Zhengyu **Peng**

Senior Radar Systems Engineer · Ph.D.

925 E Edenbridge Way, Westfield, IN 46074, USA

(+1) 806-392-6110 | zpeng.me@gmail.com | zpeng.me | rookiepeng | Z. Peng

Summary

Dr. Zhengyu Peng is a highly experienced radar systems engineer with expertise in automotive radar, signal processing, and antenna arrays. He earned his Ph.D. from Texas Tech University and has contributed to the development of high-resolution imaging radar technology at Aptiv, a global technology company. Dr. Peng is also an associate editor for the IEEE Transactions on Instrumentation and Measurement.

Experience

Aptiv *Carmel, IN*

Senior Radar Systems Engineer *Jun. 2018 - PRESENT*

- Design and develop next-generation, high-resolution imaging radar systems to enhance active safety and enable autonomous vehicle capabilities

IEEE Transactions on Instrumentation and Measurement -

Associate Editor *Dec. 2020 - PRESENT*

- Associate editor for *IEEE Transactions on Instrumentation and Measurement (IEEE TIM)*

MDPI Remote Sensing Journal -

Guest Editor *Mar. 2019 - Jun. 2020*

- Guest editor for *Remote Sensing* journal special issue: Radar Remote Sensing on Life Activities

Mitsubishi Electric Research Labs. (MERL) *Cambridge, MA*

Research Internship *May 2017 - Aug. 2017*

- Designed novel digital beamforming transmitter architectures for radars and communication systems aiming to reduce hardware complexity and power consumption
- Completed simulation evaluation and initial schematic design
- Granted 2 patents, published 1 conference paper

Education

Texas Tech University *Lubbock, TX*

Ph.D. in Electrical Engineering *Aug. 2014 - May 2018*

Zhejiang University *Hangzhou, China*

M.Sc. in Information Science and Electronic Engineering *Aug. 2011 - Mar. 2014*

Zhejiang University *Hangzhou, China*

B.Sc. in Information Science and Electronic Engineering *Aug. 2007 - Jun. 2011*

Skills

Actively Using Python, MATLAB, C++, CUDA, Git, CANape

Experience With Java, C, Verilog, CST Microwave Studio, Keysight ADS, Cadence Virtuoso/Allegro

Projects

Featured research projects at Aptiv

FLR7HD Next-generation high-resolution 4D imaging radar.
FLR4+ Aptiv's first 4D imaging radar in production for active safety and autonomous driving.
ISR Interior sensing radar for detecting small child or baby being left inside a vehicle.

Featured research projects at Texas Tech University (details on https://zpeng.me)

3D MIMO radar A portable 24-GHz 3D MIMO radar system.
Phased array radar A short-range localization radar with beamforming capability in K-band.
Multi-Mode Radar A portable K-band radar for short-range localization and vital sign detection.

Featured personal projects (details on https://zpeng.me)

RadarSimPy A radar simulator built with Python and C++.
SensorView A lightweight sensor data visualization and analysis tool.
Antenna array analysis A simple GUI tool for antenna array analysis.

Honors & Awards

2018	**Outstanding Reviewer**, IEEE Instrumentation and Measurement Society	–
2018	**Travel Fellowship**, U.S. National Committee for the International Union of Radio Science	*Boulder, CO*
2017	**Horn Professor's Graduate Achievement Award**, Texas Tech University	*Lubbock, TX*
2016	**Graduate Fellowship**, IEEE Microwave Theory and Techniques Society	*San Francisco, CA*
2016	**Finalist**, IEEE Radio Wireless Week Student Paper Competition	*Austin, TX*
2016	**Excellent Demo Track**, IEEE Radio Wireless Week	*Austin, TX*
2015	**Third Place**, IEEE IMS High Sensitivity Radar Competition	*Phoenix, AZ*

Professional Activities

Journal Reviewer

• Scientific Reports • IEEE Sensors Letters • IEEE/ASME Transactions on Mechatronics • IEEE Transactions on Biomedical Engineering • International Journal of Microwave and Wireless Technologies • IEEE Access • IEEE Transactions on Microwave Theory and Techniques • IEEE Transactions on Instrumentation and Measurement • IEEE Transactions on Circuits and Systems I: Regular Papers • IEEE Transactions on Circuits and Systems II: Express Briefs • IEEE Transactions on Mobile Computing • IEEE Transactions on Vehicular Technology • IEEE Antennas and Wireless Propagation Letters • IEEE Microwave and Wireless Components Letters • IEEE Microwave Magazine • IEEE Sensors Journal • IEEE Journal of Electromagnetics, RF, and Microwaves in Medicine and Biology • IEEE Journal on Emerging and Selected Topics in Circuits and Systems • IETE Journal of Research • Sensors and Actuators A: Physical • Sensors • Electronics • Remote Sensing • Algorithms • Applied Sciences • Symmetry • Information • Mathematical and Computational Applications • Advances in Science, Technology and Engineering Systems Journal • Computers in Biology and Medicine • Engineering Applications of Artificial Intelligence • Expert Systems With Applications • AEÜ - International Journal of Electronics and Communications • Wind Energy • ACES Journal

Conference Technical Program Committee Reviewer

• 2023 SPIE Defense+Commercial Sensing Radar Sensor Technology Committee • 2022 IEEE International RF and Microwave Conference (RFM) • 2022 IEEE International Microwave Biomedical Conference (IM-

BioC 2022) • 2020 IEEE International RF and Microwave Conference (RFM) • 2019 International Applied Computational Electromagnetics Society (ACES) Symposium • 2018 IEEE International RF and Microwave Conference • 2018 World of Multidisciplinary Research and Application Conference • 2018 Advanced Research in Eng. and Info. Technology International Conference • 2018 Symposium on Islamic Sciences and Technology • 2018 World Congress on Circuits and Systems Conference • 2017 Asia Pacific Microwave Conference

Publications

Citations: 1334, h-index: 20, i10-index: 29 (Recorded on Mar. 2nd, 2023)

Book

[1] **Z. Peng**, C. Li, and F. Uysal, Eds., *Modern Radar for Automotive Applications* (Radar, Sonar and Navigation). SCITECH PUB, 2022, ISBN: 9781839534355.

Book Chapters

[1] **Z. Peng**, C. Li, J.-M. Muñoz-Ferreras, and R. Gómez-García, "Chapter 9: Hardware Development and Applications of Portable FMCW Radars," in *Micro-Doppler Radar and its Applications*, F. Fioranelli, H. Griffiths, M. Ritchie, and A. Balleri, Eds. Raleigh, NC: SCITECH PUB, 2020.

[2] **Z. Peng**, C. Li, R. Gómez-García, and J.-M. Muñoz-Ferreras, "Chapter 5: FMCW Radar System for Short-Range Micro-Motion Sensing," in *Short-Range Micro-Motion Sensing: Hardware, signal processing, and machine learning*, C. Gu and J. Lien, Eds. Raleigh, NC: SCITECH PUB, 2019.

[3] R. Gómez-García, D. Psychogiou, **Z. Peng**, J.-M. Muñoz-Ferreras, and C. Li, "Chapter B.3: Adaptive RF multi-interference suppression for radar/wireless-communication wideband receivers," in *Radar and Communications Spectrum Sharing*, S. Blunt and E. Perrins, Eds. Raleigh, NC: SCITECH PUB, 2018.

Journal Articles

[1] D. Tang, J. Wang, W. Hu, **Z. Peng**, Y.-C. Chiang, and C. Li, "A DC-coupled high dynamic range biomedical radar sensor with fast-settling analog DC offset cancellation," *IEEE Transactions on Instrumentation and Measurement*, vol. 68, no. 5, pp. 1441–1450, May 2019.

[2] **Z. Peng** and C. Li, "Portable microwave radar systems for short-range localization and life tracking: A review," *Sensors*, vol. 19, no. 5, p. 1136, Mar. 2019.

[3] Y. Li, **Z. Peng**, R. Pal, and C. Li, "Potential active shooter detection based on radar micro-Doppler and range-doppler analysis using artificial neural network," *IEEE Sensors Journal*, vol. 19, no. 3, pp. 1052–1063, Feb. 2019.

[4] J. Yan, **Z. Peng**, H. Hong, C. H, X. Zhu, and C. Li, "Vital-SAR-imaging with a drone-based hybrid radar system," *IEEE Transactions on Microwave Theory and Techniques*, vol. 66, no. 12, pp. 5852–5862, Dec. 2018.

[5] **Z. Peng** and C. Li, "A portable K-band 3-D MIMO radar with non-uniformly spaced array for short-range localization," *IEEE Transactions on Microwave Theory and Techniques*, vol. 66, no. 11, pp. 5075–5086, Nov. 2018.

[6] **Z. Peng**, L. Ran, and C. Li, "A K-band portable FMCW radar with beamforming array for short-range localization and vital-Doppler targets discrimination," *IEEE Transactions on Microwave Theory and Techniques*, vol. 65, no. 9, pp. 3443–3452, Sep. 2017.

[7] J.-M. Muñoz-Ferreras, **Z. Peng**, R. Gómez-García, and C. Li, "Review on advanced short-range multimode continuous-wave radar architectures for healthcare applications," *IEEE Journal of Electromagnetics, RF and Microwaves in Medicine and Biology*, vol. 1, no. 1, pp. 14–25, Aug. 2017.

[8] C. Li, **Z. Peng**, T.-Y. Huang, *et al.*, "A review on recent progress of portable short-range non-contact microwave radar systems," *IEEE Transactions on Microwave Theory and Techniques*, vol. 65, no. 5, pp. 1692–1706, May 2017.

[9] **Z. Peng**, J.-M. Muñoz-Ferreras, Y. Tang, R. Gómez-García, L. Ran, and C. Li, "A portable FMCW - interferometry radar with programmable low-IF architecture for localization, ISAR imaging and vital-sign tracking," *IEEE Transactions on Microwave Theory and Techniques*, vol. 65, no. 4, pp. 1334–1344, Apr. 2017.

[10] J.-M. Muñoz-Ferreras, **Z. Peng**, Y. Tang, R. Gómez-García, D. Liang, and C. Li, "Short-range Doppler-radar signatures from industrial wind turbines: Theory, simulations, and measurements," *IEEE Transactions on Instrumentation and Measurement*, vol. 65, no. 9, pp. 2108–2119, Sep. 2016.

[11] H. Hong, H. Zhao, **Z. Peng**, *et al.*, "Time-varying vocal folds vibration detection using a 24 GHz portable auditory radar," *Sensors*, vol. 16, no. 8, p. 1181, Aug. 2016.

[12] C. Gu, **Z. Peng**, and C. Li, "High-precision motion detection using low-complexity Doppler radar with digital post-distortion technique," *IEEE Transactions on Microwave Theory and Techniques*, vol. 64, no. 3, pp. 961–971, Mar. 2016.

[13] **Z. Peng**, J. Chen, Y. Dong, *et al.*, "Radio frequency beamforming based on a complex domain frontend," *IEEE Transactions on Microwave Theory and Techniques*, vol. 64, no. 1, pp. 289–298, Jan. 2016.

[14] J.-M. Muñoz-Ferreras, **Z. Peng**, R. Gómez-García, G. Wang, C. Gu, and C. Li, "Isolate the clutter: Pure and hybrid linear-frequency-modulated continuous-wave (LFMCW) radars for indoor applications," *IEEE Microwave Magazine*, vol. 16, no. 4, pp. 40–54, May 2015.

[15] R. Wang, D. Ye, S. Dong, *et al.*, "Optimal matched rectifying surface for space solar power satellite applications," *IEEE Transactions on Microwave Theory and Techniques*, vol. 62, no. 4, pp. 1080–1089, Apr. 2014.

[16] **Z. Peng**, T. Hu, W. Cui, J. Huangfu, C. Li, and L. Ran, "Unconventional beamforming for quasi - hemispheric coverage of a phased array antenna," *IEEE Antennas and Wireless Propagation Letters*, vol. 12, pp. 1654–1657, Dec. 2013.

Conference Proceedings

[1] X. Chen, Z. Li, B. Chen, Y. Zhu, C. Lu, **Z. Peng**, F. Lin, W. Xu, K. Ren, and C. Qiao, "MetaWave: Attacking mmwave sensing with meta-material-enhanced tags," in *the Network and Distributed System Security (NDSS) Symposium 2023*, San Diego, California, Feb, 27 - Mar. 3, 2023.

[2] C. Li, J. Wang, D. Rodriguez, A. Mishra, **Z. Peng**, and Y. Li, "Portable Doppler/FSK/FMCW radar systems for life activity sensing and human localization," in *14th International Conference on Advanced Technologies, Systems and Services in Telecommunications (TELSIKS)*, Nis, Serbia, Oct. 23-25, 2019.

[3] J.-M. Muñoz-Ferreras, J. Wang, **Z. Peng**, C. Li, and R. Gómez-García, "FMCW-radar-based vital-sign monitoring of multiple patients," in *IEEE MTT-S International Microwave Biomedical Conference (IMBioC)*, Nanjing, China, May 6-8, 2019.

[4] J.-M. Muñoz-Ferreras, **Z. Peng**, J. Wang, C. Li, and R. Gómez-García, "Coherent deramping-based multi-FMCW radar architecture," in *IEEE Topical Conference on Wireless Sensors and Sensor Networks (WiSNet)*, Orlando, FL, Jan. 20-23, 2019.

[5] **Z. Peng**, P. Nallabolu, and C. Li, "Design and calibration of a portable 24-GHz 3-D MIMO FMCW radar with a non-uniformly spaced array and RF front-end coexisting on the same PCB layer," in *13th IEEE Dallas Circuits and Systems Conference 2018 (DCAS)*, Dallas, TX, Nov. 12, 2018.

[6] Z. Li, Z. Yang, C. Song, C. Li, **Z. Peng**, and W. Xu, "E-eye: Hidden electronics recognition through mm-wave nonlinear effects," in *Proceedings of the 16th ACM Conference on Embedded Networked Sensor Systems (SenSys '18)*, Shenzhen, China, Nov. 4-7, 2018.

[7] S. Luo, T. Jiao, **Z. Peng**, Y. Li, and C. Li, "Mutual decoupling of four-element transmit- receive (T-R) antenna arrays based on a metamaterial isolation structure," in *2018 International Applied Computational Electromagnetics Society Symposium in China (ACES-China)*, Beijing, China, Jul. 29-Aug. 1, 2018.

[8] T. Jiao, **Z. Peng**, S. Luo, Y. Li, and C. Li, "Mutual coupling reduction in a T/R array with T-resonate cavity EBG (TRC-EBG)," in *IEEE International Symposium on Antennas and Propagation and USNC-URSI Radio Science Meeting (AP-S/URSI)*, Boston, MA, Jul. 8-13, 2018.

[9] J.-M. Muñoz-Ferreras, J. Wang, **Z. Peng**, R. Gómez-García, and C. Li, "From Doppler to FMCW radars for non-contact vital-sign monitoring," in *2nd URSI Atlantic Radio Science Meeting (AT-RASC)*, Meloneras, Spain, May 28-Jun. 1, 2018.

[10] D. Tang, J. Wang, **Z. Peng**, Y.-C. Chiang, and C. Li, "A DC-coupled biomedical radar sensor with analog DC offset calibration circuit," in *IEEE International Instrumentation and Measurement Technology Conference (I2MTC)*, Houston, TX, May 14-17, 2018.

[11] **Z. Peng**, A. Mishra, J. Davis, J. Bridge, and C. Li, "Long-time non-contact water level measurement with a 5.8-GHz DC-coupled interferometry radar," in *IEEE International Instrumentation and Measurement Technology Conference (I2MTC)*, Houston, TX, May 14-17, 2018.

[12] J. Wang, **Z. Peng**, and C. Li, "An efficient and extended range tracking method using a hybrid FSK-FMCW system," in *IEEE MTT-S International Wireless Symposium (IWS)*, Chengdu, China, May 6-10, 2018.

[13] **Z. Peng**, K. Kim, P. Wang, *et al.*, "Code-division multiplexing based hardware reduction for a digital beamforming transmitter array," in *12th European Conference on Antennas and Propagation (EuCAP)*, London, UK, Apr. 9-13, 2018.

[14] **Z. Peng** and C. Li, "Intermodulation FMCW (IM-FMCW) radar for non-linear wearable targets detection," in *United States National Committee of URSI National Radio Science Meeting (USNC-URSI NRSM)*, Boulder, CO, Jan. 4-7, 2017.

[15] J. Yan, **Z. Peng**, H. Hong, *et al.*, "Indoor range-direction-movement sar for drone-based radar systems," in *IEEE Asia Pacific Microwave Conference (APMC)*, Kuala Lumpur, Malaysia, Nov. 13-16, 2017.

[16] **Z. Peng**, D. Psychogiou, and C. Li, "Investigation of the roles of filters for a harmonic FMCW radar," in *International Applied Computational Electromagnetics Society (ACES) Symposium*, Suzhou, China, Aug. 1-4, 2017.

[17] J.-M. Muñoz-Ferreras, **Z. Peng**, R. Gómez-García, and C. Li, "Tone-ranging-inspired architecture for short-range radars: Theory and simulations," in *International Applied Computational Electromagnetics Society (ACES) Symposium*, Suzhou, China, Aug. 1-4, 2017.

[18] Y. Li, **Z. Peng**, and C. Li, "Potential active shooter detection using a portable radar sensor with micro-Doppler and range-Doppler analysis," in *International Applied Computational Electromagnetics Society (ACES) Symposium*, Suzhou, China, Aug. 1-4, 2017.

[19] **Z. Peng**, J.-M. Muñoz-Ferreras, C. Li, and R. Gómez-García, "An FMCW radar sensor for human gesture recognition in the presence of multiple targets," in *IEEE International Microwave Bio-Conference (IMBioC)*, Göteborg, Sweden, May 15-17, 2017.

[20] J.-M. Muñoz-Ferreras, **Z. Peng**, Y. Tang, R. Gómez-García, and C. Li, "Doppler-radar-based short-range acquisitions of time-frequency signatures from an industrial-type wind turbine," in *IEEE Wireless Sensors and Sensor Networks (WiSNet)*, Phoenix, AZ, Jan. 15-18, 2017.

[21] J.-M. Muñoz-Ferreras, **Z. Peng**, R. Gómez-García, and C. Li, "A frequency-multiplexed Doppler-plus-FMCW hybrid radar architecture: Theory and simulations," in *IEEE Wireless Sensors and Sensor Networks (WiSNet)*, Phoenix, AZ, Jan. 15-18, 2017.

[22] Y. Tang, **Z. Peng**, and C. Li, "An experimental study on the feasibility of fall prevention using a wearable K-band FMCW radar," in *United States National Committee of URSI National Radio Science Meeting (USNC-URSI NRSM)*, Boulder, CO, Jan. 4-7, 2017.

[23] Y. Tang, **Z. Peng**, L. Ran, and C. Li, "iPrevent: A novel wearable radio frequency range detector for fall prevention," in *IEEE International Symposium on Radio-Frequency Integration Technology (RFIT)*, Taipei, Taiwan, Aug. 24-26, 2016.

[24] H. Zhao, **Z. Peng**, H. Hong, X. Zhu, and C. Li, "A portable 24-GHz auditory radar for non-contact speech sensing with background noise rejection and directional discrimination," in *IEEE International Microwave Symposium (IMS)*, San Francisco, CA, May 22-27, 2016.

[25] **Z. Peng**, J.-M. Muñoz-Ferreras, R. Gómez-García, and C. Li, "FMCW radar fall detection based on ISAR processing utilizing the properties of RCS, range, and Doppler," in *IEEE International Microwave Symposium (IMS)*, San Francisco, CA, May 22-27, 2016.

[26] **Z. Peng**, J.-M. Muñoz-Ferreras, R. Gómez-García, L. Ran, and C. Li, "24-GHz biomedical radar on flexible substrate for ISAR imaging," in *IEEE International Wireless Symposium (IWS)*, Shanghai, China, Mar. 14-16, 2016.

[27] J.-M. Muñoz-Ferreras, **Z. Peng**, C. Li, and R. Gómez-García, "Effects and mitigation of interference tones on coherent FMCW short-range radars," in *IEEE International Wireless Symposium (IWS)*, Shanghai, China, Mar. 14-16, 2016.

[28] **Z. Peng**, J.-M. Muñoz-Ferreras, Y. Tang, R. Gómez-García, and C. Li, "Portable coherent frequency-modulated continuous-wave radar for indoor human tracking," in *IEEE Topical Conference on Bio-medical Wireless Technologies, Networks, and Sensing Systems (BioWireleSS)*, Austin, TX, Jan. 24-27, 2016.

[29] J.-M. Muñoz-Ferreras, **Z. Peng**, R. Gómez-García, and C. Li, "Random body movement mitigation for FMCW-radar-based vital-sign monitoring," in *IEEE Topical Conference on Biomedical Wireless Technologies, Networks, and Sensing Systems (BioWireleSS)*, Austin, TX, Jan. 24-27, 2016.

[30] J.-M. Muñoz-Ferreras, **Z. Peng**, Y. Tang, R. Gómez-García, D. Liang, and C. Li, "A step forward towards radar sensor networks for structural health monitoring of wind turbines," in *IEEE Radio and Wireless Symposium (RWS)*, Austin, TX, Jan. 24–27, 2016.

[31] **Z. Peng** and C. Li, "A portable 24-GHz FMCW radar based on six-port for indoor human tracking," in *IEEE MTT-S International Microwave Workshop Series on RF and Wireless Technologies for Biomedical and Healthcare Applications (IMWS-BIO)*, Taipei, Taiwan, Sep. 21-23, 2015.

[32] **Z. Peng**, L. Ran, and C. Li, "A 24-GHz low-cost continuous beam steering phased array for indoor smart radar," in *IEEE 58th International Midwest Symposium on Circuits and Systems (MWSCAS)*, Fort Collins, CO, Aug. 2-5, 2015.

Patents

[1] **Z. Peng**, Z. Li, and C. Gianelli, "Slow-time modulation for multiple radar channels," US US20220260699A1, Aug. 2022.

[2] **Z. Peng**, J. F. Searcy, and A. Rahman, "Frequency-modulated continuous-wave (FMCW) radar-based detection of living objects," US 11 385 344, Jul. 2022.

[3] **Z. Peng** and J. F. Searcy, "Object detection sensor with radome cover configuration to reduce transmitter-receiver couplings," US 11 209 519, Dec. 2021.

[4] **Z. Peng**, C. Li, and L. Ran, "Complex domain beamforming system and methods relating thereto," US 10 958 295, Mar. 2021.

[5] B. Wang, **Z. Peng**, K.-J. Kim, P. Wang, R. Ma, and K. H. Teo, "Digital beamforming transmitter array system with hardware sharing and reduction," US 10 270 510, Apr. 2019.

[6] K.-J. Kim, **Z. Peng**, B. Wang, and K. H. Teo, "Beamforming transmission with analog hardware resource sharing," US 10 218 550, Feb. 2019.

[7] **Z. Peng**, L. Ran, and J. Huangfu, "A method for array antenna beam to achieve omnidirectional coverage," CN 103 579 759, Aug. 2015.

[8] **Z. Peng**, L. Ran, and J. Huangfu, "Adaptive array antenna," CN 103 579 779, Jul. 2015.

[9] **Z. Peng** and J. Huangfu, "Near-field and far-field universal wireless charging tray antenna," CN 102 544 756, Oct. 2013.