Vibrations is the annual newsletter of the University of Kansas Department of Mechanical Engineering, sent to over 3000 alumni and over 500 friends of the Department.

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I hope you will enjoy, and be inspired by the articles in this edition of Vibrations. I continue to be amazed by the creativity, hard work, and success of our many students and alumni. And I am grateful to work alongside faculty colleagues who positively influence students from their matriculation through graduation, and beyond.

In the fall of 2016, KUME will be home to 21 faculty members who collectively educate nearly 600 undergraduate and graduate students. In addition, each tenure-track faculty member is expected to unveil new knowledge, and be involved with their professional communities. Indeed, it is (i) the research we perform and (ii) the service we provide, as for example journal editors or peer reviewers of research proposals and manuscripts, that allows us to introduce new science, new technology, and emerging applications to our students - long before the concepts might appear in textbooks or be featured in the popular press. It is through industry-sponsored capstone and research projects that our students put theories to practice, applying new knowledge to address opportunities of immediate and practical importance.

Since January of 2015, the 21 KUME faculty members have published 111 journal articles, are inventors on six U.S. patents, and have been cited over 8500 times by researchers worldwide according to Google Scholar. We have advised students who have worked with over 20 companies on capstone and more advanced, industry-sponsored research projects. These numbers are testament to the growing influence of KUME on the way engineering is practiced today, and might be practiced decades into the future.

I would like to extend my appreciation to those alumni and organizations, several of whom are featured in this issue, who recognize the opportunity (and as many would argue, the responsibility) to grow our department’s regional, national, and international stature. As I’ve noted in previous messages, it is of critical importance to have the means to attract top faculty candidates to KU. Such individuals are aggressively and simultaneously pursued by many leading universities, and have built or demonstrate the potential to build international reputations as teachers in the broadest sense of the word.

Please enjoy your copy of Vibrations and learn more about our students, alumni, and faculty. As always, I invite you to drop in during your next visit to Lawrence to share your story.

Regards,

Theodore L. Bergman
Charles E. & Mary Jane Spahr Professor
Chairman, Department of Mechanical Engineering
Meet our New Faculty Members

Steven Soper, professor in the departments of Chemistry and Biomedical Engineering at the University of North Carolina (UNC), will join KU in July of 2016, holding appointments in the Departments of Chemistry and Mechanical Engineering. Dr. Soper will be the eleventh of only 12 University Foundation Professors, the highest academic rank at KU.

Soper’s research focuses on developing biomedical devices, concentrating on in vitro cancer diagnostics based on novel lab-on-a-chip technologies. Soper’s efforts focus on cancer, stroke and infectious diseases, and bring the diagnostics to the point-of-care. His team exploits advanced manufacturing techniques to both form and activate the small sensors. Professor Soper will teach courses in micro- and biofluid dynamics, drawing students from multiple disciplines.

“Steve is an excellent complement to the research strengths in the Department of Mechanical Engineering and the Bioengineering Program,” said Ted Bergman, professor and chair of mechanical engineering. “He will inspire impactful research among our faculty and students, and elevate the stature of the department.” According to Brian Laird, professor and chair of Chemistry, “Dr. Soper is a world-class and highly regarded bioanalytical chemist and biomedical engineer who has been successful in forging close collaborations with engineering and the biomedical sciences. He will bring an energy and drive that will help propel KU’s chemistry and engineering programs, as well as the university, to new levels.”

Between 2009 and 2012 Dr. Soper held the title of World Class University Professor at Ulsan National Institute of Science and Technology in Ulsan, South Korea. From 2013 to present, he has been an adjunct professor at Ulsan. From 1991 to 2011 he held faculty positions in the departments of Chemistry, Mechanical Engineering, and Biological Sciences at LSU. He earned bachelor’s degrees in psychology and chemistry from the University of Nebraska at Omaha, and his doctorate in bioanalytical chemistry from KU in 1989. An inventor of 12 patents, his industry experience includes two years at Colgate Palmolive. He is the founder and chief science officer of the successful startup company BioFluidica. Soper plans to move research operations of BioFluidica to incubator space at KU.

To date, Dr. Soper has secured roughly $57 million in research support from federal and other sources. He has published more than 250 papers in peer-reviewed journals, two books, five book chapters and more than 70 refereed conference proceedings. His work has been cited 10,000 times. Soper’s awards and honors include fellow status in AAAS, the Royal Society of Chemistry and the Society for Applied Spectroscopy; the ACS Award in Advances in Chemical Instrumentation; the A.A. Benedetti-Pilcher International Microchemical Award; the Whitaker Foundation Award; the National Institutes of Health Shannon Award; and the R&D 100 Award.

Gibum Kwon will join KU in August of 2016 as an Assistant Professor. Dr. Kwon received his Ph.D. in materials science and engineering from the University of Michigan, Ann Arbor, and is currently a post-doctoral associate in the Mechanical Engineering Department at MIT.

Dr. Kwon’s current research interests include advanced functional surfaces; liquid-liquid separations; oleo- and hydrophobic surfaces; self-healing coatings; and patterned surfaces. By manipulating their micro- and nanostructure, innovative surfaces and membranes can be constructed and their performance can be controlled. Applications abound, and address important challenges in both water conservation as well as oil exploration and recovery.

Dr. Kwon has authored 7 refereed journal articles, multiple conference papers, and is inventor of 5 patents. According to Dr. Kwon, “I am very excited to join the KU Mechanical Engineering Department. I strongly believe that KUME is going to be the best place to advance my research in advanced functional materials for wastewater treatment and enhanced oil recovery.”
Westar Partners with KUME on Industry-Sponsored Capstone

Westar Energy of Topeka has partnered with KU to support the Mechanical Engineering Capstone Projects Program and the new School of Engineering Student Projects Center. Westar’s gift of $100,000, pledged over five years, will be used to purchase equipment, and to support student mechanical engineering assistants or other personnel for the new West Campus Student Projects Center, which is home to most of the mechanical engineering capstone projects.

“The Westar Partnership will accelerate the growth and expansion of our successful, industry-sponsored capstone projects program,” said Ted Bergman, professor and chair of mechanical engineering. More than 90 students, split into small teams, are working on nearly two-dozen projects for a variety of companies, including Westar Energy, in the 2015-2016 academic year as part of the mechanical engineering capstone experience.

“Students tackle projects that demand innovation, require application of fundamental engineering principles, and include real-world constraints such as meeting budgets and schedules,” Bergman said. “This is usually their first opportunity to experience the thrill of delivering engineering results that are relevant in the real world. The financial structure of our capstone program, in which sponsoring companies pay a significant fee, promotes meaningful industry involvement. This, in turn, ensures that our graduates enter the workforce more seasoned and experienced relative to their peers from many other institutions. Our industry-sponsored capstone projects are a tangible example of the importance of KU to our state, region and the nation.”

“We view our partnership with the KU School of Engineering as an opportunity to develop talent by exposing students to real-world challenges through capstone design projects while familiarizing students with Westar’s brand,” said Jerl Banning, senior vice president of operations and administration for Westar. “Our organizations also can help each other by sharing what we know — research, demonstrations and just getting to know each other better through events and collaboration.”

Westar hopes the agreement increases awareness about what the company has to offer to students. “We’re always on the lookout to add to our talent. Many students think they have to look far away to find a great company. We’d like to share our story with them and let them know we’re a great place to work,” Mr. Banning said. “This partnership provides us a chance to meet talented students who are interested in the energy business and let them know they have a great choice right here near KU and an opportunity to work with an innovative company providing real value to its customers.”

The Program has grown from a handful of sponsors in 2013. What began as a regional activity has blossomed, with current participating companies from Silicon Valley in the west, to Virginia in the east. Sponsors range from individuals and early-stage startups, to large publically-traded corporations. Many KU alumni have helped identify projects relevant to their businesses.

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Beyond the project work, sponsors can identify and recruit top students for eventual full-time employment,” said Tom DeAgostino, associate professor-of-the-practice and capstone instructor. “It’s a great opportunity for businesses to increase their visibility within the mechanical engineering department. We are grateful that Westar Energy is taking the lead role to foster university-industry relations in the state and region.”

Ted Bergman concluded, “On behalf of all KUME students and alumni, I would like to extend my deep appreciation to Paul Wallen (BSME, 1991), executive director of transmission and substation construction at Westar. Paul serves as the chairman of the department’s advisory board, and provided the vision and energy to make the Westar-KU Partnership a reality.”

Josie Nixon joined the department as an accounting specialist in May of 2016. She was previously employed in the Financial Aid & Scholarships department for 2 years. Outside of work, Josie enjoys raising her son, cooking, and spending time outdoors. She originally moved to Lawrence in 2003 to attend KU as a dance student, though she eventually changed her focus to anthropology. Now she salsa dances on the occasional weekend when she can get away to Kansas City.
Turning the clock back 35 years would bring us to a time when much of the technology we take for granted did not exist. There was neither internet nor cell phone. Having an answering machine connected to a landline was considered exotic. It was also when Andres Carvallo was finishing his preparatory education at a small Catholic high school in Valencia, Venezuela. Using a modest inheritance from his recently-deceased father, Andres decided he would explore the world, with a key part of his plan being the pursuit of a college degree in Europe or the U.S.

“I played varsity soccer, baseball, and basketball in high school, and I wanted to go to a big school with nationally-recognized sports and engineering programs,” says Mr. Carvallo. “I was fascinated with cars, and I wanted to be an engineer since I was eight years old. Pitt, UCLA, and KU were popular destinations for my Valencian friends.” After visiting Pennsylvania, Los Angeles and Lawrence, Andres “fell in love” with KU, appreciating the intimacy of the campus and town. “In a way it reminded me of my little school in Venezuela. And I learned during my visit to Lawrence that Wilt Chamberlain played at KU. That clinched the deal.”

Not surprising given his interest in automobiles, the young Carvallo particularly enjoyed his classes in controls and dynamics, and was excited with the prospect of someday working for a large auto company. But in a chance conversation with the director of the KU computation center six months before his graduation, Andres was strongly advised to explore a nascent startup company in Bellevue, Washington. True to his adventurous spirit, Andres took the suggestion and soon began his first job, at Microsoft, after finishing his KU classes in 1985.

“It was exhilarating,” recalls Andres. “Microsoft had less than 400 people at the time. We worked 18 hour days, seven days a week. When we weren’t working, we slept on cots in our offices. And we were led by the individual I consider to be the greatest technology businessperson ever, Bill Gates, who was only 25 years old at the time.” Andres was project manager for the first versions of Windows. His leadership of Windows development and marketing is “what many people might consider to be the coolest achievement of my career.”

Andres left Microsoft for Santa Cruz Operation in 1989 to be a Unix product manager. He met and married Angela Chambers in 1991. After SCO, he became a general manager at Borland, and grew a division with operations in Latin America, the Asia Pacific, and Africa from $2 million to $50 million in annual revenues. Two years later Andres was hired by Digital Equipment Corporation (now HP Enterprise) as a general manager, growing his business from $20 million to over $500 million in annual revenues. In 1996, he became president and general manager of a new company, Phillips Consumer Communications, a pioneer in pagers and cell phones. In less than four years under Andres’ leadership, the company grew from just a concept to over $2.5 billion in annual sales with more than 3000 employees. Carly Fiorina chaired PCC’s board.

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Mr. Andres Carvallo.
Kipp Professorship Established

Robert and Deborah Kipp have funded the Harold L. Kipp & John E. Kipp Professorship in Mechanical Engineering. The Kipps established the professorship in honor of Bob's father, Harold, who was a faculty member in the Department of Mechanical Engineering from 1948 to 1973. Bob's brother, John, graduated from KU with his bachelor's and master's degrees in mechanical engineering in 1951 and 1955, respectively.

According to Mr. Kipp, “Debbie and I are pleased that the Kipp Professorship will be a lasting tribute to my father in honor of his passion for teaching. We are delighted to help the mechanical engineering department realize its aspirations for international leadership in both teaching and research.” According to Ted Bergman, KUME department chair, “The generosity of Bob and Debbie Kipp will have a profound impact on the department, as well as the School of Engineering. I am touched that the Kipps have honored Bob's father in a manner that will last forever.”

Bob Kipp received his bachelor's degree in civil engineering from KU in 1952, and a master's degree in public administration in 1956, also from KU. Mr. Kipp served for many years as vice president of Hallmark Cards, Inc., the world's largest publisher of greeting cards; as chairman of the board of Crown Center, a Hallmark subsidiary; and as a board member of the Hall Family Foundation. Prior to joining Hallmark in 1983, he was city manager of Kansas City, Missouri, an assignment that followed 20 years in city management in Kansas, Ohio, and Missouri. More recently, he has been vice president of the board of the Kansas City Symphony, and has served on the boards of the Metropolitan Kansas City Performing Arts Centre, the Kansas City Area Life Sciences Institute, and the University of Kansas Center for Research. He has been a member of the University of Kansas Edwards Campus board of advisors.

Mr. Kipp is past chairman of the board of trustees and board of directors of Midwest Research Institute, past chairman of the board of the Civic Council of Greater Kansas City, past chairman of the board of the Greater Kansas City Chamber of Commerce, and past president of Starlight Theatre. Among many recognitions, Bob is a recipient of the University of Kansas Distinguished Service Award, and was named Kansas Citian of the Year by the Greater Kansas City Chamber of Commerce in 2000.

The Kipp Professorship will be used to attract top faculty members to the Department of Mechanical Engineering.

Entrepreneur’s Corner

Michael Strickland (BSME, 2014) is owner of Michael Strickland Images. Michael graduated from the Interlochen Arts Academy and studied jazz in New York City before pursuing his mechanical engineering degree at KU. A fine art photographer and workshop instructor, Michael teaches nature photography around the globe, and creates fine art prints for some of the world's most prodigious collectors using both traditional and modern techniques. Michael reports that his mechanical engineering training enhanced his creativity, and gave him the work ethic and confidence to start his successful business. We thank Michael for providing the cover artwork for this edition of Vibrations.
Salute to the Spirit of Wamego

Wamego Kansas celebrated its 150th birthday on June 4, 2016. Part of the gala was the dedication of a new car for the Spirit of Wamego, a local amusement ride for young children.

Built in 1947, the Spirit lacked accessibility for the disabled. Recognizing the need, the director of an independent living center in Wamego approached Ken Fischer, professor of mechanical engineering. Could KU mechanical engineers develop a new car that would bring enjoyment and delight to children confined to wheelchairs? Dr. Fischer responded to the challenge, as did four mechanical engineering seniors, Marissa (Riddle) McLain, Andrew Boppart, Kyle Rupp, and Morgan Grahek.

Working from the original plans and building on their mechanical engineering training, the student design team modified one of the cars to ensure its accessibility, ease of use, and safety. The new car was delivered to and tested in Wamego in May, prior to its June dedication. Professor Fischer notes, “This was a fun project from the start. It’s a great example of what the BREAK program is all about - creating opportunities for Kansans with disabilities. The best part was seeing the smiles and excitement of kids who are now able to ride the train!”

The Wamego project is one of about 10 mechanical engineering capstone design efforts conducted since 2013 that have assisted non-profit organizations; specifically those that serve the disabled. Funding for the BREAK (Biomechanical Rehabilitation Engineering Advancement in Kansas) projects was acquired by Dr. Fischer through a $125,000 grant from the U.S. National Science Foundation.

Alumni Nugget

Carl Herakovich recently alerted us to his new book entitled Mechanics IUTAM USNC/TAM: A History of People, Events, and Communities. Carl received his M.S. in 1962 from the department of engineering mechanics, which was dissolved the following year. Although not officially an alumnus of any current department, he is “delighted” to be informally connected with KUME. Dr. Herakovich is an emeritus professor at the University of Virginia, and is world-renowned for his research in composite materials, the history of which is the subject of his book. When not in his Charlottesville laboratory, he spent two decades as an Atlantic Coast Conference football official. Carl’s first faculty position was at Rose-Hulman, where he served concurrently as assistant professor, head football coach, head track coach, and athletic director. A stellar athlete, Professor Herakovich is, to this day, the second-highest season-average scorer in NCAA football history (0.3 points-per-game behind Barry Sanders).
Moving to Austin in 2000, Andres conceived of numerous successful Texas-based startups with products ranging from the first wireless platforms for enterprise data management, for online trading, and for the trading of industrial equipment. His penchant for success was established throughout the information technology industry, and was becoming noticed by the visionary leadership of a nondescript, publicly-owned utility, Austin Energy (AE).

Andres became AE’s chief information and technology officer in 2003. It was in the Texas Hill Country that he and others first envisioned a future of electric vehicles, photovoltaic power generation, smart meters and devices, and distributed energy sources. The common link would be a pervasive and intelligent information network that would continuously monitor power generation and consumption, orchestrating a dance between supply and demand that would reduce energy usage, water consumption, and greenhouse gas emissions. “I was never a power generation guy, not even as a student at KU,” admits Andres. “But I realized the opportunities in electric power were strikingly similar to the opportunities during my early days at Microsoft. The grid was blind between the substation and individual homes and businesses. At AE, we developed and built what I first called, and what is known today as the smart grid and smart grid architecture.”

At AE, Andres oversaw billions of dollars in investments including but not limited to massive wind and solar farms, multiple biomass and cogeneration power plants, expansive fiber networks, and 100% smart meter coverage. Today, Austin’s smart grid links generation from multiple, distributed sources with district cooling microgrids, hundreds of electric vehicle charging stations, and over 100,000 smart thermostats in homes and businesses. AE is considered to be a world leader in smart grid innovation and technology.

Returning to his entrepreneurial roots in 2010, Andres initially led the strategic and commercialization efforts of two companies, Grid Net and Proximetry. Since 2014, he has been the chief executive officer (and founder) of two other firms: CMG, a smart energy and internet-of-things advisory and strategy consulting firm, and Westlake Energy, a distributed energy and microgrid developer. He is a frequent speaker and guest lecturer, and co-author of the seminal book, *The Advanced Smart Grid: Edge Power Driving Sustainability*. Mr. Carvallo has received countless accolades, ranging from being named one of the 15 Most Influential People in Energy, being a finalist for the Chief Information Officer Hall of Fame, to being named *Computerworld’s* Honors Laureate in Energy. He is a frequent visitor to Lawrence, working with KU students interested in sustainable energy.

Andres and Angela reside in Austin with their three children (Alexandra, AJ, and Austin) who range in age from recent college graduate to high school freshman. When asked for advice he would give to students at KU and beyond, he responds, “Live every day like it is your last. Master your passions, and be magnanimous in victory and defeat.” Coupled with a bold vision and an incredible work ethic, his advice is a surefire recipe for success.

Andres Carvallo is credited with coining the phrase “smart grid” on March 5, 2004.
We congratulate the following individuals for their contributions to, and recognition by the university, national, and international communities.

- **Deanna Marks** graduated in December of 2015 with a dual degree in the 5-year, Mechanical Engineering - Business Administration program. She completed her studies in four years with a GPA of 3.96. Ms. Marks also lettered four years on the KU women’s swim team, with her best events being the 100 and 200 meter butterfly. Deanna was named the Big 12 Scholar Athlete of the Year in women’s swimming in 2014, and KU’s Female Senior Scholar Athlete of the Year in 2015.

- **Candan Tamerler**, Wesley G. Cramer Professor, was elected Fellow of the American Institute for Medical and Biological Engineering (AIMBE) in recognition of her “scientific contributions to the design of biomolecular recognition based self-assembled and self-organized hybrid-nanomaterials, to bio-nanotechnology and next generation biomaterials.” AIMBE fellows represent the top 2% of the medical and biological engineering community who have distinguished themselves through their contributions in research, industrial practice, and/or education. In May, Dr. Tamerler served as an invited speaker at the L’Oréal - UNESCO award ceremony in Istanbul. Through a partnership between the French cosmetics company L’Oréal and the United Nations Educational, Scientific, and Cultural Organizations (UNESCO), the awards are often considered to be the equivalent of Nobel Prizes for women scientists, and carry a €100,000 honorarium for each laureate.

- **A 2015 contribution co-authored by Ted Bergman, Charles E. & Mary Jane Spahr Professor, and post-doctoral student, Dr. Nourouddin Sharifi, reached No. 1 on Science Direct’s International Top 40 Hottest Articles published in the International Journal of Heat and Mass Transfer (IJHMT).** From July through September of 2015, the article was the most frequently downloaded of all IJHMT works published over the past 55 years. Previous articles written by Bergman peaked at No. 2 in 2008, and No. 12 in 2011. IJHMT is the world’s premier venue for dissemination of heat transfer research.

- **Paulette Spencer**, Ackers Distinguished Professor, received one of four Higuchi-KU Endowment Research Achievement Awards of 2015. The Higuchi Awards are the state’s highest recognitions for scholarly excellence, with eligible individuals holding faculty appointments at any of the 6 Kansas Board of Regents universities. As recipient of the Dolph Simons Award in Biomedical Sciences, Dr. Spencer was recognized for her “research in the design and development of biomaterials that can be used to repair, reconstruct and replace human tissues.”

- **Sara Wilson**, Associate Professor, completed her term as chair of the Bioengineering Division of the American Society of Mechanical Engineers. She will continue on the executive committee of the division as past chair for 2016-2017.

Participants at the December, 2015 meeting of the Turkish Academy of Sciences in Ankara. Dr. Candan Tamerler, Wesley G. Cramer Professor and Principle Member of the Academy, is in the center of the second row. Recep Tayyip Erdogan, President of Turkey, is to Dr. Tamerler’s immediate right.
2015 Graduates
Graduate Students

Alabdullah, Raoof Jameel Ahmed
Churkunti, Preetham Reddy
Collins, Patrick Gordon
Craig, Timothy Daniel

Gandur Balagangadhara, C Kaushik
Harper, Joshua Russell
Knight, Jason Allen
Lakkappa, Eshwar Narendra

Malur Srinivasa, Srisha
Neal, Brandon Christopher
Ramani, Ajay
Weingart, Robert

Undergraduate Students

Ahlgren, Austin Wesley
Alalwani, Amer Abdul Kareem E.
Al-ani, Rusul Habib
Alenezi, Saud A F M F R
Alzuabi, Hadi KH A KH
Baggett, Nicholas Blake
Baskins, Ryan D
Bell, Stephen Thompson
Blevins, Kenneth Michael
Boersma, Andrew
Bondi, Robert Patrick
Bondurant, Cory Michael
Bowman, Nathan William
Bruntun, Levi Chase
Budd-Felix, Kash Dylan
Burns, Zachary Brian
Calvillo, Peter James
Carttar, Patrick Ellis
Chen, Feng
Chen, You
Clayton, James G
Cross, Daniel Lee
Deckert, Jonathan J
Demel, Dalton A
Dong, Wenbin
Doyen, Katharine Suzanne
Dunn, Thomas Everett
El-Ostah, Mohammed Ali
El-Ostah, Rajab Ali
Feng, Shawn
Fink, Dalen Charles
Foles, Luke Alexander
Fredrickson, John Steven
George, Matthew
Gerstner, Vincent Michael
Gile, Casey Michael
Gill, Parker Anthony
Grant, Holly Elizabeth
Graves, Gregory Michael
Grimm, Alexis Christine
Gu, Yucong

Hamilton, Blake Richard
Hamilton, William Thomas
He, Cong
Henker, Kevin Joseph
Henry, Cameron
Hildebrandt, Paige Lynn
Holcomb, Evan Murray
Holland, Katharine Elizabeth
Hrenchir, Emily Anne
Huang, Shanshan
Humphreys, Andrew Brian
Johnson, Joshua Carl
Joyce, Taylor Rae
Karczewski, Jeremiah J
Kay, Homer Johnathan
Kerr, Kelly Lynn
Kidd, Alan Smith
Kilgore Jr, Royce Daniel
Kim, Tai Hoan
Kipp, Austin Robert
Konrade, Jacob Thomas
Lakhan, Amaan
Lawson, Taylor Jacob
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Patel, Neel Dipak
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Perry, Matthew Van Cleave
Pingel, Krystina Nicole
Qian, Lei
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Rea, Damon Allan
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Salt, David J.
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Shupe, Dillon Conrad
Simpson, Myette Faye T
Sitek, Kevin J
Snyder, Colin Sumner
Snyder, Scott Milo
Somers, Karli Ann
Sorem, Darrin Michael
Spickler, Bailey Ann
Spiker, Michelle Kathleen
Stimpert, Kolton Wade
Strempeke, Andrew Donald
Stubbs, Robert Murphy
Taylor, Sarah Morgan
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