HYUN JAE KANG, PH.D.

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SUMMARY

- 17+ years of extensive and broad research, development and engineering experience in deep learning, computer vision, medical imaging, interventional surgical systems and robotics.
- 6+ years of experience in a technical leadership experience leading project teams and setting technical direction.
- Managed R&D projects from concept to production, particularly in the areas of AI-powered virtual humans (**NEON**) and surgical navigation systems (**In2Vision™**).
- Strong publication record in peer-reviewed conferences and journals, with multiple patents in the areas of AI, neural rendering, medical imaging and interventional surgical systems.
- Research interests include generative AI, multimodal deep learning, optimization of DL models, modular software framework, network distributed system, medical image reconstruction and analysis, medical data visualization, surgical instrument localization with interventional surgical system.

TECHNICAL SKILLS

SW	**Programing Language**	Python, C++, C, Java, Javascript
	Libraries	Pytorch, Keras, Tensorflow, Tensorflow-JS, ONNX, TensorRT, NumPy, MATLAB QT SDK, MFC, CUDA, OpenGL, WebGL, DirectX, OpenCV, ITK, VTK,
	Tools	Unity, 3D Max, SolidWorks, Pro/Engineer, AutoCAD, ANSYS, COMSL, K-Wave CMake, Ninja, Git
	Platforms	OSX, Linux, Windows, Android, Tizen
HW	**Motion Tracking System**	Polaris Polaris Spectra/Vicra/Aurora (NDI, Inc.), 3D Guidance medSAFE (Ascension Technology Co.), Micron Tracker (Claron Technology Inc.)
	Medical Ultrasound System	Ultrasonix CEP/RP/Touch/ DAQ (Analogic Ultrasound)
	Microscope	Inverted microscope IX-81 (Olympus Co.), MZ 12.5 (Leica), OPMI Neuro/NC 4 (Carl Zeiss AG), LSM 5 PASCAL (Carl Zeiss AG), XE-100 (PSIA Inc.)
	Micro/Nano Manipulation	MM3A-Nano-Manipulator (Kleindiek Nanotechnik GmbH), MP-285 micro-manipulator (Shutter Inc.), NI-2–biomanipulator (Eppendorf AG)

PROFESSIONAL EXPERIENCE

SAMSUNG RESEARCH AMERICA, Mountain View, CA, USA **2021 – 2023**

Senior Staff Engineer I, Research

Researched and developed **NEON**s for production

- Developed new methods to improve the image quality of the artificial human.
- Investigated the generation of full-body motion of the artificial human based on audio data and user feedback.
- Optimized the DL model of neural rendering to real-time rendering (50 fps).
- Researched and optimized neural rendering for mobile devices and web browsers.
- Generated 14 **NEON**s from in-house data captures.
- Cooperated with the software team to prepare several external commercial demos.
  - AI shopping assistant at NRF Retail Event. [*Link*]
- Published a conference paper and several related patents with the team.
  - Synthesizing Photorealistic Virtual Humans Through Cross-Modal Disentanglement (CVPR 2023). [*Link1*], [*Link2*]

SAMSUNG RESEARCH AMERICA, Mountain View, CA, USA **2019 – 2021**

Staff Engineer II, Research

Researched and developed Artificial Human (**NEON**)

- Researched and developed neural rendering methods for artificial human.
- Investigated and integrated DL model of lip-syncing to given audio with the artificial human.

- Developed facial expression control/synthesis methods for the artificial human.
- Demonstrated the first showcase of **NEON** at CES 2020. [*Link1*], [*Link2*], [*Link3*]
  - Finalist of the Best of Innovation Award at CES 2020. [*Link*]
- Participated in the preparation of Korea Sam-il event (Korean Government) with 3-**NEON**s. [*Link*]

SAMSUNG RESEARCH AMERICA, Mountain View, CA, USA **2016 – 2019**

Staff Engineer I, Research

Developed DL-based computer vision applications on mobile devices.

- Implemented object detection and style transfer DL models on a mobile device (Android OS)
- Implemented segmentation DL models on Tizen devices (mobile and TV).
- Developed a mobile SLAM application (Android OS) using the VINS-Mono method.
- Researched and developed mobile AR applications for multiple players and multiple devices. (Unity and Android OS)

Developed a neural rendering method for artificial humans.

- Investigated and researched a photorealistic face rendering with DL models (a pilot project of artificial human).

KITWARE INC., Carrboro, NC, USA **2015 – 2016**

R&D Engineer

Performed research and development of medical image analysis software.

- **Insight Segmentation and Registration Toolkit (ITKv4)** – involved in development activities for version ITK 4.9 and 4.10.
- **SimpleITK data bridges** – implemented high performance data conversion between SimpleITK's Image and NumPy's ndarray objects based on copy-on-write semantics.
- **Ultrasound Spectroscopy** – investigated and implemented the method for ex-vivo tissue characterization with ultrasound pulse-echo RF data by utilizing ITK-Ultrasound module and Quantitative ultrasound methods.
- **Ultrasonic Device for Rapid Tomographic Rodent Tissue and Vasculature Imaging** (Collaboration with SonoVol, Inc**.)**
  - Developed and integrated the automated robotic 3D ultrasound platform with 3D Slicer, Plus Toolkit and OpenIGTLink library.

JOHNS HOPKINS UNIVERSITY, Department of Computer Science, Baltimore, MD, USA **2008 – 2015**

Research Assistant

Developed real-time medical ultrasound imaging and interventional component framework – modular software component framework which enables rapid development and system setup used for ultrasound imaging research.

- **OpenIGTLinkMUSiiC**: The extended version of OpenIGTLink, accomplished by adding new message types and well-defined bidirectional communication interface between components.
  - Proposed entire design concept of **OpenIGTLinkMUSiiC**.
  - Designed and implemented new message types (USMessage, EIMessage) to support real-time ultrasound-driven data streaming.
  - Designed and developed concurrent message interfaces and callback function interface to allow bidirectional message communication on multithreading process.
- **MUSiiC Note**: The collection of software components for ultrasound research, which enables the breakdown of the monolithic processing structure of existing ultrasound system into a collection of independent and communicating software modules.
  - Proposed entire design concept of **MUSiiC Note**.
  - Implemented real-time ultrasound data acquisition and network server system for real-time GPU based ultrasound elastography and robot-assisted real-time laparoscopic ultrasound elastography.
  - Proposed and implemented real-time multiple data synchronization to combine multiple OpenIGTLink messages with the timestamp of each message.
  - Developed spatially tracked ultrasound data acquisition system for ultrasound calibration and freehand ultrasound elastography for in-vivo application.
- **Precisely shaped acoustic ablation of tumor under 3D ultrasound image guidance** (Collaboration with Acoustic Medical system, Inc., University of California at San Francisco and Vanderbilt University): A true closed-loop system for steering, placement, guidance, percutaneous delivery of ultrasound thermal ablation tool, and on-line monitoring of the treatment of hepatic tumor.
  - Implemented sensorless freehand 3D ultrasound system, and validated its accuracy with phantom study.

  - Integrated real-time GPU based ultrasound elastography system with interventional ultrasound thermal ablation system (Acoustic MedSystems TheraVisionTM) for real-time thermal monitoring of acoustic ablation therapy, and validated the performance through a series of in vivo experiments.
- **Interventional photoacoustic surgical system (i-PASS):** Novel photoacoustic ultrasound imaging techniques for accurate, reliable, and efficient fusion of intraoperative ultrasound (IOUS) images with preoperative images, real time video, and other data to assist surgeons in minimally invasive surgery and other interventional procedures.
  - Developed real-time spatially tracked photoacoustic imaging system and network data server to localize prostate brachy-therapy seeds using a clinical ultrasound system.
  - Invented 3 freehand spatial-angular compounding methods of photoacoustic images to enhance the contrast of photoacoustic image.
  - Developed 3D photoacoustic data acquisition system for concurrent photoacoustic markers for direct three-dimensional ultrasound to video registration.
  - Proposed and developed a technique of needle visualization using photoacoustic effect.

CYBERMED, INC., Seoul, Korea **2006 – 2008**

R&D Manager

Led a development team for **image-guided surgical navigation systems**, the first commercial surgical navigation systems in Korea. Managed/Directed entire development cycle: brainstorming, idea evaluation, software/hardware design, developing manufacturing processes, and managing OEM suppliers.

- **Image-guided surgical navigation systems**
  - **Neurosurgical navigation system (In2Vision^{TM}):**
    - Led 3 software engineers to implement surface registration method (ICP) and integrate Diffused Tensor Imaging (DTI) technique, including brainstorming, designing software architecture, implementation, and clinical test.
    - Engineering duties were evaluation idea, designing software architecture, and organizing clinical test.
  - **Image-free total knee replacement (TKR) navigation system (In2Knee^{TM}):**
    - Led 4 software engineers to develop user-interface software for In2Knee^{TM}.
    - Personal duties were designing and manufacturing surgical instruments (a fine-adjustable cutting block) for In2Knee^{TM}, coordinating OEM supplier collaboration, building system, and organizing clinical test.
  - **Dental implant surgical navigation system (In2Guide^{TM}):**
    - Led a team of three software engineers, starting from surveying the state of arts, building the concept of product, designing software architecture, and ending with implementation.
    - Engineering duties were evaluation idea, designing software architecture, and implementation.
- **A grant application of development of intravascular micro-robot development** (Accepted, Funded by the ministry of knowledge economy of Korea with the total amount of $ 20M, September 2007 – June 2014): To develop a micro-robot system to help cure blood vessel disease, such as Chronic Total Occlusions (CTO) and Thrombi within blood vessels.
  - Proposed and wrote the sub-grant proposal related to recognition of the pose of micro-robot in human body with real-time.
- **A grant application of development of medical treatment technology for blood vessel treatment by a micro-robot** (Accepted, funded by the ministry of knowledge economy of Korea with the total amount of $3M, June 2008 – May 2013): To develop the common technology for robotic surgery system to improve the accuracy of surgery by combining image processing technology and the conventional surgical technology.
  - Proposed and wrote the sub-grant proposal related to image-guided surgical system.
- **Proposed and wrote 16 patents related to image guided surgical systems.**

CYBERMED, INC., Seoul, Korea **2004 – 2006**

Researcher

Performed research and development of **image-guided surgical navigation systems.**

- **Image-guided surgical navigation systems**
  - **Neurosurgical navigation system (In2Vision^{TM}):**
    - Developed and integrated the real-time video image interface of surgical microscope using a Matrox METEOR board and MIL library.
    - Developed and integrated the functional interface of surgical microscope (NC-4, Carl Zeiss Microscope) using RS232C protocol.

  - Developed and implemented a virtual-tip tracking function with the focal distance of surgical microscope (NC-4, Carl Zeiss Microscope).
  - Designed and fabricated neurosurgical navigation instruments.
- **Spine surgical navigation system (In2Spine™):**
  - Designed and fabricated spine surgical navigation instruments.
  - Developed the real-time video image interface of C-arm using a Matrox METEOR board and MIL library.

KOREA INSTITUTE OF SCIENCE & TECHNOLOGY (KIST), Seoul, Korea **2002 – 2004**

Researcher
Researched and developed micromanipulations and wearable robot.

- **Sensor based micromanipulation system:**
  - **Gelatin-patterned cover glass for single bio-cell manipulation:** In-vitro cell culture scaffolds for patterned cell culturing.
    - Proposed and fabricated a gelatin patterned cover class for holding and culturing mouse bone marrow cell.
    - Measured of the property of the gelatin-patterned cover glass with Atomic Force Microscope (AFM).
  - **Single bio-cell manipulation:** A micro-robotic injector with cellular force sensing capabilities and a visual tracking function.
    - Developed and integrated the vision-based micromanipulation of single bio-cell (mouse embryo).
    - Developed and implemented auto-cell detection algorithm with pattern matching method.
    - Designed and fabricated PVDF force sensor to measure cellular force.
  - **Flexible micro-assembly system:** A flexible micro-assembly system based on hybrid manipulation scheme with sensory feedback of vision and force.
    - Developed and integrated a micromanipulation system based on vision and scaled teleoperation technique with force feedback for assembling optical components.
    - Proposed and implemented an image processing algorithm of monitoring the pose of optical components in real-time.
    - Implemented and integrated a haptic interface for force feedback-based micro-assembly.
    - Developed the graphic user interface of the micromanipulation system.
- **Wearable robotic arm:** A 7-DOF wearable robotic arm with pneumatic actuators and teleopearation control.
  - Developed a 3D virtual wearable robotic arm that interacts with the wearable robotic arm.

SNU PRECISION CO. LTD. AND SEOUL NATIONAL UNIVERSITY, Seoul, Korea **2000 – 2002**

Researcher
Performed research and development of vision-based inspection system.

- **Vision-based inspection system of optical components**
  - **Inspection system for pigtailed optical fiber:** A high-precision non-contact inspection system of pigtailed optical fiber.
    - Proposed and developed an inspection algorithm based on image processing technique to detect the facet angle of pigtailed optical fiber.
    - Developed and integrated the graphic user interface of the inspection system.
    - Developed and integrated the video interface of optical microscope.
  - **Inspection system for ferrules (optical component):** A high-precision non-contact automated inspection system of ferrules.
    - Developed the control interface motorized x-y-z stage for automated inspection with RS232C protocols.

EDUCATION

Ph.D., Department of Computer Science, Johns Hopkins University, Baltimore, MD, **2015**
- Thesis Topic: Real-time medical ultrasound imaging and interventional component framework for advanced ultrasound research

M.S.E., Department of Computer Science, Johns Hopkins University, Baltimore, MD, **2010**

M.S., Mechanical Design & Production Engineering, Seoul National University, Seoul, Korea, **2002**
- Dissertation: Development of Inspection System for PigTail using Computer Vision with Optical Microscope

B.S., Mechanical Engineering, Kyungpook National University, Daegu, Korea, (GPA 4.04 / 4.3), **2000**

HONORS AND AWARDS

- Education Fellowship for excellent academic achievement, Woosung Foundation, Seoul, Korea, **1997 – 2001**
- Honor Student Scholarship, Kyungpook National University, Daegu, Kore, **1996 – 1997**

PATENTS AND PATENT APPLICATIONS [*Link1*] [*Link2*]

1. **H. J. Kang**, S. Ravichandran, O. Texler, D. P. Dinev, A. S. J.-Y. Liot, and S. Sadi**, "Image generation using one-dimensional inputs,"** Jul 2024**,** US Patent App. 18/342,726
2. D.P. Dinev, O. Texler, S. Ravichandran, J.C. Palan, H.J. Kang, A. Gupta, A. Unnikrishnan, A.S.J.-Y. Liot, and S. Sadi**, "End-to-end virtual human speech and movement synthesization,"** Jul 2024**,** US Patent App. 18/342,721
3. S. Ravichandran, D.P. Dinev, O. Texler, A. Gupta, J.C. Palan, **H. J. Kang**, A.S.J.-Y. Liot, and S. Sadi, **"Multimodal disentanglement for generating virtual human avatars,"** Jan 2024, US Patent App. 18/296,202
4. S. Ravichandran, A.S.J.-Y. Liot, D.P. Dinev, O. Texler, **H. J. Kang**, J.C. Palan, and S. Sadi, **"Creating images, meshes, and talking animations from mouth shape data,"** Dec 2023, US Patent App. 17/967,872
5. O. Texler, D.P. Dinev, A. Gupta, **H. J. Kang**, A.S.J.-Y. Liot, S. Ravichandran, and S. Sadi, **"Hierarchical model-based generation of images,"** Dec 2023, US Patent App. 17/967,868
6. S. Antol, A. BENDALE, S.J. Gibbs, W.J. Jeon, **H. J. Kang**, J. KIM, B. Li, A.S. LIOT, L. LUO, P.K. Mistry, Z. Ying, **"Vision intelligence management for electronic devices,"** Jul 2018, US Patent 10,902,262
7. S. Antol, A. Bendale, S.J. Gibbs, W.J. Jeon, **H. J. Kang**, J. KIM, A.S.L. Bo Li, L. Luo, P.K. Mistry, Z. Ying, **"System and method for contextual driven intelligence,"** Jul 2018, US Patent 10,909,371
8. E. Boctor, B. Tavakoli, **H. J. Kang**, X. Guo, and J. Kang, **"Systems and methods for real-time tracking of photoacoustic sensing,"**Aug 2017, US Patent 9,723,995
9. C. Y. Kim, **H. J. Kang**, E. J. Choi, and J. Yoon, **"Method of determining the position of a deep brain stimulation electrode,"** Feb 2013, US Patent 8,369,931
10. C. Y. Kim, **H. J. Kang**, E. J. Choi, and J. Yoon, **"Medical instrument used in medical navigation and medical navigation method,"** May 2010, KR Patent 100,957,727
11. C. Y. Kim, **H. J. Kang**, and S. H. Shin, **"Method of operating a surgical navigation system,"** May 2010, KR Patent 100,957,713
12. C. Y. Kim, **H. J. Kang**, E. J. Choi, and S. H. Shin, **"Navigation method in bone ablation surgery,"** Feb 2010, KR Patent 100,941,612
13. C. Y. Kim, **H. J. Kang**, and J. Yoon, **"Bone cutting guide used in a medical navigation system,"** Feb 2010, KR Patent 100,941,614
14. **H. J. Kang**, C. Y. Kim, and S. H. Shin, **"Method of treating 3d medical volume data set,"** Sep 2009, KR Patent 100,915,123
15. **H. J. Kang**, C. Y. Kim, and J. Yoon, **"Bone cutting guide,"** Jul 2009, KR Patent 100,906,093
16. **H. J. Kang**, S. H. Shin, and C. Y. Kim, **"Method of operating a medical navigation system,"** Jan 2009, KR Patent 100,880,403
17. C. Y. Kim, H. Kim, and **H. J. Kang**, **"Laser indicator for surgical navigation camera,"** Oct 2007, KR Patent App. 1,020,060,053,637
18. **H. J. Kang**, H. Kim, and C. Y. Kim, **"Device for fixing a reference frame and correction method in medical navigation system using the device,"** Oct 2007, KR Patent 100,764,815
19. C. Y. Kim, H. Kim, and **H. J. Kang**, **"Universal tracker adapter for surgical navigation system,"** Aug 2007, KR Patent App. 1,020,060,053,636
20. **H. J. Kang**, J. W. Lee, B. K. Ju, S. J. Kwon, S. K. Chae, and J.-O. Park, **"Automatic re-registeration method in medical navigation system,"** Feb 2007, KR Patent 100,676,928
21. **Hyun Jae Kang,** Jin Woo Lee, Beyong Kwon Ju, Sang Ju Kwon, Soo Kyung Chae, and Jong-Oh Park, **"A dual light-reflection structure and a method of manufacturing the dual light-reflection structure,"** Nov 2006, KR Patent 100,649,124
22. **H. J. Kang**, H. Kim, W. C. Hu, and C. Y. Kim, **"Correction method in medical navigation system,"** Aug 2006, KR Patent 100,611,373
23. **H. J. Kang**, C. W. Oh, C. Y. Kim, W. C. Hu, and H. Kim, **"Probe for medical navigation system,"** Jul 2006, KR Patent 100,599,491
24. B. Kim, **H. J. Kang**, and Y. Namkung, **"Hybrid type micro manipulation method and the system thereof,"** Jan 2006, KR Patent 100,545,962

25. **H. J. Kang**, J. Sung, H. Kim, W. C. Hu, and C. Y. Kim, **"Apparatus for calibrating a medical microscope in medical navigation system,"** Oct 2005, KR Patent 100,518,837
26. **H. J. Kang**, K. Kim, E. H. Song, and D.-H. Kim, **"Method and device for assembling mems components,"** Mar 2005, KR Patent 100,473,348

PUBLICATIONS [*Link1*] [*Link2*]

1. S. Ravichandran, O. Texler, D. Dinev, and **H. J. Kang**, **"Synthesizing photorealistic virtual humans through cross-modal disentanglement,"** in Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition, 2023, pp. 4585–4594.
2. A. Cheng, X. Guo, H. K. Zhang, **H. J. Kang**, R. Etienne-Cummings, and E. M. Boctor, **"Active phantoms: a paradigm for ultrasound calibration using phantom feedback,"** Journal of Medical Imaging, vol. 4, no. 3, pp. 035001–035001, 2017.
3. H. K. Zhang, M. A. L. Bell, X. Guo, **H. J. Kang**, and E. M. Boctor, **"Synthetic-aperture based photoacoustic re-beamforming (SPARE) approach using beamformed ultrasound data,"** Biomedical optics express, vol. 7, no. 8, pp. 3056–3068, 2016.
4. S. R. Aylward, M. McCormick, **H. J. Kang**, S. Razzaque, R. Kwitt, and M. Niethammer, **"Ultrasound spectroscopy,"** in 2016 IEEE 13th International Symposium on Biomedical Imaging (ISBI), 2016, pp. 1013–1016.
5. A. Cheng, **H. J. Kang**, H. K. Zhang, R. H. Taylor, and E. M. Boctor, **"Ultrasound to video registration using a bi-plane transrectal probe with photoacoustic markers,"** in Medical Imaging 2016: Image-Guided Procedures, Robotic Interventions, and Modeling, 2016, vol. 9786, pp. 172–179.
6. H. K. Zhang, X. Guo, **H. J. Kang**, and E. M. Boctor, **"Photoacoustic image reconstruction from ultrasound post-beamformed B-mode image,"** in Photons Plus Ultrasound: Imaging and Sensing 2016, 2016, vol. 9708, pp. 576–581.
7. **H. J. Kang**, M. A. L. Bell, X. Guo, and E. M. Boctor, **"Spatial angular compounding of photoacoustic images,"** IEEE transactions on medical imaging, vol. 35, no. 8, pp. 1845–1855, 2016.
8. **H. J. Kang**, **"Medical Ultrasound Imaging and Interventional Component (MUSiiC) Framework for Advanced Ultrasound Image-guided Therapy,"** Ph.D. Thesis, Johns Hopkins University, 2015.
9. A. Cheng, X. Guo, H. K. Zhang, **H. J. Kang**, R. Etienne-Cummings, and E. M. Boctor, **"Active point out-of-plane ultrasound calibration,"** in Medical Imaging 2015: Image-Guided Procedures, Robotic Interventions, and Modeling, 2015, vol. 9415, pp. 223–229.
10. H. K. Zhang, F. Aalamifar, **H. J. Kang**, and E. M. Boctor, **"Feasibility study of robotically tracked photoacoustic computed tomography,"** in Medical Imaging 2015: Ultrasonic Imaging and Tomography, 2015, vol. 9419, pp. 31–37.
11. S. Billings, **H. J. Kang**, A. Cheng, E. Boctor, P. Kazanzides, and R. Taylor, **"Minimally invasive registration for computer-assisted orthopedic surgery: combining tracked ultrasound and bone surface points via the P-IMLOP algorithm,"** International journal of computer assisted radiology and surgery, vol. 10, pp. 761–771, 2015.
12. S. Kim, **H. J. Kang**, A. Cheng, M. A. L. Bell, E. Boctor, and P. Kazanzides, "Photoacoustic image guidance for robot-assisted skull base surgery," in 2015 IEEE International Conference on Robotics and Automation (ICRA), 2015, pp. 592–597.
13. I. Fleming, G. Hager, X. Guo, **H. J. Kang**, and E. Boctor, **"Iterative motion compensation approach for ultrasonic thermal imaging,"** in Medical Imaging 2015: Ultrasonic Imaging and Tomography, 2015, vol. 9419, pp. 207–221.
14. **H. J. Kang**, X. Guo, A. Cheng, M. A. Choti, and E. M. Boctor, **"Needle visualization using photoacoustic effect,"** in Photons plus ultrasound: imaging and sensing 2015, 2015, vol. 9323, pp. 441–447.
15. B. Tavakoli, Y. Chen, X. Guo, **H. J. Kang**, M. Pomper, and E. M. Boctor, **"Multispectral photoacoustic decomposition with localized regularization for detecting targeted contrast agent,"** in Photons Plus Ultrasound: Imaging and Sensing 2015, 2015, vol. 9323, pp. 184–189.
16. H. K. Zhang, X. Guo, **H. J. Kang**, and E. M. Boctor, **"Photoacoustic reconstruction using beamformed RF data: a synthetic aperture imaging approach,"** in Photons Plus Ultrasound: Imaging and Sensing 2015, 2015, vol. 9323, pp. 190–196.
17. A. Cheng, X. Guo, **H.J. Kang**, M.A. Choti, J.U. Kang, R.H. Taylor, E.M. Boctor, **"Direct ultrasound to video registration using photoacoustic markers from a single image pose,"** in Advanced Biomedical and Clinical Diagnostic and Surgical Guidance Systems XIII, 2015, vol. 9313, pp. 83–90.
18. N. P. Deshmukh, **H. J. Kang**, S. D. Billings, R. H. Taylor, G. D. Hager, and E. M. Boctor, **"Elastography using multi-stream GPU: an application to online tracked ultrasound elastography, in-vivo and the da Vinci surgical system,"** PloS one, vol. 9, no. 12, p. e115881, 2014.
19. M. A. L. Bell, X. Guo, **H. J. Kang**, and E. Boctor, **"Improved contrast in laser-diode-based photoacoustic images with short-lag spatial coherence beamforming,"** in 2014 IEEE International Ultrasonics Symposium, 2014, pp. 37–40.

20. **H. J. Kang**, X. Guo, R. Z. Azar, A. Cheng, and E. M. Boctor, **"Software framework for spatially tracked pre-beamformed RF data with a freehand clinical ultrasound transducer,"** in Medical Imaging 2014: Ultrasonic Imaging and Tomography, 2014, vol. 9040, pp. 487–494.
21. A. Cheng, X. Guo, **H.J. Kang**, B. Tavakoli, J.U. Kang, R.H. Taylor, E.M. Boctor, **"Concurrent photoacoustic markers for direct three-dimensional ultrasound to video registration,"** in Photons Plus Ultrasound: Imaging and Sensing 2014, 2014, vol. 8943, pp. 844–852.
22. X. Guo, B. Tavakoli, **H. J. Kang**, J. U. Kang, R. Etienne-Cummings, and E. M. Boctor, **"Photoacoustic active ultrasound element for catheter tracking,"** in Photons Plus Ultrasound: Imaging and Sensing 2014, 2014, vol. 8943, pp. 859–865.
23. **H. J. Kang**, M. A. L. Bell, X. Guo, R. H. Taylor, and E. M. Boctor, **"Freehand spatial-angular compounding of photoacoustic images,"** in Photons Plus Ultrasound: Imaging and Sensing 2014, 2014, vol. 8943, pp. 914–922.
24. X. Guo, A. Cheng, H. K. Zhang, **H. J. Kang**, R. Etienne-Cummings, and E. M. Boctor, **"Active echo: a new paradigm for ultrasound calibration,"** in Medical Image Computing and Computer-Assisted Intervention–MICCAI 2014: 17th International Conference, Boston, MA, USA, September 14-18, 2014, Proceedings, Part II 17, 2014, pp. 397–404.
25. P. Foroughi, **H.J. Kang**, D.A. Carnegie, M.G. van Vledder, M.A. Choti, G.D. Hager, E.M. Boctor, **"A freehand ultrasound elastography system with tracking for in vivo applications,"** Ultrasound in medicine & biology, vol. 39, no. 2, pp. 211–225, 2013.
26. N. Kuo, **H. J. Kang**, D. Y. Song, J. U. Kang, and E. M. Boctor, **"Real-time photoacoustic imaging of prostate brachytherapy seeds using a clinical ultrasound system,"** Journal of biomedical optics, vol. 17, no. 6, pp. 066005–066005, 2012.
27. **H. J. Kang**, N. P. Deshmukh, P. Stolka, E. C. Burdette, and E. M. Boctor, **"Ultrasound imaging software framework for real-time monitoring of acoustic ablation therapy,"** in Medical Imaging 2012: Ultrasonic Imaging, Tomography, and Therapy, 2012, vol. 8320, pp. 420–425.
28. **H. J. Kang**, N. Kuo, X. Guo, D. Song, J. U. Kang, and E. M. Boctor, **"Software framework of a real-time pre-beamformed RF data acquisition of an ultrasound research scanner,"** in Medical Imaging 2012: Ultrasonic Imaging, Tomography, and Therapy, 2012, vol. 8320, pp. 426–432.
29. S. Billings, N. Deshmukh, **H. J. Kang**, R. Taylor, and E. M. Boctor, **"System for robot-assisted real-time laparoscopic ultrasound elastography,"** in Medical Imaging 2012: Image-Guided Procedures, Robotic Interventions, and Modeling, 2012, vol. 8316, pp. 589–596.
30. **H.J. Kang**, A. Cheng, E. Boctor, L. Ibanez, A. Enquobahrie, M. Turek, J. Jomier, R. Avila, P. Cheng, Z. Yaniv, **"MUSiiC toolkit 2.0: Bidirectional real-time software framework for advanced interventional ultrasound research,"** in: MICCAI 2012, International Workshop on System and Architectures for Computer Assisted Interventions, 2012.
31. **H. J. Kang**, P. J. Stolka, and E. Boctor, **"OpenITGLinkMUSiiC: a standard communications protocol for advanced ultrasound research,"** MIDAS Journal, pp. 1–12, 2011.
32. Z. Yaniv, P. Foroughi, **H. J. Kang**, and E. Boctor, **"Ultrasound calibration framework for the image-guided surgery toolkit (IGSTK),"** in Medical Imaging 2011: Visualization, Image-Guided Procedures, and Modeling, 2011, vol. 7964, pp. 500–510.
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