KRIS L. DORSEY

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EDUCATION

PhD in Electrical and Computer Engineering 2013
Carnegie Mellon University, Pittsburgh, PA
Dissertation title: Dielectric Charging in CMOS MEMS

MS in Electrical and Computer Engineering 2011
Carnegie Mellon University, Pittsburgh, PA

BS in Electrical and Computer Engineering 2007
Olin College of Engineering, Needham, MA

ACADEMIC APPOINTMENTS

Wyss Institute Visiting Scholar 2018–Present
Harvard University, Cambridge, MA

Visiting researcher in Prof. Robert Wood's group to collaborate on a selective electrical contact, ultra-high sensitivity flexible sensor for wearable applications. Recent work, "Tuneable ultra-sensitive conformal strain sensors," is under review, and we have submitted a proposal related to this work to the NSF SenSE program.

Assistant Professor of Engineering 2015–Present
Picker Engineering Program, Smith College, Northampton, MA

Smith College is the first women's college with an ABET-accredited, undergraduate-only engineering program. My core research focuses include applications of flexible and hyper-elastic sensors for health monitoring and wearable devices, tuning hyper-elastic mechanical sensor response through hierarchically-patterned structures, and novel sensor interrogation approaches to mitigate sensor non-idealities. Recently published work includes a journal paper and two papers in conference proceedings related to tuning strain sensitivity in silicone-based strain sensors. In 2019, I received the NSF CAREER award for the proposal "Rigidity tuned elastomer origami tessellations for fast, reconfigurable, and soft mechanoreceptors."

I have taught four different undergraduate engineering courses from the 100- level to the 300-level, including Circuit Theory and Intro. to MEMS. I have supervised the research of over 14 undergraduates in five years, including five students who have entered PhD programs in engineering and four students who have entered MS programs in engineering.

UC President's Postdoctoral Fellow, PRIME Systems Laboratory 2014–2015
University of California, San Diego, San Diego, CA

UC Berkeley Chancellor's Postdoctoral Fellow, PRIME Systems Laboratory 2013–2014
University of California Berkeley, Berkeley, CA

Postdoctoral researcher in Prof. Al Pisano's lab. Collaborated with undergraduate and graduate researchers in the project areas of template-based nano-printing and chemical sensing for SMART streetlights. Published two journal papers and five conference papers.

GRANTS AWARDED

Dassault Foundation, "Introducing modern simulation and modeling software alongside the Engineering Mechanics classroom," $26,568 2020–2021

National Science Foundation, "CAREER: Rigidity tuned elastomer origami tessellations for fast, reconfigurable, and soft mechanoreceptors," $500,404 2019–2024

Smith College, Design Thinking Curriculum Grant, $1,225 2017–2018

Fellowships and Honors

Jean Picker Faculty Fellowship, Smith College	2020, 2018
Center for Nanoscale Systems (CNS) Scholar, Harvard University	2018
Angel G. Jordan Award for Academic Excellence and Service to the ECE Department, Carnegie Mellon University	2014
Univ. of California President's Postdoctoral Fellowship, UC San Diego	2014
Univ. of California Chancellor's Postdoctoral Fellowship, UC Berkeley	2013
Neil and Jo Bushnell Fellowship in Engineering, Carnegie Mellon University	2012
GEM PhD Engineering Fellowship	2008

Journal Publications

*undergraduate student author

O.A. Araromi, M.A. Graule, K.L. Dorsey, S. Castellanos, J.R. Foster, W.H. Hsu, J.J. Vlassak, W.H. Hsu, A.E. Passy, J.J. Vlassak, J.C. Weaver, C.J. Walsh, R.J. Wood, "Ultra-sensitive and resilient compliant strain gauges for soft machines," (accepted)

K.L. Dorsey, M. Cao*, G.A. Slipher, and N. Lazarus, "Mechanical Isolation and Temperature Compensation in Soft Elastomer Components," *IEEE J. Sensors*, vol. 18, no. 18, Sep. 2018.

D.A. Rolfe, K.L. Dorsey, J.C. Cheng, and A.P. Pisano, "A Surface Acoustic Resonator with Template-Patterned Interdigitated Fingers," *Sensors and Actuators A: Physical*, vol. 248, 2016.

K.L. Dorsey and A.P. Pisano, "Stability and Control of a Metal Oxide Gas Sensor Under Air Flow," *IEEE J. Sensors*, vol. 16, no. 3, 2016.

K.L. Dorsey, S.S. Bedair, and G.K. Fedder, "Gas chemical sensitivity of a CMOS MEMS cantilever functionalized by evaporative assembly," *J. Micromech. Microeng.*, vol. 24, no. 7, 2014.

Conference Publications with Review

K.L. Dorsey, "Reconfigurable Soft Capacitor with Variable Stiffness Ring," in *Proc. IEEE RoboSoft Conf.*, Seoul, Korea, 2019.

K.L. Dorsey, M. Cao*, and N. Lazarus, "Mechanical Isolation Structures for Soft Elastomer Components," in *Proc. IEEE Sensors Conf.*, Glasgow, UK, 2017.

D.A. Rolfe, K.L. Dorsey, and A.P. Pisano, "A model to guide template-based nanoparticle printing development," in *Proc. ASME Intl. Conf. on Nanochannels, Microchannels, and Minichannels*, San Francisco, USA, 2015.

Other Conference Papers

N. Terasaki, K. L. Dorsey, M. Makihata, and A.P. Pisano, "Micro printing using microfluidics for printed biodegradable devices in trillion sensing," in *ECS Trans.*, 2017.

M.M. Makihata, B.Eovino, X. Jiang, A. Toor, K.L. Dorsey, and A.P. Pisano, "Non-invasive and remote pipeline rehabilitation technology using reactive and magnetic particles," ACSE Pipelines Conf., Baltimore, USA, 2015.

K.L. Dorsey, J.R. Herr, and A.P. Pisano, "Sensor selection for outdoor air quality monitoring," in *Proc. Next-Generation Robots and Systems SPIE Sensing Technology+Applications Conf.*, Baltimore, USA, 2014.

K.L. Dorsey, D.A. Rolfe, G.D. Hoople, and A.P. Pisano, "Functionalized Micromolded Nanoparticles Towards Gas Sensor Arrays," in *Proc. IEEE Sensors Conf.*, Valencia, Spain, 2014.

K.L. Dorsey and G.K. Fedder, "A test structure to inform the effects of dielectric charging on CMOS MEMS inertial sensors," in *Proc. IEEE Microelectromechanical Systems Conf.*, Paris, France, 2012.

K.L. Dorsey and G.K. Fedder, "A Frenkel-Poole model of dielectric charging in CMOS MEMS,"

in *Proc. Solid State Sensors, Actuators, and Microsystems Conf.*, Beijing, China, 2011.

K.L. Dorsey and G.K. Fedder, "Dielectric charging effects in electrostatically actuated CMOS MEMS resonators," in *Proc. IEEE Sensors Conf.*, Kona, USA, 2010.

Conference and Workshop Presentations

"An Origami-Patterned, Flexible Pressure Sensor Fabricated with Vacuum Forming," Materials Research Society Fall Meeting 2019	2019
"Reconfigurable Soft Capacitor with Variable Stiffness Ring," IEEE RoboSoft Conference, Seoul, Korea	2019
"Reconfigurable Soft Capacitor," Southwestern Robotics Symposium, Tempe, AZ, USA	2019
"A strain isolated capacitor in a hyper-elastic substrate," Academic and Research Leadership Network Faculty Development Symposium, Pittsburgh, PA, USA	2018
"Mechanical Isolation Structures for Soft Elastomer Components," IEEE Sensors Conf., Glasgow, UK	2017
"A strain isolated capacitor in a hyper-elastic substrate," Material Robotics Workshop, Robotics: Science and Systems Conference, Cambridge, MA **with Sara Kacmoli, undergraduate researcher*	2017
"The effect of airflow on metal oxide gas chemical sensor stability," Academic and Research Leadership Network Faculty Development Symposium, Boston, MA, USA	2016
"Functionalized micromolded nanoparticles towards gas sensor arrays," IEEE Sensors Conf., Valencia, Spain	2014
"Sensor selection for outdoor air quality monitoring," SPIE Sensing Technology and Applications Conference, Baltimore, USA	2014
"A test structure to inform the effects of dielectric charging on CMOS MEMS inertial sensors," IEEE MEMS, Paris, France	2012
"A Frenkel-Poole model of dielectric charging in CMOS MEMS," Solid State Sensors, Actuators, and Microsystems Conference (TRANSDUCERS), Beijing, China	2011
"Dielectric charging effects in electrostatically actuated CMOS MEMS resonators," IEEE Sensors, Kona, USA	2010

Seminars and Colloquia

"Soft, shape, sense," Safer-at-home Summer: Materials Science and Engineering Virtual Research and Networking, NC State University	2020
"What's hard about soft sensors?" Electrical and Computer Engineering Colloquium, Tufts University	2019
"It's a bit of a stretch: selective, flexible mechanical sensors," Mechanical Engineering Seminar, University of Connecticut, Storrs	2019
"It's a bit of a stretch: selective, flexible mechanical sensors," joint ME/ECBE/CS Seminar, Union College	2019
"It's a bit of a stretch: selective, flexible mechanical sensors," Physics Seminar, Mount Holyoke College	2019
"What's hard about soft sensors?" MOSIS Distinguished Lecturer Seminar, University of Connecticut, Storrs, CT	2019
"What's hard about soft sensors?" Valve, L.L.C., Bellevue, WA	2019

"What's hard about soft sensors?" Sigma Xi, Smith College, Northampton, MA 2018

"Strain isolation in elastomer-based capacitors," National Institute of Standards and Technology, Gaithersburg, MD 2018

"Strain isolation in elastomer-based capacitors," Sensors and Electron Devices Directorate, Army Research Laboratory, Adelphi, MD 2017

"Sensor in the wind: improving metal oxide sensor stability in airflow," Materials Science and Engineering and Mechanical Engineering Seminar Series, Boston University, Boston, MA 2016

"Metal oxide sensor stability in airflow," UC Berkeley, CA 2014

"Metal oxide sensor stability in airflow," UC Los Angeles, CA 2014

PATENTS

US 9,150,402, "MEMS Devices Utilizing a Thick Metal Layer of an Interconnect Metal Film Stack," R. Mahameed, K.L. Dorsey, M.O. Abdelmejeed, M. Abdelmoneum, 2015

PROFESSIONAL SERVICE

Co-organizer of Undergraduate Soft Robotics Research Workshop at IEEE Robosoft (cancelled due to COVID-19) 2019–2020

Technical Program Committee Member, Hilton Head Solid-State Sensors, Actuators, and Microsystems Workshop 2020

Reviewer for IEEE Sensors Conference 2019

Ad-hoc reviewer, IEEE RoboSoft 2019 Conference 2019

Ad-hoc reviewer, IEEE Sensors Conference 2018

Panel reviewer, National Science Foundation EGR directorate (program 1) 2018

Panel reviewer, National Science Foundation EGR directorate (program 2) 2018

Ad-hoc reviewer, National Science Foundation, Mathematical and Physical Sciences directorate 2017

Panel reviewer, National Science Foundation EGR directorate (program 1) 2016

Reviewer, Journal of Sensors 2014–2016

PROFESSIONAL MEMBERSHIPS

Senior Member, IEEE

Member, National Society of Black Engineers

Member, Sigma Xi

INDUSTRY EXPERIENCE

Graduate Intern Technical, Intel Corporation, Hillsboro, OR 2012

Engineering Intern, Lexmark, Inc., Lexington, KY 2007

Q1: The instructor created an effective learning environment
Q2: The course contributed significantly to my education

"I have a totally different perspective on circuits and want to continue to pursue it. Prof. Dorsey is incredibly encouraging and clearly puts a lot of time and effort into the students and the class…This course became less of a requirement and more of a chance to learn and grow within electric engineering. It's truly been a game–changer and I'm really glad I was able to take this course again."—A student's evaluation of Circuit Theory, Spring 2020

Course	Term	Enrolled	Eval. (max 4.00)
EGR 220/220L: Electric Circuit Theory and Lab, Smith College	S20	29	Q1: 4.00 Q2: 4.00
EGR 323: Introduction to MEMS, Smith College	F19	12	Q1: 3.73 Q2: 3.73
EGR 100: Engineering for Everyone: *Bits, 'Bots, and Thoughts*, Smith College	F19	18	Q1: 4.00 Q2: 4.00
EGR 220L: Electric Circuit Theory Lab, Smith College	S19	32	Q1: 3.48 Q2: 3.30
EGR 220/220L: Electric Circuit Theory and Lab, Smith College	S18	29	Q1: 3.44 Q2: 3.40
EGR 324: Fundamentals of Microelectronics, Smith College	F17	21	Q1: 3.53 Q2: 3.35
EGR 100: Engineering for Everyone: *Bits, 'Bots, and Thoughts*, Smith College	F17	20	Unavail. due to database change
EGR 220/220L: Electric Circuit Theory and Lab, Smith College	S17	23	Q1: 3.35 Q2: 3.29
EGR 323: Introduction to MEMS, Smith College	F16	16	Q1: 3.69 Q2: 3.50
EGR 100: Engineering for Everyone: *Bits, 'Bots, and Thoughts*, Smith College	S16	22	Q1: 3.56 Q2: 3.44
EGR 323: Introduction to MEMS, Smith College	S16	7	Q1: 3.50 Q2: 3.33
EGR 220/220L: Electric Circuit Theory and Lab, Smith College	F15	13	Q1: 3.96 Q2: 3.96

UGRAD THESIS COMMITTEE SERVICE

Total: 8 students
4 in PhD programs, 2 MS in ECE, 1 in industry

[1] primary advisor
[2] second reader

Honors Thesis: Hayley Markos[1], Yuhan Wen[1]	2019–2020
Honors Thesis Extension: Meng Cao[2] , Becky Shen[2]	2018–2019
Senior Thesis: Alysha de Silva[1]	2017–2018
Honors Thesis: Sara Kacmoli[1]	2016–2017
Honors Thesis: Sara Loric[2], Xi Jiang[2]	2015–2016

UGRAD RESEARCH ACTIVITY SUPERVISED

Total: 10 students
4 in PhD programs, 3 in MS Eng

[a] independent study
[b] summer research
[c] other

Wasila Yussif [a] , Jody Huang [c]	2019–2020
Meng Cao [a b], Mariel Jones [a], Becky Shen [a], Yuhan Wen [a b]	2018–2019
Eli Boahen [ab], Meng Cao [a b], Jody Huang [a], Dan Lin [a], Jiaao Lu [a], Becky Shen [a b], Yuhan Wen [a]	2017–2018
Sara Kacmoli [a], Dan Lin [a], Jiaao Lu [a]	2016–2017
Dan Lin [a]	2015–2016

PRESENTATIONS BY STUDENTS

Meng Cao, "Digital signal processing with FPGAs," Honors Thesis Extension Poster Session, Smith College, 2019

Alysha da Silva, "Mechanical and Electrical Response to Fabricated Uniaxial Polymer," Celebrating Collaborations Poster Session, Smith College, 2018

Yuhan Wen and Dan Lin, "Fabrication and Testing of Liquid Metal Switches," Celebrating Collaborations Poster Session, Smith College, 2018

Sara Kacmoli, "Novel intrinsic quantum designs for quantum cascade superluminescent emitters," Honors thesis presentation, Smith College, 2017

Dan Lin, "A testbed for detecting and mimicking finger joint bending," IEEE MIT Undergraduate Research Technology Conference, MIT, 2016

DEPARTMENT-LEVEL SERVICE

Assessments and Standards sub-committee member	2019– Present
Equity, Diversity, and Inclusion sub-committee member	2019– Present
Fundamentals of Engineering Exam Faculty Coordinator	2017– Present
Honors and Awards sub-committee member	2017–2019
Picker Engineering Program Assistant Search committee member	2017
"Applying for a SURF" project workshop with EGR students	2017
Brodsky Fund for Engineering Entrepreneurship ad-hoc committee member	2016–2017
Served on the EGR program Diversity and Inclusion Charrette	2016

COLLEGE-LEVEL SERVICE

McKinley Fellowship selection committee	2019–Present
"Identity in Academia" panelist, Day of Learning/Inclusion in Action conference	2019
"Teaching Arts Panel: Effective Grading Practices" panelist	2018
Hosted faculty teaching circle on mentoring undergrad research projects	2017
"Applying to Grad school" workshop, organizer and presenter	2016

GENERAL AUDIENCE/OUTREACH TALKS

"Where the rubber meets the code," Nerd Nite, Northampton, MA	2019
"What's hard about soft sensors?" SciTech Café, Northampton, MA	2018

"Tactile sensors on people and robots," Smith College Summer Science and Engineering Program, Northampton, MA	2017
"Skin-worn sensors: Why can't I buy one yet?", Celebration of American Science and Engineering, U Maryland, College Park, MD	2017
"What is Engineering for Everyone?", Smith College Alumnae Club of Pittsburgh, Pittsburgh, PA	2017

Other Broadening Participation Activities

Half-day workshops for MA STEM teachers	2016, 2017, 2017, 2020
SCS Noonan Scholars lab tour	2018
Soft robotics outreach day for Springfield Urban League STEM youth group	2018
Motor design workshop and tour with Smith Voc. High School	2017
Glenwood Elementary School Career Day, Springfield MA	2017