



YEAR IN REVIEW

BYU

MECHANICAL ENGINEERING



SHAPING THE FUTURE OF UNMANNED FLIGHT

Three days after a devastating earthquake in Italy destroyed several towns and killed hundreds of people, a BYU team was onsite with unmanned drones to collect images of the destruction. Scientists will use the data to better understand how earthquakes impact landscapes and structures.

This practical application is just one example of the research and development accomplished by [BYU's Center for Unmanned Aircraft Systems \(C-UAS\)](#), which involves faculty from six departments. After analyzing data from the Federal Aviation Administration showing that close encounters between drones and passenger planes have increased 500 percent since 2014, one BYU research group has created a way for drones to see and avoid other aircraft. Another BYU group is developing smarter guidance and navigation systems for drones flying in places where GPS is not available—such as urban canyons, complex or remote terrains, and military zones.

Over the past three years C-UAS has brought \$3 million in funding to BYU. Scores of BYU students have participated in cutting-edge research that has resulted in many publications and conference presentations. As the lead institution, BYU joins with academic partners at Colorado Boulder, Virginia Tech, Georgia Tech, and the University of Michigan to train future leaders for the rapidly developing unmanned aircraft industry.

GREETINGS FROM THE CHAIR



Dear Friends and Associates,

I am happy to provide an overview of some of the happenings that took place in the department during 2016. Enrollments continue to climb and are at an all-time high, with more than 1,200 undergraduate students and 120 graduate students. The number of PhD candidates has now reached 50. External funding for research and Capstone projects was very strong, with a total of more than \$5.5 million in new awards in 2016. Ground was broken for and construction is underway on a new engineering building and annex. The annex building will hold laboratories for combustion and flow dynamics research and is currently on track to be completed in October 2017. The main building is on track to be completed in the summer of 2018, and we will then relocate our offices and many of our labs.

ARRIVALS



Associate professor Scott Thomson (*left*) (MS '00) originally joined the BYU ME faculty in 2004 and recently returned from teaching for two years at BYU-Idaho.

Assistant professor Troy Munro (*right*) has come to BYU after completing a dual PhD in mechanical engineering and physics from Utah State University and Katholieke Universiteit Leuven in Belgium. His research mission is to develop and exploit new in situ temperature-sensing systems to understand the thermal behavior of materials.

NEW ASSIGNMENTS



Professor Alan Parkinson (BS '77) returned to the ME Department after completing 11 years of service as dean of the Ira A. Fulton College of Engineering and Technology.



Professor Spencer Magleby (BS/MS '83) finished 11 years of service as associate dean in the Ira A. Fulton College of Engineering and Technology and, after a brief return to the department, was appointed associate dean of Undergraduate Studies.

Enclosed you can read about the notable accomplishments of faculty, staff, and alumni. I invite you to take a few minutes to read over these highlights and celebrate with us. We consistently post news to our website and social media platforms, and I encourage you to update your alumni information at BYU and to connect with us on Facebook and Twitter. I hope you have a wonderful and blessed 2017.

Sincerely,

Daniel Maynes

Daniel Maynes

PROFESSOR AND CHAIR OF MECHANICAL ENGINEERING



INFLATABLE ROBOT RESEARCH LEADS TO COLLABORATION WITH NASA

An inflatable robot that is light enough to go into space and useful enough to perform maintenance work with astronauts—this sounds like a character in a children’s movie, but it is actually the focus of current BYU ME robotics research. Funded by multiple NASA grants, assistant professor Marc Killpack and his graduate students are working in collaboration with startup company Pneubotics on new methods to model and control fabric-based pneumatic (air-pressure-operated) robots. Traditional industrial robots largely operate behind cages when working in close proximity to people to avoid causing injury. In contrast, these “soft robots” are collapsible, lightweight, and compliant, making them well-suited to operate in human environments as well as in hard-to-reach locations. Potential applications range from search-and-rescue teams to in-home assistance.

Controlling a structure that is essentially made up of sacks of air is not easy, but **Dr. Killpack and his team have made significant progress since his arrival at BYU in 2013**. Currently the team is collaborating with NASA’s Ames Research Center to test and eventually attach a soft robot arm to the lunar rover K-REX.



David Renfro (BS '72) and his wife began serving a mission in Ghana last year. David is an associate tenured professor of mechanical engineering at the University of Arkansas, the owner of Renfro Engineering, and the founder of the Engineering Institute. A major focus of his work has been vehicle dynamics.



Steven LeBaron (BS '87) helped implement Star Wars imagery on the Boeing 787 Dreamliner for the Japanese airline company All Nippon Airways (ANA) to increase their international brand recognition. LeBaron became fluent in Japanese while serving a mission to Okayama, Japan, and his language skills have opened doors to many career opportunities. He has worked with ANA since 2006 to develop 787s to their specifications.

DEPARTMENT HIGHLIGHTS



From left to right:

- **Assistant professor Oliver Johnson** (BS '10) received a prestigious NSF CAREER award for excellent integration of research and education.
- **Associate professor Steven Charles** (BS '01) and **assistant professor Marc Killpack** (BS '07) were the student-voted best mechanical engineering teachers in 2016.
- **Assistant professor Andrew Ning** (BS '06) received the 2016 ME Outstanding Research Award for his multiple publications and significant new research funding.
- **Associate professor Anton Bowden** received the 2016 ME Outstanding Teaching Award for excellence in teaching and mentoring students.



From left to right:

- **Professor Brent Webb** (MS '82) was awarded the **Heat Transfer Memorial Award**, one of the highest national honors given in mechanical engineering by the American Society of Mechanical Engineers.
- **Professor Larry Howell** received the **Purdue University Outstanding Mechanical Engineer Award** and accepted an assignment to serve as associate dean of the Ira A. Fulton College of Engineering and Technology.
- **Lab supervisor Dave Laws** (MS '92) received a BYU SAERA award for exceeding customer expectations.
- **Associate professor Julie Crockett** was selected to give the **BYU 2016 Alice Louise Reynolds Women-in-Scholarship Lecture**.
- **Professor Tim McLain** (MS '87) was awarded the **Utah Governor’s Medal for Science and Technology**.

DEPARTMENT AT A GLANCE

- 12 professors, 10 associate professors, and 6 assistant professors
- 5 associate editors for archival journals
- 80 professional journal publications by students and faculty
- 125 professional conference presentations
- \$5.5 million external research awards and educational grants

- 1,320 students enrolled
- 466 new freshmen
- 151 bachelor’s degrees granted
- 22 master’s degrees granted
- 9 doctoral degrees granted

2016 Prestigious Fellowships Received

Six students were awarded highly competitive national awards: Kyle Brown, Alex Jafek, Ian Matheson, and Trevor Stephens received graduate research fellowships from the National Science Foundation; Daniel Koch received a National Defense Science and Engineering Graduate Fellowship; and Talmage Jones received a Science, Math, and Research Transformation (SMART) scholarship from the Department of Defense.

STAY CONNECTED



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