## BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors.
Follow this format for each person. **DO NOT EXCEED FIVE PAGES.**

NAME: Song, Ailin

eRA COMMONS USER NAME (credential, e.g., agency login):

POSITION TITLE: Heed Fellowship

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)*

| INSTITUTION AND LOCATION | DEGREE *(if applicable)* | Completion Date MM/YYYY | FIELD OF STUDY |
|---|---|---|---|
| Dartmouth College, NH | BA | 06/2017 | Biomedical Engineering, Statistics |
| Duke University, NC | MHSc | 05/2022 | Clinical Research |
| Duke University, NC | MD | 05/2023 | Medicine |
| Duke University, NC | Residency | Expected 07/2027 | Ophthalmology |

### A. Personal Statement

I am an ophthalmology resident and a clinician-scientist in training at Duke University. My training began at Dartmouth College, where I graduated magna cum laude with departmental honors in biomedical engineering, and continued at Duke University School of Medicine with support from a Clinical and Translational Science Awards (CTSA) TL1 Predoctoral Scholarship funding my concurrent Master of Health Sciences in Clinical Research degree. During medical school, I led a prospective study on the use of a robotic optical coherence tomography platform in an emergency department, demonstrating a 69% relative gain in emergency physicians' sensitivity to detect pathology when using the system compared with standard clinical care. I subsequently trained a convolutional neural network on images acquired from this platform, which matched the performance of retina specialists in classifying pathology among emergency department patients. I also led an analysis showing that primary care professionals rarely perform fundoscopy for patients with diabetes and rarely detect retinopathy when they do. In a similar vein, I evaluated a federally qualified health center teleretinal screening program, highlighting that only 49% of recommended dilated eye exams were completed within one year. During residency, I deepened my work in ophthalmic health services research and epidemiology using nationwide Medicare claims and electronic health record data sources such as Epic Cosmos and All of Us. For example, using Epic Cosmos data, I showed that cataract surgery is associated with a nearly doubled risk of subsequent ischemic optic neuropathy even after accounting for confounding based on individual time-invariant factors and presented this work in a podium presentation at the 2026 American Society of Cataract and Refractive Surgeons (ASCRS) annual meeting. Throughout my career, my work has been recognized with numerous awards including the Dean's Merit Scholarship at Duke, Research to Prevent Blindness Medical Student Fellowship, Research to Prevent Blindness Small Pilot Research Award, the ARVO Foundation for Eye Research Sek-Jin Chew and Retina Research Foundation/Lawrence travel grants, the Duke Department of Ophthalmology Best Research Presentation Award, the ASCRS Foundation Resident Excellence Award, and the Machemer Resident Research Award.

Ongoing projects I would like to highlight include:

Risk of Ischemic Optic Neuropathy after Routine Cataract Surgery: A Nationwide Study
Song (PI)

Safety of Topical Anesthetics for Corneal Abrasion: A Nationwide Target Trial Emulation Pharmacovigilance Study
Song (PI)

R21EY036605-01
Borkar and Hammill (Co-PIs); Role: Collaborator
The Path to Improving Diabetic Retinopathy Outcomes: Evaluating Neighborhood Characteristics and Healthcare Quality

Citations:


1. **Song A**, Lusk JB, Roh KM, et al. Practice patterns of fundoscopic examination for diabetic retinopathy screening in primary care. *JAMA Netw Open*. 2022;5(6):e2218753. PMID: 35759262.
2. **Song A**, Johnson NA, Mirzania D, Ayala AM, Muir KW, Thompson AC. Factors associated with ophthalmology referral and adherence in a teleretinal screening program: insights from a Federally Qualified Health Center. *Clin Ophthalmol*. 2022;16:3019-3031. PMID: 36119392.
3. **Song A**, Lusk J, Roh K-M, et al. RobOCTNet: robotics and deep learning for referable posterior segment pathology detection in an emergency department population. *Transl Vis Sci Technol.* 2024;13(3):12. PMID: 38488431
4. **Song A**, Yan J, Kim S, et al. Network-based analysis of genetic variants associated with hippocampal volume in Alzheimer's disease: a study of ADNI cohorts. *BioData Min*. 2016;9(1):1-8. PMID: 26788126.


## B. Positions, Scientific Appointments, and Honors

**Positions and Scientific Appointments**

| | |
|---|---|
| 2023—Present | Resident Physician, Department of Ophthalmology, Duke University, Durham, NC |
| 2023—Present | Editor, The Duke Journal of Case Reports in Ophthalmology |
| 2022—Present | *Ad Hoc* Reviewer: *Frontiers in Medicine*, Section Ophthalmology; *Clinical Ophthalmology* |
| 2021 | Medical Student Fellow, Research to Prevent Blindness |
| 2020—2022 | CTSA TL1 Predoctoral Fellow, MHSc Student, Duke University, Durham, NC |
| 2018—2023 | Medical Student, Duke University, Durham, NC |
| 2017—2018 | Research Assistant, Cohen Children's Medical Center, Queens, NY |

**Honors**

2026 American Society of Cataract and Refractive Surgery (ASCRS) Foundation Resident Excellence Award
2026 Machemer Resident Research Award, Duke University Department of Ophthalmology
2022 Retina Research Foundation/Joseph M. and Eula C. Lawrence Travel Grant, ARVO Foundation for Eye Research
2022 Research to Prevent Blindness Small Pilot Research Award, Duke University Department of Ophthalmology
2021 Research to Prevent Blindness Medical Student Eye Research Fellowship
2021 Best Research Presentation Award, Duke University Department of Ophthalmology
2021 Sek-Jin Chew Travel Grant, ARVO Foundation for Eye Research
2020—2022 CTSA TL1 Predoctoral Scholarship (Duke-NIH program to support completion of Master of Health Sciences in Clinical Research and mentored research)
2018—2023 Dean's Merit Scholarship, Duke University School of Medicine
2017 Magna cum laude, Presidential Scholar with Honors in Biomedical Engineering, Dartmouth College

## C. Contributions to Science

**1. Establishment of an evidence base to support public health interventions for highly prevalent eye conditions.** Provision of eye care has unique challenges relative to other medical disciplines. Ophthalmic evaluation requires specialized expertise and equipment, and there are many systematic barriers to receipt of timely and high-quality eye care. For example, nearly 40% of patients with diabetes in the United States do not receive recommended dilated eye exams. It was long thought that primary care providers could fill the gap in diabetic retinopathy screening especially in areas where eye care professionals were in short supply. However, little literature existed to support this idea. My colleagues and I were the first to demonstrate with real-world

evidence that primary care providers in the United States rarely used ophthalmoscopes to examine patients for diabetic retinopathy and were poorly sensitive when attempting to do so. Some of my other work evaluated outcomes of a primary care-based teleretinal imaging program, which highlighted high rates of loss to follow-up especially among patients who screened positive.

a. **Song A**, Lusk JB, Roh KM, et al. Practice patterns of fundoscopic examination for diabetic retinopathy screening in primary care. *JAMA Netw Open*. 2022;5(6):e2218753. PMID: 35759262.
b. **Song A**, Johnson NA, Mirzania D, Ayala AM, Muir KW, Thompson AC. Factors associated with ophthalmology referral and adherence in a teleretinal screening program: insights from a Federally Qualified Health Center. *Clin Ophthalmol*. 2022;16:3019-3031. PMID: 36119392.

**2. Development and assessment of automated systems to improve eye care.** Recent studies show that the supply of eye care workforce is in sizable shortage relative to demand in the United States. Access to quality eye care is even more limited in general health care settings, such as emergency rooms and primary care clinics. Unfortunately, patients frequently utilize these facilities for eye care, where improper or delayed care is commonplace. During medical school, I was supported by a Duke-NIH scholarship and foundational grants to develop automated technologies to expand capacity for quality eye care. Our research team developed a contactless, provider-free, robotic device that eliminated the need for a skilled operator to obtain images of the retina. I then led a study that piloted the use of this technology in an emergency department, which improved emergency physicians' diagnostic sensitivity for any abnormality by 69%. Finally, I developed a deep learning model to interpret images acquired with the robotic device, which achieved retina specialist-level diagnostic accuracy in an emergency department patient population. My roles in these studies were diverse, including technology development, study design, patient recruitment, and statistical analysis. These automated technologies could be broadly applied to improve the diagnosis and monitoring of a variety of eye conditions.

a. **Song A**, Roh KM, Lusk JB, et al. Robotic optical coherence tomography retinal imaging for emergency department patients: a pilot study for emergency physicians' diagnostic performance. *Ann Emerg Med*. 2023;81(4):501-508. PMID: 36669908.
b. **Song A**, Lusk J, Roh K-M, et al. RobOCTNet: robotics and deep learning for referable posterior segment pathology detection in an emergency department population. *Transl Vis Sci Technol.* 2024;13(3):12. PMID: 38488431
c. McNabb R, Ortiz P, Roh KM, **Song A**, et al. Contactless, autonomous robotic alignment of optical coherence tomography for in vivo evaluation of diseased retinas. *Res Sq* [Preprint]. January 9, 2023. PMID: 36711930.

**3. Health informatics approaches to understand risk factors for clinical outcomes.** The ubiquitous digitization of health information provides an opportunity to use modern computational techniques to solve clinically relevant problems. My early work during my undergraduate study on computational genomics for Alzheimer's disease equipped me with advanced statistical skills including machine learning techniques to explore large datasets. I have since applied my skillset to real-world data including national electronic health records and claims data to identify factors that impact clinical outcomes in a diversity of clinical disciplines. Findings from these studies have practice-changing implications, ranging from interrogating novel risk factors for central retinal artery occlusion to evaluating the safety of cataract surgery to validating patient-reported immunization status.

a. **Song A**, Yan J, Kim S, et al. Network-based analysis of genetic variants associated with hippocampal volume in Alzheimer's disease: a study of ADNI cohorts. *BioData Min*. 2016;9(1):1-8. PMID: 26788126.
b. **Song A**, Sherin M, Cleary S, Spino C, Bernstein HH. Maternal self-report of tetanus diphtheria pertussis vaccination during pregnancy correlates with patient-specific electronic medical records. *J Pediatr*. 2021;234:220-226. PMID: 33745997.
d. Lusk JB, **Song A**, Unnithan S, et al. Association between hospital-documented atrial fibrillation and central retinal artery occlusion. *Stroke*. 2023;54(4):983-991. PMID: 36729390.
e. Lusk JB, Nalwade V., Wilson LE, **Song A,** et al. Atrial Fibrillation and Retinal Stroke. *JAMA Network Open*. 2025;8(1) e2453918.
f. **Song A**, Lusk JB, Wisely CE. Safety of topical anesthetics for corneal abrasion: a nationwide target trial emulation pharmacovigilance study. Presented at: American Society of Cataract and Refractive Surgery Annual Meeting; Ocular Surface Disease II; April 27, 2025; Los Angeles, CA.

g. **Song A**, Wilson L, Mac Grory B, Daluvoy M, Lusk JB. Risk of ischemic optic neuropathy after routine cataract surgery: a nationwide study. Presented at: American Society of Cataract and Refractive Surgery Annual Meeting; Surgical Outcomes II; April 11, 2026; Washington, DC.

**Complete List of Published Work below (H-index: 10; 22 publications, 13 first or co-first author)**

**Google Scholar**: https://scholar.google.com/citations?user=YKfxkToAAAAJ&hl=en&oi=ao
**NCBI MyBibliography:** https://www.ncbi.nlm.nih.gov/myncbi/ailin%20(irene).song.1/bibliography/public/