Younsu Kim

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Summary

Ph.D candidate 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, Sensors, Image and Signal processing.

Research projects Ultrasound thermal monitoring using deep learning approach, Single-element ultrasound imaging, Device tool tracking.

Education

2014–current **Johns Hopkins University, Baltimore, MD, USA** *PhD Program in Computer Science*.
- Served as research assistant across multiple topics including ultrasound thermal imaging, single-element imaging and surgical tool tracking.
- Developed software and implemented new ultrasound thermal monitoring algorithms using computational bioheat model and deep learning approaches.
- Developed a system to evaluate ultrasound-guided navigation system and improved a MCU-based system.
- Designed system architectures to perform experiments for thermal monitoring and single-element ultrasound imaging.
- Played a pivotal role as a member of MUSIIC research group at Johns Hopkins university in spearheading collaboration efforts with other members and advising undergraduate and upcoming PhD students.
- Courses : Computer vision, Deep learning, Machine learning, Parallel Programming, Operating Systems, Computer Networks, Algorithms, Database Systems, Computer Integrated Surgery, Medical Imaging Systems, Optimization Algorithms.

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

Dec 2013 – Feb 2014 **Korea Electronics Technology Institute** *IoT Convergence Research Center.* Gyeonggi, Korea. Research Engineer.
- High-speed Computational Fluid Dynamics Simulation of Coronary Artery using GPUs.

Nov 2009 – Mar 2013	**LG Electronics, Inc** *R&D/Advanced Technology Division.* Seoul, Korea. Research Engineer. - Developed motion sensor-based remote control as a key hardware and firmware engineer, including chip selection, main board design and firmware development. - Led the division's software research efforts on multi-view 3D Auto-stereoscopy TV, developed head tracking system for 3D TV without glasses. - Conducted training and seminars for division's executives on underlying principles of new technologies. - Led the division's expansion initiative on the Chinese market by designing customized TV mainboard and evaluating on-site mass production with technical trouble shooting capabilities.
Jul 2007 – Aug 2007	**Samsung Electronics, Inc** *Telecommunication Research and Development Center* Beijing, China Research Intern. - Developed mobile applications in the Research and Strategy Group.

Skills & Techniques

Programming Languages	Python, C/C++, Matlab, Java, SQL
Tools	Deep learning (Pytorch, Tensorflow, Keras), Hardware development tools (Zuken)

Languages

Korean	Native Speaker
English	Full professional proficiency
Chinese	Full professional proficiency

Patents

- Three-dimensional real time ultrasound monitoring system for ablation therapy, (Filing) 2018

- 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

- Course 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 golf, ski clubs at Johns Hopkins and Tsinghua university

Ski   Certified Official Ski Instructor level 2 at Korean Ski Instructors Association

Projects & Publications

2014 – current   **Ultrasound thermometry**.
- C. Audigier, **Y. Kim**, J. Ziegle, M. Friebe, and E. Boctor. Conformal radiofrequency ablation to validate ultrasound thermometry. SPIE Medical imaging 2019.
- **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. Ziegle, 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. Ziegle, 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. Ziegle, 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 – current   **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 to- ward 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 – current **Ultrasound tomography, Evaluation platfrom for ultrasound-guided technologies, Robot-based ultrasound calibration, Medical device tool tracking**.
- 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. Ziegle, M. Friebe and E. Boctor, Ultrasound Based Temperature Estimation for Thermal Therapy Monitoring. Image Guided Therapy Workshop, 2018.

- C. Audigier, **Y. Kim**, J. Ziegle, 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. Ziegle, 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.