

# Jin Seok (Andy) Lee

Cancer immunogenomics • Long-read sequencing • Neoantigens • Mutational signatures

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GitHub: <https://github.com/andyjslee> Docker Hub: <https://hub.docker.com/u/ajslee>

## EDUCATION

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- 2021 – Present **University of North Carolina at Chapel Hill**, Chapel Hill, NC, United States  
PhD in Bioinformatics and Computational Biology  
Co-advised by Drs. Alex Rubinsteyn and Benjamin Vincent
- 2015 – 2017 **University of Michigan**, Ann Arbor, MI, United States  
Master of Health Informatics  
Co-advised by Drs. Predrag Klasnja, Ambuj Tewari, and Susan Murphy
- 2010 – 2014 **University of Michigan**, Ann Arbor, MI, United States  
Bachelor of Science in Engineering in Computer Science (minor in Economics)

## PUBLICATIONS

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Peer-reviewed journal articles; first and co-first authored (\*)

- 2023 **Lee JS\***, Karthikeyan D\*, Fini M, Vincent BG, Rubinsteyn A: ACE configurator for ELISpot: optimizing combinatorial design of pooled ELISpot assays with an epitope similarity model. *Brief Bioinform* 2023, 25.
- 2019 Kim H\*, **Lee AJ\***, Lee J, Chun H, Ju YS, Hong D: FIREVAT: finding reliable variants without artifacts in human cancer samples using etiologically relevant mutational signatures. *Genome Med* 2019, 11:81.
- 2018 Lee J\*, **Lee AJ\***, Lee JK\*, Park J, Kwon Y, Park S, Chun H, Ju YS, Hong D: Mutalisk: a web-based somatic MUTation AnaLySis toolKit for genomic, transcriptional and epigenomic signatures. *Nucleic Acids Res* 2018, 46:W102-W108.

Preprint; co-first authored (\*)

- 2022 Chae J\*, **Lee JS\***, Jung Y, Hong D: Deciphering the Evolutionary History of Complex Rearrangements in Head and Neck Cancer Patients Using Multi-Omic Approach. *bioRxiv*.

## ABSTRACTS

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- 2019 Hong D, Lee J, Park J, Chae JS, **Lee AJ**, Kim H, Eho S, Lee R, Kim Y, Hwangbo Y, Choi G, Kong S, Park JB, Park S, Lee ES. An introduction of ARCHON (Advanced poRtal of Clinical History and multi-Omics iNformation) database [abstract]. In: AACR-KCA Joint Workshop on Precision Medicine in conjunction with the 23<sup>rd</sup> KCA Fall Symposium; 2019 Nov 14-15; Seoul, Korea. **AACR-KCA**; 2019. Abstract SP6-1.
- 2018 **Lee AJ**, Fu S, Vydiswaran VGV. Supervised Learning Approach to Link Prediction in FDA Adverse Event Reporting System (FAERS) Database Network [abstract]. In: AMIA 2018 Annual Symposium; 2018 Nov 3-7; San Francisco, California (CA). **AMIA**; 2018. Podium Abstract S55.

## SCIENTIFIC PRESENTATIONS

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- 06/2024 **AIRR (Adaptive Immune Receptor Repertoire) Community Meeting VII**, Porto, Portugal. "ACE Configurator for ELISpot."
- 09/2023 **UNC Chapel Hill Annual Genetics Retreat**. Asheville, NC, United States. "AI at the Benchside: Supercharging Experimental Design with Deep Learning."

## BOOK CHAPTER

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- 2017 Smith SN, **Lee AJ**, Hall K, Seewald NJ, Boruvka A, Murphy SA, Klasnja P. (2017). Design Lessons from a Micro-Randomized Pilot Study in Mobile Health. In *Mobile Health - Sensors, Analytic Methods, and Applications*, Rehg JM, Murphy SA, Kumar S, eds. (Springer), pp. 59-82.

## RESEARCH EXPERIENCE

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- 05/2022 – Present **Graduate Research Assistant at Personalized Immunotherapy Research Lab (PIRL)**  
University of North Carolina at Chapel Hill, Chapel Hill, NC, United States  
Supervised by Drs. Alex Rubinsteyn, Benjamin Vincent
- Computational method development using long-read DNA and RNA sequencing data for cancer immunotherapy.
  - Computational method development for designing and analyzing *in vitro* assays for immunotherapy development.
- 03/2021 – 06/2021 **Researcher at Catholic University of Korea, College of Medicine**  
*Department of Medical Informatics*, Seoul, South Korea  
Supervised by Dr. Dongwan Hong
- Identified clinically significant associations across somatic structural variations, 3D genome organization, and transcriptional alterations in head and neck tumors obtained from patients using long-read DNA (PacBio HiFi CCS) sequencing, *in situ* Hi-C, and RNA sequencing data.
- 06/2017 – 06/2020 **Researcher at National Cancer Center Korea**  
*Bioinformatics Analysis Team*, Goyang, South Korea  
(Substitution for national service as a technical research personnel)  
Supervised by Drs. Dongwan Hong, Yuhseog Jung
- Developed novel computational methodologies for analysis of mutational signatures on tumors samples.
  - Investigated prognostic significance of somatic mutations in whole genomes and transcriptomes of clinically annotated prostate and head and neck tumors.
- 05/2016 – 09/2016 **Research Intern at Microsoft Research**  
*Medical Devices Group*, Redmond, WA, United States  
Supervised by Drs. Dan Morris, Miah Wander, Sumit Basu
- Designed and conducted a pilot study to investigate the feasibility of monitoring physiological signals from the medical device under research and development for cardiovascular disease.
- 09/2015 – 04/2017 **Graduate Student Research Assistant at University of Michigan**  
*School of Information*, Ann Arbor, MI, United States  
Supervised by Drs. Predrag Klasnja, Ambuj Tewari, Susan Murphy
- Led the software development (cloud backend, Android, and iOS apps) of an online reinforcement learning system (HeartSteps) for post-cardiac patients entering phase III rehabilitation to maintain physical activity levels.
  - Led a group of graduate and undergraduate students to develop a research platform for the National Institute on Drug Abuse (NIDA) challenge (Addiction Research: There's an App for that).
- 05/2014 – 07/2015 **Research Assistant at University of Michigan**  
*School of Information*, Ann Arbor, MI, United States  
Supervised by Dr. Predrag Klasnja
- Developed the prototype version of HeartSteps as an Android application with a cloud backend.
  - Conducted a pilot study with 40+ human participants for HeartSteps.

## TRAINING & CERTIFICATION

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- 07/2019 **NVIDIA Deep Learning Institute**, Seoul, South Korea
- Certificate of competency in *Fundamental of Deep Learning for Natural Language Processing*
- 07/2017 **Asian Institute in Statistical Genetics and Genomics**, Seoul, South Korea
- Certification of course completion in *Cancer Genomics*
  - Certification of course completion in *Statistical Genomics – Methods and Analyses for Omics Data*
  - Certification of course completion in *Biostatistics using R*
- 12/2009 **British Council and United World College of South East Asia**, Singapore
- Certification of course completion in *Teaching English to Speakers of Other Languages (TESOL)*

## AWARD/PRIZE

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- 08/2016 2nd place in the 2016 National Institute on Drug Abuse (NIDA) “Addiction Research: There’s an App for that” challenge. Assembled the SARA (Substance Abuse Research Assistant) team and served as the team leader.

## WORK EXPERIENCE

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- 12/2016 – **Software Developer at University of Southern California**  
12/2016 *Keck School of Medicine*, remote from Ann Arbor, MI, United States  
Supervised by Dr. Jimi Huh
- Developed and delivered an Android mobile application and a cloud application for a pilot research study investigating pediatric sun protective behaviors.
- 08/2015 – **Software Developer at University of Michigan Health System**  
08/2015 *Internal Medicine*, Ann Arbor, MI, United States  
Supervised by Dr. Jennifer Meddings
- Developed and delivered cloud backed Android and iOS mobile application prototypes for a research study investigating the misuse of catheters in clinical settings.
- Summer 2012 **Summer Contractor at Samsung Engineering**  
Summer 2011 *Human Resources Department*, Seoul, South Korea
- Due diligence related to updating the human resource management database containing 5,000+ employees’ credentials and performance reviews.
  - Assisted with reviewing English-speaking foreign national candidates’ CVs.

## ENTREPRENEURIAL EXPERIENCE

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- 09/2015 – **Co-founder and Lead Developer at StepFor, LLC**  
04/2017 Ann Arbor, MI, United States
- Developed the cloud backend and the Android/iOS mobile applications for a crowdfunding corporate donation marketing platform that empowers users to help charities with their steps.
  - Raised grant funds from startup competitions: 2016 optiMize Social Innovation Challenge (\$5,000 as a finalist) and 2016 Michigan Business Challenge Social Impact Track (\$7,500 as 2<sup>nd</sup> place winner).
  - Organized a fundraising campaign for the American Cancer Society with the Relay For Life of University of Michigan.

- 09/2014 – **Team Leader at SEED System (Undergraduate Senior Capstone Project)**  
01/2015 Ann Arbor, MI, United States  
Supervised by Dr. David Chesney
- Designed and developed a proof-of-concept early detection system for postoperative patients in high risk of developing sepsis. The system incorporated machine learning, IBM's Watson, mobile as well as wearable devices.
  - Selected among other teams in EECS 481 at the University of Michigan to represent the university at the 2015 IBM Watson University Competition, where I delivered a business pitch to a panel of judges including IBM executives and venture capitalists.
- 06/2012 – **Director of Technology at FriendsLearn, Inc.**  
08/2013 San Jose, CA, United States; Chennai, India; Ann Arbor, MI, United States  
Supervised by Bhargav Sri Prakash
- Directed a team of five developers to create and launch Fooya on iOS, an educational mobile game about nutrition and healthy eating habits for kids.
  - Organized and executed a successful Kickstarter campaign that raised over \$50,000.
  - Represented the startup at various conferences in Silicon Valley, including DEMO 2012, Goldman Sachs Global Education Conference at Stanford University Graduate School of Business.

## EXTRACURRICULAR ACTIVITIES

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- 09/2011 – **Vice President at Davis United World College Scholars Society**  
04/2013 *University of Michigan, Ann Arbor, MI, United States*
- Served as one of the student representatives of the University of Michigan chapter which consisted of students from diverse cultures and backgrounds.
  - Helped organize and host social events for the incoming freshmen and the chapter members.
- 01/2011 – **Student Engineer at Michigan Hybrid Racing**  
05/2012 *University of Michigan, Ann Arbor, MI, United States*
- Contributed to the development of the team's 2012 hybrid race car Hyperion.
  - Delivered the team's business presentation at the 2012 SAE Formula Hybrid International Competition to senior engineers from the automotive industry.

## RELEVANT SKILLS

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### Programming Languages

Python, Jupyter/IPython, Rust, R, MATLAB, UNIX/Bash, Java, C, C++, C#, SQL (SQLite, MySQL, PostgreSQL), JavaScript, PHP, CSS/HTML, Swift, XML.

### Computer Science / Data Science / Software Engineering

Object-oriented programming, algorithm development, operating systems (parallelization and threading), database management, machine learning (scikit-learn), natural language processing (NLTK), high-performance computing system, containerization (Docker), version control (Git), python / rust / R package development, desktop application development (Electron), mobile application development (Android and iOS), web development (Django), cloud application development (AWS and Google Cloud), Arduino.

### Bioinformatics

Nextflow (DSL 2), IGV inspection, alignment, *de novo* assembly, variant filtering / calling / annotation, neoantigen prediction, mutational signature analysis, data visualization (ggplot2).