TITANS OF TRANSFORMATION

BIG IDEAS

Human-Centered Design Initiative

Big Ideas to Transform Tomorrow

The Titans of Transformation: Big Ideas initiative is focused right here in our region, tackling adaptive challenges that affect the health, stability, and quality of life of people in our communities.

The College of Engineering & Computer Science recently embarked on this bold and disruptive initiative, which features Big Ideas – built from the ground up – that inspire collaborations, investments, and positive impacts that position the college at the nexus between challenges and opportunities.

Purpose-driven, community-connected, investment-worthy research defines our inaugural Big Ideas. These projects, led by faculty champions committed to a deeper engagement with our communities and enhanced opportunities for our students, seek to address fundamental societal challenges through transformative collaboration and innovation.

Through private support, Big Ideas will take ideas from good to exceptional, drive innovation, and spark next-level collaborations that will generate new knowledge, powerful solutions, and positive change.

Susan Barua
Dean of the College of Engineering & Computer Science

"At its purest state, Big Ideas is about creating a better future... tackling deep-seated problems, responding to our communities, establishing access to innovative curriculum, and preparing the next generation of culturally competent engineers and computer scientists."

Big Idea: Human-Centered Design Initiative

Engineers are problem solvers by definition; however, the societal context and nuances of their solutions often lack meaningful user input and are therefore at risk of not reaching their full potential.

That's why Jin Woo Lee, assistant professor of mechanical engineering at Cal State Fullerton's College of Engineering & Computer Science, is passionate about human-centered design – and why he wants to engage students and the community to develop and deliver needs-based solutions.

"Several studies and my experiences show engineers may not always be equipped to understand social challenges and deliver contextually relevant solutions," Lee says. "Incorporating this social aspect of design ensures a product will really respond to user requirements and needs and increase its chances for success."

A TRANSFORMATIONAL OPPORTUNITY

Orange County is home to a tapestry of nonprofits, all playing important roles in serving our most vulnerable populations. Lee's human-centered design initiative team has the opportunity to partner with local companies and philanthropists to build capacity for direct-service organizations by connecting their needs to talented student groups at Cal State Fullerton who will deliver human-centered design solutions.

This effort also has the potential to impact how city governments connect with their citizens. New programs and modifications are often developed by design experts who may not ever speak with the people who will be affected by those programs or changes. Without these conversations, it is difficult to understand and solve the problems city residents face.

"The emphasis is really on working with local nonprofits, governments, and community members to identify their needs. That means listening to them and trying to walk in their shoes," he says. "That will ensure that whatever we deliver is relevant to their lives and not based on assumptions."
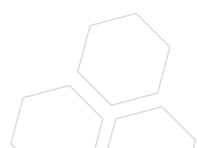
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>
> **Jin Woo Lee**

At Cal State Fullerton, diverse expertise is an advantage, Lee says.

"By coming together, we can bring unique knowledge, tools, and ideas to the table to work toward community needs while training students to think and approach problems with social awareness and an interdisciplinary lens."

The human-centered design process begins with community engagement and continues with regular meetings to ensure designs and prototypes align with the community's needs.

"There are lots of great examples of human-centered design, but one that comes to mind was a project in Africa dealing with clean water access," Lee says. "When engineers were in the field making observations, they spoke to people carrying water from the well to their homes. They often carried the water in heavy containers balanced on their heads, putting them at risk of potential neck and back injuries. So, the engineers developed rolling water containers."

The benefits, he says, were numerous. This innovation allowed people to carry larger quantities of water, making the job easier and reducing the need for multiple trips. Children, who typically have the job of carrying water, now make fewer trips and have time to go to school. The community was able to start a small farm with improved water access.

"It improved the human experience in the context of their lives," Lee says.

WHAT WE'RE DOING

Lee says he and his collaborators from diverse fields are exploring an array of areas where human-centered design could have a positive local impact. Lee plans to scale up to 10 community projects per year, incrementally employing more than 100 students.

He is partnering with the City of Fullerton to launch his first project, an initiative with his senior design class to help improve hygiene issues faced by people experiencing homelessness. His goal is to engage students through fellowship support, build project partnerships with local government and nonprofits, and disseminate the work of those projects so similar programs can be replicated throughout the California State University system.

"My background is in product design and medical device design, and I think there are many opportunities to help with medical conditions affecting the elderly population, as an example," Lee says. "COVID-19 has presented some challenges when it comes to gathering data, but we're exploring many different opportunities as we aim to scale this initiative up."

He sees the initiative as a way to equip students with transferable skills they can apply to any field and career they pursue after graduation.

"There's a call out there to transform what it looks like to be an engineer," Lee says. "Many of the skills engineers should have – like creativity, project management, and communication – can be built through human-centered design experiences. By engaging in these experiences, students will collaborate with stakeholders outside of their area of expertise and work together to solve important problems. These skills are not emphasized as much in the curriculum as meeting technical specifications."

Lee says this initiative is also an opportunity to make academia less isolated and more connected to its community.

"We create these novel ideas without the opportunity to disseminate them," he says. "By creating and engaging in partnerships with the community, we can deliver something meaningful."

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What does success look like in human-centered design? Lee says solutions that are contextually relevant, implemented, and sustained for a long time are the hallmarks. Products fail when they don't address people's needs or if there is no clear focus on how they will be maintained and sustained.

"Our initiative will evolve with community needs. It's flexible, not static," Lee says. "The problems we're helping to tackle 10 years from now will probably look different. But we'll continue to use our skills as engineers and engage with the community to ensure our solutions are relevant to the organizations we serve."

Assessing the success of human-centered design experiences for students will be evident in their post-graduate outcomes.

"We're creating the engineers of tomorrow, and as we face more complicated challenges, engineers will need to be equipped with tools and training they weren't previously exposed to," Lee says. "Engaging students in these initiatives also exposes them to wider opportunities after graduation. These are chances to shape what their future careers might look like. They don't have to be narrowly focused on just the traditional career paths for engineers." ●

Jin Woo Lee's research focuses on design theory and methodology, product design, medical device design, creativity and innovation, front-end design processes, and engineering education.

Cross-Disciplinary Collaboration

Atul Teckchandani, associate professor of management at the College of Business and Economics, is a member of Lee's "Big Idea" team.

As an entrepreneurship professor for more than 10 years, Teckchandani says he's passionate about human-centered design because it provides a set of tools to help students create products and services that people actually want to purchase.

"Many students come to me with ideas," he says. "But I can no longer keep count of how many students cannot clearly articulate what problem they are trying to solve with those ideas and who their target customer would be. If you follow the human-centered design process, the first step is to better understand the lives of the people you are designing for. That means that you start with a clear sense of your customer and their most pressing problems and then figure out what to create."

Teckchandani believes Cal State Fullerton students can play a unique role in human-centered design because many of them have firsthand experience with common societal and human challenges.

"So, they can start with a place of understanding," he says. "They also have access to the 'customers,' which will go a long way in terms of helping us craft effective solutions for them by applying the human-centered design process." ●

Let's Get Started Today

The Human-Centered Design Initiative aims to open access to innovative curriculum that enables the College of Engineering & Computer Science's ability to design solutions for social problems in Orange County and beyond. Lee's five-year strategic plan for the initiative encompasses:

- Increasing access to new and innovative curriculum and assessment

- Sourcing community projects that will allow for a phased engagement of 10 projects and 100 students

- Increasing student retention rates and equipping students with transferable skills

- Disseminating curricular and project innovations so that similar programs can be replicated statewide

Your investment and engagement in the Human-Centered Design Initiative elevates our campus's connection with the community, helping us apply the latest innovative curriculum to real-world projects in our region.

For partnership and investment opportunities, please contact **Michael Karg** at **mkarg@fullerton.edu** or **714-519-8160**.

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