



### Greetings,

We hope this note finds you and your loved ones healthy and enjoying life. The school has had some exciting events occur this year and we wanted to make sure we let all our friends/alumni know. Last summer, Dr. Tieming Liu was promoted to full professor and Dr. Jennifer Glenn was promoted to Associate Professor of Teaching. We are proud of them both. Dr. Glenn was named Undergraduate Program Director and Dr. Terry Collins was named Director of the Master of Science in Engineering and Technology Management. They are both doing great things. Dr. Glenn has been working with one of our MS students to develop new materials and hands-on activities to use while introducing IE to junior high and high school aged students, as well as making several recruiting trips across the state.



Dr. Sunderesh Heragu was promoted last summer to Associate Dean of Academic Affairs for CEAT. He will be greatly missed in the department, but, thankfully, he's only a short walk away. Our new head, Dr. Guiping Hu, joined IEM in July 2023. Her husband, Dr. Lizhi Wang will also be joining IEM. One more Assistant Professor, Dr. Pratima Saravanan, joined us in August. IEM is looking forward to welcoming all three of them!



We had to say goodbye last summer to Laura Brown, Dr. Farzad Yousefian and Dr. Bing Yao. Laura retired after serving the department faithfully for 10 years. Dr. Yousefian and his wife moved to New Jersey (Rutgers University) and Dr. Yao joined her husband on faculty at the University of Tennessee. We wish them all well. They will be missed.

### **Dr. Joseph Nuamah was awarded a \$230,000 grant from NSF to study the temporal dynamics of resilience during human-computer interaction**



Many people spend part of the day in stressful conditions, which are known in general to be a major contributor to burnout, diminished productivity, and numerous other health risks, whereas some people (including for example air traffic controllers, soldiers, and first responders) work in high stress environments seemingly with no ill effects. Why certain individuals perform better under high stress than others with similar training remains unexplored. Resilience, the ability to maintain performance during stressful events, is a crucial attribute of healthy individuals who work in such environments. Because resilience has important implications for human well-being and task performance, there is a need to identify healthy individuals who are vulnerable to stress-related performance decline, preferably prior to actual performance under stress to facilitate delivery of focused intervention that might help prevent the development of

clinical stress disorders, which pose a tremendous burden both for the individual and for society in general. This project will fundamentally advance our understanding of stress resilience by addressing the limitations of existing stress resilience measures and identifying potential biomarkers of stress resilience.

## New Faculty

We are excited about our three new colleagues – Drs. Akash Deep, Paritosh Ramanan and Sri Ramesh. They will change lives with their research. Dr. Deep studies “industrial analytics”. He tries to bring together statistical and industrial knowledge -- to effectively model complex relationships between industrial processes, provide an accurate and individualized prognosis, monitor business processes, and subsequently, use these insights to make intelligent optimal decisions for smart and connected systems.

Dr. Ramanan’s research interests pertain to the development of decentralized methodologies for large-scale optimization and machine learning problems in industrial IoT driven Cyber-Physical Systems. The hallmark of decentralized methods lies in their ability to deliver faster, scalable and privacy driven solutions without the need to transfer data.

Dr. Ramesh spearheads research at the Advanced Materials and Additive Manufacturing Laboratory at Oklahoma State University’s Helmerich Research Center. His research zeroes in on the complexities of additive manufacturing, employing numerical models to unpack the intricate processes of micro- and nano-scale printing of custom-formulated bioactive and conductive inks. The versatility of these insights is demonstrated through their application across a suite of manufacturing techniques. Parallel to this, Dr. Ramesh’s bioengineering interests lie in developing adaptive biomaterials and engineered tissues responsive to physiological changes in vivo. Further, his team is paving the way in improving bio-additive manufacturing precision and repeatability through the development of innovative control systems and machine learning models. In addition, all three are excellent teachers! The new knowledge and spark that they bring to the department is inspiring.

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Dr. Juan Borrero was promoted to Associate Professor (with tenure) in June 2023 and Dr. Chenang Liu was reappointed as an Assistant Professor, also in June. Both have bright futures in IEM!

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We have three new staff members – Luann Bowman (Administrative Associate), Tammy Abbott (Financial Assistant) and Maria Gonzalez (Graduate Programs Coordinator), plus a new work-study student, Jayden Davis-Booker. Matt Taylor (UG Advisor) and Lenley Brown (Administrative Support Specialist) are still with us. Matt was promoted last fall to Senior Associate Academic Advisor and we couldn’t be happier for him.



We initiated seven new members into Alpha Pi Mu in early November (Pictured, left), and our IISE chapter held a resume workshop as well as a Halloween bingo event in the fall. Dr. Chenang Liu took 17 IISE members to the Region V Student Paper Conference in Columbia, Missouri in February, where Kent Slater won second place in the competition.



Senior Emma Wilson received a scholarship from the Industrial Advisory Board during the Fall IAB meeting.

Two of our IEM seniors, Jeff Stockel (Far left) and Braden White (Fourth from left) were selected for the OSU Homecoming Court.



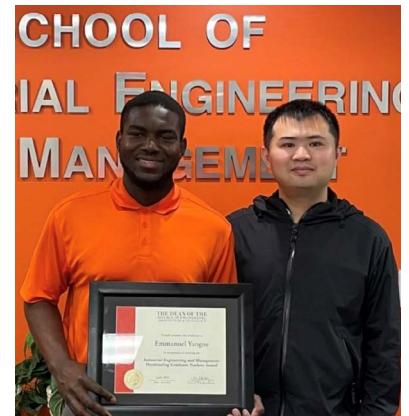
Yuxuan Li (Advisor: C. Liu) received the Doctoral Phoenix Award from the Graduate and Professional Students' Society in Spring 2023. This is the highest recognition bestowed by GPSGA on a doctoral student and recognizes exemplary achievement in leadership and scholarship, community and university service and professional involvement.

## Celebrations



Dr. Baski Balasundaram received OSU's highest teaching honor in September – the Regents' Distinguished Teaching Award. It should be noted that Baski also received the Regents' Distinguished Research Award in 2019. It is rare that a faculty member is recognized for excellence in both areas. We are lucky to have him.

**THREE** of our senior IEs, Keaton Carter, Raegen Daigle and Emma Wilson, were named "Seniors of Significance" for Oklahoma State. This select group of only 51 students across campus represents the top 1% of all graduating seniors. Keaton was also named as an "Outstanding Senior," in recognition of her academic achievement, campus/community involvement and work ethic while at OSU. IEM senior, Sarah Bishop, received the honor of wearing the 'Orange Robe' at graduation in May, recognizing her as the Dean's choice for the Outstanding Senior in CEAT and Emmanuel Yangue (C. Liu, Advisor) was selected as the Outstanding Graduate Student in IEM.



OSU-IEM MS graduate, David Boyer, was named to the Hall of Fame for the College of Engineering, Architecture and Technology, the college's highest honor. Dave is the Chief Operating Officer for Webco Industries, a member of The Cowboy Academy (TCA) and has supported IEM for many years. We enjoyed hosting him in the department prior to the banquet and learning even more from him.



In September, we recognized six new members of TCA: (left to right) John Deming, Jared Green, Farhan Khan, Jeff Moore, Virginia Pitts and Jim Poteet. More information can be found about them and TCA at <https://ceat.okstate.edu/iem/people/cowboy-academy/academy-members.html>



Dr. Jennifer Glenn received BOTH the Outstanding Senior Faculty Award for Teaching in the College of Engineering, Architecture and Technology, 2022 - 2023 AND the Outstanding Faculty Award for Diversity, Equity and Inclusion in the College of Engineering, Architecture and Technology, 2022 - 2023. Wow!



Dr. Katie Jurewicz was named a Science Policy Fellow through the Human Factors and Ergonomics Society (HFES). As a fellow, she aids in promoting the importance of HF/E science among federal agencies and legislators. HFES has engaged in advocacy efforts related to safety and health in a variety of industries and to funding support for human factors/ergonomics research. Dr. Jurewicz supports the development of policy statements for legislators to use at the federal level. In Fall 2022, Dr. Jurewicz made a trip to DC to meet with congressional offices to advocate for human factors engineering research and most notably, she met with House Science, Space, and Technology Committee, Research and Technology Committee Staff from the Office of Representative Frank Lucas. Dr. Jurewicz continues to serve as a science policy fellow and is currently working on health science policy related to improving accessibility to healthcare & overcoming health disparities as well as developing policy statements related to interface design for quantum computing.

### Several IEM students received national scholarships this year

- **Melissa Mata** received the Harold & Inge Marcus Scholarship from the Institute of Industrial and Systems Engineering (IISE)
- **Loryn (Grace) Hendrix** received the Dwight D. Gardner Scholarship, also from IISE
- **Ashton Parkey, Ethan O'Connor, Seth Thibodeau** and **Alan Meenan** all received scholarships from the Material Handling Education Foundation (MHEFI)

IEM finalized a 'transfer map' with Tulsa Community College, a first step to offering a BSIE degree at OSU-Tulsa. Students will take the first two years of their engineering coursework at TCC and then transfer to OSU-Tulsa to complete their degree. We are excited about creating a new pipeline for IEM graduates. In addition, IEM (Drs. Chenang Liu and Sri Ramesh), MAE and Material Science were involved in designing new laboratories on the campus of OSU-Tulsa to support a proposed Manufacturing Engineering option. These \$2.2M labs will be instrumental in helping us grow the IEM undergraduate program in Tulsa.

### Facts and Data for Academic Year 2022-23

<b>DEGREES</b>	<b>50</b>	BS-IEM (highest since AY 19-20)
	<b>19</b>	MS-IEM
	<b>29</b>	MSETM
	<b>5</b>	PhD

**~\$100,000**

Total Scholarships Awarded by IEM

**\$71,000**

Average Salary - BS graduates in AY 21-22

**~\$700,000**

Total Research Expenditures for AY 22-23

**34**

Publications in Peer-Reviewed Journals

## BSIE Graduates Academic Year 22-23

### Fall 22

Rawan Albahraini  
Abdulrahman Aljouher  
Jamayel Alnajem  
Rachel Bebb  
Darcie Golden  
Samantha Harizal  
Hallie Hopper (Blanton)  
Jared Jenkins  
Jared Johnson  
Bradyn Newberg  
Walter Penn  
Marco Pina-Perez  
Luke Ratke  
Javier Rodriguez  
Caleb Triplett  
Grace Voth

### Spring 23

Brady Amox  
Sarah Bishop  
Gabriel Bisogno Mendez  
Keaton Carter  
Aymen Charmi  
Patrick Cook  
Keegan Cook  
Raegen Daigle  
Christopher Dyer  
Hope Goodwin  
Jackson Green  
Jayden Grilliette  
Cameron Groenteman  
Reece Hamar  
Charles Hatfield  
Chloe Jones  
Ainsley Kyle

Jackson Linson  
Caitlin Mantooth  
Lauren Millis  
Ian Penney  
Ricky Reed  
David Schwartz  
Kent Slater  
Jeffrey Stockel  
Vamsee Krishna Sunkar  
Calvin Ward  
Braden White  
Nathan Whitehead  
Drew Williams  
Emma Wilson  
Chas Wright

### Summer 23

Cole Durkee  
Iris Martinez

## MSIE, MSETM and PhD Graduates Academic Year 22-23

### Fall

#### MSETM

Karla Antunez Marinez  
Mitchell Carlson  
Thomas Clark  
Conner Copeland  
Kyle Corriveau  
Joseph Defalco  
Geraldine Fuentes  
Terry Head  
Daniel Nava  
Guillermo Throckmorton  
Taylor  
Thomas Jason Zerbe

#### MSIEM

Enrico Laoh  
Sushrut Kirtikant Lokhande  
Vicky Rijhwani

#### PhD:

Niloufar Daemi  
(J. Borrero, Advisor)

### Spring

#### MSETM

Allan Balcita  
Alexander Burkdoll  
Stevenson Dang  
Jean-Claude Francois  
Brandon Fugate  
Alexander Manco  
Aaron Napier  
Warren Pettaway  
Joshua Reed  
Andrew Restivo  
Taylor Rodgers  
Matthew Speaks  
Shannon Stansfield  
Michael Taylor  
Partrick Turner

#### MSIEM

Md Suman Ahammed  
Adwait Chabukswar  
Nimeet Doshi  
Kylie Dowers

Varun Joshi  
Bala Jithender  
Keerthipati Kakumanu  
Hemal Sumanth  
Shubham Sushil Onkar  
Prathamesh Pawar  
Pushkar Sangvikar  
Sanket Sunil Sawant  
Jugal Setiya  
Suraj Shirsale  
Diwas Subedi  
Shweta Subramaniam

#### PhD:

Majid Akhgar Farsani  
(J. Borrero, Advisor)  
Mehdi Ansari Hadipour  
(j. Borrero, Advisor)

### Summer

#### MSIEM

Oday Bani Ahmad  
Emmanuel Yangué

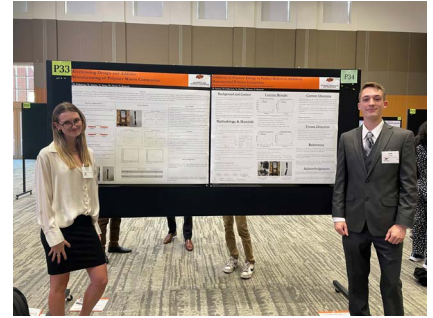
#### PhD:

Yuxuan Li  
(C. Liu, Advisor)  
Zhangyue Shi  
(C. Liu, Advisor)

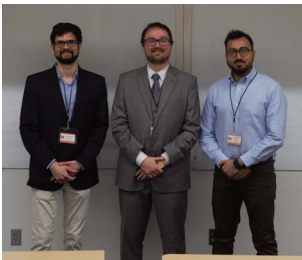
## Undergraduate Research



Dr. Chenang Liu had two students, Jacob O'Hara and Kent Slater, present their research at the OSU Undergraduate Research Conference. Dr. Sri Ramesh also had two students, Olivia Fulkerson and Erik Inman, who presented at the conference. Erik received the prestigious Wentz Research Award from the Lew Wentz Foundation to continue his research with Dr. Ramesh next fall.



## Graduate Research Conference



Matthew Nare, IEM PhD student (Advisor: K. Jurewicz), formed a planning committee (Amey Thorat, CHEME, and Amjid Khan (MAE) and organized the first CEAT Graduate Student Research Conference in February 2023. The conference had over 50 posters, with 10 faculty judges from across CEAT and welcomed over 100 participants. Three illustrious CEAT faculty members, Drs. Ritesh Sachan (MAE), Tyler Ley (Civil and Environmental), and Sunderesh Heragu (IEM/Dean's office) made keynote addresses. This unique opportunity was made possible through Matthew and his committee's hard work, CEAT Associate Dean of Research, Dr. Chuck Bunting, and the support of the Heads

of Civil/Environmental, Electrical/Computer, Industrial, Mechanical/Aerospace and Technology. We hope this conference will become an annual event!

## Faculty Publications in Academic Year 22-23

Yajun Lu, Zhuqi Miao, Parisa Sahraeian, and Balabhaskar Balasundaram. On atomic cliques in temporal graphs. *Optimization Letters*, 17(4):813–828, April 2023.

Yajun Lu, Hosseinali Salemi, Balabhaskar Balasundaram, and Austin Buchanan. On fault-tolerant low-diameter clusters in graphs. *INFORMS Journal on Computing*, 34(6):3181–3199, November- December 2022.

Niloufar Daemi, Juan S. Borrero, and Balabhaskar Balasundaram. Interdicting low-diameter cohesive subgroups in large-scale social networks. *INFORMS Journal on Optimization*, 4(3):304–325, September 2022.

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M. Ansari, J. S. Borrero, L. Lozano, "Robust Minimum-Cost Flow Problems Under Multiple Ripple Effect Disruptions." Forthcoming at *INFORMS Journal on Computing*. [Link].

N. Daemi, J. S. Borrero, B. Balasundaram, "Interdicting Low-Diameter Cohesive Subgroups in Large-Scale Social Networks," *INFORMS Journal on Optimization*, Vol. 4(3): 304-325 (2022). [Link].

J. S. Borrero, M. Akhgar, P. Krokhmal, "A Scalable Markov Chain Framework for Influence Maximization in Arbitrary Networks," *IEEE Transactions on Network Science and Engineering*, Vol. 8(3): 2372-2387 (2021).

J. S. Borrero, O. A. Prokopyev, D. Saure, "Learning in Sequential Bilevel Linear Programming," *INFORMS Journal on Optimization* (2021). Forthcoming. [Link].

B. Balasundaram, J. S. Borrero, H. Pan, "Graph Signatures: Identification and Optimization," *European Journal of Operational Research*, Vol. 296(3): 764-775 (2022). [Link].

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Y. Lu, H. Salemi, B. Balasundaram, A. Buchanan. On fault-tolerant low-diameter clusters in graphs. *INFORMS Journal on Computing*, 34(6): 3181-3199, 2022.

H. Validi, A. Buchanan. Political districting to minimize cut edges. *Mathematical Programming Computation*, 14, 623–672, 2022.

M.J. Naderi, A. Buchanan, J.L. Walteros. Worst-case analysis of clique MIPs. *Mathematical Programming*, 195: 517–551, 2022.

H. Salemi, A. Buchanan. Solving the distance-based critical node problem. *INFORMS Journal on Computing*, 34(3): 1309–1326, 2022.

H. Validi, A. Buchanan, E. Lykhovyd. Imposing contiguity constraints in political districting models. *Operations Research*, 70(2): 867–892, 2022.

V. Stozhkov, A. Buchanan, S. Butenko, V. Boginski. Continuous cubic formulations for cluster detection problems in networks. *Mathematical Programming*, 196: 279–307, 2022.

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A. Deep, S. Zhou, D. Veeramani and Y. Chen, “HMM-Based Joint Modeling of Condition Monitoring Signals and Failure Event Data for Prognosis,” in *IEEE Transactions on Reliability*, 2022, doi: 10.1109/TR.2022.3193353.

A. Deep, S. Zhou, D. Veeramani and Y. Chen, “Partially observable Markov decision process-based optimal maintenance planning with time-dependent observations,” *European Journal of Operations Research*, 2023, doi: 10.1016/j.ejor.2023.05.022. (Just accepted)

Jurewicz, K. A., & Neyens, D. M. (2022). Redefining the human factors approach to 3D gestural HCI by exploring the usability-accuracy tradeoff in gestural computer systems. *Applied Ergonomics*, 105, 103833.

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Liu, C., Wang, R., Ho, I., Kong, Z., Williams, C., Babu, S., and Joslin, C., 2022, “Toward Online Surface Morphology Measurement in Additive Manufacturing Using a Deep Learning-based Approach,” *Journal of Intelligent Manufacturing*. (In press)

Shi, Z.\* , Mamun, A., Kan, C., Tian, W., and Liu, C., 2022, “An LSTM-Autoencoder Based Online Side Channel Monitoring Approach for Cyber-physical Attack Detection in Additive Manufacturing,” *Journal of Intelligent Manufacturing*. (In press)

Xiao, P., Shi, Z.\* , Liu, C., and Darren, D., 2022, “Characteristics of circulating small non-coding RNAs in plasma and serum during human aging,” *Aging Medicine* (In Press).

Bappy, M., Liu, C., Bian, L., and Tian, W., 2022, “Morphological Dynamics-based Anomaly Detection towards In-situ Layer-wise Certification for Directed Energy Deposition Processes,” *ASME Journal of Manufacturing Science and Engineering*. Vol. 144 (11), pp. 11100

Shi, Z.\* , Mandal, S., Harimkar, S., and Liu, C., 2022, “Hybrid Data-Driven Feature Extraction-Enabled Surface Modeling for Metal Additive Manufacturing,” *International Journal of Advanced Manufacturing Technology*. Vol. 121 (7), pp. 4643-4662.

Liu, C., Tian, W., and Kan, C., 2022, “When AI Meets Additive Manufacturing: Challenges and Emerging Opportunities for Human-Centered Products Development,” *Journal of Manufacturing Systems*. Vol. 64 pp. 648-656.

Mamun, A., Liu, C., Kan, C., and Tian, W., 2022, “Securing Cyber-Physical Additive Manufacturing Systems by In-situ Process Authentication using Streamline Video Analysis,” *Journal of Manufacturing Systems*. Vol. 62 pp. 429-440.

Li, Y.\* , VanOsdol, J., Ranjan, A., and Liu, C., 2022, “A Multilayer Network-Enabled Ultrasonic Video Analysis Approach for Online Cancer Drug Delivery Monitoring,” *Computer Methods and Programs in Biomedicine*. Vol, 213, p. 106505.



Chen, Y., Abu-Heiba, A., Kassaei, S., Liu, C., Liu, G., Starke, M., Smith, B., and Momen, A., 2022, "Coupled Heat-Power Operation of Smart Buildings via Modular Pumped Hydro Storage," *ASME Journal of Energy Resources Technology*. Vol. 144 (7), pp. 070912.

1. Krishnan, D.R.\*, T. Liu. 2022. A Branch-and-cut Algorithm for Pickup-and-delivery Traveling Salesman Problem with Handling Costs. *Networks*, 80(3), 297-313.

2. Wang, R., Y. Liang, Z. Miao, T. Liu. 2022. Bayesian Analysis for Imbalanced Positive-Unlabelled Diagnosis Codes in Electronic Health Records. Accepted by *Annals of Applied Statistics*.

3. Sun, S.\*, T. Liu. Pricing and Sales Effort Coordination in a Dual-channel Supply Chain with the Presence of Free Riding Consumers. Under 2nd review at *Transportation Review Part E*.

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Nuamah, J. K., Adapa, K., & Mazur, L. M. (2022). State of the evidence on simulation-based electronic health records training: A scoping review. *Health Informatics Journal*, 28(3), 14604582221113439.

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Ramanan P., Li D. and Gebraeel N. "Decentralized Blockchain based Replay Attack Detection for Power Systems", arXiv preprint arXiv:2010.09086, accepted to IEEE Transactions on Systems, Man and Cybernetics: Systems, (Acceptance Ratio: 0.1, Impact Factor: 13.45

Numerical and experimental investigation of aerosol jet printing  
S Ramesh, C Mahajan, S Gerdes, A Gaikwad, P Rao, DR Cormier, ...  
*Additive Manufacturing* 59, 103090, 2022

Computational fluid dynamics and experimental validation of aerosol jet printing with multi-stage flow focusing lenses

S Ramesh, Z Xu, IV Rivero, DR Cormier  
*Journal of Manufacturing Processes* 95, 312-329. 2023

Monitoring and control of biological additive manufacturing using machine learning

S Gerdes, A Gaikwad, S Ramesh, IV Rivero, A Tamayol, P Rao  
*Journal of Intelligent Manufacturing*, 1-23

## Grants Awarded in Academic Year 22-23

**"Generalization of the EHS Flow Analysis and Risk Assessment Methodology and Development of OK-EFRA 2.0 with New Survey Data,"** Oklahoma Department of Emergency Management and Homeland Security, 10/1/2022 – 9/30/2023, \$159,575, M. Kamath (PI), S. Frazier, and D. Rodriguez Coca Supplemental to "Deployment and Enhancement of the ArcGIS Application Flow Analysis and Risk Assessment of HazMat Transportation in Oklahoma," Oklahoma Department of Emergency Management, 6/15/2022–8/31/2022, \$11,570, M. Kamath (PI) and D. Rodriguez Coca

**"Research on Data Science and Machine Learning for Business Process Improvement and Automation",** UW Madison (sub-award via Jewelers Mutual Insurance Company), 09/01/2022 - 08/31/2023, \$10,000, A Deep.

Joseph Nuamah (PI). HCC: Small: **Investigating the temporal dynamics of resilience during human-computer interaction:** an EEG-fNIRS study, 05/15/2023 – 04/30/2025, \$230,090. National Science Foundation

**We are always happy when alumni come back!**



Brandon Martens (BSIE-2013), Rachel Seo (BSIE-2013),  
Camille DeYong and Erin (Lee) Cunningham (BSIE-2013)



Kedar Adavadkar & Family



Somadatta Karanjekar & Family

Please know we think of our alumni and friends often. We would love to hear from you – at any time, you can send an email to [iem@okstate.edu](mailto:iem@okstate.edu). Pertinent information \*might\* include: name, year of graduation, degree, address, summary of your career, etc. Of course, pictures and updates on children, grandchildren and pets are always welcome! You might even end up in a future newsletter...