Dear Colleagues and Friends:

It is with great pleasure that I provide you with our 2011 Annual Scholarly Activities Report for the Department of Mechanical and Aerospace Engineering. You will find our enrollment continues to be strong in both the undergraduate and graduate programs, resulting in our granting roughly 25% of the degrees on the Missouri University of Science and Technology campus. Our undergraduate students received a record number of scholarships awarded by our department. Our faculty continue to provide our graduate students with new funding and educational opportunities. For example, our Seminar Committee developed a strong slate of speakers this year, attracting to our campus an impressive list of colleagues with national and international reputations.

Amidst the strong student enrollments our faculty have continued to develop their nationally and internationally recognized research programs through their scholarly activity which is highlighted in this report. Our research activities have been bolstered by the growing research programs of our junior faculty. MAE has two new faculty this year, Jie Gao and Xiaodong Yang, whose expertise includes nano-photonics and light-matter interactions. We are pleased with the great energy and passion they bring to their teaching along with the significant potential of their research and collaborative prospects with the other faculty in the department and on campus. We will continue to recruit new faculty talent to the MAE Department as we plan to grow our faculty size to meet the strong demand for mechanical and aerospace engineers. You will see our faculty contributing in many different ways, but their efforts are all critical to the vitality of our department and campus. As you review our 2011 Annual Scholarly Activities Report, I believe you will agree that the faculty along with our outstanding staff form a department of significant strength and potential focused on bringing excellence to the education of our students.

Dr. Jim Drallmeier
Curators’ Teaching Professor and Chair of Mechanical and Aerospace Engineering
Missouri University of Science and Technology
CONTENTS
Annual Scholarly Activities Report of the Department of Mechanical and Aerospace Engineering

MAE: by the Numbers ........................................... 4
Quick Facts ..................................................... 5
Graduate Seminar Series ................................... 5
Student Teams and Professional Organizations ............ 6
Scholarship Awards .............................................. 6
New Faculty ..................................................... 7
Faculty .......................................................... 7
Faculty Awards and Honors ................................ 11
New Grants and Contracts ................................... 12
Other Active Grants ........................................... 13
Professional & Scholarly Activities
Chairman, Co-Chairman of Technical Sessions
and Conferences .............................................. 16
Services on Committees of Professional Organizations ... 16
Editors of Symposia, Proceedings and Journals ............ 17
Journal Publications ............................................ 17
Refereed Conference Papers ................................ 19
Contributions to Books and Books Published ............... 21
Invited Talks .................................................... 21
Conference Presentations .................................. 22
M.S. Thesis and Ph.D. Dissertations ....................... 23
# MAE: by the numbers

## Undergraduate

<table>
<thead>
<tr>
<th></th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Undergraduate student enrollment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt; Aerospace Engineering (Fall, 4th wk)</td>
<td>179</td>
<td>178</td>
<td>183</td>
</tr>
<tr>
<td>&gt; Mechanical Engineering (Fall, 4th wk)</td>
<td>628</td>
<td>605</td>
<td>631</td>
</tr>
<tr>
<td>2. B.S. degrees awarded per full-time TT faculty</td>
<td>6.1</td>
<td>7.6</td>
<td>7.1</td>
</tr>
<tr>
<td>3. Starting salary</td>
<td>$56,153</td>
<td>$59,805</td>
<td>$59,077</td>
</tr>
<tr>
<td>&gt; Aerospace Engineering</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt; Mechanical Engineering</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Graduate

<table>
<thead>
<tr>
<th></th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Graduate student enrollment</td>
<td>177</td>
<td>236</td>
<td>208</td>
</tr>
<tr>
<td>&gt; Aerospace Engineering</td>
<td>30</td>
<td>53</td>
<td>42</td>
</tr>
<tr>
<td>&gt; Mechanical Engineering</td>
<td>109</td>
<td>130</td>
<td>112</td>
</tr>
<tr>
<td>&gt; Manufacturing Engineering</td>
<td>22</td>
<td>17</td>
<td>27</td>
</tr>
<tr>
<td>&gt; Thesis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt; Aerospace Engineering M.S. (Fall)</td>
<td>18</td>
<td>33</td>
<td>26</td>
</tr>
<tr>
<td>&gt; Aerospace Engineering Ph.D. (Fall)</td>
<td>7</td>
<td>10</td>
<td>9</td>
</tr>
<tr>
<td>&gt; Mechanical Engineering M.S. (Fall)</td>
<td>58</td>
<td>77</td>
<td>48</td>
</tr>
<tr>
<td>&gt; Mechanical Engineering Ph.D. (Fall)</td>
<td>30</td>
<td>30</td>
<td>35</td>
</tr>
<tr>
<td>&gt; Manufacturing Engineering M.S. (Fall)</td>
<td>12</td>
<td>12</td>
<td>16</td>
</tr>
<tr>
<td>&gt; Non-Thesis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt; Aerospace Engineering M.S. (Fall)</td>
<td>5</td>
<td>10</td>
<td>7</td>
</tr>
<tr>
<td>&gt; Mechanical Engineering M.S. (Fall)</td>
<td>21</td>
<td>23</td>
<td>29</td>
</tr>
<tr>
<td>&gt; Manufacturing Engineering M.E. (Fall)</td>
<td>10</td>
<td>5</td>
<td>11</td>
</tr>
<tr>
<td>&gt; Certificates</td>
<td>16</td>
<td>36</td>
<td>27</td>
</tr>
<tr>
<td>2. GRE of graduate students</td>
<td>717</td>
<td>734</td>
<td>737</td>
</tr>
<tr>
<td>3. Percentage of supported graduate students</td>
<td>76%</td>
<td>71%</td>
<td>84%</td>
</tr>
<tr>
<td>4. GRA/GTA ratio based on FTE</td>
<td>1.29/1</td>
<td>1.53/1</td>
<td>2.10/1</td>
</tr>
<tr>
<td>5. M.S. degrees (thesis) awarded per full-time TT faculty</td>
<td>0.62</td>
<td>1.16</td>
<td>1.19</td>
</tr>
<tr>
<td>6. M.S. degrees (non-thesis) awarded per full-time TT faculty</td>
<td>0.41</td>
<td>0.77</td>
<td>0.55</td>
</tr>
<tr>
<td>7. Ph.D. degrees awarded per full-time TT faculty</td>
<td>0.28</td>
<td>0.19</td>
<td>0.23</td>
</tr>
</tbody>
</table>

## General

<table>
<thead>
<tr>
<th></th>
<th>32/1</th>
<th>31/2</th>
<th>31/2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Full time TT/NTT faculty</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Undergraduate to graduate student ratio</td>
<td>4.64</td>
<td>3.38</td>
<td>3.91</td>
</tr>
<tr>
<td>3. Undergraduate student to full-time TT faculty ratio</td>
<td>24.5</td>
<td>25.3</td>
<td>26.3</td>
</tr>
<tr>
<td>4. Journal articles per full-time TT faculty</td>
<td>2.13</td>
<td>2.22</td>
<td>2.16</td>
</tr>
<tr>
<td>5. Expenditures per full-time TT faculty</td>
<td>$128,735</td>
<td>$126,508</td>
<td>$118,042</td>
</tr>
<tr>
<td>6. Professional society fellows</td>
<td>14</td>
<td>14</td>
<td>15</td>
</tr>
</tbody>
</table>
### Other Fast Facts

- **33** Faculty Members
- **31** Tenured/Tenure Track Faculty
- **2** Teaching Faculty
- **208** Graduate Students
- **814** Undergraduate Students
- **69** Journal Articles Published
- **61** Conference Papers Published
- **$4.1M** New Research Awards

### GRADUATE SEMINAR SERIES

Each semester the Mechanical and Aerospace Engineering department organizes at least four seminars under the sponsorship of the Graduate Seminar Series and the Missouri S&T Academy of Mechanical and Aerospace Engineers (AMAE). One of the purposes of the seminar series is to broaden our students academically and to aid in their professional development by providing another connection with the world of industry and business. These seminars consist of exceptional speakers whose research spans the range of the Mechanical and Aerospace Engineering disciplines. Through these seminars we seek to expose our faculty and graduate students to a scale of topics in areas both related and complementary of those areas investigated in the department.

#### 2011 Spring Semester

- **February 24, 2011** - “Space Reactor Power Systems for Space Exploration and Human Outposts” by Dr. Mohamed El-Genk, Regents’ Professor of Chemical, Nuclear, and Mechanical Engineering, University of New Mexico, Albuquerque, NM
- **April 7, 2011** - “Direct Digital Manufacturing at Crossroads” by Dr. Khershed Cooper, Metallurgist/Program Officer, Naval Research Laboratory, Washington, DC
- **April 28, 2011** - “Engineered Biomaterials for Bone and Tissue Repair” by Dr. Len Rahaman, Professor of Materials Science and Engineering and Director of the Center for Bone and Tissue Repair and Regeneration, Missouri University of Science and Technology, Rolla, MO

#### 2011 Fall Semester

- **September 22, 2011** - “Heavens! What a Mess!” by Dr. William P. Schonberg, Professor and Chair, Department of Civil, Architectural and Environmental Engineering, Missouri University of Science and Technology, Rolla, MO
- **October 3, 2011** - “Iterative Learning Control in the Delivery of Next Generation Healthcare” by Dr. Eric Rogers, School of Electronics and Computer Science, University of Southampton, Southampton, United Kingdom
- **October 11, 2011** - “Applications of High-Frequency Ultrasonics in Microfluids and Microactuation” by Dr. James Friend, Associate Dean for Research and Professor of Mechanical Engineering, Monash University, Melbourne, Australia
- **October 13, 2011** - “Aerodynamic Shape Optimization Using Variable-Resolution Models” by Dr. Leifur Leifsson, Engineering Optimization & Modeling Center, School of Science and Engineering, Reykjavik University, Iceland
- **October 27, 2011** - “Is There Sizzle in the Fluid Power Industry” by Dr. Lonnie J. Love, Group Leader, Automation, Robotics and Manufacturing (ARM) Group, Oak Ridge National Laboratory, Oak Ridge, TN

---

May 12, 2011 - “Coherent Coupling in Nanophotonic Systems: Optical Nanocavities, Quantum Dots and Mechanical Resonators” by Jie Gao, Ph.D. Candidate, Columbia University, NY

2011 Fall Semester

- **September 22, 2011** - “Heavens! What a Mess!” by Dr. William P. Schonberg, Professor and Chair, Department of Civil, Architectural and Environmental Engineering, Missouri University of Science and Technology, Rolla, MO
- **October 3, 2011** - “Iterative Learning Control in the Delivery of Next Generation Healthcare” by Dr. Eric Rogers, School of Electronics and Computer Science, University of Southampton, Southampton, United Kingdom
- **October 11, 2011** - “Applications of High-Frequency Ultrasonics in Microfluids and Microactuation” by Dr. James Friend, Associate Dean for Research and Professor of Mechanical Engineering, Monash University, Melbourne, Australia
- **October 13, 2011** - “Aerodynamic Shape Optimization Using Variable-Resolution Models” by Dr. Leifur Leifsson, Engineering Optimization & Modeling Center, School of Science and Engineering, Reykjavik University, Iceland
- **October 27, 2011** - “Is There Sizzle in the Fluid Power Industry” by Dr. Lonnie J. Love, Group Leader, Automation, Robotics and Manufacturing (ARM) Group, Oak Ridge National Laboratory, Oak Ridge, TN
STUDENT TEAMS AND PROFESSIONAL ORGANIZATIONS

Advanced Aero Vehicle Group  
Dr. F. Finaish

American Institute of Aeronautics and Astronautics  
Dr. D. Riggins

American Society of Mechanical Engineers  
Dr. K. Homan

BUV Team  
Dr. J. Sheffield

FSAE  
Dr. H. Pernicka

Human Powered Vehicle  
Dr. J. K. Nisbett

Hydrogen Design Solutions  
Dr. J. Sheffield

Miners in Space  
Dr. H. Pernicka

M-SAT  
Dr. H. Pernicka

Opportunities for Undergraduate Research Experience  
Dr. K. M. Isaac

Pi Tau Sigma  
Dr. K. Homan

Sigma Gamma Tau  
Dr. S. N. Balakrishnan

Society of Automotive Engineers  
Dr. H. Pernicka

Society of Flight Test Engineers  
Dr. F. Finaish

Society of Manufacturing Engineers  
Dr. R. Landers

Undergraduate Scholarships

Academy of Mechanical and Aerospace Engineers Scholarships
AE Alumni Endowed Scholarship
Bassem and Gery Aramaly Scholarship
William M. Byrne Endowed Scholars
Caterpillar Scholarship
Chevron Scholarship
Clark Family Scholarship
Robert and Shirley Clooney Scholarship
Clark W. Collier Scholarship
Charles Copeland Scholarship
Robert F. Davidson Scholarship
Desloge-Watlow Manufacturing Engineering Scholarship
Donnell and Ruth Dutton Scholarship
Thomas Faucett Endowed Scholarship
Norman E. Hart Scholarship
Alan Finley Endowed Scholarship
Kaiser Aluminum Endowed Scholarship
Leslie R. and Barbara R. Koval Scholarship
Tsen-Lu and Yuen-Ray Lee Scholars and Fellows
Don and Alwilda Mathews Scholarship
Don and Mary McGovern Endowed Scholarship
Robert and Linda Mueller Manufacturing Engineering Scholarship
James J. Murphy Scholarship
Fred Nelson Memorial Scholarship
C. Remington Endowed Scholarship
John Wm. and Camille Ricketts Scholarship
Rayferd D. Routh Scholarship
Patricia Ann and Harry J. Sauer, Jr. Endowed Scholarship
Robert Schoenthaler Scholars
Robert L. Seaman Memorial Scholarship
US Steel Scholarship
Amy L. Weir Scholarship
Daniel K. and Linda K. Wright Endowed Scholarship
Wyatt Endowed Scholarship

Scholarship Funds Awarded

$120,000
$100,000
$80,000
$60,000
$40,000
$20,000
$10,000
$0
2007 2008 2009 2010 2011

Scholarships Awarded

250
200
150
100
50
0
2007 2008 2009 2010 2011
Dr. Xiaodong Yang joined the department as an Assistant Professor in Fall 2011. He received his B.S. degree in Mechanics and Mechanical Engineering from the University of Science and Technology of China (USTC) in 2000, his M.S. degree in Physics from the Chinese Academy of Sciences (CAS) in 2003, and his Ph.D. degree in Mechanical Engineering from Columbia University in 2009. He was awarded an Intel Foundation Ph.D. Fellowship from 2006 to 2008. He also received the 2007 Chinese Government Award for Outstanding Students Abroad. Before joining Missouri S&T, Dr. Yang was a postdoctoral fellow in the Nanoscale Science and Engineering Center in Mechanical Engineering, University of California at Berkeley, and Materials Sciences Division, Lawrence Berkeley National Laboratory. His research interests include photonic crystals, plasmonics, optical metamaterials, silicon nanophotonics, optomechanics and optofluidics, optical nanoelectromechanical systems (NEMS), light trapping and photon management for renewable energy conversion and transport.

Dr. Jie Gao joined the department as Assistant Professor in the Spring semester of 2012. She received her Ph.D. degree in the Summer of 2011 from Columbia University, her M.S. degree from Columbia University in 2007 and B.S. degree from the University of Science and Technology of China (USTC) in 2005. Her research interests include photonic crystals, integrated silicon photonics, quantum dot energy transfer, efficient light trapping and extraction, optomechanics and cavity quantum electrodynamics for the applications of solar energy harvesting, LEDs and quantum optics. She has authored 16 peer-reviewed journal publications and more than 20 conference proceedings. She has experience reviewing for top journals such as Optics Express, Physical Review Letters and Applied Physics Letters. She is a member of the professional societies of Optical Society of America, American Physical Society and Institute of Electrical and Electronics Engineers. She is the recipient of the Chinese Government Award for Outstanding Students Aboard (2009), and IBM Ph.D. Fellowship Award Finalist (2010).

Dr. Darryl J. Aloffs
Professor of Mechanical Engineering
Education: Ph.D., University of Michigan at Ann Arbor
Research Interests: Fluid mechanics, aerosol mechanics, and the effect of clouds on global climate with an emphasis on experimental approach and instrumentation development

Dr. Bassem F. Armaly
Curators’ Professor of Mechanical Engineering
Education: Ph.D., University of California at Berkeley
Research Interests: Heat transfer and fluid mechanics, thermophysical properties, heat pipes, combined conduction, convection, and radiation heat transfer problems, solar energy, cryogenics, and thermal effects in manufacturing processes

Dr. S. N. Balakrishnan
Curators’ Professor of Aerospace Engineering
Education: Ph.D., University of Texas at Austin
Research Interests: Guidance, stability, control and estimation, pattern recognition, stochastic processes, optimization, neural network applications to control, numerical methods, design

Dr. Arindam Banerjee
Assistant Professor of Mechanical Engineering
Education: Ph.D., Texas A&M University
Research Interests: Buoyancy driven flows, turbulence, low reynolds number hydrodynamics, nano-fluidics, optical and laser based diagnostics in thermal-fluid sciences, bio-heat transfer
DR. VICTOR BIRMAN
PROFESSOR OF MECHANICAL ENGINEERING
DIRECTOR OF ENGINEERING EDUCATION CENTER
Education: Ph.D., Technion (Israel)
Research Interests: Composite material structures, smart structures and materials, structural dynamics and vibration, buckling and dynamic stability
Fellow, ASME, 1996

DR. DOUGLAS A. BRISTOW
ASSISTANT PROFESSOR OF MECHANICAL ENGINEERING
Education: Ph.D., University of Illinois at Urbana-Champaign
Research Interests: Precision motion control for micro- and nano-positioning systems, iterative learning control, robust control, modeling, design, solid freeform fabrication, microscopy, signal processing

DR. K. CHANDRASHEKHARA
CURATORS' PROFESSOR OF MECHANICAL AND AEROSPACE ENGINEERING
Education: Ph.D., Virginia Polytechnic Institute and State University
Research Interests: Composite materials, smart structures, nanocomposites, biocomposites, structural dynamics, finite element analysis, damage monitoring, composite manufacturing, experimental characterization
Fellow, ASME, 2002

DR. AL CROSBIE
CURATORS' PROFESSOR OF MECHANICAL ENGINEERING
Education: Ph.D., Purdue University
Research Interests: Multidimensional radiative heat transfer, laser processing of materials, radiative heat transfer in combustion processes, microscale heat transfer, biomedical optics, interaction of radiation with conduction and convection, multiple scattering and polarization of laser beams, solutions of integral equations, numerical heat transfer
Fellow, ASME, 1987
Fellow, AIAA, 1988
Fellow, AAAS, 1999

DR. LOKESWARAPPA R. DHARANI
CURATORS' PROFESSOR OF MECHANICAL AND AEROSPACE ENGINEERING
Education: Ph.D., Clemson University
Research Interests: Aircraft structures, fracture mechanics, fatigue and failure analysis, micro mechanics, composite materials and structures, process modeling of ceramic matrix composites, friction and wear of composites, fracture of laminated glazing
Associate Fellow, AIAA, 1995
Fellow, ASME, 2000

DR. JAMES A. DRALLMEIER
CURATORS' TEACHING PROFESSOR OF MECHANICAL ENGINEERING
DEPARTMENT CHAIR
Education: Ph.D., University of Illinois at Urbana-Champaign
Research Interests: Combustion, laser based diagnostics for sprays and combustion, optical measurement systems, fuel injection, internal combustion engines

DR. XIAOPEING DU
ASSOCIATE PROFESSOR OF MECHANICAL ENGINEERING
Education: Ph.D., University of Illinois at Chicago
Research Interests: Design optimization, multidisciplinary optimization design, probabilistic/statistical methods, system/structural reliability, robust design, kinematics, mechanism synthesis, petroleum machinery

DR. WALTER EVERSMAN
CURATORS' PROFESSOR OF AEROSPACE ENGINEERING
Education: Ph.D., Stanford University
Research Interests: Noise control, acoustics, vibrations, aircraft structural dynamics and aeroelasticity, systems and control
Fellow, AIAA, 2011

DR. FATHI FINAISH
PROFESSOR OF AEROSPACE ENGINEERING
DIRECTOR, NASA-MISSOURI SPACE GRANT CONSORTIUM
Education: Ph.D., University of Colorado at Boulder
Research Interests: Aerodynamic testing, unsteady flows, vortex dynamics in separated flows, physical and numerical flow visualizations, variable density flows, flow control
DR. JIE GAO  
ASSISTANT PROFESSOR OF  
MECHANICAL ENGINEERING  
Education: Ph.D., Columbia University  
Research Interests: Nanophotonics devices based on silicon photonics, plasmonics and metamaterials; light-matter interactions in photonic nanostructures; optical sensing; quantum dots; quantum optics and quantum information processing; solar energy harvesting; light emitting devices

DR. KELLY HOMAN  
ASSOCIATE PROFESSOR OF  
MECHANICAL ENGINEERING  
Education: Ph.D., University of Illinois at Urbana-Champaign  
Research Interests: Fluid dynamics, heat transfer, and thermodynamics of energy systems, heat and mass transfer in buoyant flows, second-law and exergy analysis, numerical simulation of transport phenomena and experimental methods

DR. SERHAT HOSDER  
ASSISTANT PROFESSOR OF  
AEROSPACE ENGINEERING  
Education: Ph.D., Virginia Polytechnic Institute and State University  
Research Interests: Computational fluid dynamics (CFD), aerodynamics, micro/nano flows, stochastic CFD, uncertainty and error quantification in computational simulations, multidisciplinary design and optimization, robust design, numerical methods

DR. RYAN S. HUTCHESON  
ASSISTANT TEACHING PROFESSOR OF  
MECHANICAL ENGINEERING  
Education: Ph.D., Texas A&M University-College Station  
Research Interests: Design theory and methodology, design of complex systems, behavioral modeling of complex systems, design of hybrid powertrain systems, engineering software development, graphical simulations of engineering systems

DR. KAKKATTUKUZHY M. ISAAC  
PROFESSOR OF AEROSPACE ENGINEERING  
ASSOCIATE CHAIR FOR AEROSPACE ENGINEERING  
Education: Ph.D., Virginia Polytechnic Institute and State University  
Research Interests: Fluid dynamics and aerodynamics, aero-structure interaction and control, microfluidics, emissions from combustion and evaporative systems, CFD applications in fluid dynamics and combustion problems

DR. UMIT O. KOYLU  
PROFESSOR OF MECHANICAL ENGINEERING  
Education: Ph.D., University of Michigan at Ann Arbor  
Research Interests: Combustion, air pollutants, alternative fuels, fuel cells, hydrogen technologies, radiative transfer, flame diagnostics, nanoparticle characterization, fire safety, thermal/ fluid engineering

DR. NISHANT KUMAR  
ASSISTANT TEACHING PROFESSOR OF  
MECHANICAL ENGINEERING  
Education: Ph.D., New Mexico University  
Research Interests: Nonlinear dynamics and vibrations, study of deterministic and random dynamical systems, model order reduction, theoretical modeling and numerical computation, structural dynamics

DR. ROBERT G. LANDERS  
ASSOCIATE PROFESSOR OF  
MECHANICAL ENGINEERING  
ASSOCIATE CHAIR FOR GRADUATE AFFAIRS  
Education: Ph.D., University of Michigan at Ann Arbor  
Research Interests: Manufacturing, systems, and control; modeling, analysis, monitoring, and control of manufacturing processes; metal cutting; laser metal deposition; freeze extrusion fabrication; friction stir processing; electro-hydraulics; analysis and control of alternative energy systems; digital control applications

DR. MING C. LEU  
KEITH AND PAT BAILEY DISTINGUISHED PROFESSOR OF MECHANICAL ENGINEERING  
DIRECTOR OF INTELLIGENT SYSTEMS CENTER (ISC)  
DIRECTOR OF CENTER FOR AEROSPACE MANUFACTURING TECHNOLOGIES (CAMT)  
Fellow, ASME, 1993  
Fellow, International Academy of Production Engineering (CIRP), 2008  
Education: Ph.D., University of California at Berkeley  
Research Interests: Rapid prototyping, additive manufacturing, virtual reality, CAD/CAM, robotics, mechatronics, automatic control

Fellow, ASME, 1993  
Fellow, International Academy of Production Engineering (CIRP), 2008
DR. FUEWEN (FRANK) LIOU
MICHAEL AND JOYCE BYTNAR PRODUCT INNOVATION AND CREATIVITY PROFESSOR OF MECHANICAL ENGINEERING
DIRECTOR OF MANUFACTURING ENGINEERING PROGRAM
Education: Ph.D., University of Minnesota at Twin Cities
Research Interests: CAD/CAM, rapid prototyping, rapid manufacturing, fuel cell manufacturing
Fellow, ASME, 2008

DR. ANTHONY OKAFOR
PROFESSOR OF MECHANICAL ENGINEERING
Education: Ph.D., Michigan Technological University
Research Interests: Manufacturing including intelligent machining, high-speed machining, machine tool dynamics and metrology, metal forming, sensors and signal processing, computer numerical control (CNC), virtual manufacturing, and neural network applications; smart structures including structural health monitoring, aging aircraft, damage assessment and repair of metallic and composite structures, non-destructive evaluation, and proton exchange membrane (hydrogen) fuel cells

DR. GEAROID MACSITHIGH
ASSOCIATE PROFESSOR OF MECHANICAL AND AEROSPACE ENGINEERING
Education: Ph.D., University of Minnesota at Twin Cities
Research Interests: Finite elasticity, viscoelasticity, liquid crystal hydrodynamics, solid and continuum mechanics

DR. HENRY (HANK) PERNICKA
ASSOCIATE PROFESSOR OF AEROSPACE ENGINEERING
Education: Ph.D., Purdue University
Research Interests: Astrodynamics, orbital mechanics, spacecraft design, spacecraft mission design, satellite attitude dynamics, nonlinear analysis, dynamics and control, optimization

DR. KEVIN B. MARTIN
ASSISTANT RESEARCH PROFESSOR OF MECHANICAL ENGINEERING
Education: Ph.D., Missouri University of Science and Technology
Research Interests: Hydrogen infrastructure modeling, fuel cell technology, energy policy

DR. J. KEITH NISBETT
ASSOCIATE PROFESSOR
ASSOCIATE CHAIR FOR MECHANICAL ENGINEERING
Education: Ph.D., University of Texas at Arlington
Research Interests: Kinematics, mechanical design, synthesis of mechanisms

DR. ASHOK MIDHA
PROFESSOR OF MECHANICAL ENGINEERING
DIRECTOR OF THE PRODUCT INNOVATION AND CREATIVITY CENTER
Education: Ph.D., University of Minnesota at Twin Cities
Research Interests: Mechanical design, rigid-body and compliant mechanism design, high-performance machinery analysis and design, machine vibration and stability
Fellow, ASME, 2003

DR. JOHN W. SHEFFIELD
PROFESSOR OF MECHANICAL ENGINEERING
ASSOCIATE DIRECTOR OF CTIS NATIONAL UNIVERSITY TRANSPORTATION CENTER
Education: Ph.D., North Carolina State University
Research Interests: Industries-of-the-future, industrial energy management, energy efficiency, hydrogen energy systems, thermal contact conductance/resistance

DR. KEVIN B. MARTIN
ASSISTANT RESEARCH PROFESSOR OF MECHANICAL ENGINEERING
Education: Ph.D., Virginia Polytechnic Institute and State University
Research Interests: Fluid dynamics, computational fluid dynamics, hypersonic propulsion systems, computational analysis of jet mixing, flow losses and mixing enhancement in combustors, aircraft gas turbine ramjet propulsion systems, scramjet performance

DR. J. KEITH NISBETT
ASSOCIATE PROFESSOR
ASSOCIATE CHAIR FOR MECHANICAL ENGINEERING
Education: Ph.D., University of Texas at Arlington
Research Interests: Kinematics, mechanical design, synthesis of mechanisms

DR. ASHOK MIDHA
PROFESSOR OF MECHANICAL ENGINEERING
DIRECTOR OF THE PRODUCT INNOVATION AND CREATIVITY CENTER
Education: Ph.D., University of Minnesota at Twin Cities
Research Interests: Mechanical design, rigid-body and compliant mechanism design, high-performance machinery analysis and design, machine vibration and stability
Fellow, ASME, 2003

DR. JOHN W. SHEFFIELD
PROFESSOR OF MECHANICAL ENGINEERING
ASSOCIATE DIRECTOR OF CTIS NATIONAL UNIVERSITY TRANSPORTATION CENTER
Education: Ph.D., North Carolina State University
Research Interests: Industries-of-the-future, industrial energy management, energy efficiency, hydrogen energy systems, thermal contact conductance/resistance

DR. KEVIN B. MARTIN
ASSISTANT RESEARCH PROFESSOR OF MECHANICAL ENGINEERING
Education: Ph.D., Virginia Polytechnic Institute and State University
Research Interests: Fluid dynamics, computational fluid dynamics, hypersonic propulsion systems, computational analysis of jet mixing, flow losses and mixing enhancement in combustors, aircraft gas turbine ramjet propulsion systems, scramjet performance

DR. J. KEITH NISBETT
ASSOCIATE PROFESSOR
ASSOCIATE CHAIR FOR MECHANICAL ENGINEERING
Education: Ph.D., University of Texas at Arlington
Research Interests: Kinematics, mechanical design, synthesis of mechanisms

DR. ASHOK MIDHA
PROFESSOR OF MECHANICAL ENGINEERING
DIRECTOR OF THE PRODUCT INNOVATION AND CREATIVITY CENTER
Education: Ph.D., University of Minnesota at Twin Cities
Research Interests: Mechanical design, rigid-body and compliant mechanism design, high-performance machinery analysis and design, machine vibration and stability
Fellow, ASME, 2003

DR. JOHN W. SHEFFIELD
PROFESSOR OF MECHANICAL ENGINEERING
ASSOCIATE DIRECTOR OF CTIS NATIONAL UNIVERSITY TRANSPORTATION CENTER
Education: Ph.D., North Carolina State University
Research Interests: Industries-of-the-future, industrial energy management, energy efficiency, hydrogen energy systems, thermal contact conductance/resistance

DR. KEVIN B. MARTIN
ASSISTANT RESEARCH PROFESSOR OF MECHANICAL ENGINEERING
Education: Ph.D., Virginia Polytechnic Institute and State University
Research Interests: Fluid dynamics, computational fluid dynamics, hypersonic propulsion systems, computational analysis of jet mixing, flow losses and mixing enhancement in combustors, aircraft gas turbine ramjet propulsion systems, scramjet performance

DR. J. KEITH NISBETT
ASSOCIATE PROFESSOR
ASSOCIATE CHAIR FOR MECHANICAL ENGINEERING
Education: Ph.D., University of Texas at Arlington
Research Interests: Kinematics, mechanical design, synthesis of mechanisms

DR. ASHOK MIDHA
PROFESSOR OF MECHANICAL ENGINEERING
DIRECTOR OF THE PRODUCT INNOVATION AND CREATIVITY CENTER
Education: Ph.D., University of Minnesota at Twin Cities
Research Interests: Mechanical design, rigid-body and compliant mechanism design, high-performance machinery analysis and design, machine vibration and stability
Fellow, ASME, 2003

DR. JOHN W. SHEFFIELD
PROFESSOR OF MECHANICAL ENGINEERING
ASSOCIATE DIRECTOR OF CTIS NATIONAL UNIVERSITY TRANSPORTATION CENTER
Education: Ph.D., North Carolina State University
Research Interests: Industries-of-the-future, industrial energy management, energy efficiency, hydrogen energy systems, thermal contact conductance/resistance

DR. KEVIN B. MARTIN
ASSISTANT RESEARCH PROFESSOR OF MECHANICAL ENGINEERING
Education: Ph.D., Virginia Polytechnic Institute and State University
Research Interests: Fluid dynamics, computational fluid dynamics, hypersonic propulsion systems, computational analysis of jet mixing, flow losses and mixing enhancement in combustors, aircraft gas turbine ramjet propulsion systems, scramjet performance

DR. J. KEITH NISBETT
ASSOCIATE PROFESSOR
ASSOCIATE CHAIR FOR MECHANICAL ENGINEERING
Education: Ph.D., University of Texas at Arlington
Research Interests: Kinematics, mechanical design, synthesis of mechanisms

DR. ASHOK MIDHA
PROFESSOR OF MECHANICAL ENGINEERING
DIRECTOR OF THE PRODUCT INNOVATION AND CREATIVITY CENTER
Education: Ph.D., University of Minnesota at Twin Cities
Research Interests: Mechanical design, rigid-body and compliant mechanism design, high-performance machinery analysis and design, machine vibration and stability
Fellow, ASME, 2003

DR. JOHN W. SHEFFIELD
PROFESSOR OF MECHANICAL ENGINEERING
ASSOCIATE DIRECTOR OF CTIS NATIONAL UNIVERSITY TRANSPORTATION CENTER
Education: Ph.D., North Carolina State University
Research Interests: Industries-of-the-future, industrial energy management, energy efficiency, hydrogen energy systems, thermal contact conductance/resistance
In 2011, many of the Mechanical and Aerospace Engineering faculty received awards and honors.

**Campus Recognition and Honors**

Global Learning Outstanding Teaching Commendation

- Dr. V. Birman
- Dr. K. Chandrashekhar
- Dr. L. Dharani

Faculty Research Award

- Dr. R. Landers
- Dr. H. Tsai

Faculty Teaching Award

- Dr. H. Pernicka
- Dr. D. Riggins

Faculty Service Award

- Dr. J. K. Nisbett
- Dr. H. Pernicka

Faculty Achievement Award

- Dr. R. Hutcheson

Commendation Letter for Excellence in Teaching

- Dr. V. Birman

**AWARDS AND HONORS**

**Young Professional Engineer Award**

St. Louis Section of Aeronautics and Astronautics

Dr. J. Rovey

**Professional Recognition**

Dr. B. Armaly, Appointed by the Governor and confirmed by the Senate to serve as a member of the Missouri Board of Boiler and Pressure Vessel Rules.

Dr. W. Eversman, AIAA Fellow, 2011.

Dr. R. Landers, Promotion to Senior Member, IEEE.

Dr. J. Sheffield, Missouri Impact Award from Missouri Enterprise for Outstanding Contributions to the Success of Missouri Manufacturers.

**Publication Recognition and Awards**


**NEW GRANTS AND CONTRACTS**

**Banerjee, A.**


**Chandrashekhara, K.**


**Birman, V.**


**Bristow, D.**


**Chandrashekhara, K.**


**Chandrashekhara, K.**


**Du, X.**


**Hosder, S.**


**Hutcheson, R.**


**Koylu, U.**


**Landers, R.**


**Leu, M.**

Leu, M. (100%), Rolls-Royce Corporation, “CAMT Membership-Rolls Royce Year 2,” continuation, $10,000.00, September 1, 2011 - August 31, 2012.

**Liou, F.**


**Leu, M.**

Leu, M. (100%), National Aeronautics and Space Administration Goddard Space Flight Center, “Missouri Space Grant Consortium,” annual supplement October 11, 2011, $328,000.00, May 1, 2010 - April 30, 2015.

**Leu, M.**

Leu, M. (100%), Boeing Company, “CAMT Membership-Rolls Royce Year 2, (Program Support Fund),” $40,000.00, September 15, 2011 - September 14, 2012.

**Leu, M.**

Leu, M. (100%), Boeing Company, “CAMT IC Gold Membership-Rolls Royce Year 2,” continuation, $10,000.00, September 1, 2011 - August 31, 2012.

**Leu, M.**


**Leu, M.**


**Leu, M.**

Leu, M. (100%), GKN Aerospace Services, “CAMT IC One-year Membership: Bell Helicopter Textron Corporation,” $10,000.00, January 1 - December 31, 2011.

**Leu, M.**


**Leu, M.**


**Leu, M.**

Leu, M. (100%), Steelville Manufacturing Company, “CAMT IC Membership Steelville Manufacturing Company - Year 2,” $10,000.00, August 1, 2009 - July 31, 2011.

**Leu, M.**

Leu, M. (100%), Steelville Manufacturing Company, “CAMT IC Membership Steelville Manufacturing Company - Year 3,” $10,000.00, August 1, 2009 - July 31, 2011.

**Leu, M.**

Leu, M. (100%), Bell Helicopter Textron, “CAMT TC One-year Membership: Bell Helicopter Textron Corporation,” $10,000.00, January 1 - December 31, 2011.
Leu, M. (100%), Bell Helicopter Textron, “CAMT IC Two-year Membership: Bell Helicopter Textron Corporation (Project Support),” $10,000.00, January 1 - December 31, 2012.


Liou, F.

Liou, F. (100%), National Science Foundation (through Product Innovation and Engineering LLC), “SBIR Phase I: A Multi-Axis Repair System (MARS),” $50,000.00, January 1 – June 30, 2011.


Liou, F. (70%) and Newkirk, J. (30%), National Aeronautics and Space Administration Glenn Research Center, “Multiscale and Multiphysics Modeling of Additive Manufacturing of Advanced Materials,” $100,000.00, June 13, 2011 - June 12, 2014.

Liou, F. (70%) and Newkirk, J. (30%), Boeing Company, “CAMT: Prediction and Validation of Material Behavior Fabricated from Additive Metal,” $40,000.00, September 15, 2011 - September 14, 2012.

Liou, F. (100%), GKN Aerospace Services, “CAMT: Undercut Repair with Additive Manufacturing,” $25,000.00, September 15, 2011 - September 14, 2012.

Midha, A.

Midha, A. (50%) and Midha, A. (50%), Center for Educational Research and Teaching Innovation (CERTI), Missouri S&T, "Development, Assessment, and Implementation of Metrics to Improve Innovation Thinking through Project-Based Design Courses,” $6,600.00, June 1, 2011 - May 31, 2012.

Pernicka, H.


Riggins, D.


Birvan, V.


Bristow, D.


Chandrashekhar, K.

Rovey, J. (75%) and Chandrashekhar, K. (25%), Department of Energy, “Remote Monitoring of the Structural Health of Hydrokinetic Turbine Blades,” $75,000.00, October 1, 2010 - September 30, 2011.


Chandrashekhar, K. (100%), GKN Aerospace Services, “CAMT IC Full Membership,” $50,000.00, April 2, 2008 - September 14, 2012.


Chandrashekhar, K. (100%), GKN Aerospace Services, “CAMT IC GKN Aerospace Services,” $8,000.00, April 2, 2008 - September 14, 2012.

Chandrashekhar, K. (100%), Boeing Company, “CAMT IC Gold Membership Boeing,” $20,000.00, February 27, 2008 - September 14, 2012.

Chandrashekhar, K. (50%) and Schuman, T. (50%), United Soybean Board, “Soy-Based UV Resistant Polyurethane Pultruded Composites,” $50,000.00, September 1, 2009 - December 31, 2011.


Drallmeier, J.


Du, X.


Eversman, W.


Finaish, F.


Finaish, F. (100%), National Aeronautics and Space Administration Goddard Space Flight Center, “NASA - Missouri Space Grant Consortium,” $2,038,666.00, May 1, 2005 - April 30, 2011.

Flanigan Jr, V.


Hosder, S.


Isaac, K.

Koylu, U.

Landers, R.

Landers, R. (100%), GKN Aerospace Services, “CAMT IC GKN Aerospace Services,” $16,000.00, April 2, 2008 - September 14, 2012.


Rovey, J.
Rovey, J. (75%) and Chandrashekhar, K. (25%), Department of Energy, “Remote Monitoring of the Structural Health of Hydrokinetic Turbine Blades,” $75,000.00, October 1, 2010 - September 30, 2011.


Rovey, J. (100%), Air Force Office of Science Research, “Energy Conversion and Loss Processes in Heavy Gas, Field-Reversed Configuration Electric Thruster Plasma;” $240,028.00, June 1, 2010 - May 31, 2013.

Rovey, J. (100%), Missouri Life Science Research Board, “Pseudospark Pulsed Plasma X-ray Generation for Portable Medical Devices;” $97,796.00, January 1, 2009 - May 31, 2011.

Sheffield, J.


Myers, J. (70%) and Sheffield, J. (30%), Department of Transportation, “NUTC (National University Transportation Center for Transportation) Infrastructure and Safety Year 2,” $3,010,000.00, July 1, 2007 - June 30, 2013.

Sheffield, J. (100%), General Motors Corporation, “EcoCAR: The NeXt Challenge Project;” $158,669.00, May 1, 2008 - June 30, 2011.


Rolufs, A. (60%) and Sheffield, J. (60%), Department of Transportation, “FTA Grant - Research on Alternative Sources of Energy to Power Transit Vehicles;” $686,073.00, April 1, 2008 - October 1, 2013.

Myers, J. (70%) and Sheffield, J. (30%), Department of Transportation, “National University Transportation Center For Transportation Infrastructure and Safety - Yr 3;” $2,858,100.00, July 1, 2008 - June 30, 2013.

Myers, J. (67%) and Sheffield, J. (33%), Department of Transportation, “NUTC (National University Transportation Center for Transportation) Infrastructure and Safety Year 1;” $1,560,000.00, July 1, 2006 - June 30, 2013.

Tsai, H.

Tsai, H. (60%) and O’keefe, M. (40%), University of Lincoln, “Multi-Laser Beam Open Atmosphere Surface Coating Techniques Based on Precursor Excitation, Photodissociation and Controlled Cooling;” $1,499,999.00, March 15, 2005 - September 30, 2011.


Tsai, H. (100%), Missouri Life Science Research Board, “Advanced Cardiovascular Stent Built with Nanotechnology;” $218,000.00, January 1, 2009 - December 31, 2011.

Administrative Chair 17th AIAA/CEAS Aeroacoustics Conference, Portland, OR, June 2011.

Leu, M.

Organizer and Chair of the Industrial Advisory Board Meeting of the Center for Aerospace Manufacturing Technologies, Wichita, KS, May 11, 2011.

Takai, S.


Service on Committees of Professional Organizations

Armaly, B.

Chaired the Accreditation Board for Engineering and Technology’s Finance Committee Meeting, Baltimore, MD, January 27 - 28, 2011.

Accreditation Board for Engineering and Technology Executive Committee Meeting (serving as Treasurer), Baltimore, MD, February 24 - 25, 2011.


Accreditation Board for Engineering and Technology Executive Committee Meeting (serving as Treasurer), Baltimore, MD, March 26, 2011.

Balakrishnan, S.

Member, IEEE Aerospace Technical Committee, 2011.

Banerjee, A.


Birman, V.

Member of the Advisory Board, ICCE-19: The Nineteenth International Conference on Composites/ Nano Engineering, Shanghai, China, July 24 - 30, 2011.

Chandrashekhar, K.


Crosbie, A.


Dharani, L.


Drallemeier, J.


Du, X.


Eversman, W.


Hosder, S.


Hutcheson, R.


Isaac, K.


Koylu, U.


Landers, R.


Leu, M.


Liou, F.


Pernicka, H.


Riggins, D.


Rovey, J.


Sheffield, J.

Hutcheson, R.


Koylu, U.


Landers, R.

Landers, R. G., “Manufacturing Process Control,” presented at Xi’an University of Technology, Xi’an, China, June 30, 2011.

Leu, M.


Liou, F.

Liou, F., “Laser Metal Deposition and Its Emerging Applications,” invited seminar by Industrial Technology Research Institute (ITRI), Taiwan, Taiwan, March 30, 2011.


Rovey, J.

Pahl, R., Meeks, W., Hulse, T., Lewis, W. and Rovey, J. L., “Missouri S&T’s Role in Developing High-Power Advanced Space Propulsion,” presented to University of Missouri Board of Curators, March 22, 2011.

Sheffield, J.

Sheffield, J., Missouri S&T EcoCAR PowerPoint and Video Presentation to the Board of Curators’ Dinner Meeting, Rolla, MO, March 21, 2011.

Tsai, H.

Tsai, H., “Femtosecond Laser Fabrication of Microsensors for Chemical and Biological Sensing and Detection,” Industrial Technology Research Institute South, Tainan, Taiwan, January 4, 2011.

Yang, X.

Yang, X., “Manipulating Light with Optical Nanostructures,” Electrical Engineering, Missouri University of Science and Technology, November 2011.

Yang, X., “Manipulating Light with Engineered Optical Nanostructures,” Physics, Missouri University of Science and Technology, November 2011.

Yang, X., “Light Manipulation with Optical Nanostructures,” Biomedical Engineering, Washington University in St. Louis, December 2011.
Balakrishnan, S.

Birman, V.


Bristow, D.

Chandrashekhara, K.


Dharani, L.
Jared Lobes (MSME), Advisor: Dharani, L. R., “Processing and Mechanical Characterization of Polyurea Aerogel,” September 2011.

Drallmeier, J.


Du, X.

Finaish, F.

Homan, K.

Hosder, S.

Koylu, U.

Leu, M.

Liu, F.


Okafor, A.

Pernicka, H.