

Yoonsu Kim

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Summary

Imaging Architect at Apple. Ph.D in the field of Computer Science with bachelor's and master's degrees in electrical and computer engineering. Strong communication skills developed through various project collaborations and multicultural experiences. Adept at working independently or as part of a broader team in various industry and academic settings.

Development experiences Software & Hardware product development, Deep learning, Machine learning, Computer vision, Data analysis, Algorithms, Optimization, Optical and ultrasound sensors, Image and Signal processing.

Research projects Camera ISP, Deep learning image processing, Ultrasound thermal monitoring using deep learning approach, Single-element ultrasound imaging, Device tool tracking.

Education

2014–2019 **Johns Hopkins University, Baltimore, MD, USA** *PhD in Computer Science.*

Ultrasound thermal imaging, single-element imaging and surgical tool tracking

- Ultrasound thermal monitoring algorithms using computational bioheat model and deep learning approaches
- Ultrasound-guided navigation system
- System design for single-element ultrasound imaging

2008–2009 **Johns Hopkins University, Baltimore, MD, USA** *Masters in Electrical and Computer Engineering.*

Research Projects : Time-reversal ultrasound imaging system, biomorphic CMOS imagers and Bioamplifiers.

2004–2008 **Tsinghua University, Beijing, China** *Bachelor 's in Microelectronics and Nanoelectronics Engineering.*

Thesis : High-resolution Digitally Controlled Oscillator for Next Generation Wireline Applications.

Work Experience

Jan 2023 – **Apple, Inc** *Camera ISP Architect.* San Diego, CA, USA. Imaging Architect.

Current Camera ISP, algorithm R&D, deep learning, system design, prototyping

Dec 2019 – **Qualcomm Technologies, Inc** *Camera ISP algorithm.* San Diego, CA, USA. Staff Engineer.

Jan 2023 QCT Camera System Algorithm Team

- Algorithm R&D, system design, prototyping
- Depth camera image processing
 - AI camera image processing research and development
 - High Dynamic Range image fusion
 - Multi-camera image fusion
 - Image motion ghost detection
 - Simulation and evaluation platform

Dec 2013 – **Korea Electronics Technology Institute** *IoT Convergence Research Center.* Gyeonggi, Korea.

Feb 2014 Senior Research Engineer.

- High-speed Computational Fluid Dynamics Simulation of Coronary Artery using GPUs.

- Nov 2009 – **LG Electronics, Inc** *R&D/Advanced Technology Division*. Seoul, Korea. Senior Research Engineer.
 Mar 2013
 - Motion sensor-based remote control hardware and firmware development
 - Multi-view 3D Auto-stereoscopy TV head tracking system development
 - Training and seminars for division's executives on underlying principles of new technologies
 - On-site mass production technical trouble shootings for TV hardware and software issues
- Jul 2007 – **Samsung Electronics, Inc** *Telecommunication Research and Development Center* Beijing, China
 Aug 2007 Research Intern.
 - Mobile application development in the Research and Strategy Group.

Skills & Techniques

Programming Languages Python, C/C++, Matlab, Java

Tools Deep learning tools(Pytorch, Tensorflow, Keras), Hardware development tools (Zuken)

Languages

Korean Native Speaker

English Full professional proficiency

Chinese Full professional proficiency

Patents

- Real-time ultrasound monitoring for ablation therapy, US/17057542, 2021
- System for generating synthetic aperture ultrasound images during needle placement, PCT/US2017/030660, WO2017192603, 2017
- Multimedia device for communicating with at least one device and method for controlling the same, 1020140029810, Korea, 2014

Awards

- SPIE Best poster award, 2019. (Deep learning image reconstruction for limited-angle ultrasound tomography in prostate cancer.)
- SPIE Honorable Mention award, 2019. (Conformal radiofrequency ablation to validate ultrasound thermometry.)
- IEEE International Ultrasonics Symposium Student Travel Support, Competitive basis, 2018. (Low-cost ultrasound thermometry for HIFU therapy using CNN.)
- SPIE Medical Imaging Young Scientist Awards, Runner-up, 2017. (Toward dynamic lumbar punctures guidance based on single element synthetic tracked aperture ultrasound imaging.)
- Dean's Merit Scholarship for MSc students , 2008 - 2009

Teaching

- Teaching Assistant - Machine Learning : Data to Models, 2019.
- Head Teaching Assistant - Database Systems, 2017.
- Course Assistant - Computer-Integrated Surgery, 2016, 2019
- Head Teaching Assistant - Computer System Fundamentals, 2014.

Extracurricular Activities

Student associations Served as a board member at Johns Hopkins and Tsinghua university

Sports clubs Led sports clubs at Johns Hopkins and Tsinghua university
Ski Certified Official Ski Instructor level 2 at Korean Ski Instructors Association

Projects & Publications

2014 – 2019 **Ultrasound thermometry.**

- **Y. Kim**, Towards modular ultrasound system for medical intervention and image guided therapy: Ultrasound temperature monitoring, Johns Hopkins University, 2019
- C. Audigier, **Y. Kim**, J. Ziegler, M. Friebe, and E. Boctor. Conformal radiofrequency ablation to validate ultrasound thermometry. SPIE Medical imaging 2019.
- C. Chen, **Y. Kim**, C. Audigier and E. M. Boctor. Ultrasound thermometry using an ultrasound element and deep learning for HIFU. 2019 IEEE International Ultrasonics Symposium (IUS), Glasgow, United Kingdom, 2019, pp. 548-551.
- **Y. Kim**, C. Audigier, N. Ellens and E. M. Boctor. Low-Cost Ultrasound Thermometry for HIFU Therapy Using CNN. 2018 IEEE International Ultrasonics Symposium (IUS), Kobe, 2018, pp. 1-9.
- **Y. Kim**, C. Audigier, Emran M. A. Anas, J. Ziegler, M. Friebe, and E. Boctor. CUST: CNN for Ultrasound thermal image reconstruction using Sparse Time-of-flight information. Simulation, Image Processing, and Ultrasound Systems for Assisted Diagnosis and Navigation. POCUS 2018. Lecture Notes in Computer Science, vol 11042, pp 29-37, Sep 2018.
- C. Audigier, **Y. Kim**, N. Ellens, and E. Boctor. Physics-based Simulation to enable Ultrasound monitoring of HIFU ablation: an MRI validation. Medical Image Computing and Computer Assisted Intervention, MICCAI 2018. MICCAI 2018. Lecture Notes in Computer Science, vol 11073, pp 89-97, Sep 2018.
- **Y. Kim**, C. Audigier, J. Ziegler, M. Friebe, and E. Boctor. Ultrasound thermal monitoring with an external ultrasound source for customized bipolar RF ablation shapes. International Journal of Computer Assisted Radiology and Surgery, Apr 2018.
- J. Ziegler, C. Audigier, J. Krug, G. Ali, **Y. Kim**, E. Boctor, and M. Friebe. Rf-ablation pattern shaping employing switching channels of dual bipolar needle electrodes: ex vivo results. International Journal of Computer Assisted Radiology and Surgery, Apr 2018.
- **Y. Kim**, C. Audigier, N. Ellens, and E. Boctor. A novel 3d ultrasound thermometry method for hifu ablation using an ultrasound element. In 2017 IEEE International Ultrasonics Symposium (IUS), pages 1-4, 2017.
- C. Audigier, **Y. Kim**, and E. Boctor. A novel ultrasound imaging method for 2d temperature monitoring of thermal ablation. In Imaging for Patient-Customized Simulations and Systems for Point-of-Care Ultrasound, pages 154-162, 2017.
- C. Audigier, **Y. Kim**, A. Dillow, and E. Boctor. Computational modeling of radiofrequency ablation: evaluation on ex vivo data using ultrasound monitoring. In Proc.SPIE, pages 10135 - 10, 2017.
- **Y. Kim**, X. Guo, A. Cheng, and E. Boctor. Speed of sound estimation with active pzt element for thermal monitoring during ablation therapy: feasibility study. In Proc.SPIE, pages 9790 - 8, 2016.

2015 – 2019 **Single element ultrasound imaging.**

- K. Xu, **Y. Kim**, E. Boctor, and H. Zhang. Enabling low-cost point-of-care ultrasound imaging system using single element transducer and delta configuration actuator, SPIE Medical imaging 2019.
- H. Zhang, **Y. Kim**, A. Moghekar, N. Durr, and E Boctor. Single-Element Needle-Based Ultrasound Imaging of the Spine: An *In Vivo* Feasibility Study. Simulation, Image Processing, and Ultrasound Systems for Assisted Diagnosis and Navigation. POCUS 2018. Lecture Notes in Computer Science, vol 11042, pp 82-89, Sep 2018 (H. Zhang and Y. Kim - Equal contribution)
- H. Zhang, **Y. Kim**, M. Lin, M. Paredes, K. Kannan, A. Moghekar, N. Durr, and E Boctor. Toward dynamic lumbar puncture guidance using needle-based single-element ultrasound imaging. Journal of Medical Imaging, pages 5 - 10, 2018.
- H. Zhang, M. Lin, **Y. Kim**, M. Paredes, K. Kannan, N. Patel, A. Moghekar, N. Durr, and E. Boctor. Toward dynamic lumbar punctures guidance based on single element synthetic tracked aperture ultrasound imaging. In Proc.SPIE, pages 10135 - 11, 2017.
- H. Zhang, H. Huang, C. Lei, **Y. Kim**, and E. Boctor. Software-based approach toward vendor independent real-time photoacoustic imaging using ultrasound beamformed data. In Proc.SPIE, pages 10064 - 6, 2017.

2014 – 2018 **Photoacoustic catheter tracking.**

- A. Cheng, **Y. Kim**, Y. Itsarachaiyot, H. Zhang, R. Clifford, R. Taylor, and E. Boctor. Photoacoustic-based catheter tracking: simulation, phantom, and in vivo studies. *Journal of Medical Imaging*, 5 - 10, 2018.
- A. Cheng, Y. Itsarachaiyot, **Y. Kim**, H. Zhang, R. Taylor, and E. Boctor. Catheter tracking in an interventional photoacoustic surgical system. In *Proc.SPIE*, pages 10135 - 8, 2017.
- A. Cheng, **Y. Kim**, H. Zhang, R. Taylor, and E. Boctor. Catheter tracking in an interventional photoacoustic surgical system. In *2016 Conference on Lasers and Electro-Optics (CLEO)*, pages 1-2, 2016.

2014 – 2022 **Ultrasound tomography, Evaluation platform for ultrasound-guided technologies, Robot-based ultrasound calibration, Medical device tool tracking, Ultrasonud phantom research.**

- C. Kut, T.J. Kao, M. Morcos, **Y. Kim**, E. Boctor, A.N. Viswanathan, 3D-printed Magnetic Resonance (MR)-based gynecological phantom for image-guided brachytherapy training, *Brachytherapy*, 2022.
- C. Kut, T.J. Kao, M. Morcos, **Y. Kim**, E. Boctor, A.N. Viswanathan, Anatomically Precise, Non-Biodegradable Whole Pelvic Phantom for Ultrasound-Guided Training in Hydrogel Spacer Injections, *International Journal of Radiation Oncology, Biology, Physics*, 2020.
- A. Cheng, **Y. Kim**, E. Anas, A. Rahmim, E. Boctor, R. Seifabadi, B. Wood. Deep learning image reconstruction for limited-angle ultrasound tomography in prostate cancer, *SPIE Medical imaging* 2019.
- A. Cheng, **Y. Kim**, E. Anas, A. Rahmim, E. Boctor, R. Seifabadi, B. Wood. Use of Deep Learning to Reconstruct Limited-Angle Ultrasound Tomography Images in Prostate Cancer: A Simulation Feasibility Study. In *2018 IEEE International Ultrasonics Symposium (IUS)*, 2018.
- H. Zhang, A. Cheng, **Y. Kim**, Q. Ma, G. Chirikjian, E. Boctor. Phantom with multiple active points for ultrasound calibration. *Journal of Medical Imaging*, Oct 2018.
- **Y. Kim**, S. Kim, and E. Boctor. Consistent evaluation of an ultrasound-guided surgical navigation system by utilizing an active validation platform. In *Proc.SPIE*, pages 10135 - 6, 2017.
- F. Aalamifar, A. Cheng, **Y. Kim**, X. Hu, H. Zhang, X. Guo, and E. Boctor. Robot- assisted automatic ultrasound calibration. *International Journal of Computer Assisted Radiology and Surgery*, 11(10):1821-1829, Oct 2016.
- Q. Ma, J. Davis, A. Cheng, **Y. Kim**, G. Chirikjian, and E. Boctor. A new robotic ultrasound system for tracking a catheter with an active piezoelectric element. In *2016 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, pages 2321- 2328, 2016.
- **Y. Kim**, Guo X., and Boctor E. New platform for evaluating ultrasound-guided interventional technologies. In *Proc.SPIE*, pages 9790 - 9, 2016.

Workshop & Symposium presentations

- E. Anas, C. Audigier, **Y. Kim**, J. Ziegler, M. Friebe and E. Boctor, Ultrasound Based Temperature Estimation for Thermal Therapy Monitoring. *Image Guided Therapy Workshop*, 2018.
- C. Audigier, **Y. Kim**, J. Ziegler, N. Ellens, M. Friebe, E. Boctor, Novel Ablative Therapy Monitoring Approach: Temperature Mapping using Ultrasound Smart Ablation Tools. *Image Guided Therapy Workshop*, 2018.
- **Y. Kim**, C. Audigier, E. Anas, J. Ziegler, M. Friebe, E. Boctor, Ultrasound thermal monitoring using external ultrasound elements: CNN approach. *Ultrasonic Imaging and Tissue Characterization*, 2018.
- A. Cheng , **Y. Kim**, Y. Itsarachaiyot, H. Zhang, C. Weiss, R. Taylor, E. Boctor, Photoacoustic-based catheter tracking: simulation, phantom and in vivo studies. *Ultrasonic Imaging and Tissue Characterization*, 2018.
- C. Audigier, **Y. Kim**, N. Ellens, E. Boctor, Ultrasonic monitoring method for HIFU ablation using physics-based simulation. *Ultrasonic Imaging and Tissue Characterization*, 2018.
- **Y. Kim**, C. Audigier, A. Dillow and E. Boctor, HIFU ablation monitoring using active ultrasound elements: feasibility study. *Ultrasonic Imaging and Tissue Characterization*, 2017.
- C. Audigier, **Y. Kim**, E. Boctor, Novel ultrasound imaging method for 2D temperature monitoring of thermal ablation. *Ultrasonic Imaging and Tissue Characterization*, 2017.

- A. Cheng , **Y. Kim**, C. Weiss, R. Taylor, E. Boctor, In-vivo catheter tracking using photoacoustics. Ultrasonic Imaging and Tissue Characterization, 2017.
- A. Cheng, **Y. Kim**, R. Taylor and E. Boctor, Interventional photoacoustic surgical system: tool tracking. Ultrasonic Imaging and Tissue Characterization, 2016.
- C. Audigier, **Y. Kim**, A. Kamen, E. Boctor, Ultrasound monitoring of radiofrequency ablation based on computational modeling. Ultrasonic Imaging and Tissue Characterization, 2016.