound, materials science, fabrication of ultrasonic transducers, hardware development, and signal/image processing. This is a great opportunity to delve into the medical devices space, and you will be able to:

- Learn about medical device development, ultrasound, clinical applications, regulatory affairs, and technical writing
- Contribute to high-impact, cutting-edge research
- Build a variety of technical skills that are useful across bioengineering

Kravets Lab (Shu Chien-Gene Lay Department of Bioengineering) - Dr. Vira Kravets

14 **Applicants**	2 **Students Selected**

Project Recruitment Description:

The research project focuses on experimental and computational assessment of the role of alpha cells and neighboring first responder beta cells in the response of pancreatic islets to nutrients in diabetic conditions. It will involve MATLAB and C++ modeling of a pancreatic islet, pancreatic tissue processing, and confocal imaging of synchronized calcium dynamics in the islets. The alpha-beta cell communication will be perturbed pharmacologically, and the effect of this manipulation on the calcium (surrogate for insulin) response of the pancreatic islet will be quantified. This will deepen the understanding of what may be happening in diabetes onset when alpha-beta cell crosstalk is lost.

The project will begin with the literature review under the supervision of a Ph.D. student, and will continue with lab safety trainings, tissue handling, and imaging training in the first quarter. Data collection and analysis will follow in the subsequent quarters. Undergraduate students will have the opportunity to meet directly with Dr. Kravets weekly.

Student Testimonial 1:

I think the BMES project cycle is an excellent opportunity for students looking to get involved in research but not sure how to start. Unless you've been networking with people already in labs, nobody really tells you how to write a cold email, how to find labs you're interested in, or what kinds of things PIs are looking for in resumes. Project cycles help bootstrap future researchers into this process and are a great way for curious students to see how research is actually performed in their field. I would definitely recommend applying to anyone who is on the fence; the great thing about not getting into one lab is there's always another cycle!

Student Testimonial 2:

I applied for project cycles looking to gain valuable practical experience and fuel my curiosity but it delivered a lot more than that. Weekly meetings with member's research updates and literature presentations train critical thinking and test my understanding of ongoing research in the field. The scientific rigor applied in both computational and wet lab aspects of the work is something you just don't encounter in classes. Project cycles make lab experience accessible to undergraduates.

Myers Lab (La Jolla Institute for Immunology) - Dr. Sam Myers

14 **Applicants**	1 **Student Selected**

Project Recruitment Description:

The lab aims to develop the next generation of cancer immunotherapies by understanding the cell signaling pathways and epigenetic mechanisms that drive the phenotype and function of chimeric antigen receptor (CAR) T cells in an in vitro model of B cell malignancy. This treatment has proven to be a clinical success in treating B-cell cancers, as well as certain cases of autoimmune disease. Despite this, CAR-T therapies are effective in some patients, depending on the cancer type and target, and carry the risk of inducing auto-inflammatory disorders. To enhance its efficacy and safety, the laboratories are investigating cell signaling and epigenetic regulation in CAR-T cells. The goal is to exploit these processes to enhance CAR-T function against cancer and uncover deployable strategies for therapeutic use.

Key Roles and Responsibilities:

- Plan and conduct experiments to address key scientific questions
- Perform molecular cloning to produce relevant DNA constructs
- Proliferate, extract, and purify plasmid DNA
- Culture and maintain immortalized cell line such as Raji B Cells & Lenti-X HEK293T
- Optimize and evaluate packaging high-titer enveloped viral particles for CAR-T generation and base editing mutagenesis
- Analyze, summarize, and clearly present data to the lab group and principal investigators to facilitate decision-making while keeping an electronic laboratory notebook up to date

Saphire Lab, CAR T Cell Therapy Project (La Jolla Institute for Immunology) - Dr. Erica Ollmann Saphire

14 **Applicants**	1 **Student Selected**

Project Recruitment Description:

The project studies how engineered immune cells recognize and eliminate cancer cells. We focus on chimeric antigen receptor (CAR) T cells and CAR NK cells that are genetically modified to target specific tumor antigens. CAR T cell therapy has transformed the treatment of certain blood cancers, yet its effectiveness can vary widely from patient to patient. In this project, we will use quantum dot (Qdot) labeling combined with advanced fluorescence microscopy to map the distribution of key synaptic proteins on living CAR T cells. In addition, we employ cutting-edge cryo-electron tomography (cryo-ET) to study the native 3D molecular architecture of the immune synapse at nanometer resolution. By integrating live-cell imaging, image analysis, and correlative cryo-electron microscopy, we measure how receptor clustering, membrane topology, and cytoskeletal organization evolve during CAR T cell engagement with target cells.

Undergraduate interns will gain hands-on experience in:

- Mammalian cell culture and fluorescent labeling of immune cells
- Live-cell and confocal microscopy
- Quantitative image analysis using software such as QuPath
- Cryo-electron tomography sample preparation and data interpretation
- Correlative Light and Electron Microscopy (CLEM) workflow
- Operation and alignment of the Transmission Electron Microscope (TEM)
- Experimental design and data interpretation in immuno-cell biology

Saphire Lab, Antiviral Drug Discovery Project (La Jolla Institute for Immunology) - Dr. Erica Ollmann Saphire

24 **Applicants**	1 **Student Selected**

Project Recruitment Description:

The project aims to develop broad-spectrum antiviral drugs that work against all deadly filoviruses, including Ebola and Marburg. To do this, we study the virus's nucleocapsid—the large protein-RNA core that is essential for the virus to assemble and replicate. Using cutting-edge imaging methods such as cryo-electron tomography, we recently visualized the Ebola nucleocapsid inside infected cells and identified several "assembly interfaces" that the virus depends on. We are now expanding this work to the Marburg virus and testing small molecules that could block these critical interaction sites. By combining structural biology, cell-based assays, and computational drug screening, our goal is to discover new antiviral compounds that stop virus assembly and could eventually lead to universal treatments for filovirus infections.

Microscopy & Histology Core (La Jolla Institute for Immunology) - Dr. Zbigniew Mikulski

29 **Applicants**	1 **Student Selected**

Project Recruitment Description:

Microscopy and Histology Core Facility at La Jolla Institute for Immunology was developed to help scientists with their imaging projects. We work with scales starting from whole organisms and ending at single molecules. Our interns can help us to optimize sample preparation methods, digitize slides with an automated slide scanner, advance live cell imaging, aid in multiplexing for spatial biology applications, and improve image analysis. We also work on projects that involve robotics, 3D-printer based manufacturing, microfluidics, and database development. There is also part of our work that involves cross-talk of science and art.

The intern will assist in a project evaluating AlphaGenome (Google DeepMind's latest sequence-to-function model) on the CEDAR data. The goal is to determine if AI features can help us better predict which cancer mutations will actually be seen by the immune system.

Student Testimonial:
So far, working in a research lab has been amazing as I've been able to gain the hands-on experience necessary for my career path. I am so grateful to have been provided this opportunity especially because I am a transfer student. As a transfer it can be more difficult finding experience opportunities but this project cycle program allows students like me with little experience to flourish and gain confidence in the intimidating world of engineering. So far, I've learned way more than I anticipated and plan to continue working in the lab after the project cycle ends.

Peters Lab (La Jolla Institute for Immunology) - Dr. Bjoern Peters

17 **Applicants**	1 **Student Selected**

Project Recruitment Description:

When cancer cells mutate, they produce novel protein fragments known as neoepitopes that are absent in healthy tissue and can be recognized by the immune system. While thousands of mutations may exist within a single tumor, only a rare few are truly immunogenic, meaning they possess the specific biochemical properties required to trigger a functional T-cell response. Our research focuses on developing bioinformatic pipelines and advanced machine learning algorithms to decode the complex patterns that define these "triggers". Central to this effort is our creation and maintenance of the Cancer Epitope Database and Analysis Resource (CEDAR), a comprehensive database that provides the high-quality, curated data necessary to train and validate predictive models. We aim to identify the optimal targets for personalized cancer vaccines, tailoring treatment to the unique genetic landscape of each patient's disease.

Student Testimonial:
Before joining the BMES project cycle, I was unsure how to get involved in research and felt overwhelmed by the process of finding opportunities. This program made that first step much more accessible and gave me the chance to explore research in a field I'm genuinely interested in. Working on a project with close collaboration and guidance from a mentor, as well as attending weekly lab meetings and hearing about the work others are doing, has been extremely inspiring. I'm very grateful for the

opportunity because it made research feel much more approachable and confirmed my interest in pursuing it further.

Colas Lab (Sanford Burnham Prebys) - Dr. Alexandre Colas

9 **Applicants**	2 **Students Selected**

Project Recruitment Description:

Heart disease remains the leading cause of death worldwide, in part because the adult human heart has limited regenerative capacity. Our laboratory studies the molecular mechanisms that control cardiac cell fate acquisition, maintenance, and plasticity during development, aging, and disease. A central focus of our work is identifying "barrier" mechanisms that stabilize fibroblast identity and limit direct cardiac reprogramming — a promising strategy to convert scar-forming fibroblasts into functional cardiomyocytes after injury. Using human iPSC-derived cardiomyocytes, primary human cardiac fibroblasts, and advanced high-throughput functional screening platforms, we combine genomics, epigenomics, and quantitative imaging approaches to uncover novel regulators of cardiac regeneration. Our goal is to develop innovative gene- and mechanism-based therapies that enhance heart repair after injury.

The intern will assist in a project aimed at identifying and functionally characterizing novel regulators of cardiac cell fate and proliferation using human stem cell–derived platforms. Depending on interest and background, the project may involve:

- Analysis of RNA-seq or ATAC-seq datasets to identify candidate regulators of cardiac reprogramming
- Quantitative image-based analysis of cardiomyocyte proliferation or structural maturation
- Functional validation of candidate genes using siRNA or CRISPR-based approaches
- Integrating multi-omics datasets to uncover regulatory networks governing cardiac identity

This project will provide exposure to cutting-edge regenerative biology, human stem cell systems, and high-throughput functional genomics.

Osterman Lab (Sanford Burnham Prebys) - Dr. Andrei Osterman

5 **Applicants**	1 **Student Selected**

Project Recruitment Description:

Long-term research interests of Osterman's Lab (at Sanford Burnham Prebys Institute for Medical Discovery, SBP, La Jolla) are in the field of comparative and functional genomics of microbial metabolic and regulatory networks underlying adaptation, vulnerabilities, and microbe-host interactions. The current research is focused in two areas. Research area 1 (Metabolic genomics): Genomics-based in silico metabolic reconstruction of human gut-colonizing microbiota aimed to understand host-microbiome metabolic interactions with translational applications in rational development of prebiotics and therapeutic

nutritional supplements to correct dysbiosis-associated syndromes (PMID: 40670725). Research area 2 (Antibiotic resistance): Experimental evolution and genomics of antimicrobial resistance aimed to explore mechanisms and dynamics of acquisition of antibiotic resistance with translational implications in rational selection of antibiotics and combinations thereof for the optimal treatment of infectious disease (PMID: 41159736).

Sinha Lab (Sanford Burnham Prebys) - Dr. Sanju Sinha

3 **Applicants**	1 **Student Selected**

Project Recruitment Description:

Imagine trying to cure cancer but you cannot measure whether your tumor shrieked or is completely being removed. You can only measure how long your patient lived. This is the current state of aging research - we do not know how to measure aging. With the reasoning the organ function emerges from its structure, we develop compute vision methods to quantify the organ structure features and how it ages, whether a drug can slow down its breakdown during aging and what molecular changes drive it.

Ranade Lab (Sanford Burnham Prebys) - Dr. Sanjeev Ranade

4 **Applicants**	2 **Students Selected**

Project Recruitment Description:

The Ranade lab is seeking a motivated BMES at UCSD undergraduate student for a part-time research position focused on developing AI-assisted computational workflows for functional genomics and perturbation screening. Our lab studies the molecular and cellular mechanisms underlying congenital heart disease and Down syndrome using human stem cell models, single-cell genomics, high-content imaging, and CRISPR-based perturbations. We integrate multimodal datasets (morphology, transcriptomics, and protein measurements) to define disease-associated cell states and identify regulatory drivers. We are building an agentic AI workflow to assist in the design and prioritization of perturbation screens (e.g., small molecules, siRNA, CRISPR-based modulation) coupled to transcriptomics (RNA-sequencing) readouts. The goal is to develop computational tools that can intelligently nominate high-confidence candidate regulators for experimental validation, integrating prior knowledge, transcriptomic signatures, and cross-platform datasets. The intern will be primarily computational but will be encouraged to participate in the wet lab validation experiments. The specific implementation details will evolve collaboratively, but this project sits at the intersection of AI, systems biology, and stem cell disease modeling.

Student Testimonial:

The BMES Project Cycle has been an incredibly impactful part of my academic journey, serving as the essential bridge between my classroom learning and the professional research world. As a student, the process of finding a lab and connecting with faculty can often feel overwhelming, but this program provided a clear, structured pathway to interface with junior faculty at [Sanford Burnham Prebys]. It has been instrumental in helping me navigate the complexities of lab onboarding and departmental logistics,

allowing me to focus on the research goals ahead. This experience has not only made the transition into a research environment easy but has also given me the confidence to pursue long-term professional goals within the bioengineering field. I would highly recommend the project cycle to any student looking for a supportive and effective entry point into high-level research.

Figure 12.1. Overflow room for our first meeting of Fall Quarter.

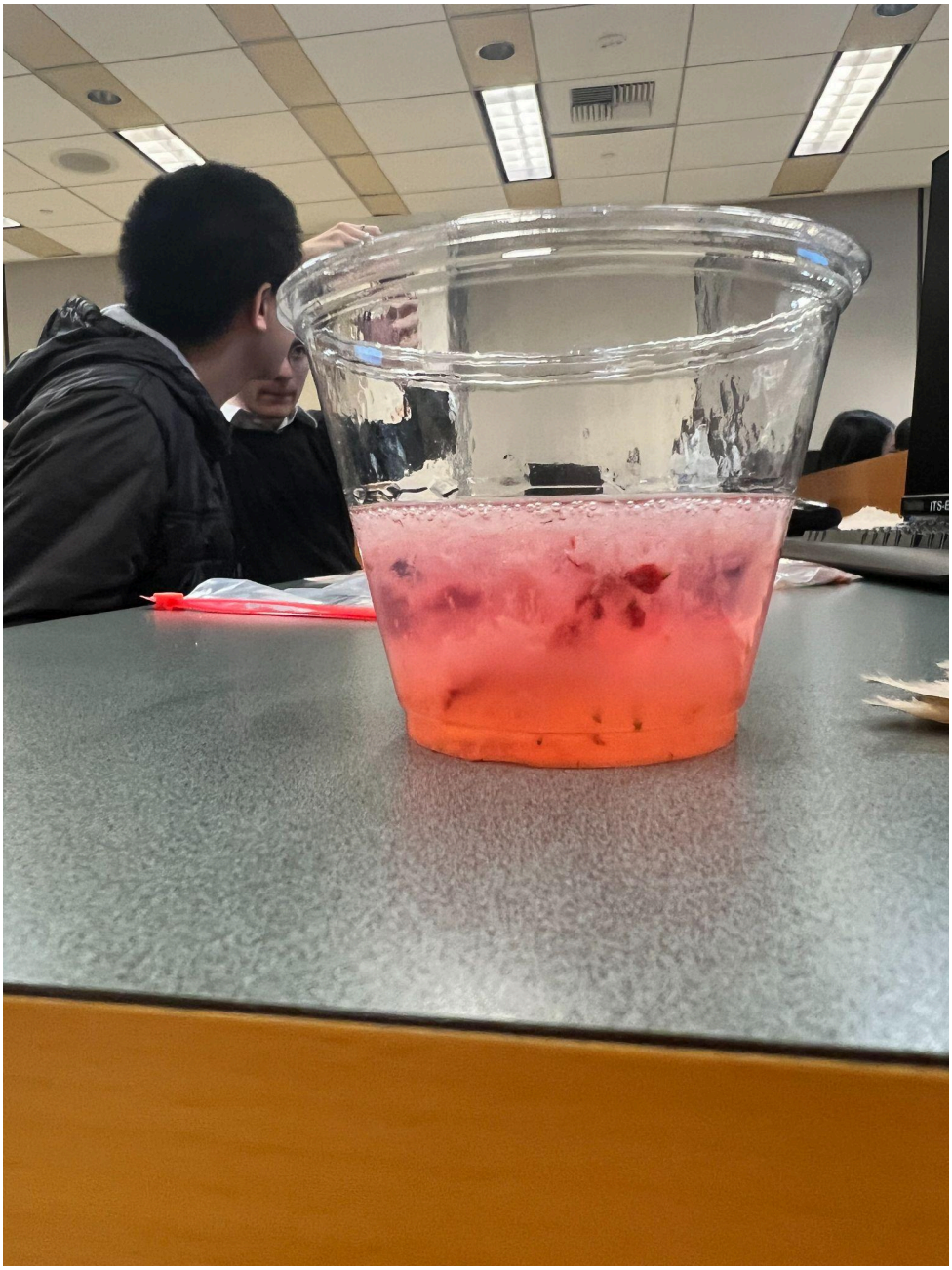


Figure 12.2. DNA extracted from Strawberries at our Winter Week 8 meeting.

Figure 12.3. Attendees extracting DNA from strawberries at our Winter Week 8 meeting.

XII.III Project Team Workshops & Workdays

The Project Team committee aims to establish a nurturing community to foster the development of students' technical and interpersonal abilities in fields relevant to bioengineering. The aim is to enhance the accessibility of research and practical learning experiences for students who are keen to develop professionally. Throughout the year, the Project team holds technical workshops to provide students with the necessary skills to contribute to the year-long student-led project. Each workshop held during the academic year is listed below.

Fall Quarter:

Workshop Name	Date	Total Attendance	Cost
CAD Workshop #1	10/15/25	23	$0
Intro to Arduino	11/05/25	26	$0
CAD Workshop #2	11/19/25	15	$0

Spring Quarter:

Workshop Name	Date	Total Attendance	Cost
Coding Basics	01/24/26	7	$0
CAD Review	01/26/26	15	$0
Intro to GitHub	01/26/26	7	$0
Wiring Practices	01/31/26	11	$0
CAD Workshop #3	02/02/26	14	$0
Intro to Controls	02/07/26	8	$0
CAD Workshop #4	02/09/26	12	$0
CircuitPython	02/14/26	7	$0
3D Printing/Laser Cutting	02/21/26	8	$0

The thorough nature of these workshops ensures that the project team has no barrier of entry – all interested students are welcome to join regardless of prior experience, and have the opportunity to pick up new skills along the way. In addition to teaching basic mechanical design skills like CAD, the workshops dive into more specialized topics like controls, wiring practices, and operating 3D printers and laser cutters.

XII.IV Other Professional Development Activities

Organized by the Vice President External Affairs, these following professional development opportunities seek to connect interested students to graduate programs or industry. By giving students the chance to network with program and industry leaders, these events provide students with opportunities to discover their interests or pursue future goals.

Event Name	Event Date	Attendance	Description
Mayo Clinic Graduate Application Talk	9/30/25	38	Students learn about Mayo Clinic's graduate programs, application requirements, and tips for crafting a competitive application from admissions staff.
Medtronic Summer 2026 Internship Information Session	10/1/25	134	Medtronic representatives give an overview of the company history, eligibility criteria, and the application process to help students pursue summer 2026 opportunities.
Graduate Student Series Workshop: What to prepare for Grad School Applications	10/8/25	14	Interactive workshop with graduate students about key components of a strong grad school application, including personal statements, letters of recommendation, and picking schools.
Exact Sciences 2026 Internship Information Session	10/15/25	47	Exact Sciences presents internship openings, company culture, and recruitment timelines to connect students with summer 2026 opportunities.
Becken Dickenson Information Session	10/22/25	35	BD representatives introduce the company's product lines, career paths, and recruiting process to students interested in medical device and diagnostics careers.
Master of Translational Medicine Degree for UCSF/UCB Info Session	10/27/25	16	Admissions staff present the joint MTM program, outlining the curriculum, career outcomes, and how to apply.
Orthofix Information Session	10/29/25	32	Orthofix shares an overview of their orthopedic/spine product portfolio and the career trajectories of the

			representatives.
Graduate Student Series Workshop: How to Strategically Apply to Graduate School	10/29/25	12	Students learn how to identify and prioritize programs, tailor applications to specific labs or faculty, and build a strategic school list.
Wild Genomics Information Session	11/5/25	27	Wild Genomics introduces their genomics-focused work and career or internship opportunities for students interested in computational biology and genomics.
Johnson & Johnson Company Tour	11/10/25	13	Students visit J&J facilities to gain firsthand exposure to operations, research environments, and company culture while networking with employees.
Johnson & Johnson Information Session	12/3/25	46	A representative from Johnson & Johnson presents their medical device and pharmaceutical divisions and their career trajectory.
Graduate Student Series Workshop: Interview Practice and Tips	12/3/25	4	A hands-on workshop where students practice common interview formats, receive feedback, and develop strategies for technical and behavioral interview questions.
Bioengineering Career Fair	2/25/26	187	Students meet recruiters from leading 26 bioengineering, medtech, and life sciences companies to network and explore potential opportunities.
Virtual session with Carle Illinois College of Medicine	4/28/26	TBD	A virtual info session introducing the Carle Illinois engineering-focused medical school, its unique curriculum, and admissions guidance for interested students.

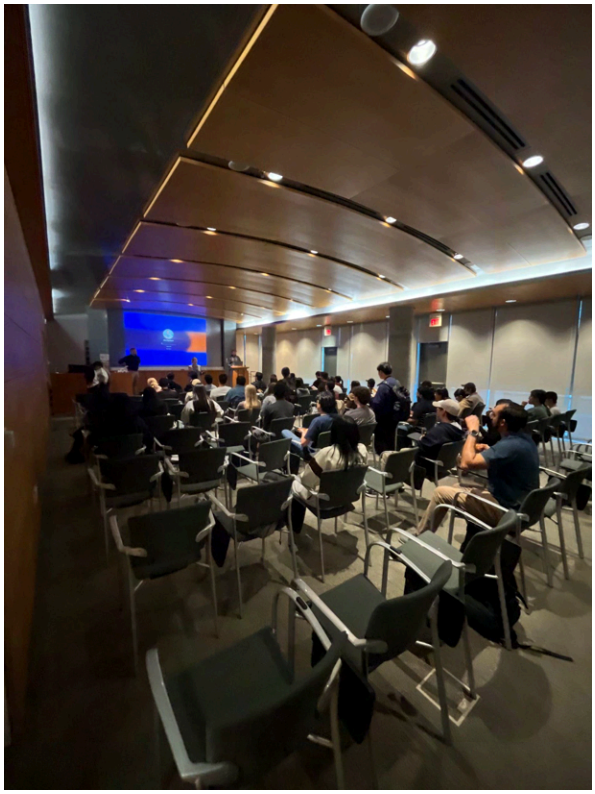


Figure 12.4. Image from Exact Sciences Internship Information Session

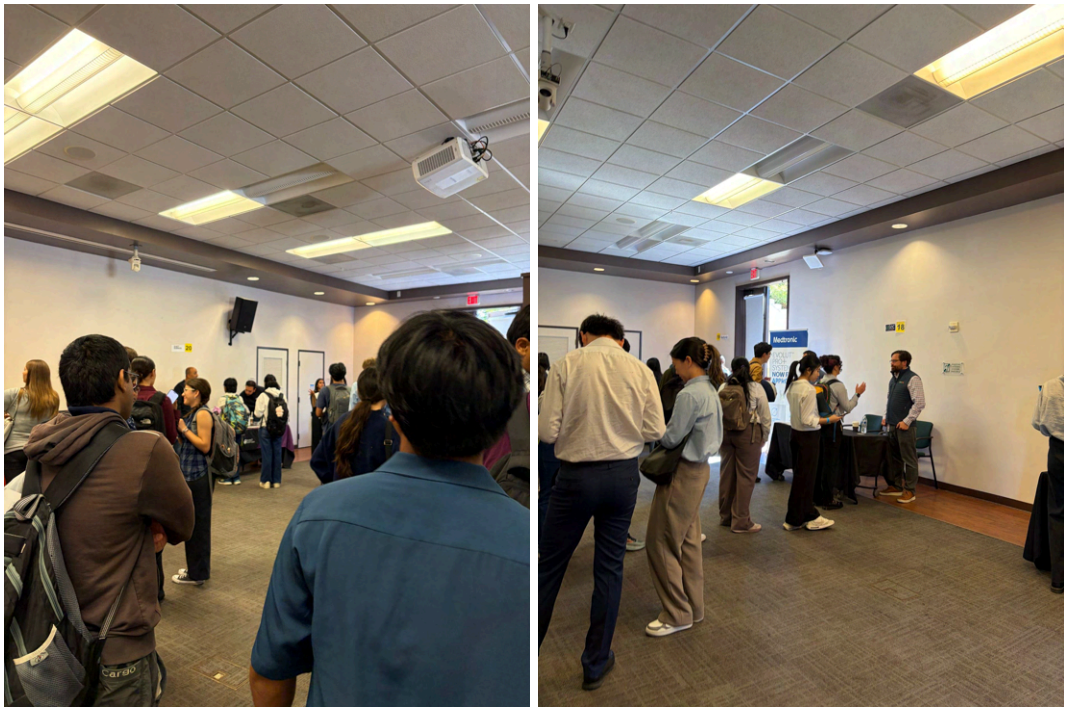


Figure 12.5. Images of students at the annual Bioengineering career fair

XIII. Societal Impact Activities

The Biomedical Engineering Society (BMES) student chapter at UCSD worked on a Bidirectional Arm Interface Project during the 2025-26 academic school year, a multidisciplinary initiative aimed at designing and prototyping a biomimetic robotic system that integrates a haptic glove with a robotic arm for teleoperation and sensory feedback. This project reflects the chapter's commitment to advancing hands-on biomedical engineering education through practice while contributing to emerging applications in medical robotics, such as rehabilitation, prosthetics, and telesurgery.

The primary objective of this project is to develop a functional, scalable prototype that facilitates real-time interaction between a user and a robotic system through bidirectional communication. The system utilizes flex sensors embedded in a wearable haptic glove to capture finger motion, while vibrotactile motors and thermal elements provide sensory feedback to the user. The robotic arm mirrors these inputs through servo motors and cable-driven actuation, enabling coordinated finger and wrist movement. This integrated design emphasizes accessibility, modularity, and ease of implementation, making it well-suited for an academic environment while maintaining relevance to real-world biomedical applications.

To achieve these goals, the project team was organized into specialized subteams focusing on mechanical design for each of the glove and arm and a comprehensive software/electrical integration team. Structured weekly meetings and collaborative workshops supported iterative design, rapid prototyping, and testing. The mechanical teams leveraged CAD modeling and 3D printing to fabricate components, while the software/electrical team focused on sensor integration, control systems, and system communication. This interdisciplinary workflow allowed for efficient prototype development and successful integration of arm and glove components cohesively.

Key accomplishments of the project include the development of an enhanced haptic glove with improved motion tracking and thermal feedback, as well as a robotic arm featuring increased degrees of freedom in the fingers and wrist. The team successfully demonstrated a working prototype capable of basic bidirectional interaction, validating the feasibility of the system design and establishing a strong foundation for future improvements.

Looking ahead, the project identifies several opportunities for advancement, including the integration of wireless communication (e.g., Bluetooth) to enable long-range teleoperation, implementation of force feedback for improved realistic performance, and refinement of hardware for greater compactness and independence. These enhancements aim to expand the system's applicability to more advanced biomedical and clinical use cases.

Overall, this project exemplifies the BMES student chapter's dedication to innovation, collaboration, and experiential learning. By engaging students in complex, real-world

engineering challenges similar to those encountered in academia and industry, the chapter continues to foster technical growth and prepare members for impactful careers in biomedical engineering.

XIII.I Project Scope

This project aims to develop a working prototype for the proposed system using fully wired connections and one microcontroller. This haptic glove will utilize flex sensors and vibrotactile motors to track finger flexion and deliver feedback to the end user, respectively. Additionally, the robotic arm will use servo motors and tensioned cables to drive finger and wrist actuation. These modalities were chosen for ease of programming and scalability, prioritizing the student team's overall learning. Future improvements could involve integrating bluetooth drivers for long-range teleoperation and force feedback for improved haptic experience.

XIII.II Deliverables, and Goals

- Develop a bidirectional robotic arm interface that enables real-time teleoperation through a wearable haptic glove.
- Design and fabricate a robotic hand and wrist system with multiple degrees of freedom, including a 2 DOF wrist and fully articulating fingers, with a thumb capable of both flexion and rotational (inward/outward) motion.
- Integrate flex sensors within the haptic glove to accurately track finger and hand movements.
- Implement vibrotactile and thermal feedback systems to provide the user with real-time sensory feedback.
- Develop a microcontroller-based control system to coordinate signal processing, actuation, and communication between the glove and robotic arm.
- Prototype and test mechanical components using CAD modeling and 3D printing to ensure functionality and iterative improvement.
- Demonstrate successful bidirectional interaction between the user and robotic system through coordinated motion and feedback.
- Prepare and present a functional prototype at Biomedical Engineering (BE) Day, effectively communicating design, performance, and potential applications to a broad audience.

XIII.III Research & Planning

To ensure the accuracy and feasibility of the project, a literature review was conducted to study physiological markers, parameters, robotics design, signal processing, and previous projects related to prosthetics and vibrotactile feedback. Additionally, research was performed to identify suitable components, including motors, joints, sensors, and materials that will be used in the final design.

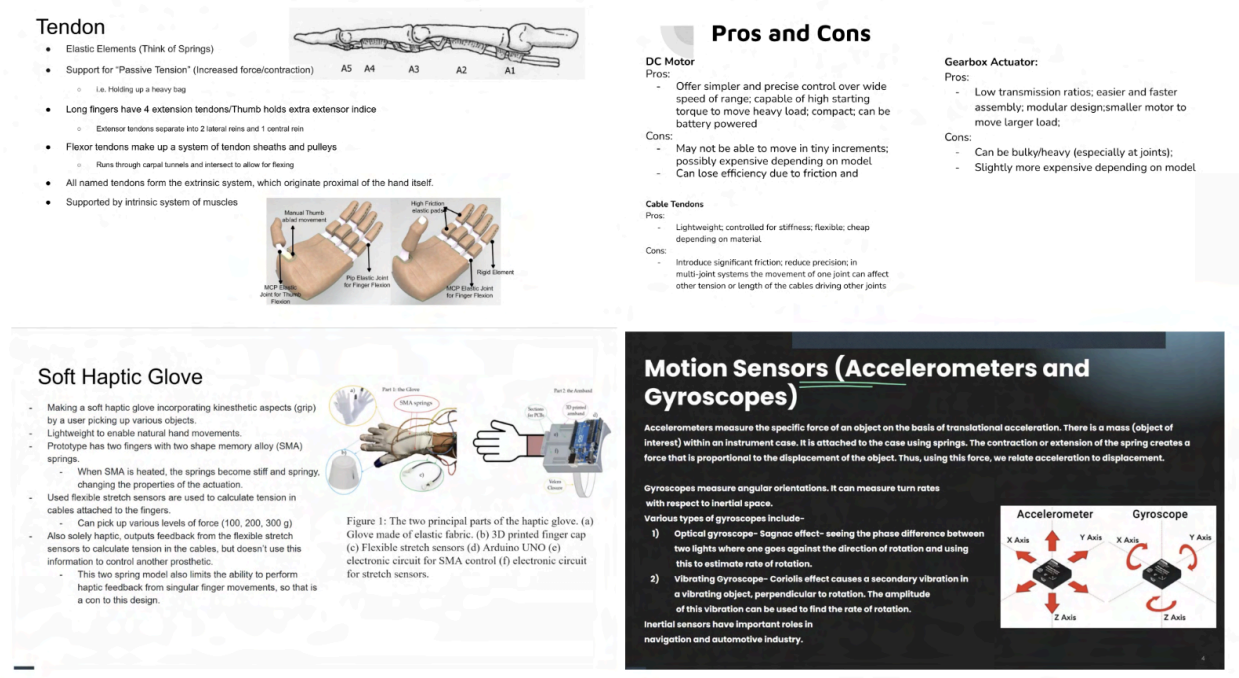


Fig 13.1. Example slides from topic-specific literature reviews for (A-B) the robotic arm and (C-D) the haptic glove.

Full Literature Review documents:

Actuation Methods
https://docs.google.com/presentation/d/1BnYAqGv3v_fxGHX1_jOHvXxm2biXSkChps6gXCWQPiI/edit?usp=sharing

PT Arm DOF
https://docs.google.com/presentation/d/10pZwM1bGRibZwHi9X618cnfIrJroTNypY2Us8uuH6is/edit?usp=sharing

BMES Lit Review
https://docs.google.com/presentation/d/19Xx3kuPgyVuCodtr48NbpoqBARwIZYLAEPeO9vYKaDc/edit?usp=sharing

Hand-atomy
https://docs.google.com/presentation/d/1HbWk8pxaVN89McmkSvVfGDN2W0K7RIV53nB-sNhrjSU/edit?usp=sharing

Signal Processing
https://docs.google.com/presentation/d/1ySeFc6_BtX7nA46QkLLIlDa0UJThdJy0z45hIIxJDc4/edit?usp=sharing

Software/Design of Haptic Devices Literature Search Presentation
https://docs.google.com/presentation/d/1j_qbX2a_jkz2eHf3351rHV9iWmfKCtNWbbGQJ7_IDc8/edit?usp=sharing

Haptic Feedback Mechanism
https://docs.google.com/presentation/d/1xa1EgqtGB3T7cJ3mtwNdI-0XUdaly0ROtUYsp08goa4/edit?usp=sharing

BMES PT: Lit review
https://docs.google.com/presentation/d/11XKrPHXJTdHBnqAvXW7XWpBK1ZJne862Qf5RyrVTGmU/edit?usp=sharing

XIII.IV Design Process

The system broadly aimed to interface a biomimetic robotic arm with a haptic glove, allowing for teleoperation with real-time feedback to improve haptic sensitivity. This draws partial inspiration from a previous project, though the developed solution largely differs from its predecessor. To organize the student team, the co-chairs agreed that separate subteams should be designated for the mechanical design of the robotic arm and haptic glove, though the software and electrical interfacing was combined across the full system for ease of integration (henceforth referred to as “software/electrical”).

The Project Team co-chairs facilitate design discussions, ensuring the team stays on track and progresses effectively. After interviewing and selecting subleads, they were given creative liberty to explore different solutions with their respective subteams. Subleads would then work with general team members to assign responsibilities and help integrate individual subcomponents.

This iteration prioritized the improvement of the haptic glove, with flex sensors for improved position tracking and a heating pad to introduce thermal feedback. Additionally, the robotic arm added passive planar abduction/adduction at the fingers, radial abduction/adduction at the thumb, and a new 2 DOF wrist system.

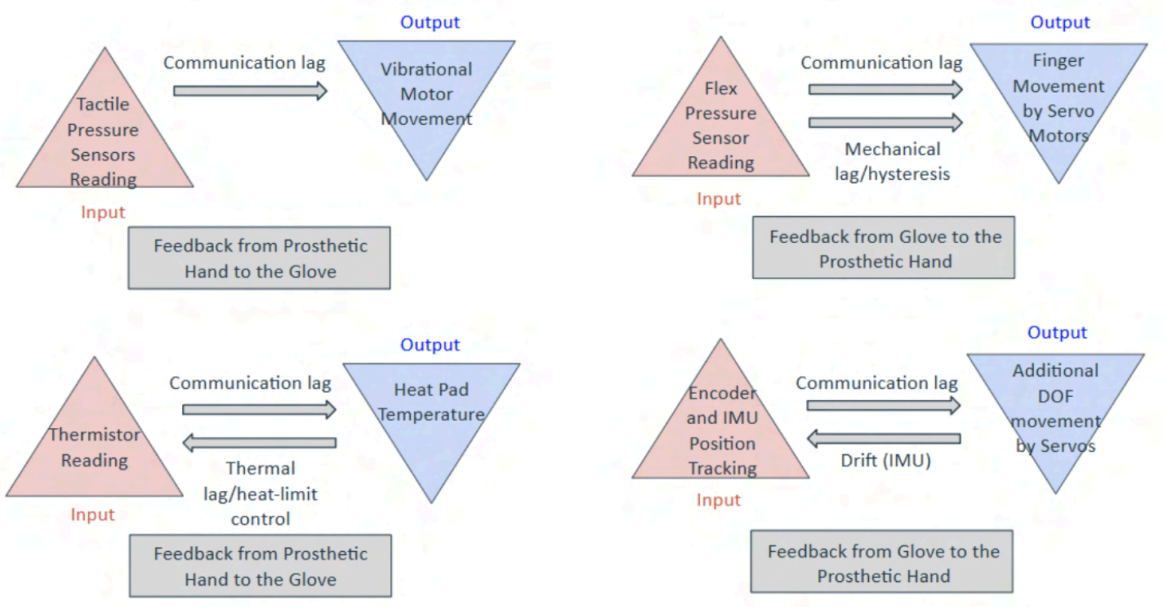


Fig 13.2. Proposed control diagram for the Bidirectional Arm Interface Project

To optimize the workflow, the Monday committee meetings served as an open work session for the software/electrical team, while the mechanical subteams would have CAD workshops and design brainstorming sessions to fabricate in the Design and Innovation Building.

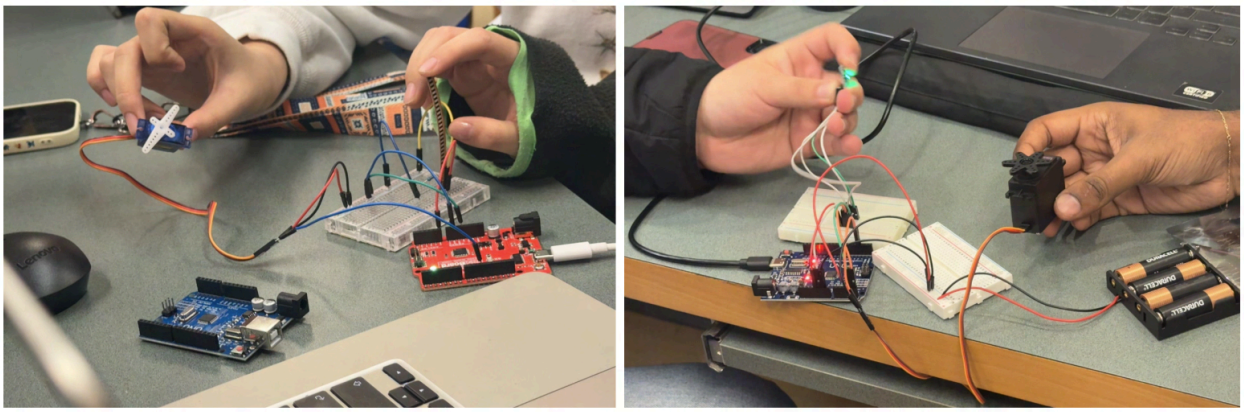


Fig 13.3. Software testing from Monday committee meeting work time

Conversely, the Saturday workdays allowed the software/electrical subteam to have hands-on workshops and continue their work from Monday. Meanwhile, the access to 3D printers and low-cost commercial parts (e.g., bolts, nuts, bearings) allowed the mechanical subteams to test their CAD designs from the previous Monday and interface their physical prototypes with any related sensors or actuators.

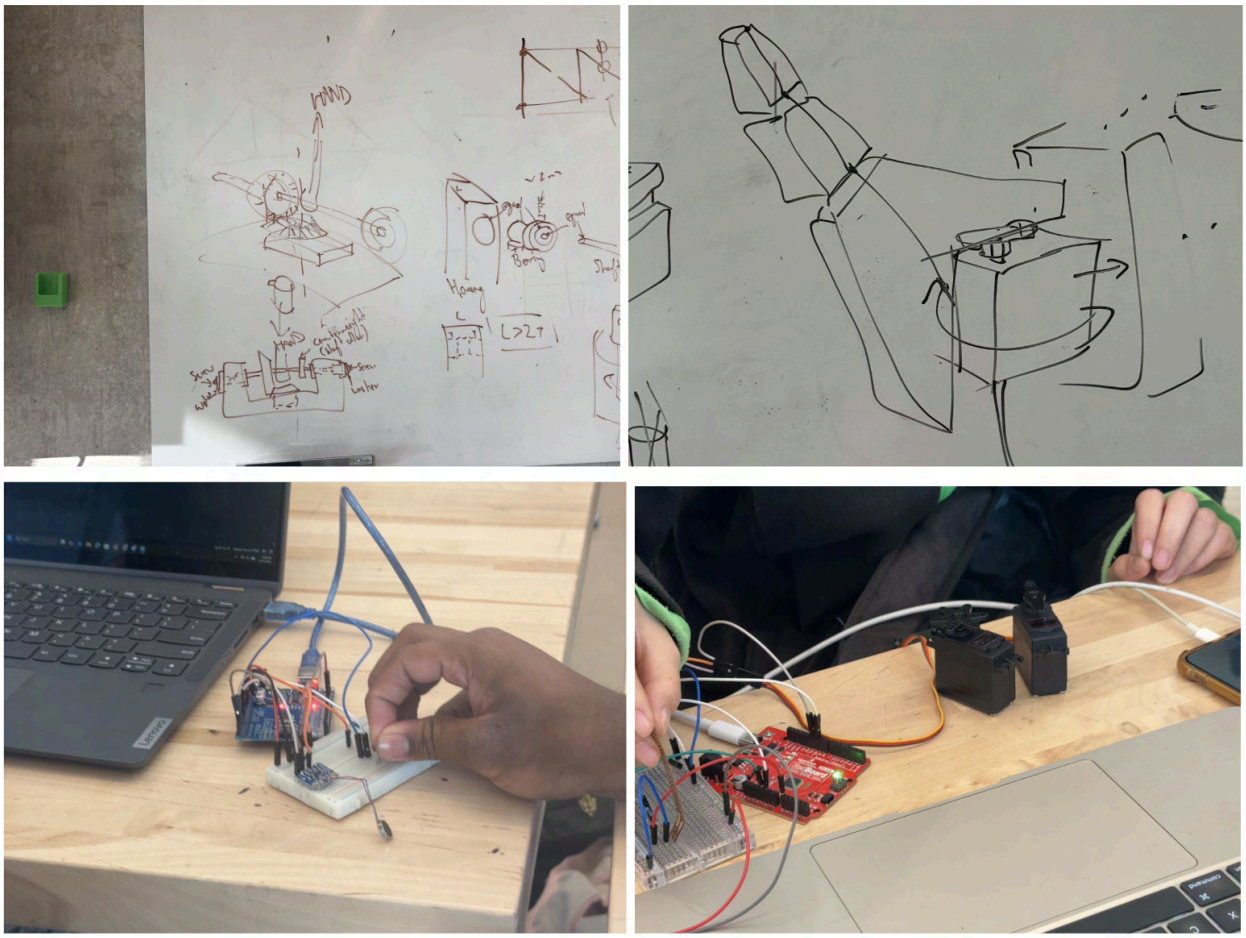


Fig 13.4. (A-B) Design brainstorming sketches and (C-D) software tests during Saturday meetings in Design and Innovation Building

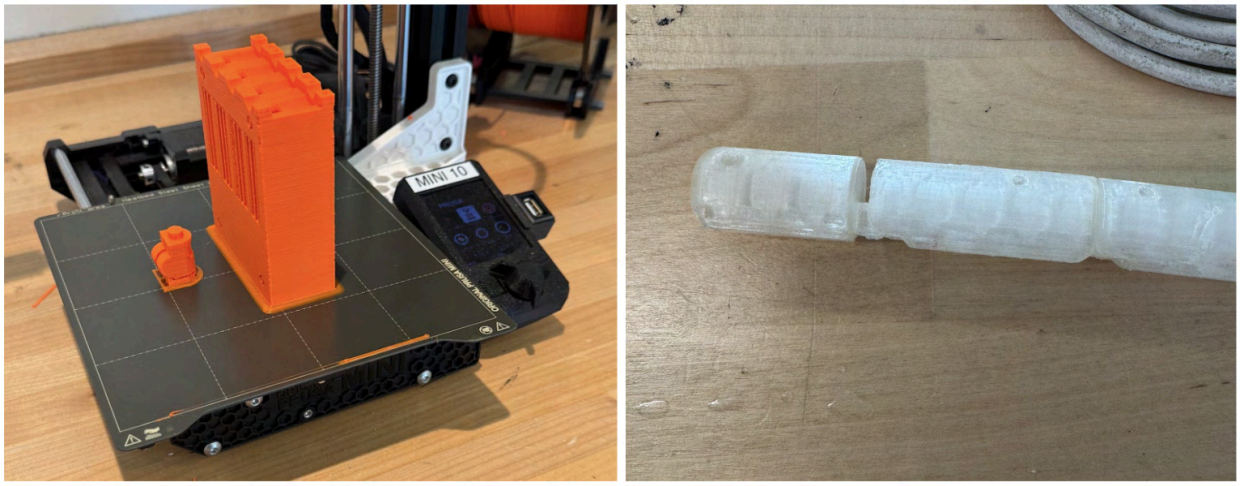


Fig 13.5. 3D printed prototypes of (A) palm and passively-actuating knuckle and (B) arc joint finger

XIII.V Future Direction

Project Team is successful in theorizing and prototyping an ambitious, complex robotic system. Despite the project's successes in creating a simple working bidirectional arm interface, there are many more mechanisms that can be explored in the future to dive deeper into the practical applications of medical robotics.

One future improvement that would bring the current project closer to simulating practical applications would be bluetooth integration. The current system responsible for connecting the robotic arm and haptic glove driven by user-input is limited to wired connections with short range. As a result, the robotic arm can only be controlled a short distance away from a user. Bluetooth integration would increase teleoperation distance, allowing the user to interact with objects from a distance naturally impossible. This improvement would bring the project closer to mimicking essential applications of long range robotics, such as telesurgery and other forms of remote care.

Upgrading the current vibrotactile feedback system to a tactile force feedback system would also be of interest. A force feedback system would improve force directionality, providing more detailed sensory information that a haptic feedback system misses. Haptic feedback systems output presence and magnitude to the user, but fail to simulate realistic physical interactions with objects. Upgrading to a force feedback system would dramatically improve user-object interaction. Limitation to this feedback system is financial considering force feedback systems are costly.

Additionally, to better simulate realistic physical interactions, it would be beneficial to expand thermal feedback and sensing to the fingertips. Fingertips are more sensitive to temperature changes compared to the palm, and are primary points of interaction with objects. Thermal feedback at the fingertips would output important sensory information to a smarter location, allowing the user to make faster decisions with objects.

Lastly, a future change that could enhance performance of the bidirectional arm interface is the integration of more compact motors in comparison to current motors being used. The current robotic arm mechanism runs on bulky servos that successfully actuate/rotate each finger, however smaller motors can be implemented to achieve the same tasks while scaling down the size of the mechanical system. Benefits of this change can encourage better portability and modularity for the robotic arm as a whole.

XIV. National BMES Meeting

The UC San Diego Biomedical Engineering Society (BMES) Chapter had the invaluable opportunity to attend the 2025 BMES National Conference in San Diego thanks to the generous support of the Shu Chien-Gene Lay Department of Bioengineering. This experience was transformative for all attendees, providing a unique platform for professional growth, academic exploration, and meaningful networking.

Students engaged with cutting-edge research through oral and poster presentations, both as participants and observers, gaining insight into topics such as immunology, biomaterials, and translational medicine. One member of the BMES Chapter at UCSD, Donovan Moore, had the opportunity to present his work at the undergraduate poster session.

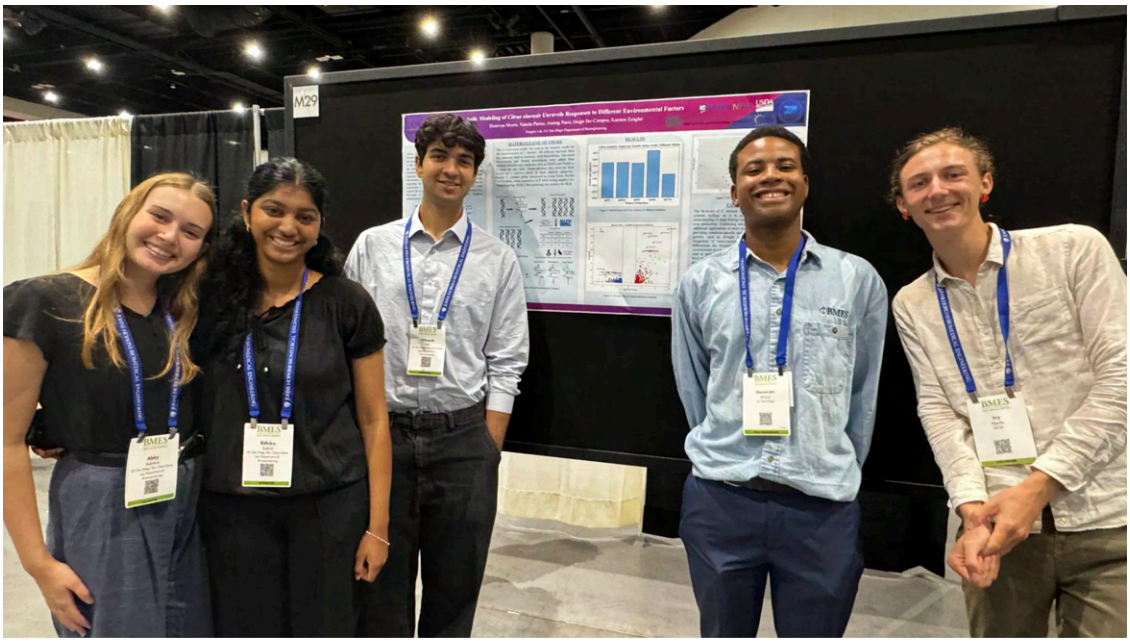


Figure 14.1. Donovan Moore (second from right) presenting his research at the BMES National Meeting!

Additionally, attendees connected with faculty from a variety of institutions to learn about graduate school programs, as well as with researchers, postdoctoral scholars, and BMES chapters from across the nation. These conversations offered valuable guidance on graduate school applications, career paths, and emerging trends in bioengineering.

Beyond the academic and professional benefits, the conference fostered a sense of community and inspiration. Students returned to UC San Diego with renewed motivation to pursue their research, seek internships, and contribute to the bioengineering field. The experience also strengthened inter-chapter relationships and deepened student pride in representing the UCSD Bioengineering Department on a national stage.

We are excited to attend the 2026 BMES National Meeting in Orlando, Florida next academic year. Many of our members are looking forward to learning more about graduate school opportunities and networking with professionals within the diverse field of biomedical engineering.

Figure 14.2. Photo of BMES Officers with Staff from the Shu Chien-Gene Lay Department of Bioengineering at the national BMES Meeting 2025.

XV. Future Direction

Over the course of the academic year, BMES at UC San Diego saw significant improvements in student engagement and widely expanded opportunities for technical, professional, and social development. Looking forward, our Chapter hopes to preserve this momentum and grow the community of students interested in biomedical engineering on campus. Some more information on new initiatives pursued this year and notable improvements for the future can be found in the section below.

XV.I Ongoing & Future Initiatives

Organizing Datahacks 2026:
A new initiative the Chapter tackled this year is being involved in planning Datahacks 2026, a large on-campus hackathon with an expected attendance of over 500 students from schools across the nation. BMES at UC San Diego has partnered the Data Science Students Society (DS3) and other student organizations on campus to plan the logistics of the Hardware/IoT track of this event, which tasks participants to prototype a solution addressing a mystery prompt in 36 hours. We hope to expand this opportunity in following years by including a track focused on Biotechnology design and partnering with the UC San Diego Jacobs School of Engineering to reach more students.

Continue Expanding Collaborations with other Student Organizations at UC San Diego:
This year, the Chapter expanded greatly by collaborating with other student organizations on campus for the first time. These initiatives have been extremely rewarding and have provided fruitful opportunities for technical and professional development. In addition to organizing Datahacks 2026, the BMES at UC San Diego chapter is collaborating with Triton Droids, an on-campus robotics club, to support their annual Robothon event. In previous years, many participants in this 10 week-long design challenge were bioengineering majors – this collaboration allowed students from the BMES Chapter to become involved with mentoring competing teams. In addition, BMES at UC San Diego is set to host a guest lecture from Dr. David Berry, an Assistant Professor in Residence in the Department of Orthopedic Surgery, in collaboration with the Sports Care, Ortho, & Pre-Health Exploration (SCOPE) organization on campus. We hope this opportunity will provide interested students with valuable insight into the clinical applications of bioengineering. Lastly, the Chapter showcased the Outreach Committee's circulatory model at the student-organized Science Olympiad invitational for high schoolers. All these collaborations have been extremely rewarding, and have fostered social connections between students across related disciplines. As such, we hope to continue this trend in the future.

Implementing Bioworks hands-on workshops:
One of the primary goals of the Bioworks committee was to host hands-on workshops that introduced undergraduate students to key skills like cell culture, bacterial transformation, and gel electrophoresis in a lab-based environment. The workshops would be held in the recently constructed Bioengineering Instructional Lab space in the Shu Chien-Gene Lay Department of Bioengineering. Due to logistical challenges, this goal could not be realized this year – however, we hope to realize this vision next year. Currently, the Executive Board is discussing future strategies with the Department of Bioengineering.

Continue Expanding Attendance and Improving General Body Meeting Experience:
This academic year saw a large leap in student engagement when compared to last year, with a roughly 30% increase in paid members alone. The larger number of students provided novel logistical and structural challenges this year, while making it more difficult for members across committees to connect with each other. This challenge was resolved by incorporating an additional General Body Meeting each quarter solely focused on fostering social interaction. For instance, Fall GBM #3: BMES Holiday Party and Winter GBM #3: BMES Game Night allowed members to bond. Due to their success, we hope to continue these initiatives in future years while integrating more opportunities for social connection in traditional GBMs

Figure 15.1. Outreach Committee's cardiovascular model being showcased at UCSD's Science Olympiad Tournament

Organize Inter-Chapter Activities with Other BMES Chapters:
In previous years, social events have occurred between BMES Chapters located in the Southern California area. While the Chapter did not participate in any inter-chapter activities this academic year, the connections made at the BMES National Meeting in 2025 inspired our interest in organizing and participating in inter-chapter events in the future.