Kun ho [John] Kim

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EDUCATION & BACKGROUND

California Institute of Technology | B.S. Computer Science - GPA: 4.22/4.3 (Highest in class of 2018)
Sep 2012 – Present | Pasadena, CA

Signal Intelligence Lab | Republic of Korea Army
Sep 2014 – May 2016 | Camp Humphreys, South Korea

PUBLICATION PREPRINTS

[1]. **Context Embedding Networks**
Kun ho Kim , Oisin Mac Aodha, Pietro Perona, under review at CVPR 2018, arXiv:1710.01691 [cs.LG]

[2]. **All-Optical Intraocular Sensor Implant for On-demand Assessment of High-resolution Ocular Hemodynamics**
Jeong Oen Lee, **Kun ho Kim** , Ashwin Balakrishna, Juan Du, David Sretavan, Hyuck Choo, in preparation for submission to Nature Biomed. Eng.

JOURNAL PUBLICATIONS

[3]. **Real-Time In Vivo Intraocular Pressure Monitoring using an Optomechanical Implant and Artificial Neural Networks**
Kun ho Kim , Jeong Oen Lee, Juan Du, David Sretavan, Hyuck Choo, IEEE Sensors Journal, vol. 17, no. 22, 2017 (Best Paper Nominee)

[4]. **Sound Analysis of a Cup Drum**
Kun ho Kim , Eur. J. Phy., vol. 33, no. 6, 2012

HIGHLY REFEREED CONFERENCE PUBLICATIONS

[5]. **Quantifying Performance of Bipedal Standing with Multi-channel EMG**
Yanan Sui, **Kun ho Kim** , Joel W. Burdick, IROS 2017, arXiv:1711.07894 [stat.ML]

REFEREED WORKSHOP AND SYMPOSIUM PUBLICATIONS

[6]. **Context Embedding Networks**
Kun ho Kim , Oisin Mac Aodha, Pietro Perona, SoCal Mach. Learn. Symp. 2017, arXiv:1710.01691 [cs.LG]

[7]. **A Minimalist Robot for In Situ Exploration of Small Bodies**
Issa Nesnas, Julie Castillo-Rogez, Marco Pavone, Robert Reid, Christine Fuller, **Kun ho Kim** , Paul Hebert, Rudranarayan Mukherjee, Ross Allen, Adam Koenig, JPL RP Conference, 2013

SELECTED RESEARCH EXPERIENCE

Brunskill Lab | Undergraduate Researcher
Sep 2017 - Present | Stanford, CA
Collaborators: Ramtin Keramati, Emma Brunskill
Exploring object oriented reinforcement learning (e.g. DOORMAX) approaches to improve sample complexity and generalization capacity of policies learned in the ATARI environment.

Stanford Artificial Intelligence Lab (SAIL) | Summer Undergraduate Research Fellow
Jun 2017 - Sep 2017 | Stanford, CA
Collaborators: Emma Brunskill, Shameek Ganguly, Oussama Khatib
Proposed an algorithm for coordinated multi-agent policy search which exploits a novel quantity named the cross advantage that enables each agent to learn distinguishable strategies to accomplishing tasks.

Caltech Vision Lab | Undergraduate Researcher
Sep 2016 - Present | Pasadena, CA
Collaborators: Oisin Mac Aodha, Pietro Perona
● Proposed Context Embedding Networks (CEN) for crowd clustering: learning low-dimensional disentangled embeddings of images in an unlabeled dataset by having non-expert crowd annotators cluster a collection of images.
● Designed a web interface for interactive machine teaching which was used to collect more than 100k Human Intelligent Tasks (HITs) on Amazon Mechanical Turk.

Burdick Research Group | Undergraduate Researcher
Sep 2016 - Present | Pasadena, CA
Collaborators: Yanan Sui, Joel Burdick
● Developed an end-to-end system to quantify the bipedal standing performance of patients with motor complete spinal cord injury (SCI) using 12-channel EMG signals and classifiers built on a Support Vector Machine (SVM) framework.
● Developed an electromagnetic simulation of the electrode array used to induce epidural spinal stimulation for SCI patients. Simulator used in the inner loop of a correlational dueling bandit algorithm that searches for the optimum array configuration.

Signal Intelligence Lab, Republic of Korea Army | Software Engineer
Sep 2014 - May 2016 | Camp Humphreys, South Korea
Led several cryptography and cyber security projects. Developed machine learning algorithms for communication activity detection. Due to confidentiality reasons, specifics of project are omitted.

Choo Lab | Summer Undergraduate Research Fellow
Jun 2016 - Dec 2016 | Pasadena, CA
Collaborators: Jeong Oen Lee, Juan Du, David Sretavan, and Hyuck Choo
● Developed an end-to-end system to train a fast and robust neural network based signal demodulation algorithm for high-temporal real-time intraocular pressure (IOP) readout from optomechanical sensors which are used to monitor Glaucoma progression.
● Showed that our IOP sensor is the first implant capable of providing on-demand assessment of ocular hemodynamics.

NASA Jet Propulsion Lab | Research Assistant
Jul 2013 - May 2014 | Pasadena, CA
Collaborators: Robert Reid, Issa Nesnas
Formulated a Lagrangian dynamics model to profile free-space tumbling motion and derived the multi-contact manifold to model slip-grip phase transitions, both of which comprised a dynamics simulator for the "Hedgehog" rover.

Korean National Youth Research Group | Lead Researcher
Apr 2011 - Oct 2012 | Gachon, Korea
Collaborators: Chan Woong Park
Formulated the physics model of cup drum -a topless inverted cylindrical cavity with a flanged membrane, capable of producing pitches spanning two octaves as it is placed closer to reflective medium, such as water.

SELECTED COURSE PROJECTS

CDS270. Dynamics and Control of Walking Robots | Class Project
Apr 2017 - Jun 2017 | Pasadena, CA
Collaborators: Richard Cheng, Karena Cai, Fangzhou Xiao
Investigated optimizing cost-of-transport for a robot with a spring-foot design. Optimized walking gaits in simulation and ran experiments on the AMBER-3M bipedal walking robot.

CS159. Advanced Topics in Machine Learning | Class Project
Apr 2017 - Jun 2017 | Pasadena, CA
Collaborators: Tae Hwan Kim
Proposed an inverse reinforcement learning (IRL) algorithm that exploits prior knowledge of high-value states by adding a convex constraint to the Maximum Entropy IRL objective which can be optimized efficiently by performing dual gradient descent.

CS155. Machine Learning and Data Mining | Class Projects
Jan 2017 - Mar 2017 | Pasadena, CA
Collaborators: Eli Sorey
● Developed ensemble models that combine gradient boosting, Adaboost, neural networks, and SVMs for an in-class Kaggle challenge (voting outcome prediction). Achieved 78.5% prediction accuracy and placed 9th out of 70 teams.
● Trained a Hidden Markov Model (HMM) and a Long Short Term Memory (LSTM) network to generate Shakesphere's sonnets.

CS187. Neural Computation | Class Project
Sep 2016 - Dec 2016 | Pasadena, CA
Assessed the generalization capacity of CNNs from a theoretical standpoint. Investigated the influence of various hyper parameters (e.g. learning rate, depth) on the generalization performance CNNs.

SELECTED AWARDS & SCHOLARSHIPS

Henry Ford II Scholar Award | - Caltech
Scholarship ($5000) awarded to an engineering student with the best academic record.

Summer Undergraduate Research Fellowship x 3 (2013, 2016, 2017) | - Caltech
Selective fellowship ($6000) for summer research.

1st Place | - 707 Brigade Hackathon
Largest Hackathon in the Republic of Korea army with 1000+ participants.

1st Place, Best Research Project | - International Young Physicists' Tournament (IYPT)
Largest world-level high school physics research competition with 30+ participant countries

1st Place | - Korean Young Physicists' Tournament (KYPT)
Largest national high school physics research competition

1st Place | - European Schools Debate Championship
Second largest world-level high school debate competition

ACADEMIC SERVICE

International Conference on Intelligent Robots and Systems (IROS), 2017 | Reviewer

TEACHING

CS 21. Decidability and Tractability | Teaching Assistant - Grading problem sets, holding weekly office hours

Dean's Office | Tutor - Quantum Physics, Linear Algebra, Probability and Statistics

PROGRAMMING SKILLS

Over 5000 lines: Python (Tensorflow, Theano, Pytorch, Torch) • C++ • C • Matlab • Mathematica • LaTeX

Over 1000 lines: HTML • Javascript • CSS • Scheme • Assembly

Familiar: Java • MySQL

OUTREACH

North Korean Defector School | Taught Algebra I/II, Chemistry, Biology, Physics to children that defected from North Korea

Migrant Worker's Initiative | Organized 4+ fund raisers and prepared impoverished migrant workers for GED exam

Free North Korea Radio | Translated articles on North Korean oppression for world-wide english audiences