

# Younsus Kim

## Summary

Ph.D candidate studied in candidate in the Department of Computer Science with a bachelor's and master's in electrical engineering, with strong communication skills developed from various project collaborations and multiple cultural experiences, working independently and as part of a team in various industry and academic settings..

**Development** Software & Hardware development, Machine learning, Algorithms, Optimization, Image/Signal processing, Computer vision, System Architecture, Data analysis.

**Research** Ultrasound thermal monitoring, Single-element ultrasound imaging, Medical device tracking, Ultrasound tomography, Robot-assist ultrasound calibration.

## Education

- 2014–current **Johns Hopkins University, Baltimore, MD, USA** *PhD Program in Computer Science.*
- Research Assistant - Ultrasound thermal imaging, single-element imaging, surgical tool tracking, etc
  - Developed software to implement new ultrasound thermal monitoring algorithms.
  - Implemented new ultrasound thermal monitoring algorithms using machine learning tools (Pytorch, Tensorflow, Keras).
  - Developed hardware to evaluate ultrasound-guided navigation system, and improved a MCU-based system
  - Designed system architectures to perform experiments to implement new ideas
  - Played a pivotal role as a member of MUSIIC research group by helping other members and advising undergraduate and new PhD students
- 2008–2009 **Johns Hopkins University, Baltimore, MD, USA** *Masters Degree Electrical and Computer Engineering.*
- Research projects : Time-reversal ultrasound imaging system, biomorphic CMOS imagers and Bioamplifiers
- 2004–2008 **Tsinghua University, Beijing, China** *Bachelor's Degree Microelectronics and Nanoelectronics Engineering.*
- Thesis : High-resolution Digitally Controlled Oscillator for Next Generation Wireline Applications

## Work Experience

- Dec 2013 – **Korea Electronics Technology Institute IoT Convergence Research Center** Gyeonggi, Korea
- Feb 2014 Research Engineer.
- Published a domestic conference paper on the topic of High-speed Computational Fluid Dynamics Simulation of Coronary Artery using GPUs, implemented using CUDA.
- Nov 2009 – **LG Electronics, Inc R&D Division/Advanced Technology Team** Seoul, Korea Research Engineer.
- Mar 2013
- Developed 6 and 9-axis Motion Sensor Remote Control as a hardware and firmware engineer, played a key roles including chip selection, main board design and firmware development.
  - Researched multi-view 3D Auto-stereoscopy TV, developed head tracking system for 3D TV without glasses as a software engineer.
  - Researched Holographic TV, conducted training and seminars for division's executives on the topic of principles of Holographic TV technology.
  - Developed TV mainboard for Chinese market as a hardware engineer, and also involved in mass production and technical trouble shooting.
  - Served military duty as a government designated Technical Research Specialist due to strong academic records and previous research achievements.

Jul 2007 – **Samsung Electronics, Inc** *Telecommunication Research and Development Center* Beijing, China  
Aug 2007 Research Intern.  
- Developed new applications for mobile phone in the Research and Strategy Group.

## Skills & Techniques

Programming Languages Matlab, Python, C, C++, Java, SQL, etc.

Tools Deep learning (Pytorch, Tensorflow, Keras), Zuken, FPGA, MCU control, Spice tools, etc.

## Languages

Korean Native Speaker

English Full professional proficiency

Chinese Full professional proficiency

## Patents

- THREE-DIMENSIONAL REAL TIME ULTRASOUND MONITORING SYSTEM FOR ABLATION THERAPY (Pending), 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

- 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

- Head Teaching Assitant - Database systems, 2017.
- Head Teaching Assitant - Computer system fundamentals, 2014.
- Course Assistant - Computer-Integrated Surgery, 2016.

## Extracurricular Activities

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

Sports & music clubs Led golf, ski and music clubs as a head at Johns Hopkins Univseristy and Tsinghua university

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

## Projects & Publications

### 2014 – **Ultrasound thermometry.**

- current
- **Y. Kim**, C. Audigier, N. Ellens, and E. Bector. Low-cost ultrasound thermometry for HIFU therapy using CNN. In 2018 IEEE International Ultrasonics Symposium (IUS), 2018.(Accepted)
  - **Y. Kim**, C. Audigier, Emran M. A. Anas, J. Ziegler, M. Friebe, and E. Bector. CUST: CNN for Ultrasound thermal image reconstruction using Sparse Time-of-flight information, Point-of-care ultrasound (POCUS) MICCAI workshop 2018. (Accepted)
  - C. Audigier, **Y. Kim**, N. Ellens, and E. Bector. Physics-based Simulation to enable Ultrasound monitoring of HIFU ablation: an MRI validation, Medical Image Computing and Computer-Assisted Intervention MICCAI 2018. (Accepted)
  - **Y. Kim**, C. Audigier, J. Ziegler, M. Friebe, and E. Bector. 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. Bector, 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. Bector. 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. Bector. 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. Bector. 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. Bector. Speed of sound estimation with active pzt element for thermal monitoring during ablation therapy: feasibility study. In Proc.SPIE, pages 9790 - 8, 2016.
- Three more conference papers are accepted and pending for publication due to a patent application . (Two first author papers and one second author paper)

### 2014 – **Single element ultrasound imaging.**

- current
- H. Zhang, **Y. Kim**, A. Moghekar, N. Durr, and E Bector. Single-Element Needle-Based Ultrasound Imaging of the Spine: An *In Vivo* Feasibility Study. Point-of-care ultrasound (POCUS) MICCAI workshop 2018. (Accepted)
  - H. Zhang, **Y. Kim**, M. Lin, M. Paredes, K. Kannan, A. Moghekar, N. Durr, and E Bector. 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. Bector. 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. Bector. 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. Bector. 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. Bector. 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. Bector. Catheter tracking in an interventional photoacoustic surgical system. In 2016 Conference on Lasers and Electro-Optics (CLEO), pages 1-2, 2016.

- 2014 – 2017 **Ultrasound tomography, Evaluation platform for ultrasound-guided navigation system, Robot-based ultrasound calibration, Medical device tracking.**
- 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 (Accepted).
  - **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. (Accepted)
- 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. (Accepted)
- **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.