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2022

Annual Report, 2021-2022

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College of Engineering

2021-2022

Annual Report



UNIVERSITY OF
ARKANSAS®

College of Engineering

September 1, 2022

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College of Engineering 2021 Annual Report

Executive Summary

The College of Engineering continued to lead the University of Arkansas campus in new research awards in 2021-22, with total awards of more than \$54 million, according to the Division of Research and Innovation. The college previously had doubled its annual new research awards in the four years from fiscal 2017 to 2020 (from more than \$16.6 million to \$35.3 million), then dipped slightly in fiscal 2021 to \$30.7 million. The majority of 2021-22 awards were federal (87%). Another 7% were industry and 1.4% were state, with the remaining from “other” categories and foundation funds.

The College of Engineering received 14 new grant awards that totaled \$1 million or more in fiscal 2021-22. The largest two grants were an \$8 million National Science Foundation grant and \$4.4 million U.S. Army Research Office grant to principal investigator Alan Mantooth for a national silicon carbide research and fabrication facility. Mantooth is a distinguished professor of electrical engineering. The next-largest grant was \$4.4 million from the U.S. Office of Naval Research to principal investigator Fisher Yu, professor of electrical engineering, to develop the next generation of infrared sensors used in night vision technology.

Two faculty members earned National Science Foundation Faculty Early Career awards in fiscal 2022: Lu Zhang, assistant professor of computer science and computer engineering, and Xiao Liu, assistant professor of industrial engineering. Known as CAREER awards, they are considered by the NSF to be the most prestigious award for early-career faculty members. Each researcher will receive more than \$500,000 over five years to support their research.

College of Engineering students remain nationally competitive in their research, service and leadership. Coleman Warren, who graduated in industrial engineering and political science in May, was named a 2022 Rhodes Scholar for graduate study at Oxford University in the United Kingdom. Mary Jia, a Stuttgart native, was named a 2022 Goldwater Scholar, receiving a scholarship of \$7,500 from the Barry Goldwater Scholarship Foundation. Lillie Haddock received a Fulbright U.S. Student Program award to Australia to study the role of water markets in managing climate change and low-water availability. Haddock earned a master’s degree in biological engineering in May, having worked with adviser and mentor Brian E. Haggard, professor of biological engineering and director of the Arkansas Water Resources Center.

Some accolades among alumni included Bob Crafton, B.S.C.E.'57, and Grady Harvell, B.S.C.E.'72, being named to the Arkansas Construction Hall of Fame. Harvell also received a Lifetime Achievement Award from the American Institute of Steel Construction. Cmdr. Billie J. Farrell, M.S.O.M.'09, became the first female commander of the USS Constitution.

I. Summary of Significant Achievements

Industrial Engineering

- INEG contributed 1 book, 3 book chapters (one of which three faculty members were cited on), 43 refereed journal articles and 13 refereed conference proceedings, and offered 15 invited lectures, along with 44 other publications and presentations. As it relates to scholarly activity the department productivity included 7 external research awards with a funding total of \$1.7M.
- \$216,500 in scholarships to 61 students, which is an all-time high. Significant funding was provided by our distinguished alumni group, the Arkansas Academy of Industrial Engineering (AAIE) and by its members. AAIE currently has 223 active members. AAIE inducted 7 new members in April at its first in-person banquet since 2019. The support and resources provided by our Academy continues to help distinguish our department as a top program.

Chemical Engineering

- In August 2021, Keisha Walters joined the department as Department Head and Professor after a national search. In addition, a tenure-track faculty search in 2021-2022 resulted in the hiring of two tenure track faculty, Associate Professor Will Richardson and Assistant Professor Jacob Monroe for AY22-23. Both of these faculty hires are in the area of Data Science, which is an important field for student training and research, as evidenced by feedback from employers and alumni. In addition, Jorge Almodovar received tenure and was promoted to Associate Professor.
- The major productivity goal in the COE Strategic Plan calls for \$300,000 in research expenditures per faculty member by 2021. In 2021, the CHEG three-year average research expenditures per faculty was \$226,410 and that has increased to \$248,147 and is slated to exceed the goal for 2022. In 2021-2022, Chemical Engineering faculty held twenty-five external research grants/awards in the amount of ca. \$5.9M.

Biological Engineering

- Dr. Benjamin Runkle continues to be successful with extramural research funding, post-docs and graduate students in his climate-related research in rice production. He has also taken over the ABET-coordinator responsibilities from Dr. Costello. Drs. Yanbin Li and Jin-Woo Kim continued with their prolific publication completions.

Biomedical Engineering

- Biomedical Engineering housed 147 total students in the 2021-2022 school year. The student population was comprised of 198 undergraduate students, 113 of which were honors students, and 49 graduate students, divided 38 Ph.D. and 11 MS. The Biomedical Engineering department successfully graduated 61 students for the academic year.
- Research activity continued to grow with 28 funded grants for approximately \$7.1 million for the 2021 fiscal year. Notable BMEG research awards included: NIH-S10 for Wolchok (Single Cell RNA Sequencing Instrumentation); NIH-R15 for Balachandran (ACE2 SARS-CoV2-mediated valve disease in a microphysiological tissue-chip model); NIH for Harris (Phenotype Heterogeneity and Dynamics in SCLC); DoD for Balachandran (Nasal Airway-Lung-on-chip to study effect of toxic pollutants on airway pathology); NSF for Samsonraj (Biophysical Modulation for

Scalable Biomanufacturing of Stem Cell-Derived Therapeutics); NIH for Abbas and Jung (Enhancing Sensorimotor Integration Using a Neural Enabled Prosthetic Hand).

Computer Science and Computer Engineering

- CSCE remains the largest department in the College of Engineering in terms of undergraduate enrollment.
- The total amounts of new research awards and research expenditures grew substantially from CY 2021 to CY 2022.
- Successfully recruited one new female faculty member.
- Reformed the CSCE Industry Advisory Board and had a highly successful in-person meeting

Civil Engineering

- The department was awarded 29 new research grants for a total just over \$6.8M. This was up from \$4.0M in 2020.
- CVEG faculty published 38 journal articles in 2021 (up from 31 in 2020).
- The number of undergraduate students was 215 which is lower than last year's enrollment of 254. The number of Civil Engineering graduate students was 50. This number includes 29 MSCE and 21 Ph.D. students. There are also 24 graduate students in the Construction Management program.

Electrical Engineering

- The Electrical Engineering Faculty were extremely busy this year, receiving 36 awards, totaling \$26,181,975. The faculty members also served as conference organizers and continued their respective service as board members, session chairs and invited speakers and technical committee members. Faculty and students published over 70 refereed journal and conference proceedings in calendar year 2022.
- In Fall 2021, the department had a total of 121 graduate students (70 doctoral and 51 masters). In Spring 2022, the number increased slightly to 122 students (72 doctoral and 50 master). Twenty-one students completed graduate degrees during that time with a total of 14 master's degrees and 7 doctoral degrees being conferred; the latter group had two females.
- Engineering researchers led by Distinguished Professor Alan Mantooth received \$17.87 million from the National Science Foundation to build and operate a national silicon carbide research and fabrication facility at the U of A. Other Electrical Engineering personnel involved in the project are Zhong Chen, Associate Professor, and Shannon Davis, Business and Operations Manager.

Mechanical Engineering

- Faculty submitted 46 research proposals and was awarded \$2,519,837 in new funding.
- The department enrolled 558 students and graduated 153.
- Steve Tung, appointed as Associate Department Head on 16 August 2021.

II. Summary of Achievements in Teaching, Research and Public Service

Industrial Engineering

- Ashlea Milburn and Kelly Sullivan, both Associate Professors, were inducted into The Teaching Academy at the University of Arkansas. The Teaching Academy's mission is to advocate and represent teaching interests, promote and stimulate an environment of teaching and learning excellence, and encourage recognition and reward for exceptional teaching.
- Greg Parnell was one of three recipients of the 2022 Geren-Koski Award for excellence in graduate education.
- Industrial Engineering faculty members serve in a variety of leadership and public service roles. In 2021, 138 leadership positions were held by faculty members, which is 16 positions higher than in 2020, and 56 higher than 2019. To name a few notable service roles, Sandra Eksioglu served as President of the Energy Systems Division of IISE, Haitao Liao served as the Associate Editor of *RAMS*, Ashlea Milburn served the Healthcare Systems Engineering Alliance as Treasurer, Heather Nachtmann is the Editor-in-Chief of *The Engineering Economist*, Ed Pohl is the Editor of *The Journal of Military Operations Research*.

Chemical Engineering

- The Ralph E. Martin Department of Chemical Engineering had 190 undergraduate and 36 graduate students in AY21-22, with 79 students graduating with chemical engineering degrees from the BS to PhD levels.
- Average departmental teaching evaluations (4.52 weighted) were above the college average (4.40 weighted) and second highest in the college.
- Chemical Engineering faculty submitted 153 research funding proposals and were awarded 94 grants for circa \$5.9M. Eight of the Chemical Engineering faculty received over \$200,000 in research fundings and Jamie Hestekin, Greg Thoma, and Ranil Wickramasinghe achieved over \$350,000 in research expenditures.
- Chemical Engineering faculty were recognized for high-visibility national and international service including four journal editorial positions. Our faculty received 21 honors and awards this year including 18 invited/keynote talks.

Biological Engineering

- Sammy Sadaka received the Outstanding Researcher of the Year from the Arkansas Association of Cooperative Extension Service.

Computer Science and Computer Engineering

- Undergraduate enrollment increased by 1.97% in 2021 over 2020.
- Graduate enrollment increased by 5% in 2021 over 2020.
- CSCE faculty published 36 journal articles (in the previous year this number was 17) and 58 conference papers.
- CSCE had a total of \$4.639 million in research grants
- CSCE faculty did 22 invited lectures.

Civil Engineering

- In 2017, CVEG approved a strategic plan. The plan supports the COE strategic plan and UA's Guiding Priorities. A major emphasis was placed on graduate student recruitment which included faculty presentations at regional universities. The

department has successfully recruited 6 graduate students from LeTourneau University in Longview, TX, 2 graduate students from Harding University in Searcy, AR, 3 graduate students from Cedarville University, and 3 students from Christian Brothers University in Memphis, TN.

Electrical Engineering

- Dr. Alan Mantooh was named to the newly created Arkansas Future Mobility Advisory Council with the Governor office.

III. Summary of Achievements of Students and Alumni

Industrial Engineering

- Coleman Warren is a spectacular student whose honors include being the only University of Arkansas undergraduate student to have ever been recognized as both a Truman Scholar and a Rhodes Scholar. Coleman was also named the Industrial Engineering Outstanding Senior, the College of Engineering Outstanding Senior, and one of two students recognized with the 2022 Senior Honor citation which recognizes the top two seniors on campus. He also served the university as its 100th student body president while double majoring in Industrial Engineering and Political Science. As if that wasn't enough, he is the founder and CEO of Simple + Sweet Creamery, which has won several start-up competitions and was even featured on Good Morning America.
- The Alpha Pi Mu Industrial Engineering National Honor Society gave out nine scholarships this year and University of Arkansas students were the recipients of three. Natalia Sandhu, Shantal Sarmiento, and Coleman Warren were chosen for various scholarships from a competitive pool of applicants.

Biological Engineering

- Alexis Barber, a U of A honors junior from West Plains, Missouri, was named a Morris K. and Stewart L. Udall Scholar. Recognized by the Morris K. and Stewart L. Udall Scholarship Foundation for their commitment to environmental sustainability as well as demonstrated leadership connected to the environment on campus and in their communities

Biomedical Engineering

- Mary Jia – Goldwater Scholar
- Malavika Nidhi and Amir Mahari (Doctoral Academy Fellowship)

Computer Science and Computer Engineering

- CSCE formed an Industry Advisory Board (IAB), which is composed of nine computer science and computer engineering experts and industry leaders

Electrical Engineering

- PhD student Solomon Ojo was awarded a 2022 Optics and Photonics Education Scholarship by SPIE.
- Basha Moncur, Electrical Engineering Senior, was selected as one of eight University of Arkansas students taking part in the Tjuana Byrd internship program. The program is made possible by the Women's Foundation of Arkansas and several corporate sponsors, and was created to advance women of color in STEM fields for Arkansans attending two- or four-year colleges in Arkansas.

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APPENDIX A

FACULTY HONORS 2021-2022 COLLEGE OF ENGINEERING

COLLEGE OF ENGINEERING OUTSTANDING TEACHER

Jun Zhu, Biological & Agricultural Engineering
Young Hey Song, Biomedical Engineering
Karthik Nayani, Chemical Engineering
Cameron Murray, Civil Engineering
Matthew Patitz, Computer Science and Computer Engineering
Jeff Dix, Electrical Engineering
Chase Rainwater, Industrial Engineering
James Davis, Mechanical Engineering
Heath Schluterman, Engineering

COLLEGE OF ENGINEERING OUTSTANDING RESEARCHER

Ben Runkle, Biological & Agricultural Engineering
Kyle Quinn, Biomedical Engineering
Ranil Wickramasinghe, Chemical Engineering
Suman Mitra, Civil Engineering
Lu Zhang, Computer Science and Computer Engineering
Alan Mantooh, Electrical Engineering
Haitao Liu, Industrial Engineering
David Huitink, Mechanical Engineering

COLLEGE OF ENGINEERING OUTSTANDING SERVICE TO STUDENTS

Scott Osborn, Biological & Agricultural Engineering
Jeff Wolchok, Biomedical Engineering
Tammy Lutz-Rechtin, Chemical Engineering
Eric Fernstrom, Civil Engineering
Dale Thompson, Computer Science and Computer Engineering
Silke Spiesshofer, Electrical Engineering
Kelly Sullivan, Industrial Engineering
John Hamilton, Mechanical Engineering
Leslie Massey, Engineering

COLLEGE OF ENGINEERING STAFF EXCELLENCE AWARD

Linda Pate, Biological & Agricultural Engineering
Cassandra Parks, Biomedical Engineering
Heather Pollard, Chemical Engineering
Sandy Thomas, Civil Engineering
Jenna Stacey, Computer Science and Computer Engineering
Daniel Klein, Electrical Engineering
Ashley Reeves, Industrial Engineering

Mike Kyle, Mechanical Engineering
Adrienne Gaines, Engineering

UNIVERSITY & COLLEGE AWARDS

Fisher Yu	2021-22 John Imhoff Outstanding Research Award
Susan Gauch	2021-22 John Imhoff Outstanding Teaching Award
Qianghua Li	2021-22 Collaborative Research Faculty Award
Xiao Liu	2021-22 Rising Star Award
Alex Nelson	2021-22 Rising Teaching Award
Chase Rainwater	2021-22 Outstanding Public Service Award
Heather Walker	2021-22 Non-Tenure Track Teaching Award

APPENDIX B

2021-2022 COLLEGE OF ENGINEERING STUDENT HONORS

COLLEGE OF ENGINEERING FIRST RANKED SENIOR SCHOLARS

Joshua Carson Adams	Biomedical Engineering
Nicholas Dean Beck	Computer Science and Computer Engineering
Dustin Louis Black II	Computer Science and Computer Engineering
Rachel Ann Culbertson	Computer Science and Computer Engineering
Andre Esteban Fuentes	Computer Science and Computer Engineering
Katie Anne Loethen	Biological and Agricultral Engineering
Aubin House Payne	Biological and Agricultral Engineering
Emma Clare Regier	Industrial Engineering
Charles Aaron Rieth	Biomedical Engineering
Natalie Kaye Smith	Biomedical Engineering
Christina Michalee Trexler	Computer Science and Computer Engineering
Coleman Louis Warren	Industrial Engineering
Benjamin Kah-Ho Yip	Biomedical Engineering

COLLEGE OF ENGINEERING SENIOR SCHOLARS

Benjamin Allen	Computer Science and Computer Engineering
Jack Arp	Biomedical Engineering
Rafael Estrella	Mechanical Engineering
Jayden Goff	Biomedical Engineering
Noah Gregory	Electrical Engineering
Sarah Hendrix-See	Computer Science and Computer Engineering
Yaling Liu	Computer Science and Computer Engineering
Spencer Loper	Industrial Engineering
Anthony Malloy	Electrical Engineering
Anthony Ming	Mechanincal Engineering
Elizabeth Moriconi	Civil Engineering
Zachariah Neumeier	Biomedical Engineering
Dawson Oakley	Biological and Agricultural Engineering

COLLEGE OF ENGINEERING OUTSTANDING SENIOR

Coleman Warren	Industrial Engineering
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DEPARTMENTAL OUTSTANDING SENIORS

Amanda Bogart	Biological Engineering
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Fah Sysavanh
Lauren Shepard
Jarrett Hoover
Kira Threlfall
Elizibeth Moriconi
Noah Gregory
Coleman Warren
Matthew Sullivan

Biomedical Engineering
Chemcial Engineering
Computer Engineering
Computer Science
Civil Engineering
Electrical Engineering
Industrial Engineering
Mechanical Engineering

PORTER STONE CO-OP AWARDS

Muhammet Faith Cengil
Dhylan Culmer
Carlos Diaz Calvo
Md Abul Hayat
Ruohan Li
Anthony Ming

Industrial Engineering
Mechanical Engineering
Operations Management
Electrical Engineering
Chemical Engineering
Mechanical Engineering

PRESIDENTIAL SCHOLAR

Walker Harbison

Electrical Engineering

GOLDWATER SCHOLARS

Mary Jia

Biomedical Engineering

APPENDIX C

COLLEGE OF ENGINEERING CHAIRS, PROFESSORSHIPS, DISTINGUISHED PROFESSORSHIPS AND LECTURESHIPS

Charles D. Morgan/Acxiom Endowed Graduate Research Chair in Data Base, Xintao Wu, Professor, Computer Science and Computer Engineering

Irma F. and Raymond F. Giffels Endowed Chair in Engineering, Kim Needy, Professor, Industrial Engineering & Dean of Engineering

John L. Imhoff Endowed Chair in Industrial Engineering, Shengfan Zhang, Associate Professor, Industrial Engineering

Rodger S. Kline Endowed Chair in Computer Science and Computer Engineering, Jia Di, Professor, Computer Science and Computer Engineering

The Twenty-First Century Endowed Chair in Materials, Manufacturing and Integrated Systems, Min Zou, Professor, Mechanical Engineering

The Twenty-First Century Research Leadership Chair, Alan Mantooth, Professor, Electrical Engineering

The Twenty-First Century Leadership Chair in Mechanical Engineering, Darin Nutter, Professor, Mechanical Engineering

The Twenty-First Century Leadership Endowed Leadership Chair, Micah Hale, Professor, Civil Engineering

Walter E. Hicks and Blossom Russell Hicks Professorship for Infrastructure Engineering, Kevin D. Hall, Professor, Civil Engineering

Bates Teaching Endowed Professorship in Chemical Engineering, Greg Thoma, Professor, Chemical Engineering

James T. Womble Endowed Professorship in Computational Mechanics and Nanotechnology Modeling, R. Panner Selvam, Professor, Civil Engineering

The Twenty-First Century Professorship in Engineering, Ed Pohl, Professor, Industrial Engineering

Thomas Clinton Mullins Endowed Chair in Engineering, David Andrews, Professor, Computer Science and Computer Engineering

The Twenty First Century Professorship in Mechanical Engineering, Paul Millet, Associate Professor, Mechanical Engineering

The Twenty First Century Professorship in Mechanical Engineering, Uche Weijinya, Associate Professor, Mechanical Engineering

Ross E. Martin Endowed Chair in Emerging Technologies, Ranil Wickramasinghe, Professor, Chemical Engineering

Ansel and Virginia Condray Endowed Professorship in Biochemical and Chemical Separations, Christa Hestekin, Associate Professor, Chemical Engineering

The Twenty-First Century Leadership Chair in Electrical Engineering, Juan Balda, University Professor, Electrical Engineering

George M. and Boyce W. Billingsley Endowed Chair in Engineering, Raj Rao, Professor, Biomedical Engineering

Ralph E. Martin Endowed Leadership Chair in Chemical Engineering, Jamie Hestekin, Professor, Chemical Engineering

Tyson Endowed Chair in Biosensing Engineering, Yanbin Li, Professor, Biological and Agricultural Engineering

John and Mary Lib White Endowed Systems Integration Chair in Industrial Engineering, Haitao Liao, Professor, Industrial Engineering

Earl J. and Lillian P. Dyess Endowed Chair in Engineering, Heather Nachtmann, Professor, Industrial Engineering and Associate Dean, College of Engineering

Ray C. Adam Endowed Chair in Chemical Engineering, Jorge Almodavar, Assistant Professor, Chemical Engineering

Robert E. Babcock, Sr. Endowed Professorship in Chemical Process Safety and the Environmental Fate of Chemicals, Audie Thompson, Assistant Professor, Chemical Engineering

The Twenty-First Century Endowed Professorship in Biomedical Engineering, Chris Nelson, Assistant Professor, Biomedical Engineering

Kevin W. and Marie L. Brown Department Head Chair in Chemical Engineering, Keisha Walters, Professor, Chemical Engineering

James M. Hefley and Marie G. Hefley Endowed Professorship in Logistics and Entrepreneurship, Sandra Eksioglu, Professor, Industrial Engineering

The Twenty First Century Professorship in Mechanical Engineering, Keith Walters, Professor,
Chemical Engineering

Vacant Chairs

Charles W. Oxford Endowed Professorship in Emerging Technologies

Jim L. Turpin Endowed Professorship in Chemical and Biochemical Separations

Louis Owen Endowed Professorship in Green Chemical Process Design and Development

Maurice E. Barker Endowed Chair in Chemical Process Safety and the Environmental Fate of
Chemicals

The Twenty-First Century Research Leadership Chair

The Twenty-First Century Research Leadership Chair

Ralph E. Martin Endowed Professorship in Chemical Process Engineering