Beechui (Katy) Koo, BS

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EDUCATION

University of Chicago, Chicago, IL 09/2024 – 12/2025
M.S. in Applied Data Science (GPA: 3.98/4.00)

- Relevant Courses: Data Engineering, Statistical Models for Data Science, Machine Learning I/II, Bayesian Machine Learning with GenAI Applications, Time Series Analysis and Forecasting, Leadership and Consulting, Computer Vision, GenAI Principles & Applications, Capstone I/II

Boston College, Brighton, MA 08/2017 – 05/2021
B.S. in Computer Science, Minor in Biology

- Relevant Courses: General Chemistry I/II, Organic Chemistry I/II, Cell Biology, Genomics, Computer Science I/II, Algorithms, Object-Oriented Design, Computer Systems, Intro to Physics I (Calc) w/ Lab, Multivariable Calculus, AP Physics B1/B2/C Equivalent

University of California San Diego, Online 06/2025 – 08/2025
Accredited Physics Extended Courses

- Relevant Courses: Mechanics and Thermodynamics, Electricity and Magnetism, Modern Physics

RESEARCH PROJECTS

Research Associate (Advisor: Dr. James J. Sohn) 03/2025 – Current

- Performed quantitative evaluation and benchmarking of commercial CT metal artifact reduction (MAR) algorithms in a radiation oncology context
- Developed TOPAS Monte Carlo simulations incorporating advanced nanomaterials to optimize shielding designs for next-generation radiation therapy vaults
- Simulated the dosimetric impact of tattoos on skin during radiation therapy using TOPAS-based Monte Carlo methods
- Designed and implemented an automated pipeline for generating variable-thickness 3D printed molds tailored for conformal surface brachytherapy, improving patient-specific fit and dose conformity.

Capstone Partner AI / Software Engineer (Advisor: Prof. Nick Kadochnikov) 02/2025 – Current

- Designed and implemented an AI-driven diagnostic assistant that analyzes user-uploaded skin or dental photos to identify potential diseases.
- Integrated CNN-based computer vision models with Gemini 2.5 LLM to provide explainable condition summaries and recommend next steps using verified medical sources.
- Developed a cross-platform mobile application using React Native (Expo Go), with backend integration into Firestore database, Google BigQuery, and Vertex AI for scalable data storage and inference.

United Airlines GenAI Hackathon Project 02/2025 – 03/2025

- Led the development of an agent-to-agent GenAI solution for real-time airline fault reporting, awarded 2nd place in UA GenAI hackathon, seamlessly operable across iOS, Android, and web applications.
- Architected a modular multi-agent system using LangChain and Gemini to handle multimodal inputs and automate issue triage, significantly improving response time and accuracy.
- Integrated specialized AI agents (Image, Form, Submission, Supervisor) to classify images, auto-fill structured forms, and execute Retrieval-Augmented Generation (RAG)-driven fault resolution pipelines.

Machine Learning Project (Advisor: Prof. Utku Pamuksuz) 11/2024 – 05/2025

- Built a machine-learning pipeline to predict BMI from images by benchmarking CNN-based models, and deploy the best model in a live smartphone app. (04/2025 – 05/2025)
- Developed an end-to-end deep-learning pipeline that estimates left-ventricular ejection fraction from echocardiogram videos on public echo datasets. (02/2025 – 03/2025)
- Built a stock price prediction model by performing sentiment classification on financial news headlines using a BERT-based NLP pipeline, and integrated results into an LSTM model to forecast stock price movements. (11/2024 – 01/2025)

PROFESSIONAL EXPERIENCE

Sohn Lab, Dept. of Radiation and Cellular Oncology, University of Chicago, Chicago, IL 03/2025 – Current
Research Associate / Project Lead

- Led independent research projects on “Quantitative Comparison of CT Metal Artifact Reduction (MAR) Algorithms in

Radiation Oncology" and "TOPAS Monte Carlo Simulations with Cutting-Edge Nanomaterial Applications to Optimize Shielding Designs for Modern Radiation Therapy Facilities," etc.
- Directly managed a team of interns and junior researchers through weekly meetings, milestone planning, and technical lectures on applied medical physics and computational modeling.
- Established project roadmaps and analysis pipelines, including custom evaluation metrics (e.g., HU error maps, M-Error Index) and artifact quantification methods.
- Served as the primary liaison between the research team and faculty advisor, ensuring scientific alignment, resource coordination, and progress reporting.

Oncosoft Inc., Chicago, IL 06/2025 – Current
Data Scientist / AI Engineer
- Designed and integrated an AI-powered clinical chatbot leveraging Retrieval-Augmented Generation (RAG) and specialized agents to provide real-time, context-aware responses by querying graph databases, LLMs (GPT-4), and external medical knowledge sources, contributing to a 200% increase in annual revenue by streamlining patient information access.
- Developed a full-stack clinical software platform using React.js and Django, enabling clinicians to view dashboards, analyze patient charts, create custom forms, and manage records efficiently for radiation therapy.
- Represented the platform at professional conferences, demonstrating features and engaging with potential users and stakeholders.

Xsphera Biosciences Inc., Boston, MA 09/2021 – 07/2024
Software Engineer
- Developed an end-to-end multi-omics data pipeline for immuno-oncology analysis, integrating Python ML frameworks with MySQL and AWS S3 to automate ingestion, preprocessing, and quality-controlled analysis.
- Led the development of a cloud-based single-cell flow cytometry analysis platform built with Django and React.js, integrating ML classifiers for immune cell population profiling and deploying scalable data processing pipelines using AWS EC2.
- Replaced manual Excel-based plotting by building interactive dashboards with Plotly Dash, custom JavaScript callbacks, and Django back-end, reducing result-check steps and centralizing insights, directly reducing validation time by 10x.

Hur Lab, Harvard Medical School, Boston Children's Hospital, Boston, MA 05/2019 – 05/2020
Research Assistant
- Contributed to research investigating innate immune responses to viral infection, with a focus on the RIG-I/MAVS signaling pathway and downstream cellular mechanisms.
- Assisted in experimental design, execution, and data interpretation for molecular and cell biology studies aimed at elucidating antiviral defense mechanisms.
- Performed core laboratory techniques including molecular cloning, mammalian cell culture and transfection, SDS-PAGE, western blotting, cDNA synthesis, and fluorescence microscopy.

PUBLICATIONS

1. **Beechui Koo**, Hyunuk Jung, Mitchell Polizzi, Indra J. Das, Siyong Kim, James J. Sohn. "*Quantitative Comparison of CT Metal Artifact Reduction (MAR) Algorithms in Radiation Oncology*" Biomedical Physics & Engineering Express. (Minor Revision Submitted)
2. Max Paget, Cristhian Cadena, Sadeem Ahmad, Hai-Tao Wang, Tristan X Jordan, Ehyun Kim, **Beechui Koo**, Shawn M Lyons, Pavel Ivanov, Xin Mu, Sun Hur. "*Stress granules are shock absorbers that prevent excessive innate immune responses to dsRNA"* Mol Cell. 2023;83(7):1180-1196.e8.
3. **Beechui Koo**, Richard Xu, Morgan Glennie, Jungwook Park, James J. Sohn. "*TOPAS Monte Carlo Simulations with Cutting-Edge Nanomaterial Applications to Optimize Shielding Designs for Modern Radiation Therapy Facilities*" Med. Phys. (In Preparation; Manuscript in Revision)
4. Hongjun Park, **Beechui Koo**, Jungwook Park, Siyong Kim, James J. Sohn. "*Does Tattoo Ink Alter Radiation Dose in Human Skin?*" Med. Phys. (In Preparation; Manuscript in Revision)
5. **Beechui Koo**, James J. Sohn, Jason W. Sohn. "*Automated Design of Variable Thickness 3D Printed Molds for Conformal Surface Brachytherapy*" Med. Phys. (In Preparation)

CONFERENCE ABSTRACTS

UChicagoGRAD 7th Annual Transcending Boundaries Research Symposium, Chicago, IL, USA (2025). (Oral)
US-Korea Conference, Atlanta, GA, USA (2025). (Poster)
RSNA Radiological Society of North America (RSNA), Chicago, IL, USA (2025). (Poster)

CERTIFICATION

MIT Data Science & Machine Learning 12-week Certificate (MIT-Schwarzman College of Computing) 05/2025
General Assembly Software Engineering 14-week Immersive Course Certificate 08/2020

HONORS AND SCHOLARSHIPS

Korean Honor Scholarship 2025 (Embassy of Republic of Korea in the USA) 08/2025
United Airlines GenAI Hackathon 2nd Place 06/2025
The University of Chicago Data Science Institute Merit Scholarship 08/2024

AFFILIATIONS

Member, *American Association of Physicists in Medicine (AAPM)*, 2025–Present
Member, *Radiological Society of North America (RSNA)*, 2025–Present
Member, *Korean-American Scientists and Engineers Association (KSEA)*, 2025–Present
Member, *University of Chicago Korean Graduate Student Association (KGSA)*, 2024–Present
Co-President, Quiet Waters Boston College, 2018–2021

SKILLS

Programming: Python, R, Django, React.js, Ruby on Rails, SQL (MySQL, PostgreSQL), NoSQL (MongoDB/Mongoose)
AI & Machine Learning: Generative AI (LLMs, RAG, LangChain), PyTorch, TensorFlow, Keras, Scikit-learn, Computer Vision, QLoRA
Cloud & DevOps: AWS, GCP
Data Science & Analytics: Data Pipelines (cleaning, wrangling, visualization, modeling, interpretation), Statistical Analysis, Hypothesis Testing, Tableau, Pandas, OpenCV
Monte-Carlo simulation: TOPAS
CAD/Modeling Software/3D Printing: AutoCAD, Fusion 360, Rhino, Bambu Studio, Makerspace, 3D printing

REFERENCES

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