**David E. Kotecki, Ph.D.**
University of Maine
Department of Electrical and Computer Engineering
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## EDUCATION

Ph.D., Engineering Applied Science, University of California Davis, Davis, CA (1988)
M.S., Engineering Applied Science, University of California Davis, Davis, CA (1984)
B.E.E., Electrical Engineering, *magna cum laude*, University of Dayton, Dayton, OH (1981)

## PROFESSIONAL STATEMENT

Associate professor of electrical and computer engineering, U.S. patent agent, inventor, and researcher. Over thirty years experience working with start-up companies, multinational corporations, government laboratories, and academia. More than fifteen years experience as an educator. Authored or co-authored more than 70 peer-reviewed research papers; awarded 60 U.S. patents for inventions in microfabrication, microstructures, and semiconductor devices. Areas of expertise include: electronics, integrated circuit design, RF electronics, semiconductor materials, micro- and nano-electronic devices, microfabrication and process integration.

## EMPLOYMENT

University of Maine, Orono, ME (1999 – )
**Associate Professor**, Electrical and Computer Engineering

Blue Hill Innovation LLC, Orono, ME (2010 – )
**Patent Agent** (USPTO Registration #72,338) and **Consultant**

IBM, Microelectronics Division, Hopewell Junction, NY (1988–1999)
**Senior Engineer**, DRAM Development Alliance, 1Gbit Integration Department (1997–1999); **Advisory Engineer**, Semiconductor Research & Development Center, Advanced Process Technology Department (1992–1997); **Staff Engineer**, Semiconductor Development Laboratory, CVD Technology Development Department (1988–1992)
Lawrence Livermore National Laboratory, Livermore, CA (1981–1988)
**Student Engineer**, Physics Department, (1984–1988); **Electronics Engineer**, Diagnostic Development Group, (1981–1984)
MacAulay Brown, Inc., Fairborn, OH (1980–1981)
**Assistant Programmer** (part-time)

NASA, Goddard Space Flight Center, Greenbelt, MD (1978–1980)
**Engineering Intern**, Instrument Electro-Optics Branch

## AWARDS

Graduate Faculty Mentor Award, University of Maine (2008, 2015); Award for Service, IEEE Maine Section (2014); Dean's Award of Excellence, University of Maine (2005); Teaching and Technology Fellowship, University of Maine (2001) and 15 Invention Achievement Awards, IBM (1990-2000).

## PROFESSIONAL AND HONORARY SOCIETIES

IEEE (senior member), American Physical Society (APS), National Association of Patent Practitioners (NAPP), American Society for Engineering Education (ASEE); *Tau Beta Pi*, (The Engineering Honor Society) and *Eta Kappa Nu*, (The Electrical and Computer Engineering Honor Society of the IEEE).

## PROFESSIONAL AND PUBLIC SERVICE

*Tau Beta Pi*, (The Engineering Honor Society): Maine Alpha Chapter Advisor (2006–2007, 2016–present); Chief Advisor (2008–2015); Fellowship Reviewer (2018).

IEEE, Maine Section: Secretary (2001); Member at Large (2002); Vice Chair (2003); Chair (2004) and Treasurer (2006–2009); IEEE, University of Maine Student Branch Co-counselor (2003–2011).

Journal Reviewer: IEEE Transactions on Circuits & Systems; IEEE Electron Device Letters; IEEE Microwave & Wireless Components Letters; IEEE Journal of Solid State Circuits; IEEE Journal on Emerging and Selected Topics in Circuits and Systems; Applied Physics Letters; Journal on Educational Resources in Computing; Journal of the American Ceramic Society; Journal of Vacuum Science & Technology; IET Circuits, Devices & Systems; Journal of Circuits, Systems, and Computers; and Analog Integrated Circuits and Signal Processing.

Reviewer: NSF review panelist (2016, 2019), Department of Defense SMART Scholarship panelist (2014-2015), Natural Sciences and Engineering Research Council of Canada (NSERC), and Civilian Research & Development Foundation (CRDF).

Book Reviewer: Prentice Hall and Oxford University Press.

University of Maine: Faculty Senator (2004–2007); Graduate School Executive Committee (2011); University of Maine New Faculty Mentor (2006–2009); Department of Electrical & Computer Engineering (ECE) Graduate Program Coordinator (2008–2011); Electrical Engineering Curriculum Committee Chair (2007–2011); Microelectronics Scholarship Consortium Chair (1999–2011); ECE Faculty Search Committee Chair (2000, 2001, 2006), ECE Graduate Board Representative (2000–2002, 2008–2011), and Member, Engineering and Science Building Committee (2001).

## TEACHING EXPERIENCE (UNIVERSITY OF MAINE)

ECE 209: Fundamentals of Electric Circuits
ECE 210: Electric Circuits I
ECE 214: Electric Circuits Laboratory
ECE 342: Electronics I
ECE 444: Analog Integrated Circuit Design
ECE 445: Digital Integrated Circuit Design
ECE 464: Microelectronics Science and Engineering

ECE 512: Linear Systems Analysis
ECE 543: Microelectronic Devices I
ECE 643: Microelectronics Devices II
ECE 547: Integrated Circuit Design and Layout
ECE 548: Integrated Circuit Characterization and Testing
ECE 598: Special Topics in Integrated Circuit Design

## RESEARCH AREAS

Analog and mixed-signal integrated circuit design; computational modeling and simulation; microelectronic materials and micro-fabrication; and solid-state devices.

Current project: exploration of new architectures for the development of high data rate Impulse-Radio Ultra-Wide-Band (IR-UWB) transmitters utilizing the FCC approved 3.1-10.6 GHz spectrum for applications related to the Internet of Things (IoT).

## GRADUATE STUDENTS ADVISED

1. P. Gunturi, "Impulse radio ultra wide-band transmitters for internet of things," Ph.D. dissertation, University of Maine, Orono, ME, May 2017. Available: https://digitalcommons.library.umaine.edu/etd/2673/
2. Y. Lin, "A new era of innovation: High-gigahertz and terahertz voltage-controlled oscillators (VCOs) and phase-locked loops (PLLs)," Ph.D. dissertation, University of Maine, Orono, ME, May 2013. Available: https://digitalcommons.library.umaine.edu/etd/1926/
3. R. Tumati, "Solid–state nanopore characterization and low noise transimpedance amplifier for nanopore–based gene sequencer," M.S. thesis, University of Maine, Orono, ME, Mar. 2008. Available: https://digitalcommons.library.umaine.edu/etd/950/
4. R. Bethel, "Low voltage high performance BiCMOS circuit topologies for the design of a 1.2V, 19GHz, 4-bit accumulator in silicon-germanium," M.S. thesis, University of Maine, Orono, ME, May 2007. Available: https://digitalcommons.library.umaine.edu/etd/963/
5. Z. Zhu, "Low noise operational amplifier in $0.35\mu$m CMOS for nanopore based DNA sequencer," M.S. thesis, University of Maine, Orono, ME, May 2007. Available: https://digitalcommons.library.umaine.edu/etd/958/
6. S. Manandhar, "High speed ROM for direct digital synthesizer applications in Indium Phosphide DHBT technology," M.S. thesis, University of Maine, Orono, ME, Aug. 2006. Available: https://digitalcommons.library.umaine.edu/etd/964/
7. S. E. Turner, "High-speed digital and mixed-signal components for X– and Ku–band direct digital synthesizers in Indium Phosphide DHBT technology," Ph.D. dissertation, University of Maine, Orono, ME, May 2006. Available: https://digitalcommons.library.umaine.edu/etd/965/
8. C. R. Kenney, "Magnetic flux sensor for hearing aid application," M.S. thesis, University of Maine, Orono, ME, Aug. 2005. Available: https://digitalcommons.library.umaine.edu/etd/249/

9. F. Yang, “Characterization of $HfO_2$ capacitors,” M.S. thesis, University of Maine, Orono, ME, Dec. 2003. Available: https://digitalcommons.library.umaine.edu/etd/254/
10. J. L. Cousins, “Simulation of the variability in microelectronic capacitors having polycrystalline dielectrics with columnar microstructure,” M.S. thesis, University of Maine, Orono, ME, Dec. 2003. Available: https://digitalcommons.library.umaine.edu/etd/258/

**PUBLICATIONS**

1. P. Gunturi and D. E. Kotecki, “Analysis and implementation of a gaussian addition transmitter (GAT) for increased spectral efficiency,” *Springer, Wireless Personal Communications*, vol. 102, no. 1, pp. 437–448, Sept. 2018. Available: https://doi.org/10.1007/s11277-018-5851-x
2. P. Gunturi, N. W. Emanetoglu, and D. E. Kotecki, “A 250-Mb/s data rate IR-UWB transmitter using current-reused technique,” *IEEE Transactions on Microwave Theory and Techniques*, vol. 65, no. 11, pp. 4255–4265, Nov. 2017. Available: https://doi.org/10.1109/tmtt.2017.2695189
3. P. Gunturi and D. E. Kotecki, “IR-UWB BPK transmitter optimized for maximum distance of transmission,” in *Proc. IEEE International Midwest Symposium on Circuits and Systems (MWSCAS ’15)*, Fort Collins, Colorado, Aug. 2015, pp. 1–4. Available: https:doi.org/10.1109/MWSCAS.2015.7282069
4. P. Gunturi and D. E. Kotecki, “A PA for MBOFDM-UWB and IR-UWB transmitters,” in *Proc. IEEE International Midwest Symposium on Circuits and Systems (MWSCAS ’15)*, Fort Collons, Colorado, Aug. 2015, pp. 1–4. Available: https://doi.org/10.1109/MWSCAS.2015.7282193
5. P. Gunturi and D. E. Kotecki, “Temperature and supply voltage insensitive OOK transmitter for outdoor UWB communications,” in *Proc. IEEE International Midwest Symposium on Circuits and Systems, (MWSCAS ’14)*, Austin, Texas, Aug. 2014, pp. 733–736. Available: https://doi.org/10.1109/mwscas.2014.6908519
6. P. Gunturi and D. E. Kotecki, “A wideband Class E PA with more than 40% PAE and 800 MHz bandwidth,” in *Proc. IEEE International Midwest Symposium on Circuits and Systems, (MWSCAS ’14)*, Austin, Texas, Aug. 2014, pp. 725–728. Available: https://doi.org/10.1109/mwscas.2014.6908517
7. P. Gunturi and D. E. Kotecki, “Class E power amplifiers with tuned RC output matching circuit,” in *IEEE Topical Workshop on Power Amplifiers for Wireless Communications*, San Diego, California, Sept. 2013.
8. Y. Lin and D. E. Kotecki, “A 126.9-132.4 GHz wide-locking low-power frequency-quadrupled phase-locked loop in 130nm SiGe BiCMOS,” in *Proc. IEEE International Midwest Symposium on Circuits and Systems, (MWSCAS ’12)*, Boise, Idaho, Aug. 2012, pp. 754–757. Available: https://doi.org/10.1109/mwscas.2012.6292130
9. Y. Lin and D. E. Kotecki, “A 290 GHz frequency quadrupled SiGe voltage-controlled oscillator,” in *Proc. IEEE International Midwest Symposium on Circuits and Systems, (MWSCAS ’11)*, Seoul, Korea, Aug. 2011, pp. 1–4. Available: https://doi.org/10.1109/mwscas.2011.6026637

10. Y. Lin and D. E. Kotecki, “2.9 – 30.3 GHz fourth-harmonic voltage–controlled oscillator in 130nm SiGe BiCMOS technology,” in *Proc. of the IEEE International Conference on Electronics, Circuits and Systems (ICECS)*, Athens, Greece, Dec. 2010, pp. 401–404. Available: https://doi.org/10.1109/icecs.2010.5724536
11. Y. Lin and D. E. Kotecki, “A voltage–controlled oscillator with a 0.8–13.4 GHz tuning range in 130nm SiGe BiCMOS technology,” in *Proc. of the IEEE International Conference on Electronics, Circuits and Systems (ICECS)*, Athens, Greece, Dec. 2010, pp. 431–434. Available: https://doi.org/10.1109/icecs.2010.5724540
12. Y. Lin and D. E. Kotecki, “A 312GHz fourth–harmonic voltage–controlled oscillator (VCO) designed using 130nm SiGe BiCMOS technology,” in *Proc. IEEE International Conference on Electronics, Circuits and Systems, (ICECS ’09)*, Yasmine, Tunisa, Dec. 2009, pp. 747–750, **(Best student paper award.)**. Available: https://doi.org/10.1109/icecs.2009.5410799
13. B. C. Gierhart, D. G. Howitt, S. J. Chen, Z. Zhu, D. E. Kotecki, R. L. Smith, and S. D. Collins, “Nanopore with transverse nanoelectrodes for electrical characterization and sequencing of DNA,” *Sensors and Actuators, B: Chemical*, vol. 132, pp. 593–600, June 2008. Available: https://doi.org/10.1016/j.snb.2007.11.054
14. R. H. Bethel and D. E. Kotecki, “Low voltage BiCMOS circuit topologies for the design of a 19GHz, 1.2V, 4-bit accumulator in silicon-germanium,” in *Proc. 14th IEEE International Conference on Electronics, Circuits and Systems, (ICECS ’07)*, Marrakech, Morocco, Dec. 2007, pp. 1127–1130. Available: https://doi.org/10.1109/icecs.2007.4511193
15. C. R. Kenney and D. E. Kotecki, “Microelectronic magnetic flux sensor for hearing aid application,” in *Proc. 14th IEEE International Conference on Electronics, Circuits and Systems, (ICECS ’07)*, Marrakech, Morocco, Dec. 2007, pp. 6–9. Available: https://doi.org/10.1109/icecs.2007.4510917
16. B. Gierhart, D. Howitt, S. Chen, Z. Zhu, D. E. Kotecki, R. L. Smith, and S. D. Collins, “Nanopore with transverse nanoelectrodes for electrical characterization and sequencing of DNA,” in *Proc. 6th IEEE International Conference on Solid-State Sensors, Actuators and Microsystems (Transducers ’07)*, Lyon, France, June 2007, pp. 399–402. Available: https://doi.org/10.1109/sensor.2007.4300152
17. S. Manandhar, S. E. Turner, and D. E. Kotecki, “36-GHz, 16x6 bit ROM in InP DHBT technology,” *IEEE J. Solid-State Circuits*, vol. 42, no. 2, pp. 451–456, Feb. 2007. Available: https://doi.org/10.1109/jssc.2006.889361
18. Z. Zhu, R. Tumati, S. Collins, R. Smith, and D. E. Kotecki, “A low-noise, low-offset operational amplifier in 0.35$\mu$m technology,” in *Proc. 13th IEEE International Conference on Electronics, Circuits and Systems, (ICECS ’06)*, Nice, France, Dec. 2006, pp. 624–627. Available: https://doi.org/10.1109/icecs.2006.379866
19. S. Manandhar, S. E. Turner, and D. E. Kotecki, “A 20-GHz and 46-GHz, 32x6-bit ROM for DDS application in InP DHBT technology,” in *Proc. 13th IEEE International Conference on Electronics, Circuits and Systems, (ICECS ’06)*, Nice, France, Dec. 2006, pp. 1003–1007. Available: https://doi.org/10.1109/icecs.2006.379960

20. S. E. Turner and D. E. Kotecki, “Direct digital synthesizer with sine-weighted DAC at 32 GHZ clock frequency in InP DHBT technology,” *IEEE J. Solid-State Circuits*, vol. 41, no. 10, pp. 2284–2290, Oct. 2006. Available: https://doi.org/10.1109/jssc.2006.881552

21. D. E. Kotecki, T. Monk, V. Tkachuk, Z. Zhu, A. Delic-Ibukic, and S. E. Turner, “Custom analog and mixed–signal integrated circuit design at the undergraduate level – a university/industry collaboration,” in *Proc. 6th International Workshop on Microelectronics Education*, Stockholm, Sweden, June 2006, pp. 47–50, ISBN: 91-7178-402-0.

22. S. E. Turner and D. E. Kotecki, “Direct digital synthesizer with ROM-less architecture at 13-GHz clock frequency in InP DHBT technology,” *IEEE Microwave Wireless Compon. Lett.*, vol. 16, no. 5, pp. 296–298, May 2006. Available: https://doi.org/10.1109/lmwc.2006.873490

23. S. E. Turner, R. B. Elder, Jr., D. S. Jansen, and D. E. Kotecki, “4-bit adder-accumulator at 41-GHz clock frequency in InP DHBT technology,” *IEEE Microwave Wireless Compon. Lett.*, vol. 15, no. 3, pp. 144–146, Mar. 2005. Available: https://doi.org/10.1109/lmwc.2005.844199

24. S. E. Turner and D. E. Kotecki, “Benchmark results for high-speed 4-bit accumulators implemented in Indium Phosphide DHBT technology,” *International Journal of High Speed Electronics and Systems*, vol. 14, no. 3, pp. 646–651, Sept. 2004. Available: https://doi.org/10.1142/s0129156404002612

25. F. Yang, D. E. Kotecki, G. Bernhardt, and M. Call, “Electrical and structural characterization of $HfO_2$ MIM capacitors,” in *Novel Materials and Processes for Advanced CMOS, Proc. Mater. Res. Soc.*, vol. 745, 2003, pp. 203–208. Available: https://doi.org/10.1557/proc-745-n5.16

26. J. L. Cousins and D. E. Kotecki, “Simulation of the variability in microelectronic capacitors having polycrystalline dielectrics,” *IEEE Electron Device Lett.*, vol. 16, no. 5, pp. 267–269, May 2002. Available: https://doi.org/10.1109/55.998872

27. R. Schmidtt, D. McCann, B. Marquis, and D. E. Kotecki, “Dielectric relaxation of $WO_3$ thick films from 10 Hz to 1.8 GHz,” *J. Appl. Phys.*, vol. 91, no. 10, pp. 6775–6777, May 2002. Available: https://doi.org/10.1063/1.1468276

28. J. L. Cousins and D. E. Kotecki, “Simulation of the variability in next-generation microelectronic capacitors with polycrystalline dielectrics,” in *Ferroelectric Thin Films X, Proc. Mater. Res. Soc.*, vol. 695, 2002, pp. 247–252. Available: https://doi.org/10.1557/proc-688-c7.24.1

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30. C. C. Cabral, Jr., K. L. Saenger, D. E. Kotecki, and J. M. Harper, “Optimization of Ta-Si-N thin films for use as oxidation-resistant diffusion barriers,” *J. Mater. Res. Soc.*, vol. 15, no. 1, pp. 194–198, Jan. 2000. Available: https://doi.org/10.1557/jmr.2000.0031

31. D. E. Kotecki, J. D. Baniecki, H. Shen, R. B. Laibowitz, K. L. Saenger, J. J. Lian, T. M. Shaw, S. D. Athavale, C. C. Cabral, Jr., P. R. Duncombe, M. Gutsche, G. Kunkel,

Y.-J. Park, Y.-Y. Want, and R. Wise, "(Ba,Sr)$TiO_3$ dielectrics for future stacked-capacitor DRAM," *IBM J. of Res. and Dev.*, vol. 43, no. 3, pp. 367–382, May 1999. Available: https://doi.org/10.1147/rd.433.0367

32. J. D. Baniecki, R. B. Laibowitz, T. M. Shaw, K. L. Saenger, P. R. Dumcombe, C. C. Cabral, Jr., D. E. Kotecki, H. Shen, J. Lian, and Q. Ma, "Effects of annealing conditions on charge loss mechanisms in MOCVD $Ba_{0.7}Sr_{0.3}TiO_3$ thin film capacitors," *J. European Ceramic Soc.*, vol. 19, no. 6-7, pp. 1457–1461, 1999. Available: https://doi.org/10.1016/s0955-2219(98)00449-x
33. J. D. Baniecki, R. B. Laibowitz, T. M. Shaw, P. R. Dumcombe, D. E. Kotecki, H. Shen, J. Lian, and Q. Ma, "Nonlinear dielectric relaxation of Mn doped polycrystalline (Ba,Sr)$TiO_3$ thin films over the temperature range of 4.2 - 473K," in *Ferroelectric Thin Films VII, Proc. Mater. Res. Soc.*, vol. 541, 1999, pp. 23–28. Available: https://doi.org/10.1557/proc-541-23
34. M. Copel, J. D. Baniecki, P. R. Duncombe, D. E. Kotecki, R. Laibowitz, D. A. Neumayer, and T. M. Shaw, "Compensation doping of $Ba_{0.7}Sr_{0.3}TiO_3$ thin films," *Appl. Phys. Lett.*, vol. 73, no. 13, pp. 1832–1834, Sept. 1998. Available: https://doi.org/10.1063/1.122297
35. K. L. Saenger, A. Grill, and D. E. Kotecki, "Buried, self-aligned barrier layer structures for perovskite-based memory devices comprising Pt or Ir bottom electrodes on silicon-contributing substrates," *J. Appl. Phys.*, vol. 83, no. 2, pp. 802–813, Jan. 1998. Available: https://doi.org/10.1063/1.366761
36. J. D. Baniecki, R. L. Laibowitz, T. M. Shaw, P. R. Duncombe, D. A. Neumayer, D. E. Kotecki, H. Shen, and Q. Ma, "Dielectric relaxation of $Ba_{0.7}Sr_{0.3}TiO_3$ thin films from mHz to 20 GHz," *Appl. Phys. Lett.*, vol. 72, no. 4, pp. 498–500, Jan. 1998. Available: https://doi.org/10.1063/1.120796
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39. H. Shen, D. E. Kotecki, R. Murphy, M. Zaitz, R. B. Laibowitz, T. M. Shaw, K. L. Saenger, J. D. Baniecki, G. Beitel, V. Klueppel, and H. Cerva, "Microstructure control of (Ba,Sr)$TiO_3$ films for gigabit DRAM," in *Ferroelectric Thin Films VI, Proc. Mater. Res. Soc.*, vol. 493, 1998, pp. 33–38. Available: https://doi.org/10.1557/proc-493-33
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**SELECTED PRESENTATIONS**

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