MEETING SOCIETY'S GRAND CHALLENGES

INVESTING IN MECHANICAL ENGINEERING EDUCATION

COLLEGE OF ENGINEERING

UNIVERSITY of WASHINGTON

"Without mechanical engineers, we won't have energy independence, we won't be able to reduce health-care costs or create appropriate infrastructure in developing countries. Instead of relying solely on policy to solve societal challenges, we need engineers interfacing with policy and decision-making."

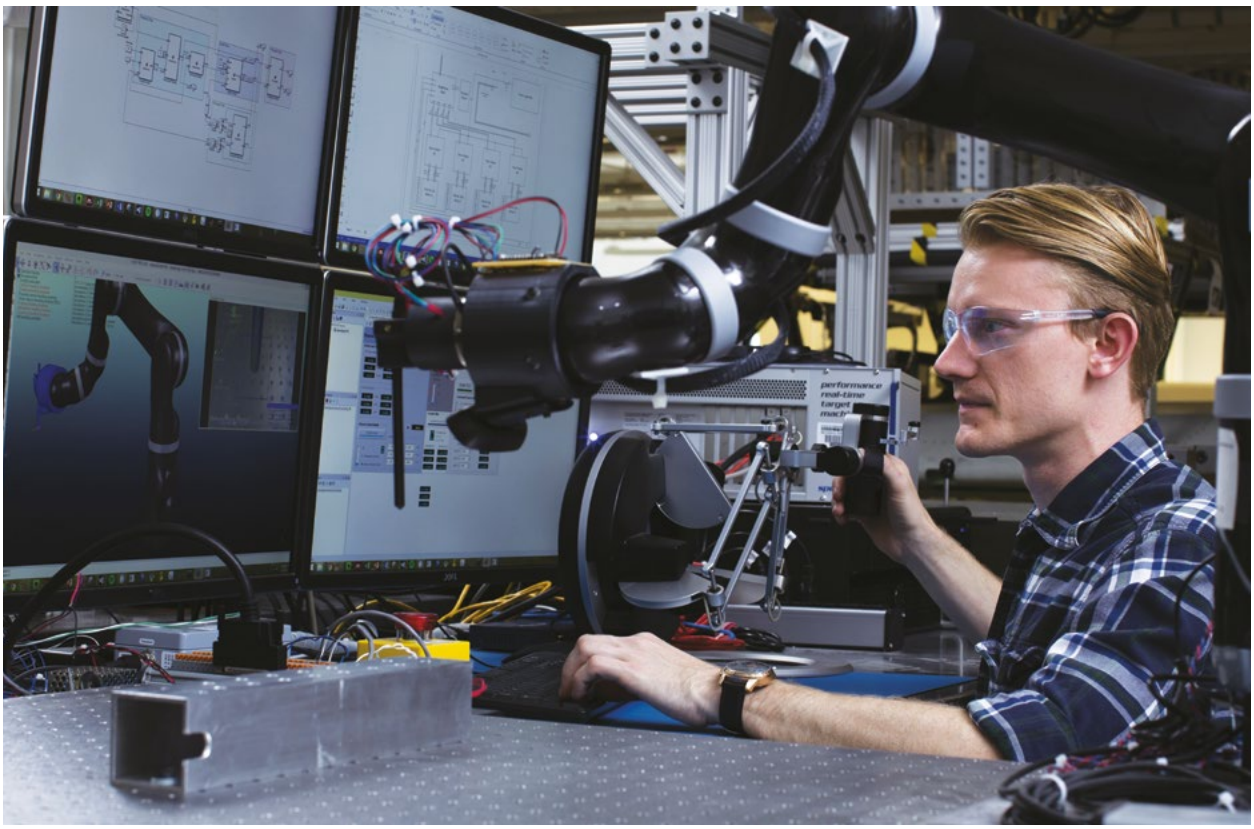
– Per Reinhall
Chair, UW ME

Our vision

From the current health-care crisis, to adjusting to the rapidly evolving field of advanced manufacturing, to the need for sustainable energy solutions, we as a society are facing "grand challenges" that are also exciting opportunities for innovation. The discipline of mechanical engineering is critical to the development of solutions in these arenas, and the UW Department of Mechanical Engineering (UW ME) is making a real-world impact on people's lives through its leadership as the field moves beyond "nuts and bolts" to include areas such as health care and energy.

However, the demand for a UW ME education is outpacing our ability to serve qualified Washington students. Mechanical engineering is currently one of the top five first-choice majors of UW confirmed incoming freshmen, and the demand for an engineering education will only increase. To meet the needs of our students and the state, and to fully leverage our potential to address society's grand challenges and improve quality of life around the globe, we must grow.

To do so, we need your support. Here, we detail our vision for the future of mechanical engineering education and research, and how you can partner with us to make a positive impact on society.



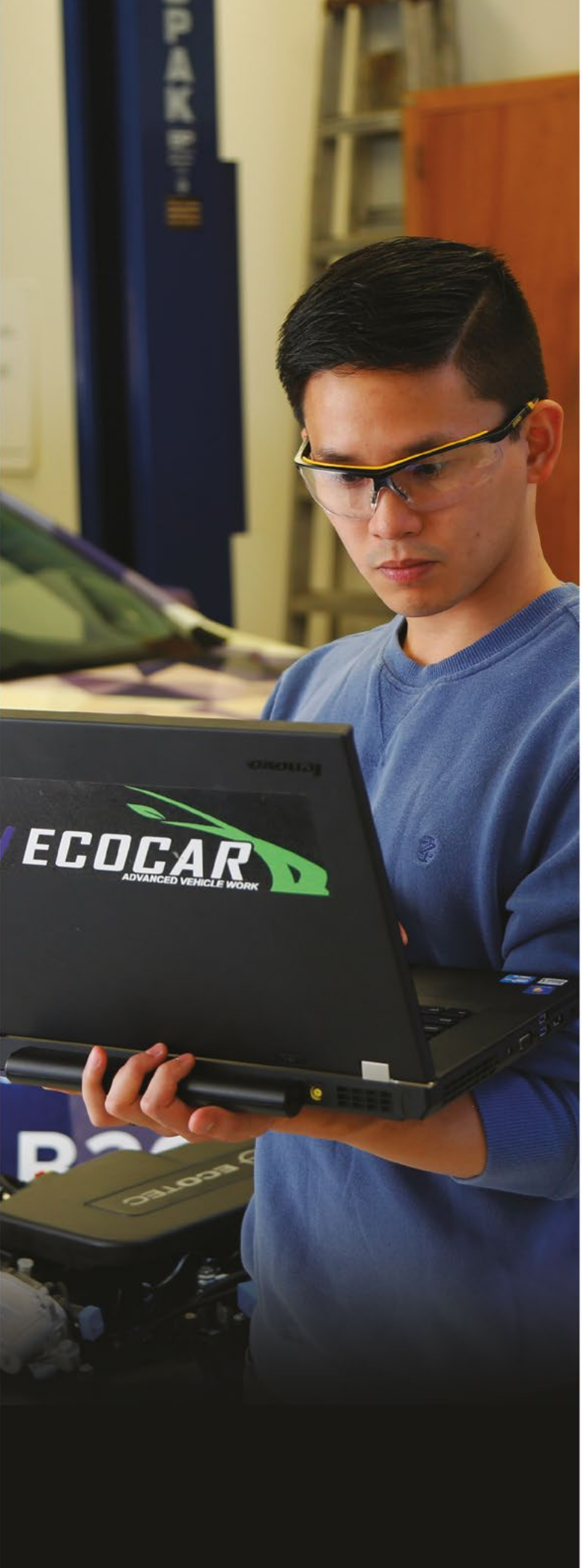
A legacy of innovation

One of the top departments at the UW for patents and innovations, UW ME has a history of leadership in the arenas of **advanced manufacturing, alternative energy** and **biotechnology/health.** In fact, approximately half of UW ME faculty members have research interests in the health arena, with the goal of bridging the gap between innovation and device development.

Partnerships with organizations such as the Bill and Melinda Gates Foundation and PATH — as well as with UW Medicine, Seattle Children's, the VA Puget Sound and others — enable UW ME to leverage a global health ecosystem second to none. As one example of the power of these partnerships, the Engineering Innovation in Health (EIH) program provides a framework for engineering students and faculty to partner with clinicians to develop medical device innovations.

As one of our notable efforts in advanced manufacturing, the Boeing Advanced Research Center (BARC) is a partnership with The Boeing Company that pairs Boeing engineers working at the UW with students and professors to solve manufacturing problems in the areas of automation and aircraft assembly through robotics.

These partnerships are examples of the ways in which research conducted by UW ME faculty benefits not just society at large, but enhances the undergraduate student experience. The department's focus on society's grand challenges is drawing diverse, non-traditional students with an interest in social impact. And by taking part in the faculty research enterprise — as well as by participating in clubs like UW EcoCar and competitions such as the UW Buerk Center for Entrepreneurship's Hollomon Health Innovation Challenge — students gain valuable, real-world skills through hands-on learning that brings classroom theory alive.



Engineering Innovation in Health: Team-based health-care solutions

The EIH program partners students with faculty, clinicians and industry participants to produce medical device prototypes.

MedsForAll, an affordable alternative to the epinephrine auto-injectors currently on the market, developed for use in low-resource communities worldwide.

PlayGait,™ a pediatric exoskeleton that helps children with gait disorders walk more, so they can build muscle strength and increase independent mobility.

MistEase, a device that makes it easier for elderly patients with glaucoma to administer eye drops.


ERSITY OF WASHINGTON
The Vascular System and Viscera
UNIVERSITY OF WASHINGTON

The need for growth

The need goes beyond just the manufacturing sector; from the high tech arena to the medical device industry, the state needs more mechanical engineers.

UW ME is a world-class leader in innovation addressing the challenges of the 21st century. Limits on capacity keep the department from meeting student demand and the current and future need for mechanical engineers to support Washington's expanding high tech economy—including the health care, novel manufacturing and clean energy sectors.

To match these demands by students and industry, it is imperative that we grow the number of graduates with B.S. degrees from 140 to approximately 200 per year. And, to preserve the quality of engineering education achieved by hands-on learning, student growth of this magnitude must be met by a 50% increase in the number of faculty.

Lack of space is a primary constraint in achieving these goals — currently, we can accommodate only one-third of qualified students who apply to the major each year. The department is still housed in outdated facilities built to accommodate the teaching methods of the past. The ME Annex, where students work on team projects, is one of the oldest on campus, dating back to the 1909 Alaska-Yukon-Pacific Exposition. While we have made the most of our facilities, and these buildings have "good bones," they need major renovations in order to preserve a modern, hands-on educational experience as we expand.

New and upgraded facilities — including wet labs, classrooms, offices and student makerspaces — will allow us to increase the number of undergraduate students we can admit into the department, and provide them with the educational experience needed for the future of mechanical engineering.

Expanding our impact

UW ME is expanding its vibrant educational and research programs in the following critical areas:

Advanced manufacturing

Digital/novel manufacturing technologies, including machine learning, are revolutionizing how products are made and distributed while increasing sustainability; they also have the potential to reduce costs, increase efficiency and quality, and improve the health and safety of workers around the world. UW ME is strengthening Washington's innovation ecosystem and helping to create a more globally competitive manufacturing sector with initiatives such as the Center for Advanced Materials in Transport Aircraft Structures and the Boeing Advanced Research Center (BARC). This work creates better jobs and increases the competitiveness of Washington's manufacturing sector.

Alternative energy

Energy availability, security and sustainability are core issues of the future. UW ME is at the forefront of energy research and technology translation of solar, wind and ocean power, energy storage and distribution, and clean combustion. For example, the Northwest National Marine Renewable Energy Center (NNMREC) researches the conversion of marine renewable energy resources (river, tidal and ocean currents, and waves) to mechanical power. The Clean Energy Institute (CEI) focuses on developing next-generation solar panels, batteries and smart grid solutions. Technologies developed by NNMREC and CEI are key to a clean energy future.

Biotechnology/health

Mechanical engineering will be instrumental in improving quality of life for people with disabilities, lowering health-care costs and improving medical processes. Our Ability & Innovation Lab leads the nation in empowering human mobility through engineering and design. And through the Engineering Innovation in Health (EIH) program, students are creating accessible solutions to pressing clinical needs to address both national and global health-care challenges.

Supporting the growth of these and other innovative programs will lead to more patents, start-up companies, discoveries and new technologies emerging from UW ME to improve global health.

At the same time, growing our research programs will provide more real-world learning opportunities for our students as we train the workforce of the future. Our goal is to create an open-source environment in which students are involved in problem-solving projects throughout their academic careers.

Join us

Philanthropy has been instrumental in bringing UW ME to its current level of impact. With your partnership, we can fulfill our mission as an international leader in population health, energy sustainability and manufacturing, and improve lives around the globe through research and education while directly supporting the growth of our region.

As noted, space is our primary concern — we seek funding for **a full-scale renovation of the Mechanical Engineering building and annex** and for an interdisciplinary engineering education building to accommodate state-of-the-art labs, offices and classrooms, as well as a student makerspace, which will support collaborative student projects and research.

Philanthropy has been instrumental in bringing UW ME to its current level of impact.

Additional funding priorities include the following:

- Fellowships and scholarships to attract and support top mechanical engineering students
- Endowed chairs and professorships to recruit and retain star faculty
- Program support for curricular enhancements such as EIH and other initiatives
- Discretionary funds to enable UW ME to respond to emerging priorities

Thank you

Thank you for your interest in Mechanical Engineering.
For more information, please contact:

Sue Brennan
Associate Director for Advancement
206.685.1378 or suemb7@uw.edu.

BE BOUNDLESS

FOR WASHINGTON | *FOR THE WORLD*