



DEPARTMENT  
AT A GLANCE

FACULTY AND RESEARCH

- 15 full professors
- 10 associate professors
- 3 assistant professors
- 160 journal publications
- 59 conference papers

STUDENTS AND GRADUATES

- 53 Capstone projects
- \$1,000,000 in Capstone grants
- 290 students mentored in paid research positions
- 604 students in the freshman seminar
- 1,397 undergraduate students enrolled
- 126 graduate students enrolled
- 157 bachelor’s degrees awarded
- 20 master’s degrees awarded
- 14 PhD degrees awarded

INFLUENTIAL ALUMNI

**Bradford James Brown** (BS ’91) is the founder and CEO of ATL Technology LLC, a global medical products and interconnect solutions company. Brown started ATL Technology in 1993, adding the first biotech project in 2001. The company now does business with 7 of the top 10 medical device companies. Brown is also a private pilot, flying both helicopters and airplanes. He has served on the BYU Fulton College of Engineering Advancement Council.



**Chris R. Edwards** (BS ’86) is vice president of operations at Lockheed Martin Skunk Works®. During his 34-year career, Edwards has held positions as managing director, general manager, and director of production operations for Lockheed Martin in the US, UK, and Japan. He has led operations for prototype and rapid development; mechanical and electronics detail fabrication; RF electronics; and final integration and test of missiles, launch systems, ground vehicles, aircraft, and autonomous systems.



Dear Alumni and Friends,

Events of the past several months have changed how we live in countless ways, and this is true of engineering education as well. The BYU Department of Mechanical Engineering has sought to optimize learning within the constraints of this ongoing worldwide pandemic. In the process, faculty and staff have created new ways for students to realize and test engineering designs and have developed and tested new pedagogical methods that may be useful in transforming the educational process in the future. We are now positioned to better utilize technology when our students are outside of the classroom and to provide better connectivity when in person.

Even during the challenging environment that now exists, our department generated \$6.2 million in external funding, which is a new department record. Our faculty have utilized these funds to produce an average of 7.8 peer-reviewed publications per year per faculty member. They have employed 290 undergraduate research assistants, 53 of which have been coauthors on peer-reviewed papers. Once again, the Capstone program will provide 53 Capstone teams with industrially sponsored design-build-test projects. The department continues to grow, adding two faculty positions, bringing the total to 30. Further, as of the Fall 2020 semester, we have a record number of students enrolled in our programs. Our students are truly receiving world-class opportunities for real-world experiential learning and will continue to be a positive influence in the world.

*Dale R. Tree*

Dale R. Tree, **PROFESSOR AND CHAIR OF MECHANICAL ENGINEERING**

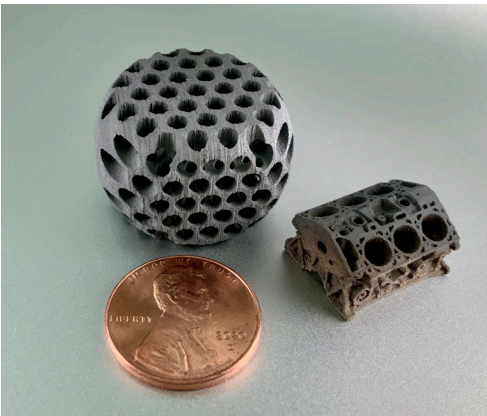
FROM THE CHAIR



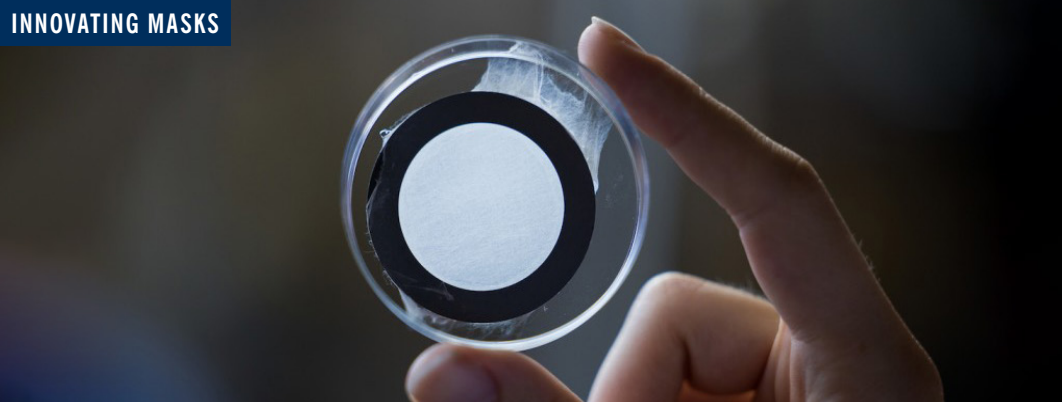
METAL MANUFACTURING IN 3D

Additive manufacturing (3D printing) at BYU has gone metallic! Two recently acquired machines now allow the college to print metal parts with a wide range of materials and processes. The first, a Concept Laser M2 curing system with dual 400W lasers, allows direct fabrication of metal parts in a wide range of ferrous and reactive alloys. The second, an Innovent+ from ExOne, creates fine-featured parts from almost any powdered material using the binder jetting process.

The machines are an important part of collaborative research projects involving ME professors Nathan Crane, David Fullwood, and Matthew Jones and manufacturing engineering professors Tracy Nelson, Michael Miles, and Jason Weaver. Research activities include creating new methods to locally adjust the composition of the metal parts and developing processes for fusing tungsten alloys.



INNOVATING MASKS



BYU engineering students have teamed up with Nanos Foundation to develop an innovative nanofiber membrane that can be sandwiched between the cloth pieces in homemade masks to protect against COVID-19. The membrane can be made using simple, inexpensive materials and can block 90 to 99 percent of particles, increasing effectiveness while preserving breathability. The membranes are made through a process called electrospinning, in which nanofibers land on a collector to create a sort of non-woven mesh. Static charge in the fibers attracts virus particles. The group plans to make the instructions for creating the membranes open-source, hoping nonprofit organizations will use the instructions to set up local sites where people can bring in their cloth masks to be fitted with a membrane.

NUCLEAR RESEARCH TAKES OFF AT BYU



Exciting things are happening at BYU in nuclear energy: a cross-disciplinary Nuclear Research Group involving 12 faculty programs across the university has been formed. Government agencies—including the Nuclear Regulatory Commission and the Department of Energy’s (DOE) Office of Nuclear Energy and Idaho National Laboratory (INL)—have invested nearly \$750,000 into research within the ME Department in the last two years for a new type of nuclear reactor called a molten salt reactor. These grants, coupled with department funds, have supported 2 faculty, 6 graduate students, and 16 undergraduate students to develop new technologies. Additionally, INL has been a repeat Capstone supporter by sponsoring at least two projects per year over the past two years. The caliber of BYU ME students is being recognized through both DOE and American Nuclear Society scholarships and with internships at national laboratories and energy companies.

FACULTY AWARDS



Faculty receiving awards or rank advancement in 2020: Brian Iverson, Marc Killpack, Scott Thomson, Andrew Ning, and Steve Gorrell

The following faculty were recognized in 2020 for their contributions to BYU and the engineering profession.

**Julie Crockett:** Fulbright US Scholar Award to research at Queen Mary University of London

**Christopher Mattson:** ASME Fellow

**Brian Iverson:** BYU Early Career Scholarship Award

**Scott Thomson:** BYU Technology Transfer Award

**Anton Bowden:** College of Engineering Excellence in Scholarship Award

**Marc Killpack:** College of Engineering Most Influential Faculty Award; received continuing faculty status and advanced to associate professor

**Steve Gorrell:** advanced to full professor

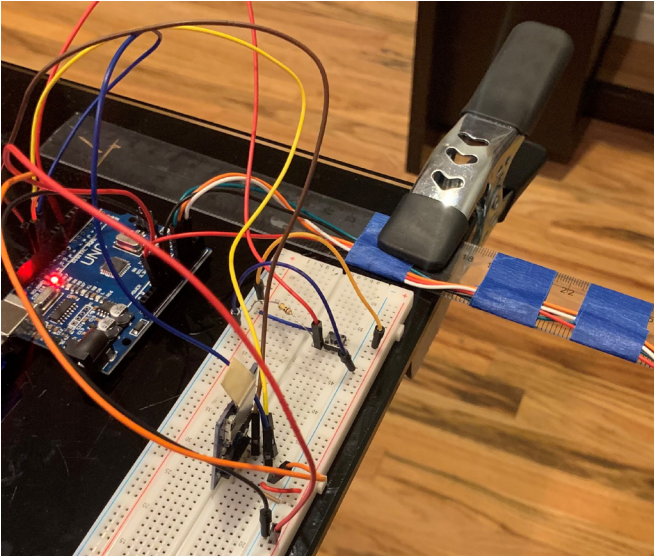
**Andrew Ning:** received continuing faculty status and advanced to associate professor

**John Salmon:** received continuing faculty status and advanced to associate professor

HANDS-ON LEARNING AT HOME

Several faculty have found creative ways to translate normally on-campus experiences to labs and projects that students can do at home. Group-project work has become more challenging with COVID-19 restrictions, and these changes are helping students continue to have rich hands-on learning experiences.

Professor Scott Thomson has changed the labs and final project in his ME362 class to be Arduino-based. Each student has their own kit with the Arduino board, various sensors, and an SD card reader. Professor Steven Charles, even prior to COVID-19, has wanted to find a way for students to explore mechatronic systems at home in a fun and playful way. He has since designed a series of labs that let students learn how to integrate microcontrollers, circuits and sensors, and motors and actuators to bring their own mechatronic creations to life.



Other faculty have turned group-based projects into individual projects for the time being, and many are helping student teams still function while working virtually or in smaller groups on campus.



A NEW NAME FOR THE CHECKOUT ROOM

The well-used ME Checkout Room has been renamed the Project Support Center (PSC) to better reflect its core purpose. Kevin Cole (BS ’06), PSC manager since 2003, and his staff train students on how to choose good tools and equipment for measurement and construction and then check those tools out to students for their projects. The PSC also offers a work area for short-term projects, includes some longer-term workspaces, and provides training on the use of large equipment, such as the tensile testers, wind tunnels, and engine labs.

NEW FACULTY MEMBER

Professor Mathew Allen is the newest member of the ME faculty. He received his BS from BYU and his MS and PhD from Georgia Tech. He has been on the faculty at the University of Wisconsin for the past 12 years. Prior to that he was a postdoctoral researcher at Sandia National Laboratories. His area of research is in dynamics and vibrations, with a particular focus on nonlinear systems.



NEW AEROSPACE EMPHASIS

Students can now specialize in aerospace within the mechanical engineering major. The department has a long history of aerospace research and coursework, and in recent years, interest in aerospace activities has skyrocketed, including the BYU Rocketry, Aeronautics, and Spacecraft Clubs and the Mars Rover and Unmanned Air Vehicle competition teams. Many graduates have been looking for ways to signal to employers their interest in aerospace positions, and this emphasis will be a way to do that.

CAPSTONE PROJECTS CONTINUE

Although COVID-19 has brought its challenges, in true BYU form, our Capstone students adapted and finished 54 projects for the 2019–20 school year. Final presentations moved online, and we missed having our sponsors join us on campus in April. Noteworthy projects included the development of animation-streaming therapy glasses and several application projects using sanitizing UV-C light systems for NKFG in Taiwan.

We are especially grateful for our alumni and corporate friends for their help and support. We would also like to welcome Lisa Barrager (BS ’95, MS/MBA ’97) as the new Capstone coordinator and external relations manager. If you are interested in sponsoring a future Capstone project, please contact Lisa at [lisa\\_barrager@byu.edu](mailto:lisa_barrager@byu.edu).



STAY CONNECTED



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[me.byu.edu/content/alumni-home](http://me.byu.edu/content/alumni-home)  
Capstone program: [capstone.byu.edu](http://capstone.byu.edu)