

Empowering the Future of Marine Energy: A Journey of Engagement and Collaboration

As a team of engineering and business students from the University of California, Riverside (UCR), we embarked on a transformative journey in the Marine Energy Collegiate Competition (MECC). Our mission was not only to develop a marine energy harvesting device but also to engage with the marine energy industry and the local community.



Photo 1: Team Photograph at symposium: Mechanical and Electrical engineering students (left) and business team (third from the right onward)

After Action Report

Since the mid-year deliverable, we executed a series of impactful actions to address the challenges identified. Specifically we wanted to tackle the challenge of opportunities for marine energy to be paired with other generation or storage technologies, guiding much of our professional interview goals and research. These actions included participation in symposiums, community events like Highlander Day, continued professional interviews with industry leaders, and collaboration with Engineers Without Borders (EWB) at UCR.

Throughout our journey, we encountered various challenges, including logistical constraints and resource limitations. However, through effective planning and collaboration, we successfully mitigated these challenges and remained focused on our outreach goals. As a large team comprising approximately 17 members, ensuring seamless information sharing and alignment proved to be a daunting task. Decision-making processes often necessitated extensive consensus-building, leading to delays in progress and implementation. Moreover, pursuing ambitious objectives such as wave tank testing posed logistical and financial challenges, requiring careful navigation and strategic resource allocation. Additionally, adhering to timelines and deadlines amidst competing priorities and external pressures presented inherent difficulties, occasionally impeding team progress. Despite these obstacles, our collective resilience and unwavering commitment enabled us to overcome challenges, demonstrating our capacity to adapt and thrive in dynamic environments.

Our actions had a profound impact on the marine energy community, fostering dialogue, raising awareness, and inspiring interest among students and professionals alike. Reflecting on the Community Connections Challenge as a whole, we are proud of our accomplishments and the lasting connections we've forged.

Metrics Report

Industry Interviews Outcomes:

Throughout our journey, we conducted a total of seven interviews spanning diverse sectors of the marine energy industry, including: developers, regulators, researchers, educators, consultants, and business leaders. Many team members actively participated in these interviews, ensuring comprehensive coverage and knowledge sharing within our team. Additionally, insights gathered from these interviews were disseminated to team members who could not attend, fostering collaboration and collective understanding. Contact information for each interviewee is provided in the Appendix for reference and future engagement.

Our expedition through the MECC's Community Connections Challenge has been a vibrant odyssey, enriched by the invaluable insights gleaned from our interactions with industry trailblazers. Our dialogue with Daniel So from CODAR Ocean Sensors delved into the intricacies of testing protocols and design hurdles specific to wave data capture. His expertise illuminated the delicate balance between weather dynamics and sensor robustness, guiding us towards a nuanced comprehension of electronic component management in marine settings.

Robert Cavagnaro's discourse provided vital perspectives on power transmission hurdles and material selection dilemmas, notably the cost considerations surrounding titanium utilization in power cables. His insights underscored the challenges of maintaining system integrity in harsh

marine environments, prompting our team to explore innovative cost-effective solutions for enhancing operational reliability.

Conversations with Trent Dillon from the Integrated Decision Support (IDS) Group introduced a holistic approach to addressing equity concerns and energy justice issues in marine energy ventures. His emphasis on community engagement and cost-effectiveness underscored the importance of considering societal implications and resource allocation strategies for achieving sustainable outcomes.

Ryan Coe's insights into wave energy converter (WEC) design processes shed light on the critical importance of clarity in problem definition and reliability considerations in operational lifetime cycles. His expertise in modeling and fatigue limits offered invaluable guidance for refining our prototype design and performance expectations.

Bryson Robertson's experience in team management and open-source WEC initiatives provided invaluable insights into effective communication and collaboration frameworks within project teams. His emphasis on incremental progress and resource optimization reinforced our commitment to fostering a culture of innovation and knowledge-sharing within the marine energy community.

Additionally, discussions with Jack Pan and Rolle Hogan further expanded our understanding of market opportunities and challenges in the ocean observation and wave energy sectors. Their insights into powering ocean sensors and market dynamics enhanced our strategic approach to technology development and commercialization.

As we distill these multifaceted perspectives into actionable strategies, we are poised to make significant contributions to the marine energy landscape. Our expedition, characterized by profound engagement and interdisciplinary collaboration, lays the groundwork for future innovation and sustainability in marine energy research at UCR.



Photo 2: Professional interviewees (photos and company/organization logos). **Daniel So** (CODAR), **Robert Cavagnaro** (Pacific Northwest National Laboratory), **Trent Dillon** (NREL), **Ryan Coe** (Sandia National Laboratories), **Bryson Robertson** (Oregon State University), **Jack Pan** (Ocean Motion Technologies), **Rolle Hogan** (Dolphin Labs Ocean). Read from left to right and top to bottom.

Action Outcomes:

Our engagement efforts were diverse and impactful, encompassing a range of activities and events. From dynamic symposium presentations to engaging tabling events, insightful professional interviews, and fruitful collaborations with another UCR club, Engineers Without Borders (EWB), our outreach spanned various avenues. At symposium events, where we showcased our work and our WEC prototype to over 100 attendees, our entire team participated, demonstrating our collective dedication and expertise. Highlander Day, an open house for incoming UCR students and their families, saw the enthusiastic participation of around 10,000 individuals, including students, faculty, and community members, reflecting the broad reach of our endeavors. These events attracted attendees from both local and regional communities,

underscoring the widespread interest and support for our initiatives. While our presence was robust at symposiums, our team made a significant impact at Highlander Day, engaging in meaningful conversations and forging valuable connections.



Photo 3: Mechanical Engineering Research Symposium



Photo 4: Symposium community outreach photos, Jansen Lindrose (MEH-1) explaining research



Photo 5: Symposium community outreach photos, Isaac Echeverria(MEH-2) explaining research



Photo 6: MEIS tabling at Highlander Day Community Engagement



Photo 7: MEIS tabling at Highlander Day Community Engagement, Victor Cuchilla standing awkwardly next to a wonderful family



Photo 8: MEIS tabling at Highlander Day Community Engagement. (Photo with UCR faculty)



Photo 9: MEIS/EWB logos, representing future collaboration in ocean renewable research at UCR

Outreach Strategy Outcomes:

Our outreach efforts resonated with a wide audience, engaging approximately 200 individuals through dynamic symposium presentations, lively tabling events, and insightful professional interviews. Reflecting on our strategy, we found that interactive demonstrations and meaningful conversations were particularly effective in capturing the interest and involvement of our audience. These engaging approaches not only drew attention to our project but also sparked intriguing discussions and fostered valuable connections within the marine energy community.

Our outreach endeavors transcended mere engagement metrics, catalyzing a profound ripple effect within our local community and the continuously growing marine energy sector. At symposium presentations and tabling events, we witnessed firsthand the strong enthusiasm and curiosity sparked among attendees, ranging from eager prospective students to inquisitive parents. These interactions transcended disciplinary boundaries, drawing interest from students studying a myriad of fields, from engineering to sustainability, business, and environmental studies. The resonance of our message extended beyond academic spheres, resonating with individuals keen on understanding the broader implications of energy justice within the industry.

The conversations we shared with prospective students were not just exchanges of information but dynamic dialogues that kindled a sense of belonging and purpose within our nascent club, MEIS. It was heartening to witness the excitement with which students embraced the idea of contributing to a community dedicated to marine energy, irrespective of their academic backgrounds. Moreover, our dialogues with UCR faculty members from diverse disciplines served as a catalyst for broader institutional support and collaboration. By sharing insights into

the challenges and opportunities inherent in marine energy research, we galvanized support from faculty members who were previously unaware of our project's scope and impact.

These interactions underscored the transformative potential of our outreach efforts, transcending numerical metrics to foster meaningful connections and inspire collective action. As we reflect on the outcomes of our outreach, we are by the realization that our endeavors have not only sparked interest but sowed the seeds for a vibrant, inclusive community committed to driving innovation and sustainability in marine energy research at UCR and beyond.

Social Media Strategy Outcomes:

Despite our modest start with just 2 posts and 7 followers on the Marine Energy Innovators Society (MEIS) Instagram account, our platform engagement has seen promising growth in a short period of time. With 8 unique visitors scanning the MEIS student discord QR code in the first 3 days, our social media presence serves as a window into our project's engagement. Through strategic sharing of our journey, we successfully connected with our audience, sparking interest and interaction along the way.

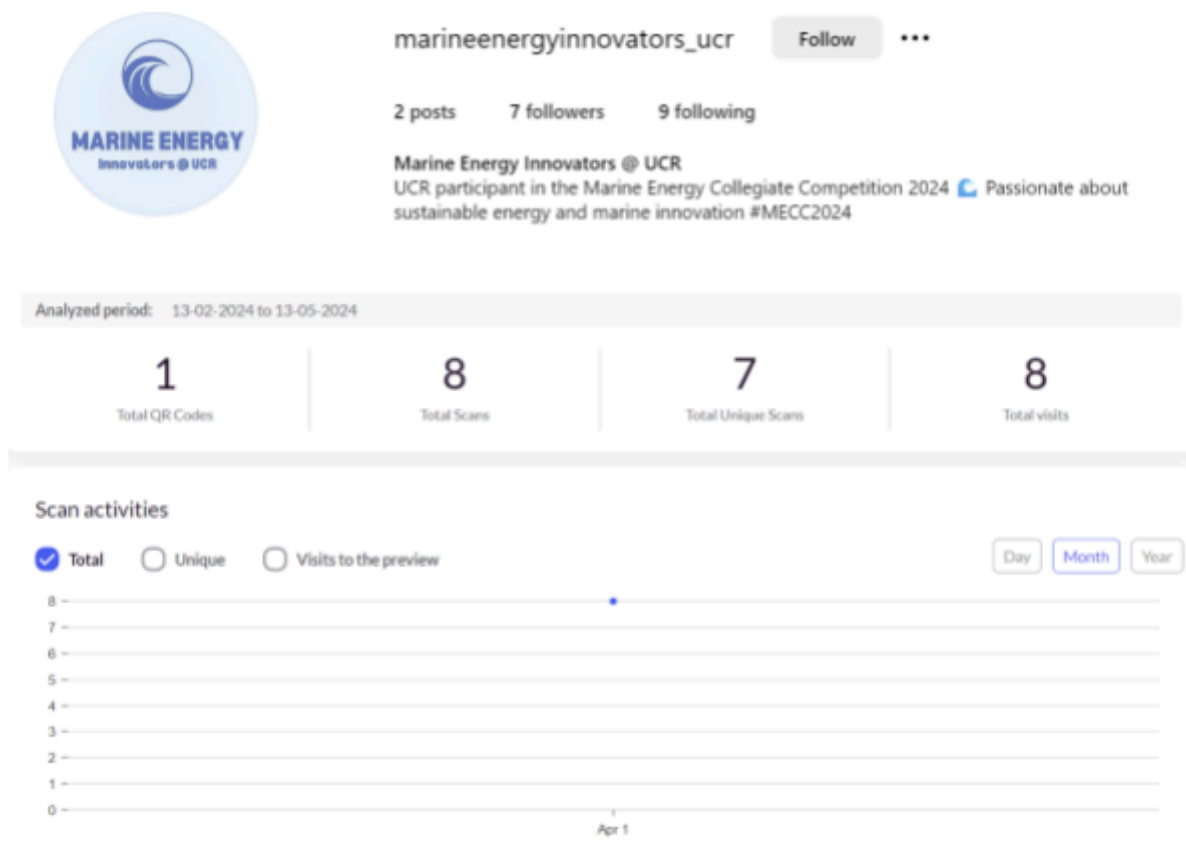


Photo 10: MEIS Instagram account and QR code scan metrics screenshot

Timeline of Events:

In the initial months of January and February, our team delved deep into the industry's insights through professional interviews with key leaders. March marked an exciting period as we showcased our progress at the UCR Mechanical Engineering Senior Design Poster Exhibition and the Electrical Engineering Symposium. As spring unfolded, April and May saw us actively engaging at Highlander Day, fostering collaboration with Engineers Without Borders, and extending our network with further professional interviews, this time focusing on additional business leaders. This timeline encapsulates our journey, from gathering knowledge to sharing our advancements and forging meaningful connections along the way.

Conclusion:

Our participation in the MECC's Community Connections Challenge has been far more than just a series of events, evolving into a profound journey of discovery and collaboration. Despite modest metrics, the depth of our engagement, the quality of our interactions, and the multidisciplinary effort speak volumes. This transformative experience has shaped our understanding of marine energy and fostered collaboration with industry professionals, the local community, and another UCR engineering club with a similar mission statement. As we pass the torch to future students, we anticipate the ongoing growth and innovation in marine energy research at UCR with excitement.

APPENDIX

Industry Professional Information

Full Name	Company Affiliation	Email Address	Origin of Relationship	Sector in Marine Energy Industry
Daniel So	CODAR Ocean Sensors	danielso89@gmail.com	UCR Alumni	Testing Engineer
Robert Cavagnaro	Pacific Northwest National Laboratory	robert.cavagnaro@pnnl.gov	Professional	Mechanical Engineering
Trent Dillon	NREL	Trent.Dillon@nrel.gov	Professional	Wave-Powered Desalination
Ryan Coe	Sandia National Laboratories	rcoe@sandia.gov	Professional	Fluid Dynamics Modeling
Bryson Robertson	Oregon State University	bryson.robertson@oregonstate.edu	Professional	Marine Energy Research

Jack Pan	Ocean Motion Technologies, Inc.	jack@oceanmotion.tech	Professional	Ocean Observation
Rolle Hogan	Dolphin Labs Ocean	rolle@dolphinlabs.tech	Professional	Wave Energy Generation