

Junmo An, Ph.D.

Postdoctoral Fellow
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EDUCATION

Ph.D. in Computer Science August 2011 - May 2016

Medical Robotics, University of Houston, Houston, TX

Advisor: Nikolaos V. Tsekos, Ph.D.

Committees: Ernst Leiss, Ph.D.; Weidong (Larry) Shi, Ph.D.; Dipan J. Shah, M.D.; R. Jason Stafford, Ph.D.

Ph.D. Dissertation: "Sensors and System Integration for Magnetic Resonance Image (MRI)-Guided and Robot-Assisted Interventions"

M.S. in Computer Science and Engineering February 2006

Real-Time System Engineering, Konkuk University, Seoul, South Korea

Advisor: Moon Hae Kim, Ph.D. (He passed away unexpectedly on September 30, 2006, thus does not appear in my list of recommendations.)

M.S. Thesis: "Design and Implementation of the OSEK/VDX Operating System Based on the Time-triggered Message-triggered Object (TMO) Model"

B.S. in Computer Science February 2004

Konkuk University, Seoul, South Korea

Advisor: Moon Hae Kim, Ph.D.

Graduation Project: "Design and Implementation of a Broken Link Checker using the Breath-First-Search (BFS) Algorithm"

EMPLOYMENT

Biomedical Engineering, University of Houston, Houston, TX June 2016 - Present

Postdoctoral Fellow

Advisor: Joseph T. Francis, Ph.D.

Joe Francis Lab (www.joefrancislab.com):

Develop an autonomously updating brain-machine interface (BMI) utilizing reinforcement learning principles. Analyze neural activities (i.e., spiking activity and local field potentials) recorded from the primary motor cortex (M1), dorsal premotor cortex (PMd), ventral premotor cortex (PMv), and primary somatosensory cortex (S1) while nonhuman primates performed center-out reaching and grip force tasks. Translate movement-related information from the motor cortices using a variety of classification algorithms and regression models.

Medical Robotics Laboratory, University of Houston, Houston, TX August 2011 - May 2016

Research Assistant

Advisor: Nikolaos V. Tsekos, Ph.D.

Medical Robotics Lab (www.medicalroboticslab.com):

Developed algorithms for segmentation and 3D reconstruction of tubular structures (i.e., blood vessel mimicking phantom) from three orthogonal MR projection images.

Developed an MR pulse sequence for triplanar projection imaging.

Developed an MR-compatible surgical snake-like robot for minimally invasive surgeries (direct apical aortic valve replacement operations using real-time MRI imaging).

Developed an optically detunable MR-visible marker for MRI-guided and robot-assisted surgeries.

Developed and simulate a cardiac surgical robot for minimally invasive surgeries.

Developed an optical encoder for an MRI-compatible surgical robot.

Developed an optical/NMR dual-modality probe (light-induced fluorescent and MR spectroscopy).

WOOJEON & HANDAN Co., Ltd., Seoul, South Korea

January 2006 - December 2009

Senior Software Engineer

Developed Set-top boxes (STB), Digital Video Recorders (DVR), and Internet Protocol televisions (IPTV) which communicate with a full duplex. They include a web browser, an Ethernet LAN card and a Public Switched Telephone Network (PSTN) modem for return path.

Developed and ported Teletexts, Digital Video Broadcasting (DVB) subtitles, closed captioning, Electronic Program Guides (EPG), a mini web browser, a photo album, smart card security, the Pay-per-view (PPV) system, and middleware systems (e.g., Multimedia Home Platform (MHP) and OpenTV middleware) for interactive digital television.

This company was listed on *Forbes Magazine's Asia's 200 Best Under a Billion in 2010 list*.

Konkuk Software Research Center, Seoul, South Korea

December 2003 - December 2005

Graduate Student

Researched real-time computing (real-time system) and developed an Unmanned Ground Vehicle (UGV), an Unmanned Aerial Vehicle (UAV), mobile robots, Time-triggered Message-triggered Object (TMO), real-time middleware based on Linux and a tiny Real-Time System Operating System (RTOS).

TEACHING EXPERIENCE**Computer Science, University of Houston, Houston, TX**

January 2014 – May 2016

Co-Instructor

COSC 4332/6332 - Medical Robotics and Interventions (Spring 2016)

COSC 4372/6370 - Fundamentals of Medical Imaging (Fall 2015)

COSC 4397/6397 - Cyber-Physical Systems (Spring 2014)

Computer Science, University of Houston, Houston, TX

August 2012 - July 2015

Teaching Assistant

COSC 3340/6309 - Introduction to Automata and Computability (Summer 2015)

COSC 3320 - Data Structures and Algorithms (Fall 2014 and Spring 2015)

COSC 4330/6310 - Fundamentals of Operating Systems (Summer 2013 and Summer 2014)

COSC 4372/6370 - Fundamentals of Medical Imaging (Fall 2013)

COSC 4353/6353 - Software Design (Fall 2012 and Spring 2013)

COSC 4397/6397 - Cyber-Physical Systems (Fall 2012)

RELATED WORK EXPERIENCE**International Student & Scholar Services Office, University of Houston, TX**

August 2011 - June 2012

Instructional Assistant

Developed the International Student and Scholar Services (ISSS)'s website to provide accurate information and resources to international students and scholars.

Designed, implemented, maintained, and repaired Student and Exchange Visitor Information System (SEVIS) database and International Friendship Program (IFP) database.

Maintained essential departmental information technology resources; debugs technical malfunctions in departmental software/hardware, and conducts training for staff/students to use departmental technologies.

Developed technologies to support the education and reporting of University of Houston non-immigrants' visa status, intercultural communication skills, as well as community and academic resources.

Trained and supervised student leaders who assist other students during International Check-in and International Student Orientation.

Collected and analyzed data for creation of University of Houston's Non-Immigrant Enrollment Reports.

Designed and developed software as needed to assist the department in fulfilling its mission.

Konkuk Center for Teaching & Learning, Seoul, South Korea

March 2004 - December 2005

E-learning Assistant

Helped create e-learning contents, edited video lectures using software (Adobe Premiere, Windows Movie Maker and CyberLink PowerDirector, etc) and created a website for geography and journey information (www.jotra.com).

NGO Times, Seoul, South Korea

December 2002 - March 2003

Internship Reporter

Wrote articles after taking surveys and creating analyses. Covered the activities of non-governmental organization (NGO) groups.

JOURNAL ARTICLES

J. An, A. G. Webb, D. J. Shah, K. Chin, and N. V. Tsekos, "Manipulator-Driven Selection of Semi-Active Fiducial Markers for Localization and Tracking", *The International Journal of Medical Robotics and Computer Assisted Surgery*, 2018 (DOI: 10.1002/rcs.1846).

J. An, A. G. Webb, I. Seimenis, E. Christoforou, N. V. Tsekos, "Tracking of MR compatible interventional robots by controlling the MRI visibility of optically detunable MR markers", *Physica Medica: European Journal of Medical Physics*, Vol. e30, e51, 2014 (DOI: 10.1016/j.ejmp.2014.07.155).

J. An, A. G. Webb, I. Seimenis, E. Christoforou, N. V. Tsekos, "MR compatible endoscope for assessing the spatial distribution of co-registered optical and 1H signals", *Physica Medica: European Journal of Medical Physics*, 30, Vol. e39, 2014 (DOI: 10.1016/j.ejmp.2014.07.120).

CONFERENCE PROCEEDING ARTICLES

J. An, T. Yadav, M. B. Ahmadi, V. A. Tarigoppula, and J. T. Francis, "Near Perfect Neural Critic from Motor Cortical Activity Toward an Autonomously Updating Brain Machine Interface", *40th International Engineering in Medicine and Biology Conference (EMBC)*, Honolulu, HI, USA, 2018.

J. An, E. G. Christoforou, K. Chin, J. Hinojosa, D. J. Shah, A. G. Webb, and N. V. Tsekos, "Tracking of a Robotic Device by Controlling the Visibility of Markers from the Robot Control", *24th Annual Meeting of ISMRM*, Singapore, 2016. - **Educational Stipend Award**

J. An, M. Unan, K. Chin, D. J. Shah, A. G. Webb, I. Seimenis, and N. V. Tsekos, "3D Reconstruction of Tubular Structures from Three Orthogonal MRI Projections", *XIV Mediterranean Conference on Medical and Biological Engineering and Computing (MEDICON)*, Vol. 57, 326-331, Paphos, Cyprus, 2016 (DOI: 10.1007/978-3-319-32703-7_64).

J. An, X. Liu, M. Unan, E. G. Christoforou, A. G. Webb, and N. V. Tsekos, "Tracking of MRI Interventional Devices with Computer-Controlled Detunable Markers", *XIV Mediterranean Conference on Medical and Biological Engineering and Computing (MEDICON)*, Vol. 57, 663-667, Paphos, Cyprus, 2016 (DOI: 10.1007/978-3-319-32703-7_128).

J. An, N. von Sternberg, K. Chin, D. J. Shah, A. G. Webb, and N. V. Tsekos, "Localization and tracking with RF coils that are optically detuned by the control of an MR compatible manipulator", *In Joint Annual Meeting of ISMRM-ESMRMB*, Milan, Italy, 2014. - **Educational Stipend Award & Graduate Student Travel Award**.

J. An, A. E. Sonmez, M. Unan, R. D. Darrow, I. Hancu, R. J. Stafford, A. G. Webb, and N. V. Tsekos, "Manipulator-mounted optical NMR dual-modality probe for multimodality scanning in MR guided and robot-assisted interventions", *In Joint Annual Meeting of ISMRM-ESMRMB*, Milan, Italy, 2014. - **Educational Stipend Award & Graduate Student Travel Award**.

N. von Sternberg, **J. An**, K. Chin, D. J. Shah, and N. V. Tsekos, "A new method for MR compatible actuation: Solid Media Flexible Transmission", *In Joint Annual Meeting of ISMRM-ESMRMB*, Milan, Italy, 2014. - **Magna cum Laude ISMRM Merit Award**

CONFERENCE PROCEEDING ABSTRACTS

J. An, V. A. Tarigoppula, T. Yadav, and J. T. Francis, "Reward-induced changes of neural activity in the primary motor cortex toward an autonomously updating brain-machine interface", *47th Annual Meeting of Society for Neuroscience (SfN)*, Washington, DC, USA, 2017.

MANUSCRIPTS SUBMITTED or IN PREPARATION

J. An, T. Yadav, J. Hessberg, V. A. Tarigoppula, and J. T. Francis, "Reward-Modulated Changes in Local Field Potentials, Spiking Activity and Spike-Field Coherence in the Primary Motor Cortex", in Preparation.

J. An, M. Unan, K. Chin, D.J. Shah, A.G. Webb, I. Seimenis, N.V. Tsekos, "Imaging of tubular structures with MRI volume projections", *European Journal of Medical Physics*, To be Submitted in February 2018.

M. Unan, **J. An**, A.G. Webb, I. Seimenis, N.V. Tsekos, "Resolving 3D tubular structure from fast mutually oblique magnetic resonance imaging (MRI) volume projections", in Preparation.

AWARDS/HONORS/FELLOWSHIPS/GRANTS

- **Educational Stipend Award**, International Society for Magnetic Resonance in Medicine (ISMRM) (2016)
- **4th Place Winner Poster Award**, Korean-American Biomedical Scientists Symposium (KABMS) (2016)
- **3rd Place Winner Poster Award**, Korean-American Biomedical Scientists Symposium (KABMS) (2015)
- **Graduate Tuition Fellowships**, University of Houston (2014 - 2016)
- **Texas Public Education Grant**, University of Houston (2012 - 2015)
- **Educational Stipend Award**, International Society for Magnetic Resonance in Medicine (ISMRM) (2014)
- **Magna cum Laude ISMRM Merit Award**, ISMRM (2014)
- **Graduate Student Travel Award**, University of Houston (2014)
- **Doctoral Student Tuition Fellowship**, University of Houston (2011 - 2014)
- **Computer Science Doctoral Student Scholarship**, University of Houston (2011 - 2012)
- **Graduate Research Scholarship**, Konkuk University (2005)
- **National Graduate Science and Technology Scholarship**, Ministry of Education, Republic of Korea (2005)
- **ITRC Stipend**, ITRC, National IT Industry Promotion Agency (2004 - 2005)
- **Teaching Assistant A (Full Tuition Scholarship)**, Konkuk University (2004 - 2006)
- **Academic Excellence Scholarship**, Konkuk University (2003)

CERTIFICATIONS

- Certificate of Hands-On Electrophysiology Training, Blackrock Microsystems (2016)
- Certificate of Training - Working Safety with Nonhuman Primates-Animal Care, University of Houston (2016)
- Certificate of Training - Occupational Health & Safety Training-Animal Care, University of Houston (2016)
- Certificate of Appreciation as a Peer Advisor, University of Houston (2011)
- Certificate, Advanced Intensive Course in English As a Second Language, University of Pittsburgh (2010)
- Certificate, E-Learning Intensive Program, Konkuk University (2004)
- Engineer Information Processing, Human Resources Development Service of Korea (2003)
- Industrial Engineer Information Processing, Human Resources Development Service of Korea (2002)
- Microsoft Certified Professional System Engineer (MCSE), Microsoft (2000)
- Microsoft Certified Professional + Internet (MCP + Internet), Microsoft (2000)
- Microsoft Certified Professional (MCP), Microsoft (2000)

PROFESSIONAL SERVICES

- Member, Institute of Electrical and Electronics Engineers (IEEE)
- Reviewer and Member, IEEE Engineering in Medicine and Biology Society (EMBS)
- Member, Society for Neuroscience (SfN)
- Reviewer and Member, International Society for Magnetic Resonance in Medicine (ISMRM)
- Reviewer and Member, Mediterranean Conference on Medical and Biological Engineering and Computing (MEDICON)
- Reviewer, Transactions on Biomedical Engineering (TBE)

LANGUAGES

- English - speaking - fluent, reading / writing - high proficiency
- Korean - native

SKILLS & INTERESTS

- Brain-Machine Interface, EEG, fNIRS, signal processing, medical robotics, MRI, biosensor, medical imaging, image processing, machine learning, embedded systems, STB, DVR, IPTV, UAV, UGV, robotics, autonomous navigation, path planning, real-time computing, 3D printing, object oriented programming, network programming, web programming, microcontroller, hardware, VoIP, TMO, RTOS, etc.
- C, C++, C#, JAVA, Python, Basic, UML, HTML, XML, ASP, PHP, SQL (MS-SQL, Oracle, and MySQL), PL/SQL, PERL, JavaScript, CSS, C shell scripting, AWK/SED scripting, assembly language (INTEL, ARM, Power PC, and MIPS), LaTeX, graphics libraries (Qt, GTK, FLTK, ITK, VTK, OpenCL, OpenGL, etc.), deep learning libraries (TensorFlow, PyTorch, Scikit-Learn, Keras, etc.), etc.
- MATLAB, R, Simulink, SolidWorks, Source Insight, Wind River Tornado, Visual Studio .NET, Osirix, CVS, Subversion, etc.
- Dos, Windows NT, MAC OS, Linux, Unix, Solaris, VxWorks, MicroC/OS-II, OSEK/VDX, etc.

REFERENCES

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Joseph T. Francis, Ph.D.

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Houston Methodist Hospital
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