



David Burnett, Ph.D.

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Professional Profile

Dr. Burnett's training and experience in electrical engineering encompasses analog, RF, mixed-signal, and digital electronics design including embedded systems, sensors and sensor systems, wearable devices, and wireless communication such as IEEE 802.15.4 and Bluetooth. He has experience in ASIC-level design of wireless SoCs, particularly crystal-free wireless systems based on relaxation/ring oscillators. This work has been applied to biomedical and physiological device design, Internet-of-Things domains, and chemical sensing.

Dr. Burnett has substantial experience in electrical engineering for marine and oceanographic applications including sonar, ROVs, and littoral sensor systems. He has also conducted extensive field trials of prototype devices in harsh environments including the open ocean via oceanographic research vessels, various US coastal locations, and Antarctica.

Academic Credentials & Professional Honors

B.S., Electrical Engineering, University of Washington, 2023

M.S., Electrical Engineering, University of Washington, 2023

Ph.D., Electrical Engineering and Computer Science, University of California, Berkeley, 2019

Prior Experience

Graduate Student Researcher, University of California Berkeley, 2015-2018

National Defense Science and Engineering Graduate (NDSEG) Fellow, 2012-2015

Technical Staff, Sandia National Laboratories Livermore, 2007-2012

Professional Affiliations

Institute for Electrical and Electronic Engineers (IEEE) CAS, SSCS, MEMS

Association for Computing Machines (ACM) SIGGRAPH

Marine Technical Society (MTS)

Patents

International Patent WO/2018/026404: Crystal-Free Radio, August 2008 (Pister KSJ, Khan O, Wheeler B, Burnett DC).

US Patent Application 16/099,992: CRYSTAL FREE RADIO, Sep. 12, 2019 (Kristofer S.J. PISTER, Osama Ullah KHAN, Bradley WHEELER, David C. BURNETT).

Publications

I.Suciu, F. Maksimovic, B. Wheeler, D.C. Burnett, O. Khan, X. Vilajosana, T. Watteyne, and K.S.J. Pister, "Dynamic Channel Calibration on a Crystal-Free Mote-on-a-Chip." IEEE Access, vol. 7, 2019, pp.120884-900.

D.C. Burnett, H.M. Fahad, L. Lee, F. Maksimovic, B. Wheeler, O. Khan, A. Javey, and K.S.J. Pister, "Two-Chip Wireless H2S Gas Sensor System Requiring Zero Additional Electronic Components." 2019 20th International Conference on Solid-State Sensors, Actuators and Microsystems (TRANSDUCERS), Berlin, 2019.

F.Maksimovic, B. Wheeler, D.C. Burnett, O. Khan, S. Mesri, I. Suciu, L. Lee, A. Moreno, A. Sundararajan, B. Zhou, R. Zoll, A. Ng, T. Chang, X. Vilajosana, T. Watteyne, A.M. Niknejad, and K.S.J. Pister, "A Crystal-Free Single-Chip Micro Mote with Integrated 802.15.4 Compatible Transceiver, sub-mW BLE Compatible Beacon Transmitter, and Cortex M0," 2019 Symposium on VLSI Circuits, Kyoto, Japan, 2019, pp. C88-C89.

I.Suciu, F. Maksimovic, D.C. Burnett, O. Khan, B. Wheeler, A. Sundararajan, T. Watteyne, X. Vilajosana, and K.S.J. Pister, "Experimental Clock Calibration on a Crystal-Free Mote-on-a-Chip," CNERT: Computer and Networking Experimental Research using Testbeds, in conjunction with IEEE INFOCOM 2019, Paris.

D.C. Burnett, B. Wheeler, L. Lee, F. Maksimovic, A. Sundararajan, O. Khan and K.S.J. Pister, "CMOS oscillators to satisfy 802.15.4 and Bluetooth LE PHY specifications without a crystal reference," Computing and Communication Workshop and Conference, Las Vegas, NV, 2019, pp. 1-4.

O. Khan, D.C. Burnett, F. Maksimovic, B. Wheeler, S. Mesri, A. Sundararajan, B.L. Zhou, A.M. Niknejad, K.S.J. Pister, "Time Keeping Ability of Crystal Free Radios," IEEE Internet of Things Journal, pp. 11, 2018.

D.C. Burnett, B. Kilberg, R. Zoll, O. Khan, K.S.J. Pister, "Tapeout class: Taking students from schematic to silicon in one semester," 2018 IEEE International Symposium on Circuits and Systems (ISCAS), Florence, Italy, 2018, pp. 1-5.

D.C. Burnett, B. Wheeler, F. Maksimovic, O. Khan, A. M. Niknejad and K. S. J. Pister, "Narrowband communication with free-running 2.4GHz ring oscillators," 2017 Intl. Conf. on Performance Evaluation and Modeling in Wired and Wireless Networks (PEMWN), Paris, 2017, pp. 1-6.

B. Wheeler, F. Maksimovic, N. Baniasadi, S. Mesri, O. Khan, D. Burnett, A.M. Niknejad, and K.S.J. Pister, "Crystal-free narrow-band radios for low-cost IoT," 2017 IEEE Radio Frequency Integrated Circuits Symposium (RFIC), Honolulu, HI, 2017, pp. 228-231.

O. Khan, B. Wheeler, F. Maksimovic, D. Burnett, A. M. Niknejad and K. Pister, "Modeling the Impact of Phase Noise on the Performance of Crystal-Free Radios," in IEEE Transactions on Circuits and Systems II: Express Briefs, vol. 64, no. 7, pp. 777-781, July 2017.

O. Khan, B. Wheeler, D. Burnett, F. Maksimovic, S. Mesri, K.S.J. Pister, A.M. Niknejad, "Frequency reference for crystal free radio," 2016 IEEE International Frequency Control Symposium (IFCS), New Orleans, LA, 2016, pp. 1-2.

R.D. Sochol, E. Sweet, C.C. Glick, S. Venkatesh, A. Avetisyan, K.F. Ekman, A. Raulinaitis, A. Tsai, A. Wienkers, K. Korner, K. Hanson, A. Long, B.J. Hightower, G. Slatton, D.C. Burnett, T.L. Massey, K. Iwai, L.P. Lee, K.S.J. Pister, L. Lin, "3D Printed Microfluidic Circuitry via Multijet-Based Additive Manufacturing." *Lab on a Chip*, vol. 16, no. 4, Feb. 2016, pp. 668–78.

B. Smarr, D. Burnett, S. Mesri, K. Pister, and L. Kriegsfeld, "A Wearable Sensor System with Circadian Rhythm Stability Estimation for Prototyping Biomedical Studies," *IEEE Transactions on Affective Computing*, vol. 7, no. 3, pp. 220-230, July-Sept. 1 2016. (Co-primary author)

D.C. Burnett, B.J. Smarr, S.M. Mesri*, L.J. Kriegsfeld, K.S.J. Pister, "Reconfigurable, Wearable Sensors to Enable Long-Duration Circadian Biomedical Studies," *BODYNETS Conference*, Oct. 2014, London UK.

D.A. Sheaffer and D.C. Burnett, "Improved Surface Swimmer Detection through Multimodal Data Fusion." 2012 IEEE International Carnahan Conference on Security Technology (ICCST), 2012, pp. 292–96.

D. C. Burnett and D. Sheaffer, "Preliminary evaluation of imaging sonars for high-security underwater assessment," *OCEANS 2010 MTS/IEEE*, Seattle, WA, 2010, pp. 1-5.

D.C. Burnett and D. Sheaffer Jr., "Component field testing for SWPIDS: a shallow-water perimeter intrusion detection system", *Proc. SPIE 7677, Fiber Optic Sensors and Applications VII*, 23 April 2010.

H. Lin, D. Burnett, D. Sheaffer, E. Arnold, "Applying Decision Analysis Process to Exterior Physical Security System Technology Design and Selection." 43rd Annual 2009 International Carnahan Conference on Security Technology, 2009, pp. 312–16.

T. Pham, D.C. Burnett, L. Handugan, D. Frashure, C.J. Chen, L. Bushnell, L. Sullenberger, J. Ruesink, and A. Trimble, "A Low-Cost, Data-Logging Salinity Sensor," *OCEANS 2007 MTS/IEEE*, Vancouver, BC, 2007, pp. 1-5.

Project Experience

Designed and tested several generations of crystal-free wireless sensor mote integrated circuits requiring no external electronic components as part of a university research team. Focused in particular on RF systems based on low-power relaxation oscillators benefiting from process scaling, and on Bluetooth Low-Energy (BLE) integration. (UC Berkeley) Created a new course to teach Bluetooth SoC ASIC design in a 28nm SOI process starting from system architecture and ending by sending out finished design files for fabrication. (UC Berkeley) Designed and fabricated a wearable data logger in conjunction with circadian biologists to enable unobtrusive long-term circadian rhythm studies in humans. (UC Berkeley) Developed electronics of under-ice ROV including PCB design, microcontroller programming, control station software, and localization system. Piloted vehicle during deployment to McMurdo Station, Antarctica. (Scripps Institution of Oceanography / Moss Landing Marine Laboratories)

Developed, deployed, and led teams conducting tests of, sensors for physical security applications in marine environments. (Sandia National Laboratories Livermore) Evaluated high-resolution imaging sonars for diver identification in shallow water environments. (Sandia National Laboratories Livermore)

Peer Reviews

IEEE Internet of Things Journal, 2020

MDPI Sensors Journal, 2020

IEEE SENSORS Conference, 2019

