Byung Hyung Kim

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Research Interest

My research interests include algorithmic transparency, interpretability in affective intelligence, computational emotional dynamics, cerebral asymmetry and the effects of emotion on brain structure for affective computing, brain-computer interface, and assistive and rehabilitative technology.

Education

- **KAIST** — Republic of Korea
  Ph.D in Computer Science — *Aug. 2018*
  - Thesis: Wearable Affective Lifelog System for Understanding Emotion Dynamics in Daily Life
- **Boston University** — Boston, MA
  M.A in Computer Science — *Oct. 2010*
- **Inha University** — Republic of Korea
  B.S in Computer Science and Engineering — *Feb. 2008*

Honors, Awards, Media, Professional Activities

- **Newspaper Coverage** — Korean Media Electronic Times(ET News)
  Affective Situation Learning System (www.etnews.com/20190327000232) — *Mar. 2019*
- **Newspaper Coverage** — Korean Media Electronic Times(ET News)
  Deep Physiological Affect Network (www.etnews.com/20170712000212) — *Jul. 2017*
- **Nominated Research Highlights** — Annual Report 2015-2016, School of Computing, KAIST
  Jan. 2016
- **Honorable Mention Paper 2014 (Top 10%)** — Computers in Biology and Medicine, Elsevier
  Jul. 2015

Experience

- **KAIST** — Republic of Korea
  Research Assistant Professor — *Aug 2018 - Present*
  - Instructor - Data Structures(CS206) :Fall 2018 - Present
- **KAIST** — Republic of Korea
  Research and Teaching Assistant — *Sep 2013 - Aug 2018*
  - Research Assistant - Affective Intelligence and Machine Learning: Supervised under Dr. Sungho Jo. Specialized to learn physiological characteristics in cerebral lateralization in human emotion. Designed an unobstrusive wearable life-log system which records physiological signals and egocentric images to supports unencumbered user activity in daily life.
  - Teaching Assistant: Intelligent Robot Design and Programming (CS270), IT Convergence Design Project (ITC203), Problem Solving (CS202)
- **Univeristy of California, Riverside** — Riverside, CA
  Research and Teaching Assistant — *Sep 2011 - Aug 2012*
  - Research Assistant - Machine Vision and Learning: Supervised under Dr. Anastasios Mourikis. Researched motion estimation in real time on a mobile phone. Specialized in adaptive algorithm design, multi-core estimation, and rolling-shutter compensation.
  - Teaching Assistant: Introductory Computer Science for Engineering Majors (CS13), Spring 2012
- **Boston University** — Boston, MA
  Research Assistant — *Sep 2008 - Aug 2010*
  - Research Assistant - Computer Vision and Machine Learning: Supervised under Dr. Margrit Betke. Researched and developed content-based retrieval from YouTube images which is able to detect multiple human body parts. Designed multi camera-based HCI system which supports multiple users, unencumbered user activity in physical space, unconstrained user space, easy of use, and simple installation.

Research Funding

- National Research Foundation of Korea (NRF), **Sejong Science Fellowship**, Development of the Closed-Loop Affective Feedback System for Trust-driven Robotic Arm Control, single PI, 575 million Korean Won (approx. $513,400), 2021/03/01 - 2026/02/28.

Patent

- Method for estimating human emotions using deep psychological affect network and system therefor, U.S(10,853,632), KOR(10-2221264).
- Method for estimating emotion based on psychological activity and biosignal of user and system therefor, KOR(10-2142183)
- Method for understanding emotion dynamics in daily life and system therefor, KOR(10-2020-0053203)

Publication

- Yoon-Je Suh*, Byung Hyung Kim*†, "Riemannian Embedding Banks for Common Spatial Patterns with EEG-based SPD Neural Networks," *35th AAAI Conference on Artificial Intelligence (AAAI)*, Feb, 2021.
  Acceptance Rate=**21.4%**, **Top-tier** in Computer Science. *Co-first Author. †Corresponding Author.
- Byung Hyung Kim, Yoon-Je Suh, Honggu Lee, Sungho Jo, "Nonlinear Ranking Loss on Riemannian Potato Embedding," *25th International Conference on Pattern Recognition (ICPR)*, pp.4348-4355, Jan, 2021.
- Byung Hyung Kim, Seunghun Koh, Sejoon Huh, Sungho Jo, Sunghee Choi, "Improved Explanatory Efficacy on Human Affect and Workload through Interactive Process in Artificial Intelligence," *IEEE Access*, vol.8, pp.189013-189024, 2020.
- Byung Hyung Kim, Sungho Jo, Sunghee Choi, "A-Situ: a computational framework for affective labeling from psychological behaviors in real-life situations," *Scientific Reports*, vol.10, 15916, Sep, 2020.
- Jin Woo Choi*, Byung Hyung Kim*, Sejoon Huh, Sungho Jo,"Observing Actions through Immersive Virtual Reality Enhances Motor Imagery Training," *IEEE Transactions on Neural Systems and Rehabilitation Engineering*, vol.28, no.7, pp.1614-1622, 2020.
  IF:3.340, JCR Rank:7/68=**9.56%** in Rehabilitation. *Co-first Author.
- Byung Hyung Kim, Sungho Jo, "Deep Physiological Affect Network for the Recognition of Human Emotions," *IEEE Transactions on Affective Computing*, vol.11, no.2, pp.230-243, 2020.
  IF:**7.512**, JCR Rank:11/136=**7.72%** in Computer Science, Artificial Intelligence.
- Seunghun Koh, Hee Ju Wi, Byung Hyung Kim, Sungho Jo, "Personalizing the Prediction: Interactive and Interpretable Machine Learning," *16th IEEE International Conference on Ubiquitous Robots (UR)*, pp.354-359, Jun, 2019.
- Byung Hyung Kim, Sungho Jo, "An Empirical Study on Effect of Physiological Asymmetry for Affective Stimuli in Daily Life," *5th IEEE International Winter Workshop on Brain-Computer Interface*, Jan, 2017.
- Byung Hyung Kim, Jinsung Chun, Sungho Jo, "Dynamic Motion Artifact Removal using Inertial Sensors for Mobile BCI," *7th IEEE International EMBS Conference on Neural Engineering*, pp.37-40, Apr, 2015.
- Byung Hyung Kim, Sungho Jo, "Real-time Motion Artifact Detection and Removal for Ambulatory BCI," *3rd IEEE International Winter Workshop on Brain-Computer Interface*, Jan, 2015.
- Minho Kim, Byung Hyung Kim, Sungho Jo,"Quantitative Evaluation of a Low-cost Noninvasive Hybrid Interface based on EEG and Eye Movement," *IEEE Transactions on Neural Systems and Rehabilitation Engineering*, vol.23, no.2, pp.159-168, 2015.
  IF:3.972, JCR Rank:3/65=**4.61%** in Rehabilitation.
- Byung Hyung Kim, Minho Kim, Sungho Jo, "Quadcopter flight control using a low-cost hybrid interface with EEG-based classification and eye tracking," *Computers in Biology and Medicine*, vol.51, pp.82-92, 2014. **Honorable Mention Paper(Top 10%)**.
- Mingyang Li, Byung Hyung Kim, Anastasios Mourikis, "Real-time Motion Tracking on a Cellphone using Inertial Sensing and a Rolling-Shutter Camera," *IEEE International Conference on Robotics and Automation (ICRA)*, pp.4712-4719, May, 2013.
- Byung Hyung Kim, Hak Chul Shin, Phill Kyu Rhee, "Hierarchical Spatiotemporal Modeling for Dynamic Video Trajectory Analysis," *Optical Engineering*, vol.50, no.107206, Oct, 2011.
- Byung Hyung Kim, Danna Gurari, Hough O'Donnell, Margrit Betke, "Interactive Art System for Multiple Users Based on Tracking Hand Movements," *IADIS International Conference Interfaces and Human Computer Interaction (IHCI)*, Jul, 2011.

Invited Talks

- **Affective Intelligence and Its Potential in Dailylife** — The Fourth Industrial Revolution and AI Korea
  (www.irobotnews.com/news/articleView.html?idxno=16424) — *AI Industry Association, Feb. 2019*

Reference

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Dr. Uichin Lee, Associate Professor
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