

UNIVERSITY OF NORTH TEXAS

MECHANICAL & ENERGY ENGINEERING

ANNUAL REPORT

2016-2017



EST. 1890

COLLEGE OF
ENGINEERING



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MESSAGE FROM THE CHAIR



KURUVILLA JOHN Ph.D.

Welcome to the Department of Mechanical and Energy Engineering at the University of North Texas! The department is committed to educating globally competitive engineers and tomorrow's leaders by teaching innovative courses and conducting leading edge research within the broad area of mechanical and energy-related sciences.

Mechanical engineers have been at the forefront of every major innovation and change in the world during the recent times. By being leaders in solving some of the most challenging problems in the areas of aerospace to space exploration to alternate energy to nano-engineering to innovative materials for biomedical and energy applications, mechanical engineers have made a global impact. Today, we are facing an ever-changing world that calls for urgent solutions to balance both human needs and the nature around us, especially pertaining to energy-related issues. The need for engineers with both mechanical and energy engineering skills has never been greater.

We are 10 years young and growing rapidly. The Mechanical and Energy Engineering program at UNT has seen record growth in recent years, and with an undergraduate enrollment of 795 students and a healthy graduate enrollment of 65 M.S. and 20 Ph.D. students, it is the most sought after major within the college of engineering. Over the past decade, we have produced

over 560 MEE alumni who are located in Texas and beyond, and they are continuing to serve as contributing members in the global engineering community. Former MEE graduates can be found in key positions in some of the leading companies in Texas and around the world.

In the Department of Mechanical and Energy Engineering at UNT, we are educating today's engineers to be tomorrow's leaders. Companies seeking problem-solving leaders are looking at our department as a source of new talent because of our reputation for high quality student and program performance. Our students are engaged in solving industrial problems through capstone senior design projects. During the past year, local area industries generously sponsored 15 of our 34 senior design teams.

Through innovative curricula and research activities, our nationally and internationally acclaimed professors engage students in a unique, interactive learning environment that facilitates academic excellence and prepares our students for their future careers while earning a B.S., M.S., or a Ph.D. degree in MEE at UNT. Faculty and students in MEE are conducting research in areas related to energy and the environment, sustainable products and systems, biotechnology, nanotechnology, materials for energy storage, advanced manufacturing and renewable energy systems. Our faculty have generated nearly \$1 million in research funding and published over 30 papers with our students this past year.

I invite you to explore MEE at UNT and see what we have to offer. Whether you are a prospective student or parent, an alumni, or a stakeholder, I encourage you to visit UNT, meet our dedicated students, faculty, and staff, and tour our state-of-the art facilities. This annual report attempts to provide a brief overview of our program and some of the highlights from 2016-2017. If you need additional information about our program, please feel free to contact me.

Sincerely,

Dr. Kuruvilla John

*Professor and Chair
Department of Mechanical and Energy Engineering*

FACULTY



Dr. Kuruvilla John
Professor and Chairman

Dr. Kuruvilla John serves as Professor and Chairman of the Department of Mechanical and Energy Engineering. He earned his M.S. and Ph.D. degrees in chemical engineering from the University of Iowa. His research interests are in the area of environmental sustainability with a focus on air quality monitoring, modeling and assessment. He has been instrumental in securing over 40 research contracts, grants and projects worth over \$15 million from various industries and funding agencies.



Dr. Nandika D'Souza
Regents Professor, Associate Dean of Undergraduate Studies

Dr. Nandika D'Souza received a B.E. in polymer engineering from the University of Pune, a M.S. in Mechanical Engineering (Materials Program) from Auburn University and a Ph.D. in mechanical engineering from Texas A&M University. Her research interests are in reliability and design of multifunctional heterogeneous materials, blends, alloys, composites and nanocomposites.



Dr. Vish Prasad
Professor

Dr. Vish Prasad received his Ph.D. from University of Delaware and M.Tech. He has published over 200 peer-reviewed and invited papers and made numerous presentations nationally and internationally in heat transfer, materials processing (crystal growth, thin films, and thermal spray), and manufacturing. Dr. Prasad has three patents to his credit and has received more than \$25 million in research grants and contracts from NSF, DOE, DOD, and industry either as a PI or Co-PI.



Dr. Wonbong Choi
Professor

Dr. Wonbong Choi is a tenured, full professor in the Department of Materials Science and Engineering and jointly appointed to Department of Mechanical and Energy Engineering. His research interests include 2D materials, graphene, carbon nanotubes, energy storages, and ubiquitous electronics.



Dr. Tae-Youl Choi
Associate Professor

Dr. Tae-Youl Choi's research focuses on small scale manufacturing and instrumentation such as characterization of micro and nanoscale thermal properties. In addition to his research he has 15 years of academic experience and currently supervises multiple PhD and Masters students. He has extensive publications, 69 refereed technical papers with 41 journal papers and 29 peer-reviewed conference proceedings.



Dr. Sheldon Shi
Professor

Dr. Sheldon Shi has published more than 160 journal papers and professional conference proceedings; served as reviewers for more than 30 professional journals, standard organizations and federal funding agencies. His research is in the area of manufacturing of natural fiber functional composite bioproducts and nanocomposites, biomass to carbon conversion through pyrolysis process, and solid waste recycling processes. He has been serving as PI or Co-PI for federal research projects funded by National Science Foundation, Department of Energy, U.S. Department of Agriculture, and industry sponsors.

FACULTY



Dr. Weihuan Zhao

Assistant Professor

Dr. Weihuan Zhao's research areas are in thermal-fluid sciences, including heat transfer, thermodynamics, and fluid dynamics. Her research activities include the thermal energy storage system for the concentrated solar power plant and also the thermal management technologies for other electric components, devices and equipment. She is also the lead researcher working in The Zero Energy (ZØE) Research Laboratory.



Dr. Mark Wasikowski

Associate Clinical Professor, Senior Design Coordinator

Dr. Wasikowski has 30 years extensive experience spanning industry, academia, research, teaching, and government. His broad interests in engineering science include applied physics / math, statics, dynamics, fluid mechanics, thermodynamics, hydraulics, mechanics of materials, dynamics and controls, machine design, machine dynamics, multi-body finite element methods, structural dynamics, aerodynamics, aeroelasticity, and design.



Dr. Cherish Qualls

Associate Chair, Senior Lecturer

Dr. Cherish Qualls received her Ph.D. in aerospace engineering from Auburn University. During her graduate studies, she was a member of the Tethered Satellite Working Group, which was funded by the U.S. DoD. She worked at Lockheed Martin Missiles and Fire Control as a Senior Systems Engineer working on guidance systems development. Her research on tethered satellites has been published in multiple journals, and she has presented at several national conferences.



Dr. Xiaohua Li

Senior Lecturer

Dr. Xiaohua Li received a B.S. in theoretical and applied mechanics from Lanzhou University and a Ph.D. in mechanical engineering from Florida International University. He has published several journal articles and conference publications in his career.



Dr. Sheila Williams

Lecturer

Dr. Sheila Williams received her PhD in mechanical engineering from Southern Methodist University. During her graduate studies, she focused on flow field feature extraction and correlating them to kinetics of the flow field and turbulence in porous media. Her research led to multiple highly reviewed publications and conference presentation. In 2014, she was awarded the outstanding ASME Graduate Student Award.

ADJUNCTS

Mr. Thomas Allsup
Dr. Azize Akcayoglu
Mr. James Brauer
Dr. Liping Cai
Dr. Uma Choppali

Mr. Jerry Davis
Dr. Hyeonu Heo
Dr. Ramakrishna Koganti
Dr. Kaiwen Liang
Dr. Junghyon Mun

Mr. Ray Pahler
Dr. Ruth Pierson
Dr. Suresh Rao
Dr. Mike Shenoda
Dr. Shaojie Wang

NEW FACULTY



FACULTY TEACHING AWARD

Dr. Wasikowski was recently appointed as a Clinical Associate Professor, the first of its kind in the College of Engineering. Dr. Wasikowski joined the faculty of the Mechanical and Energy Engineering Department at the University of North Texas in the fall semester of 2016. In this capacity, he serves to bridge the gap between basic and applied research with practical clinical applications in industry and develop new industry relationships. He brings 30 years of extensive industry, government, and applied research experience as a practicing engineer to students and the department.

Along with serving as adjunct faculty at UNT, UTA, SMU, and TCU, he previously worked in the rotorcraft and helicopter division of Bell Helicopter Textron in Fort Worth as an Aerospace Engineer for 20 years. Prior to that, he worked at Georgia Tech Research Institute, Rand Corporation, and the US Army. His teaching and research interests in engineering science include mechanical systems, robotics, mechatronics, aerospace, and automated manufacturing. As a Clinical Professor, his teaching focus includes senior design, machine design, and core mechanical engineering courses.

He holds several patents in helicopter design and has published over 10 refereed journal articles. He has been active in professional societies such as the American Helicopter Society (AHS), the American Institute for Aeronautics and Astronautics (AIAA), and the American Society for Mechanical Engineers (ASME). He earned his BS in Aerospace Engineering from Purdue and his MS and PhD from The Georgia Institute of Technology. He is an Army Rotorcraft Fellow and has received the Lawrence D. Bell Pioneer award nomination for technology innovation.

STAFF



Robbin Shull
Lab Supervisor



Natarsha Joseph-Hall
Administrative Coordinator



Kelli Butler
Administrative Specialist



Erin Allice
Administrative Specialist

ZHAO ZEROES IN ON RESEARCH

Assistant Professor, Dr. Weihuan Zhao is one of many new faces in the ever-growing Department of Mechanical and Energy Engineering. As one of only two primary researchers at the Zero Energy Lab following former Department Chair Dr. Yong Tao's departure, Zhao is diving head first into her work.

The Zero Energy Research Laboratory, the only building of its kind in Texas, is designed to test and demonstrate various alternative energy generation technologies to achieve a net-zero energy consumption of energy.

It's the perfect place for Zhao to work on her research, which zeroes in on thermal-fluid sciences, including heat transfer, thermodynamics and fluid dynamics.

"The Zero Energy Laboratory allows us to test building energy savings as well as human physiological and psychological responses through modulating room temperatures, lighting conditions, and so on in a specific space. It has a lot of renewable devices – solar panels, geothermal heat pumps, and wind turbines – that allow us to collect data that provides guidelines for how the current renewable energy technologies work, allowing us to compare with our new technologies to seek their improvements on building," said Zhao. "It also helps us integrate a lot of our research elements, such as when we want to integrate a small part of the storage system – like the HVAC with the geo-thermal pump system – the lab and the data already collected helps us to see the improvements we've made in heat transfer."

Zhao currently has three graduate students working under her. One student is working on improving the HVAC efficiency in the building. The other student is looking into phase-changing materials embedded in the building envelope and how they improve building energy efficiency. Another student, Caleb Traylor, who studied under Dr. Tao and graduated this year, is researching how temperature relates to building energy savings and comfort.

"Working in the Zero Energy Lab has been great, because I have been able to see all the technologies up close. I've been able to learn what goes into the solar and wind power systems, the rainwater system, and the HVAC system, etc.," said Traylor, a graduate student in the Department of Mechanical and Energy Engineering. "My research in human thermal comfort and finding ways to heat and cool buildings that will save energy has revealed how much goes into analyzing our energy usage. So much goes into researching the things that use energy and the reasons we do them; it's been interesting to be able to contribute in this growing field."

"The students at UNT are very hard working and smart," said Zhao. "They're willing to explore different research activities to advance their knowledge."

Zhao also teaches three classes: Introduction to Heat Transfer, Conduction and Radiation Heat Transfer, and Computational Heat Transfer and Fluid Flow.

"This department is an excellent fit for my background," she said. "The department is very new – under 10 years – and has room to grow. As a new faculty, I can get more involved in research activities and have a lot opportunities for advancement."



RESEARCHER STUDIES OZONE THROUGH AIR QUALITY MONITORING AND MODELING

Dr. Kuruville John, chair of the Department of Mechanical and Energy Engineering, has been engaged in air quality research for over 30 years – contributing specifically to the study of ozone, that is. The chemical engineer says he first got his start researching acid rain at the University of Iowa, but moved to the more cutting-edge topic of ground-level ozone pollution shortly after his post-graduate studies.

“I was fascinated by acid rain, and I was using complex atmospheric models to study the problem over the Northeast, but at that point in time, the acid rain problem was nearly solved and research funding was waning, so then I shifted my focus studying yet another harmful secondary pollutant: ozone,” said John.



Now, John uses atmospheric modeling and monitoring tools to help identify sources of ozone pollution in the atmosphere. The ozone in the lower atmosphere can cause serious health problems among susceptible populations residing in highly-polluted areas. “Ozone is a primary component of smog in major urban areas and is formed from the photochemical reaction of precursor gases during the warm months,” said John. “When there’s high ozone levels in urban areas, people can have trouble breathing and their eyes can become irritated.”

By setting up four ozone monitoring stations strategically located in various locations around urban and rural areas in South Texas, John was able to monitor the air and track the data in minute increments. He then uses the data to run model simulations of various real-world scenarios – such as closing a large emitter of oxides of nitrogen and/or volatile organic compounds within the model to study the impact of emissions on urban and regional air quality – that may not be possible in current everyday life.

“When I started my academic career and was working with the City of Corpus Christi, we learned that ozone was influenced by wind patterns and would carry over into rural areas, affecting the people in those areas just as much as people in urban areas,” he said. “With these monitoring stations, we can see that ozone levels have gone down over the years, and now we also have really good long-term data available to the research community.” But, since moving to UNT in 2009, John is puzzled by a new mystery occurring at UNT’s own Discovery Park campus.

“A few years ago, some of my students set up a station near the Zero Energy Lab to track ozone levels here at Discovery Park,” he said. “What we found interesting was that the levels measured were consistently higher than those measured at a nearby station located at Denton Airport. So, of course, we checked our equipment and ran additional tests, but they kept recording higher levels during the ozone season. So, now, I am intrigued with what is contributing to these higher levels.”

This summer, John plans to run more tests out at Discovery Park to try and solve this mystery. He will be conducting measurements of ozone and fine particulate matter both indoors and outdoors at the Zero Energy Lab. He will also be acquiring instrumentation to measure other smog pollutants, including oxides of nitrogen, volatile organic compounds, ammonia, sulfur dioxide, methane, carbon monoxide, carbon dioxide and nano-particles. This will be a first of its kind, a truly net-zero air quality monitoring station. “I never thought I’d be continuing to study the ozone problem for this long, but 30 years later I’m still doing it.”

TECHNICAL SEMINARS

Investigation of graphite foam infiltrated with phase change material for a high-temperature latent heat thermal energy storage (LHTES) system

Dr. Weihuan Zhao

Assistant Professor, Mechanical & Energy Engineering, University of North Texas

Materials for Energy Storage

Dr. Dervis Emre Demirocak

Assistant Professor, Mechanical & Industrial Engineering, Texas A&M University at Kingsville

Specific Heat Mechanism of Molten Salt Nanofluids

Dr. Donghyun Shin

Assistant Professor, Mechanical & Aerospace Engineering, The University of Texas at Arlington

Vehicle Dynamics

Dr. Steven Ma

Adjunct Professor, The University of Texas at Arlington

Combined Bending and Torsion Failure Analysis

Dr. Sheikh Ferdous

Visiting Assistant Professor, Binghamton University
Adjunct Faculty, State university New York at Stonybrook

Free Body Diagrams

Dr. Sheila Williams

Visiting Lecturer, Department of Mechanical Engineering, Southern Methodist University

Boron Nitride Nanotubes and Its Applications

Dr. Jaewoo Kim

Principal Researcher, Korea Atomic Energy Research Institute
Professor, University of Science and Technology, Korea

Computational Modeling of the Brain: Development, Health, and Disease

Maria Holland

Ph.D. Candidate, Department of Mechanical Engineering, Stanford University

Deep Learning for Autonomous Driving

Dr. Branislav Kisacanin

NVIDIA

Understanding Microstructural Evolution

Dr. Jacob Bair

Post-Doctoral Fellow, Brigham Young University

Computational Fluid Dynamics for Biofluids and Biomimetic Design

Matthew Ballard

Ph.D. Candidate, Woodruff School of Mechanical Engineering, Georgia Institute of Technology

Particle Dynamics in Confined Systems with Vortex Flows and Chemical Gradients

Jesse Ault

Ph.D. Candidate, Department of Mechanical & Aerospace Engineering at Princeton University

Computational Materials Science at Engineering and Atomic Scales in a Composite Application

Dr. Xiawa Wu

Computational Materials Scientist, Sentient Science

High-Fidelity Computational Methods for Ocean Vehicle Dynamics

Dr. Hamid Sadat-Hosseini

Adjunct Assistant Professor, Department of Mechanical & Industrial Engineering, University of Iowa

Initiation of Force Transmission in Tiny Adhesions of Adherent Cells

Dr. Sangyoon J. Han

Postdoctoral Researcher, Department of Bioinformatics & Department of Cell Biology, University of Texas Southwestern Medical Center

Developing Advanced Composites for Extreme Environments

Dr. Nikhil Gupta

Associate Professor, Composite Materials and Mechanics Laboratory, Mechanical & Aerospace Engineering, Tandon School of Engineering, New York University

Reliability of Electronic Devices: Past, Present and Future

Dr. Cemal Basaran

Professor, Director, Electronic Packaging Laboratory, University at Buffalo

Computer-Vision Systems for Industrial Applications

Dr. Bugao Xu

Professor, Chair, Department of Merchandising & Digital Retailing University of North Texas

Nanofabrication and Nanopatterning of Carbon

Nanomaterials for Flexible Electronics

Junjun Ding

Ph.D. Candidate, Stevens Institute of Technology

Failure Analysis of Composites: Micromechanics Approach

Hamsasew Sertse

Ph.D. Candidate, Purdue University

Developing Technologies for Sustainable Energy Future

Dr. Hailei Wang

Research Assistant Professor, Mechanical, Industrial & Manufacturing Engineering, Oregon State University

Thermal Properties of Carbon-Based Nanomaterials

Dr. Richard Z. Zhang

Aerospace Corporation

Multifunctional Materials for Energy Conversion and Surface

Roughness Control

Dr. Russell Reid

U.S. Naval Research Laboratory, Materials Science & Technology Division

CAPSTONE PROJECTS

COMPANIES REAP BIG BENEFITS FROM CAPSTONE PROJECTS

The UNT MEEN Department had an amazing response to its recent request for corporate sponsors and mentors in The Engineer's Aerie – the UNT capstone senior design experience is required for every undergraduate engineering student. Professor of Practice, Dr. Mark Wasikowski, teaches the Senior Design course which equips student teams of three to five seniors for success in a year-long process requiring them to design, build, test and document a mechanical hardware project.

The Engineer's Aerie allows a corporate mentor to guide students through a realistic project defined by the company. Sponsors check in every week or two for progress briefings and to steer when needed. Each project directly benefits the sponsoring company in that any designs, prototypes, test results, and documentation are turned over without further licensing or fees when the project is completed.

Ten companies committed in fall semester 2016 to provide both the sponsor's fee and a mentor. These include Capstone Metering, Custom Computer Cables, Forney Corporation, GE Transportation, Kinetic Inc., Lockheed Martin, Mayday Manufacturing, PolyPrinter, Triumph Aerostructures and Zyvex Labs.

Up to five additional capstone projects will be integrated into this year's racing car built by the UNT Mean Green Formula SAE Auto Racing Team – an endeavor in which many MEEN students participate. "Many companies and individuals sponsor Mean Green Racing each year," according to Team President Kyle McDougal. "We are happy to provide sponsor recognition – including placing your corporate logo or name on the car for funding, material or services valued at \$500 or more."

While most projects are done at Discovery Park it is also possible for students to do a project in a company facility if they are within a reasonable drive from Denton. Students will also sign a non-disclosure agreement if needed.

Dr. Wasikowski summarizes the experience as a "win-win situation in which the sponsoring company gets to vet engineering students who are solving a real engineering problem, while the students get very real engineering project team experience with a real company, real deadlines, a real budget, and a real need for regular and honest reporting of their efforts."

MEEN Alumni with "B list" projects that are important to accomplish and interested in sponsoring and mentoring such a project, may contact Dr. Tom Derryberry, Assistant Dean for Corporate Relations at 940-565-4324 or tom.derryberry@unt.edu. Dr. Derryberry encourages MEEN Alumni to "bring it on, because there's always room for another capstone project sponsor." He adds, "It's also a great way for MEEN Alumni living in the Metroplex to give back to the UNT College of Engineering while also playing a direct role in educating the next generation of engineers." See also The Engineer's Aerie webpage: <http://engineering.unt.edu/capstone>

MEEN Alumni interested in sponsoring Mean Green Auto Racing may contact Mr. Angus McColl, Senior Director of Development at 940-565-2180 or angus.mccoll@unt.edu McColl can also provide information about many other ways to give to the MEEN Department and UNT College of Engineering.



SENIOR DESIGN

TEXAS GREEN TEAM

"Participating in the DOE Race to Zero Student Design Competition strengthened our will to persevere when faced with a rigorous challenge, gave us the opportunity and the confidence to share our ideas with industry leaders, and helped us develop relationships among members of the green building community nationwide."

Alyssa Sylvester of the Texas Green Team



Second person left-to-right is Skylar Andrae, Katie Welch, Anissa Kappayil, and Alyssa Sylvester

The department would like to congratulate the Texas Green Team for their participation in the Department of Energy's 2016 Race to Zero Design Competition. The team comprised of Skylar Andrae, Alyssa Sylvester, Katie Welch, and Anissa Kappayil who used the competition to meet their Senior Design requirements. The competition has students design a complete house (including architecture, working systems, and interior finishes) to the Zero Energy Ready Home certification guidelines. A Zero Energy Ready home is one that uses cost effective strategies to reduce the consumption of energy within the home down to a minimum level to lessen the cost of renewable energy systems.

The team had to first create a design concept in one of four areas: Suburban Single-Family, Urban Single-Family, Attached, or Small Multifamily. From this design concept, submitted fall of 2015, teams were selected from each category and invited into the full competition with a presentation of the final design at the National Renewable Energy Laboratory in Golden Colorado. The final presentation was over two days and consisted of 31 teams from 23 Universities.

For the competition, the team decided to partner with Denton County Habitat for Humanity. They saw the collaboration as a way to help Habitat for Humanity learn how they could improve the efficiency, comfort, and durability of their homes while still meeting the very strict budgetary constraints for the affordable housing market. After many, many, ...many hours of work, the team was able to successfully create a design that saw the home's projected energy usage reduced by 53% when compared to the 2006 International Energy Code and prior to a photovoltaic system with an estimated cost for construction of \$100,008. The national average for a similar-size Zero Energy Ready Home is \$215,321, as provided by the Department of Energy ZERH calculator.

SENIOR DESIGN

MEE's Senior Design program is the culmination of the undergraduate MEE degree program where seniors are able to apply their engineering knowledge and showcase their abilities through the completion of challenging, real-world design problems. The program is made up of a two-semester course sequence.

Senior Design Day is held twice a year once in the Fall and in the Spring, it is a unique opportunity for companies, organizations and individual entities to partner and interact with UNT College of Engineering students. The day starts off with poster and prototype displays giving everyone a chance to walk around, meet and interact with the teams on a one-on-one basis. Afterwards the teams will give oral presentations before an audience of peers, experts from industry, and faculty.

SPRING 2016

ASME - HUMAN POWERED VEHICLE

Sponsor: **ASME**

Team Members: Ryan Burch, Armstrong Ekpete, Thomas Rather III, and Martin Steenbock

AUTOMATED AQUAPONICS SYSTEM

Sponsor: **Mark Smith**

Team Members: Zachary Cole, Joshua Conner, James Masler, Matthew McIntosh, and Jonathan Rogers

BIOMASS GASIFIER

Team Members: Brodie Coleson, Justin Cox, Madden Mengwasser, Kevin Niamkey, Kelsey Sanders, and Liu Qi

ENCORE WIRE

Sponsor: **Encore Wire**

Team Members: Sarah Forester, Teresa Gaitan, and Samantha Stodola

EZ-BREAKER

Sponsor: **Stout International LLC**

Team Members: Jose Pineda, Nicholas Huggins, Jacob Essy, John Mora, Israel Gonzalez, Victor Muro, and Gayland Waindim

HUMAN POWERED VEHICLE

Sponsor: **ASME**

Team Members: Nicholas Croker, Anthony Taylor, Andrew Wright, Quintin Zipper, and Jacob Bagwell

IAM3D CHALLENGE

Team Members: Christian Gilbreth, Jake Popkin, and Tristan Sartor

NATURAL FIBER BOAT HULL

Sponsors: **Molded Fiber Glass (MFG), MultiCam Inc., Hemp Solutions**

Team Members: Adil Dadabhoy, Michael Hackett, Alexander Nuanes, Troy Eakins, and Robert Miller

PARAGON HUMAN POWERED VEHICLE

Team Members: Eric DeLaPaz, Thomas Payton, Caleb Flucker, and Christopher Weatherspoon

RASC-AL AADS SUB GROUP

Team Members: Philip Branz, Drew Fisher, Amber Medina, and Shane Summers



SAE AERO

Sponsor: **SAE**

Team Members: Jose Carrillo, Cameron Cummins, Gustavo Macias, Hector Martinez, and Ampelio Mendez

SAE FORMULA ENGINE

Sponsors: **Go Engineer, Peterbilt, SGA, ETEC, NGK, Deatsch-Werks, SolidWorks, SAE**

Team Members: Justin Vincik, Clayton Jalili, Christopher Whitehead, and Pawit Jullawatilert

SHELL ECOMARATHON

Sponsors: **SAMPE, Acorn Glass Company**

Team Members: Matthew Carroll, Theodore Scheurman, Kristopher Carmona, Rupesh Budhathoki, Steve Burns, and Devin Skelton

SPINAL FIXATION SYSTEM

Sponsor: **Orthofix**

Team Members: Firas Asfoor, Alex Carmen, Jamie Carson, and Jalyn Nickerson

TEXAS GREEN TEAM

Team Members: Adam Miller, Katie Welch, Alyssa Sylvester, Anissa Kappayil, and Skylar Andre

TROPHY TRUCK

Team Members: Stephen Watts, Adam Lunn, Jerod Bond, Glen Glass, and Howard Hunter

SENIOR DESIGN

FALL 2016

CANINE BRACE

Team Members: Madeline Edwards, Corey Hooker, Katherine Ivey, and Jordan Julius

COOL UNDER FIRE

Faculty Choice Award Winner

Team Members: Jonathan Jacobson, Benjamin Froehlich, Zachary Caldwell, and Alvaro Fuentes

ELECTRIC SUBSTATION STATIC DESIGN

Sponsors: **Denton Municipal Electric**

Team Members: Jerin Thomas, Donald Martinez, Ifeanyichukwu Azogu, and Geoffrey Ekwelum

ENERGY EFFICIENT WALL

Sponsors: **84 Lumber, Huitt-Zollars**

Team Members: Mohammad Alshabeeb, Amy Bolanos, Clayton Kelly, and Sarah Smith

FENCE STRETCHER

Faculty Choice Award Winner

Team Members: Moses Aguilar, Jason Martin, Kade Morse, Kolt Shepherd, and Alexandra Wintz

GREENNEST

Team Members: Sheldon Cook, Sarah Peña, and Dylan Young

MAYAX LIQUID 3D PRINTER

Faculty Choice Award Winner

Team Members: Ali Almudhry, Ali Almutaliq, Miguel Grajales-Castro, and Yuqi Jin

PEDAL TO GREEN POWER

Faculty Choice Award Winner

Team Members: Aramis Finley, Muteb Alhajri, Farshid Ghahremani, Ahmed Okedele, and Beatrice Oghenede

SAE SUSPENSION

Faculty Choice Award Winner

Sponsors: **AAA Electric Motors, SAE, Mountian View College, Solidworks**

Team Members: Daniel Cooksey, Ruben Lopez, Joseph Maravilla, Yashin Robles, Brandon Weaver, and Kofi Wellington

SOLAR HEATED WATER TANK

Team Members: David Pecina, and Adam Miller

TURBINE TEST STAND

Faculty Choice Award Winner

Sponsors: **Principal Technology, Encore Wire**

Team Members: Nelson Fearn, Zeke Garcia, Chris Jilek, George Oreta, and Brandon Salinas



SENIOR DESIGN

SPRING 2017

5 STAR - DRUM RESIN MIXER

Team Members: Chris Miles, Eric Gilstrap II, Alina Meakin, Gerald Onyekonwu, and Collins Chukwuka

AMI - GOLF CART POWERED BY SOLAR POWER

Team Members: Ahmed Almandhari, Ibrahim Alduways, and Mansoor Al-busaidi

ASME - GE

Sponsors: **GE Transportation**

Team Members: Jonathan Thibodeaux, Adam Bonilla, Calum Fletcher, Sonja Sorbye, and Mohammed Abualraha

BENCHWARMERS

Sponsors: **Capstone Metering**

Team Members: Robert Myers, Alejandro Rivas, Raul Salvador, Riley Walberg, and Grant Wuensch

BOARD ENGINEERS

Team Members: David Bracewell, Yichun Cai, Dylan St. John, Aubrey Kingman, and Mohammed Al Marzooq

CARRIER

Sponsors: **Marlow Industries**

Team Members: Ange Aluku, Samantha Brophy, William Edwards, Nathan Groover, and Scott Howell

DESIGNERS

Team Members: Ahmed Alghamdi, Abdulaziz Rasheed, Hesham Gazany, and Nasser Alsaeed

FSW - ELECTRONICALLY ASSISTED BICYCLE SYSTEM

Team Members: Colton Kadlecck and Shuai Zhang

FURIOUS 5 - HUMAN POWERED VEHICLE

Sponsors: **Affordable Welding Services**

Team Members: Ifeanyi Agolua, Majid Alatowi, Jerrell Cook, Obinna Nwaobia, and Unwana Iwot

GE - AUX

Sponsors: **AFISCO Industrial Inc., Earl R. Waddell & Sons Inc, and GE Transportation Inc.**

Team Members: Mohaned Dewaidi, Christopher Dobbs, Stephen Ellis, Corey Rockefeller, and Joseph Wyman

HOIST AWAY

Faculty Choice Award Winner

Sponsors: **CCC Power**

Team Members: Jacob Behning, Jonathan Garcia, Zachary Garner, Brian Hardy, and Hannah Wilcox

KILLA - WATTS - HYDROELECTRIC TEST STAND & TURBINE DESIGN

Team Members: Xavier Castelazo, Dakota Bower, Sarah Minette, Garrett Inkster, and Cody Tilghman



SENIOR DESIGN

MAYDAY ENGINEERING

Sponsors: **Mayday Manufacturing**

Team Members: Tyler Chidester, Ian Morrow, Clark Limbaugh, Daniel Whitaker, and Jamie Wood

MEEN GREEN

Sponsors: **CertainTeed**

Team Members: Christian Stephens, Luis Ramirez, Juan Espinosa, Roque Rivas, and Tyrone Thompson

PDQ PRINTING

Sponsors: **PolyPrinter**

Team Members: Robert Cline, Caleb Tallakson, Jacob Long, and Brian McConnell

POLYFOAM

Faculty Choice Award Winner

Team Members: Mariela Alvarez, Hans Roehrig, Lex Schindler, and Aaron Sundquist

ROCKET

Faculty Choice Award Winner

Sponsors: **Anida Technologies, Lockheed Martin, Solidworks, NASA, and George, Jack, and Suzy Sprague from DARS**

Team Members: Luis Gonzalez, Jessica Hampton, Lindsey Smith, and Joel Thompson

SMITH

Faculty Choice Award Winner

Sponsors: **Aztec Renewable Energy**

Team Members: Leroy Ahwinahwi, Hamad Alomani, Jeremy Riggs, and Robert P Smith

TOP GEAR

Faculty Choice Award Winner

Team Members: Tafadzwa Nigel Chimwaza, Emily Seo, Landon Stinnett, and Connor Wright

TORCH SQUAD

Sponsors: **Forney**

Team Members: Jordan Hollingsworth, Shannon Smith, Eric Tien, and Sofia Weir

TRIUMPH

Faculty Choice Award Winner

Sponsors: **Triumph Aerospace Structures**

Team Members: Sarah Bundy, Brandon Leney, Ryne Spears, Preston Stalter, Blake Stewart, and Phai Thach

THE WATER CYCLE

Team Members: Sam Abraham, Roy Aguh, Kyle Croft, Cassidi Mercereau, and John Merkaje

ZYVEX

Sponsors: **Zyvex Laboratories, Dr. James Owen**

Team Members: Ryan Tharp, Nathaniel Goode, Eric Goode, Joseph Andrew Grimm, and Gerson Perez-Rios



AWARDS



**Outstanding Teaching Assistant
Trent McInturff**

OUTSTANDING AWARDS



**Outstanding Graduate Student
Ramesh Shrestha**

Not Pictured
**Outstanding Undergraduate Student
Adil Dadabhoy**



DEPARTMENT SCHOLARSHIP WINNERS

The Department of Mechanical and Energy Engineering at the University of North Texas offers competitive scholarships each academic year. A few of the Department Scholarship recipients are from left to right: Karthik Alagarsamy, Lex Schindler, Devin Bryce Skelton, and Omar Musa Almahmoud.

AWARDS

2016 (FPS) WOOD AWARD

MEEN Ph.D. student **Changlei Xia** received 1st place for the 2016 Forest Products Society (FPS) Wood Award for his work on “Self-activation for Activated Carbon from Biomass: Theory and Parameters” conducted under Prof. Sheldon Shi. The Wood Award recognizes and honors the most outstanding research conducted by graduate students in the field of wood and wood products. As first place winner of the Wood Award, Changlei was recognized at the Award Luncheon at the 2016 70th FPS International Convention, in Portland, Oregon and received a \$1,000 honorarium as well as an engraved plaque. Changlei Xia just received his PhD degree (May 2016) in Mechanical and Energy Engineering from University of North Texas (UNT), and was honored as an Outstanding Doctoral Student in April 2016 at UNT. Changlei has published 19 peer-reviewed journal papers and secured one patent.



Changlei Xia receiving the First Place Wood Award at the 70th International Convention in Portland, Oregon. Pictured left to right: Dr. Sheldon Shi, Changlei Xia, and Dr. Richard P. Vlosky

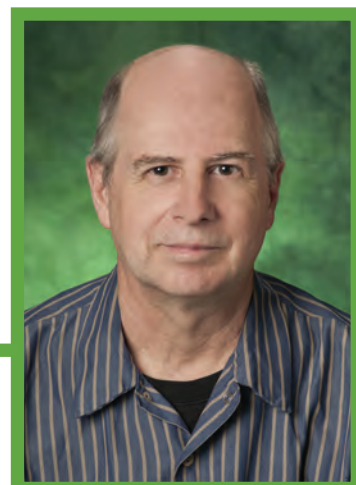


FACULTY TEACHING AWARD

Dr. Cherish Qualls received UNT's Faculty Teaching Award in Spring 2016.

STAR PERFORMER AWARD

Robbin Shull received UNT's Star Performer Award in Spring 2016.



JOSEPH KORUTH, M.S. 2012

"In 2007-08, when the recession struck, I was one of the lucky few who landed a good job immediately after obtaining an undergraduate degree in Mechanical Engineering. There was always a longing to expand my knowledge in my area of interest, which happened to be very specific: energy engineering from a Mechanical Engineering perspective with focus on environmental impacts due to energy generation. I did research for the best universities that offered this type of combination course, and my search ended at the Department of Mechanical and Energy Engineering (MEE) at the University of North Texas. I was very excited since the courses that were offered fit perfectly with my interests.



Starting UNT in 2010, I was fortunate enough to be part of Dr. Kuruvilla John's research group. Our research focused on air pollution in the Dallas Fort Worth area, while my course work covered Energy Engineering related topics. During my time at UNT I was awarded the most Outstanding Graduate Student for two years in a row, and I was blessed enough to represent UNT in an International Case Study competition in Denmark conducted by Vestas, the world's largest wind turbine manufacturing company. My team was the underdog as we competed against smart minds from Harvard and Stanford and we won the competition.

The opportunities and training at UNT prepared me to apply and secure a leadership position with Kohler Co, a world-leader in plumbing industry. I started off as a Mechanical Project Engineer and in just under two years I became the New Product Development Project Manager, a jump that ordinarily takes seven to ten years. In this position, I currently manage both domestic and international projects and some of my projects secured awards both internally and externally. Today, I am PMP certified and currently pursuing an MBA to further develop myself. Looking back at those late nights and long days at UNT I can't help but feel thankful towards my Professors Dr. Kuruvilla John, Dr. Srinivasan Srivilliputhur, and the MEE department for pushing me to achieve more than I thought I could. Their efforts played a tremendous role in getting me to where I am today. As an alumni, I have faith in the Department of Mechanical and Energy Engineering, and that it will play a great role in molding a strong future for their students."

Joseph Koruth
New Product Development Project Manager
Kohler Co, Sheboygan, Wisconsin



AHMED ABOOD, M.S. 2014

"I am a Process Engineer for Aereon Jordan Technologies; a company leader in vapor control and recovery. As Process Engineer I have designed different projects thanks to my prior role as product development engineer which was like an extension of my studies and research at UNT. I have developed many testing procedures, research, failure analysis, and projects designs.

Prior to studying in UNT I had B.S. in Chemical Engineering and some energy related projects experience. I was extremely happy to be accepted at the University of North Texas in the Department of Mechanical & Energy Engineering. The unique courses and the help of the friendly staff and knowledgeable professors have prepared me to take many new challenges and advanced my engineering career."

Ahmed Abood
Process Engineer
Aereon Jordan Technologies, Louisville, Kentucky



KELSEY GORMAN, B.S. 2016

"The University of North Texas originally appealed to me because of their Mechanical and Energy Engineering program. This unique degree allowed me to learn both engineering fundamentals and specialized knowledge that sparked my interest. During my time at UNT, I took two classes on LEED (Leadership in Energy and Environmental Design). I also interned at Schneider Electric in their energy performance contracting business. These two experiences went hand-in-hand – I learned fundamentals in the classroom and saw their practical application at work.

After graduation, I began working for Schneider Electric. Since I had interned the previous summer, I was made responsible for the summer 2016 interns' final project. This project consisted of an energy audit of our Carrollton office that would allow me a two week experience as an Energy Engineer. The goals of this energy audit project aligned closely with the goals of LEED certification – to reduce energy consumption and promote sustainability – so I added two LEED credits as part of the project. The interns presented their research and found that Schneider Electric's Carrollton office has reduced water usage by 23.44% by replacing plumbing fixtures and fittings. Overall, I am thankful for UNT's Mechanical and Energy Engineering elective classes. The LEED classes in particular prepared me for my career and gave me value in my workplace!"

Kelsey Gorman
Energy Performance Specialist
Schneider Electric, Carrollton, Texas

DEREK BIGGS, B.S. 2013

"I'm a Mechanical Design Engineer for Plastronics Sockets & Connectors. I started with Plastronics right after graduating from UNT with my Mechanical and Energy Engineering Degree. I have progressed through the company by engaging in lean manufacturing and new design concepts as well as working within existing product lines for manufacturing improvement. Currently I am a Sr. Mechanical Design Engineer where my functions include developing new connectors, thermal management control system design, and mentoring new engineers. At Plastronics, Engineers have a very diverse role in how our products are made by having project ownership.

We manage our projects from start to finish. This enables us to have a wide variety of engineering roles that include design, manufacturing and quality. UNT's MEEN Degree Program gave me the ability to excel at all three of these roles at Plastronics through its course curriculum and its dedicated teachers that push students to not settle for one idea, but to be creative and find a multitude of solutions for whatever problem they were facing. The degree I received from UNT has not only provided me a great start to my career, but it has shown me a new insight to engineering for my company, a greener one."



Derek Biggs
Sr. Mechanical Design Engineer
Plastronics, Irving, Texas

GRADUATES

SPRING 2016

Summa Cum Laude

Dadabhoy, Adil A
Gorman, Kelsey Elizabeth
Miller, Robert D
Skelton, Devin Bryce

Magna Cum Laude

Forester, Sarah Margaret
Gilbreth, Christian Lee
Mengwasser, Madden M
Pineda, Jose J
Zipper, Quintin Xavier

Cum Laude

Carmona, Kristopher Joseph
Carson, Jamie Melinda
Eakins, Troy Alan
Gaitan, Teresa Antonia
Liu, Qi
Sylvester, Alyssa
Welch, Kathryn Michelle
Whitehead, Christopher

Undergraduate

Alfareed, Hussain Ali H.
Andrae, Skylar T
Asfoor, Firas G
Bond, Jerod P
Branz, Philip Andrew
Budhathoki, Rupesh
Burch, Ryan Keith
Burns, Steve A
Carman, Alexandria Denise
Carmona, Kristopher Joseph
Carrillo, Jose Antonio
Carroll, Matthew
Carson, Jamie Melinda
Cheatham, Reed
Coleson, Jt Brodie
Cox, Justin Taylor
Croker, Nicholas Alexander
Cummins, Cameron Shane
Cummins, Matthew D
Dadabhoy, Adil A
Daniel, Joshua Thomas
Delapaz, Eric M
Eakins, Troy Alan
Ektepe, Armstrong Ayibatobara
El-Amin, Nadiyah SharifahEssy,
Estrada, Thomas Joseph
Fisher, Jon A
Flucker, Caleb Issac
Forester, Sarah Margaret
Gaitan, Teresa Antonia
Gallegos, Alexandro Sabas
Gilbreth, Christian Lee
Glass, Glen C
Gonzalez, Israel
Gorman, Kelsey Elizabeth
Hackett, Michael Steven
Huggins, Nicholas
Igwenagu, Kenechukwu Alex
Jacob Dulaney
Jalili, Clayton Thomas
Jullawatilert, Pawit
Liu, Qi
Lunn, Adam Ray
Macias, Gustavo
Martin, Phillip Michael
Martinez, Hector
McIntosh, Matthew Markus
Mendez Jr., Ampelio
Mengwasser, Madden M
Miller, Robert D
Muro, Victor Hugo
Nuanes, Alexander M
Page, Joshua Andrew
Payton, Thomas A
Pineda, Jose J
Popkin, Jacob B
Quintero, Julian Esteban
Rather, Thomas Gordan
Sartor, Tristan L
Skelton, Devin Bryce
Steenbock, Martin Lutz
Summers, Shane S
Sylvester, Alyssa
Taylor, Anthony Donald
Watts, Stephen A
Weatherspoon, Christopher D
Welch, Kathryn Michelle
Whitehead, Christopher
Wright, Andrew J
Zipper, Quintin Xavier

Graduate (M.S.)

Abdulameer, Saif
Ahmadi, Mahdi
Bakare, Taslim Abiola
Bartolini Vinado, Alejandro
Dean, Andrew Wesley
Gage, Holly Anne
Li, Jun
Matin, Maleeha
Mccary, William
Panchagnula, Bharadwaj
Rizvi, Syed Hussain Raza
Warner, Nathaniel Anthony
Wu, Min
Yao, Shulong
Zheng, Xiangqian

Graduate (Ph. D.)

Xia, Changlei
Dissertation: Biomass-derived activated carbon through self-activation process



SUMMER 2016

Undergraduate

Cole, Zachery William
Essman, Jordan D
Hunter, Howard
Charles
Medina, Amber
Mora, John F

Graduate (M.S.)

Agbulom, Chibuzor
Boling, Robyn Nicole
Chailah, Akshay Raj
Kanaparthi, Abhinav
Nichols, Leannah
Marie
Patel, Girish

GRADUATES

FALL 2016

Summa Cum Laude

Froehlich, Benjamin D
Garcia, Zeke F

Cum Laude

Almudhry, Ali Ahmed S
Edwards, Madeline
Kelly, Clayton Davis
Salinas, Brandon Rey
Shepherd, Kolt Lee
Smith, Sarah

Undergraduate

Aguilar, Moses Martinez
Al Wesaibi, Hassan Abdul
Alhajri, Muteb Saeed M
Almudhry, Ali Ahmed S
Al-Mutaliq, Ali Mohammed S
Alshabeeb, Mohammed Jaffer
Bolanos, Amy Z
Conner, Josh Alexander
Cooksey, Daniel Glynn
Edwards, Madeline
Finley, Aramis S
Froehlich, Benjamin D
Fuentes, Alvaro
Garcia, Zeke F
Ghahremani, Farshid
Grajales-Castro, Miguel Angel
Ivey, Katherine J
Jacobson, Jonathan Roy
Jin, Yuqi
Julius, Jordan Elizabeth
Kappayil, Anissa S
Kelly, Clayton Davis
Martin, Jason Ray
Martinez, Donald Anthony
Masler, James A
Morse, Kade A
Nickerson, Jalyn Leynell
Oghenede, Beatrice Elohor
Pena, Sarah Elizabeth
Robles, Yashin
Rogers, Jonathan Levi

Salinas, Brandon Rey
Schuerman, Theodore W
Shepherd, Kolt Lee
Smith, Sarah
Thomas, Jerin Sunny
Waindim, Gayland Jam
Wintz, Alexandra M

Graduate (M.S.)

Brauer Jr., James Michael
Dorreyatim, Mohammad Navid
Garcia, Juan Luis
Grullon Varela, Rodolfo
Lipscomb, Celena Andrea
Mbazouloumou, Cedric
McInturff, Trent
Phanitina, Karthikeyudu
Poudel, Amir
Reese, Gregory A.
Roberts, Richard Braden
Smith, Albert Joseph
Uddin, Md Salah
Usiagu, Osaretin Jerry

Graduate (Ph. D.)

Heo, Hyeonu
*Dissertation: Programmable
Mechanical Metamaterials with
Negative Poisson's Ratio and
Negative Thermal Expansion*

Uddin, Md Salah
*Dissertation: Enhanced Course
- Graining for Multiscale
Modeling of Elastomers*



GIVE TO MEE

THOUGHTS ON GIVING BACK TO UNT LIVE HAPPIER AND LONGER

There is a dark joke about where the inflection point lies when a public university becomes private. Most state governments are cutting funding for public universities such that an increasing portion of operating expenses are born by the private sector. This has occurred at a time when many companies have reduced charitable giving to universities, although companies continue to sponsor scholarships and research. UNT's alumni are increasingly stepping up to make charitable gifts. We hope our growing population of Mechanical & Energy Engineers will join in as they are able. A few already have.



Research has shown again and again that those who give regularly to causes that interest them are happier. Most people in fact discover joy in giving. A global study documented by Harvard Business School reports that giving to charity produces as much of a boost in happiness as doubling one's income (see "Prosocial Spending and Well-Being: Cross Cultural Evidence for a Psychological Universal," Lara B. Aknin, et al).

Wealth building adviser Dave Ramsey notes that there are four perks to being a generous person in his blog article "Why Giving Makes You Feel Good": 1. Generosity is good for your brain. 2. Generosity makes you – and those around you – happier. 3. Generosity can help you live longer. 4. Generosity Counters Depression. Please see: <https://www.daveramsey.com/blog/why-giving-makes-you-feel-good> If you are reading this newsletter, chances are you have some interest in the UNT Department of Mechanical & Energy Engineering. Why not put the hypothesis described above to a test and make a gift? You can give online to either the Mechanical & Energy Engineering Excellence fund or the Mechanical & Energy Engineering Scholarship fund: <https://one.unt.edu/giving/college-of-engineering>.

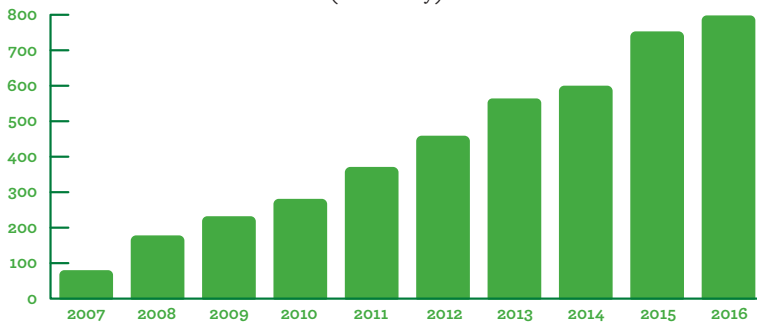
The Excellence Fund allows the Department Chair to fund new initiatives and ventures that benefit the students and faculty in MEE. The Scholarship fund helps MEE students with financial need. You may choose either fund or other engineering activities by selecting OTHER in the Area of Support menu, and typing in the specific information. Examples of other engineering activities include UNT Mean Green Racing Formula SAE, and student chapters of engineering professional societies.

Every gift is useful to us. Even a small gift will help. Our hope is that our UNT Engineering Alumni will become regular donors who give back to the university each year, and who will give more in future years as their means increase. You can also find the same portal on the UNT Engineering home page by simply clicking the "Giving" button. Many of our alumni work for companies with an "employee matching gift benefit. But research shows that only about one third of employees with this benefit who make a charitable gift will actually complete the paperwork or on-line application for the company to make the matching gift? Please check if your company offers a matching gift benefit for any gift you might make to UNT, and then follow through.

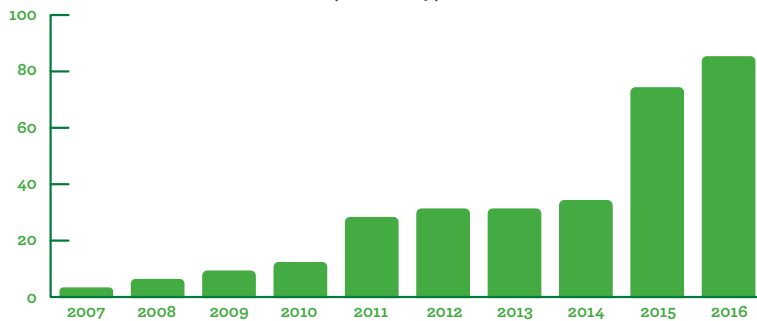
Please contact Angus McColl at 940-565-2180 or angus.mccoll@unt.edu with questions or for more information on charitable giving options to the Department and the UNT College of Engineering.

MEE BY THE NUMBERS

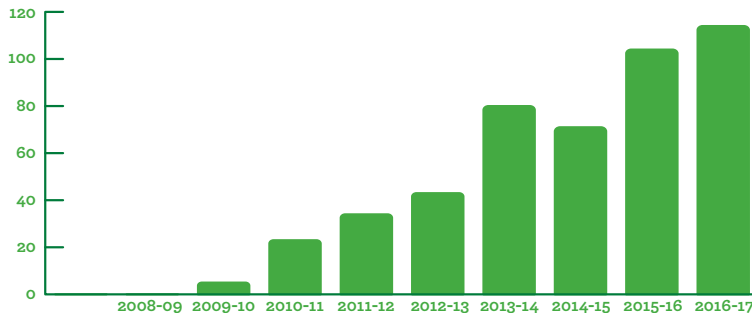
Undergraduate Enrollment
(Fall Only)



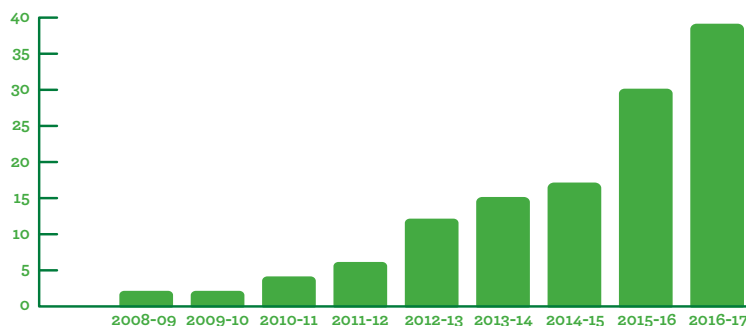
Graduate Enrollment
(Fall Only)



Undergraduate Degrees Awarded



Graduate Degrees Awarded



MEE QUICK FACTS 2016-2017

Undergraduate Enrollment
795

Graduate Enrollment
85 (65 MS and 20 PhD)

Alumni
562

Faculty and Staff
11 Tenure/Tenure-Track
4 Courtesy
4 Lecturers
6 Adjuncts
4 Staff

Teaching Assistants/Fellows
18

Journal Publications
30

Senior Design Projects
34

Research Awards
\$934,964

Research Expenditures
\$548,143

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