

YUNCHAN HWANG

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📍 Cambridge, MA, USA

EDUCATION

Massachusetts Institute of Technology	Cambridge, MA
Ph.D. candidate, Electrical Engineering and Computer Science	2020 – Present
S.M., Electrical Engineering and Computer Science	2024
Advisor: Professor Jim Fujimoto	
Seoul National University	Seoul, South Korea
B.S., Electrical and Computer Engineering	2014 – 2020
Two-year military service	2015 – 2016

RESEARCH INTERESTS

Advancing non-invasive ocular imaging to prevent blindness and detect disease earlier. I develop high-speed optical coherence tomography angiography (OCTA) to quantify retinal and choroidal hemodynamics, and high-resolution OCT to capture structural changes in the retina. My clinical applications target the leading causes of vision loss across the lifespan: age-related macular degeneration in the elderly, diabetic retinopathy in working-age adults, and inherited retinal diseases in the young. I am particularly interested in identifying early biomarkers, in diabetes prior to clinical retinopathy and in the aging eye prior to AMD, with longer-term interest in the eye as a window into neurodegenerative disease.

PUBLICATIONS

[†]First or co-first author. Author name in **bold**.

Peer-Reviewed Journal Articles

1. **Hwang Y[†]**, Jamil MU, Woo KM, Kaiser S, Babiker F, Rosenfeld PJ, Waheed NK, Fujimoto JG, “Large Hypertransmission Defects Exhibit Choriocapillaris Blood Flow Speed Impairment in Non-Exudative Age-Related Macular Degeneration”, *Ophthalmology Science*, 6(3):101060 (2026)
2. Woo KM, Babiker F, Khalid MA, **Hwang Y**, Waheed NK, “Novel Heterozygous Variant in RP1L1 Gene With Retinitis Pigmentosa Phenotype: A Case Report”, *Ophthalmic Surgery, Lasers and Imaging Retina*, 57(1):60–65 (2026)
3. Won J, Yaghy A, Ploner SB, Kaiser S, Girgis JM, **Hwang Y**, Jamil MU, Maier A, Waheed NK, Fujimoto JG, “High-Resolution, Motion-Corrected, Volume-Fused OCT for Investigating Longitudinal Changes in Subretinal Drusenoid Deposits in Intermediate AMD”, *Translational Vision Science & Technology*, 14(6):15 (2025)
4. Takahashi H, **Hwang Y**, Won J, Jamil MU, Yaghy A, Liang MC, Bauman CR, Witkin AJ, Ohno-Matsui K, Duker JS, Fujimoto JG, Waheed NK, “Evaluating Blood Flow Speed in Retinal Microaneurysms Secondary to Diabetic Retinopathy Using Variable Interscan Time Analysis OCTA”, *Translational Vision Science & Technology*, 14(2):27 (2025)
5. Yaghy A, Birch DG, **Hwang Y**, Luo E, Jung JA, Curtiss D, Waheed NK, “Addressing Multiplicity in Retinal Sensitivity Analysis: An Alternative Approach to Assessing Gene Therapy Efficacy in Inherited Retinal Diseases”, *Translational Vision Science & Technology*, 14(3):25 (2025)
6. **Hwang Y[†]**, Takahashi H, Won J, Yaghy A, Marmalidou A, Kaiser SM, Jamil MU, Bauman CR, Waheed NK, Fujimoto JG, “Quantification of capillary blood flow speeds in diabetic retinopathy using variable interscan time analysis OCTA”, *RETINA*, 45(1):35–43 (2025)
7. Jamil MU, Won J, Ploner SB, Marmalidou A, Takahashi H, Kaiser S, **Hwang Y**, Abu-Qamar O, Yaghy A, Witkin AJ, Zhao PY, Desai S, Duker JS, Maier A, Fujimoto JG, Waheed NK, “High-Resolution OCT Reveals Age-Associated Variation in the Region Posterior to the External Limiting Membrane”, *Translational Vision Science & Technology*, 14(1):16 (2025)
8. Won J, Takahashi H, Ploner SB, Karbole W, Abu-Qamar O, Yaghy A, Marmalidou A, Kaiser S, **Hwang Y**, Lin J, Witkin A, Desai S, Bauman CR, Maier A, Curcio CA, Waheed NK, Fujimoto JG, “Topographic Measurement of the Subretinal Pigment Epithelium Space in Normal Aging and Age-Related Macular Degeneration Using High-Resolution OCT”, *Investigative Ophthalmology & Visual Science*, 65(10):18 (2024)
9. **Hwang Y[†]**, Won J, Yaghy A, Takahashi H, Girgis JM, Lam K, Chen S, Moulton EM, Ploner SB, Maier A, Waheed NK, Fujimoto JG, “Retinal blood flow speed quantification at the capillary level using temporal autocorrelation fitting OCTA [Invited]”, *Biomedical Optics Express*, 14(6):2658–2677 (2023) **Editor’s Pick**

10. Chen S, Abu-Qamar O, Kar D, Messinger JD, **Hwang Y**, Moulton EM, Lin J, Bauman CR, Witkin A, Liang MC, Waheed NK, Curcio CA, Fujimoto JG, “Ultrahigh Resolution OCT Markers of Normal Aging and Early Age-related Macular Degeneration”, *Ophthalmology Science*, 3(3):100277 (2023)
11. Mino T, Moriguchi Y, Tamura M, Matsumoto A, Kubota A, Akiba M, **Hwang Y**, Makita S, Yasuno Y, Enaida H, Fujimoto JG, Wang Z, “Extended and adjustable field-of-view of variable interscan time analysis by amplitude-scanning swept-source optical coherence tomography angiography”, *Biomedical Optics Express*, 14(8):4112–4125 (2023)
12. Chen S, Potsaid B, Li Y, Lin J, **Hwang Y**, Moulton EM, Zhang J, Huang D, Fujimoto JG, “High speed, long range, deep penetration swept source OCT for structural and angiographic imaging of the anterior eye”, *Scientific Reports*, 12(1):992 (2022)
13. Yu J, Lee S, Song J, Lee SR, Kim S, Choi H, Kang H, **Hwang Y**, Hong YK, Jeon NL, “Perfusible micro-vascularized 3D tissue array for high-throughput vascular phenotypic screening”, *Nano Convergence*, 9(1):16 (2022)
14. Moulton EM, **Hwang Y**, Shi Y, Wang L, Chen S, Waheed NK, Gregori G, Rosenfeld PJ, Fujimoto JG, “Growth Modeling for Quantitative, Spatially Resolved Geographic Atrophy Lesion Kinetics”, *Translational Vision Science & Technology*, 10(7):26 (2021)
15. Park D, Son K, **Hwang Y**, Ko J, Lee Y, Doh J, Jeon NL, “High-Throughput Microfluidic 3D Cytotoxicity Assay for Cancer Immunotherapy (CACI-IMPACT Platform)”, *Frontiers in Immunology*, 10:1133 (2019)

Manuscripts Under Review

16. **Hwang Y**[†], Won J, Jamil MU, Potsaid B, Waheed NK, Fujimoto JG, “Human Retinal Capillary Network Analysis using Vascular Interconnectivity Optical Coherence Tomography Angiography”
17. **Hwang Y**[†], Jamil MU, Takahashi H, Marmalidou A, Curcio CA, Fujimoto JG, Waheed NK, Zhao PY, “Reflectivity of the Hyperautofluorescent Ring in Retinitis Pigmentosa on High-resolution Optical Coherence Tomography”
18. Hassan AR[†], **Hwang Y**[†], Ploner SB, Babiker F, Zhao PY, Witkin AJ, Liang MC, Karbole W, Maier A, Fujimoto JG, Waheed NK, “High-resolution en face OCT of the RPE in geographic atrophy captures patterns resembling FAF”

Preprints

19. Goh YM, Li C, **Hwang Y**, Flores H, Mehrabad MJ, Fujimoto JG, Englund DR, “Visible Spectral-Domain Optical Coherence Tomography for Photonic Integrated Circuits Characterization”, arXiv:2603.23815 (2026)

CONFERENCE PRESENTATIONS

Oral Presentations (Presenter)

- Hwang Y**, Hassan AR, Ploner SB, Jamil MU, Maier A, Waheed NK, Fujimoto JG, “High-Resolution, Linear-Scale OCT Measures EZ Thickening and Longitudinal Changes in AMD”, *International Retinal Imaging Society*, Oral Presentation (2026)
- Hwang Y**, Hassan AR, Ploner SB, Jamil MU, Maier A, Waheed NK, Fujimoto JG, “EZ Axial Thickening and Longitudinal Changes in AMD Quantified by High-resolution Linear-scale OCT”, *ARVO Imaging in the Eye*, Oral Presentation (2026)
- Hwang Y**, Won J, Jamil MU, Waheed NK, Fujimoto JG, “Retinal Capillary Network Analysis in Healthy and Diabetic Retinopathy Eyes”, *ARVO Annual Meeting*, Oral Presentation (2026)
- Hwang Y**, Jamil MU, Babiker F, Woo KM, Rosenfeld PJ, Waheed NK, Fujimoto JG, “Large Hypertransmission Defects Exhibit Greater Choriocapillaris Flow Speed Impairment in Non-Exudative Age-related Macular Degeneration”, *ARVO Imaging in the Eye*, Oral Presentation (2025)
- Hwang Y**, Takahashi H, Won J, Yaghy A, Marmalidou A, Kaiser SM, Jamil MU, Bauman CR, Waheed NK, Fujimoto JG, “Capillary blood flow speed alterations in diabetic retinopathy quantified with OCTA using variable interscan time analysis (VISTA)”, *International Retinal Imaging Society*, Oral Presentation (2024)
- Hwang Y**, Won J, Takahashi H, Yaghy A, Waheed NK, Fujimoto JG, “Inter-plexus connection visualization and graph representation of retinal vasculature using optimally oriented flux OCTA”, *SPIE Photonics West*, Oral Presentation (2024)
- Hwang Y**, Won J, Chen S, Yaghy A, Takahashi H, Girgis JM, Lam K, Waheed NK, Fujimoto JG, “Retinal blood flow speed quantification at the capillary level using a temporal autocorrelation model: Variable Interscan Time Analysis (VISTA)”, *ARVO Imaging in the Eye*, Oral Presentation (2023)
- Hwang Y**, Won J, Chen S, Yaghy A, Girgis JM, Lam K, Waheed NK, Fujimoto JG, “600 kHz A-scan rate enables OCTA-based retinal blood flow speeds quantification at capillary segment level using variable interscan time analysis (VISTA)”, *SPIE Photonics West*, Oral Presentation (2023)

Poster Presentations (Presenter)

Hwang Y, Jamil MU, Kaiser S, Raja K, Babiker F, Won J, Fujimoto JG, Waheed NK, Zhao PY, “Hyper-reflective Macular Ring in Retinitis Pigmentosa Observed with Ultrahigh Resolution OCT”, *ARVO Annual Meeting*, Poster Presentation (2025)

Co-Authored Presentations

Hassan AR, **Hwang Y**, Ploner SB, Babiker F, Fujimoto JG, Waheed NK, “High-resolution OCT captures FAF-corresponding reflectivity patterns in the RPE in GA”, *ARVO Annual Meeting* (2026)

Islam MS, **Hwang Y**, Tse T, Chen Y, Navajas EV, Mammo Z, Fujimoto JG, Ju MJ, “Advanced Retinal Perfusion Quantification with a Robust Motion-Free Variable Interscan Time Analysis Framework”, *ARVO Annual Meeting* (2026)

Deiana M, **Hwang Y**, Hassan AR, Babiker F, Woo KM, Kaiser S, Raza K, Jamil MU, Takahashi H, Moriguchi Y, Kuji R, Desai S, Witkin A, Akiba M, Fujimoto JG, Waheed NK, “Choriocapillaris hemodynamic changes across healthy and Non-Exudative Age-Related Macular Degeneration using Variable Interscan Time Analysis OCT Angiography”, *ARVO Imaging in the Eye* (2026)

Hassan AR, **Hwang Y**, Won J, Jamil MU, Takahashi H, Marmalidou A, Fujimoto JG, Waheed NK, Zhao PY, “Outer Retinal Band Measurements in Retinitis Pigmentosa Using High-Resolution OCT”, *ARVO Imaging in the Eye* (2026)

Khalid MA, Jamil MU, Babiker F, Ploner SB, **Hwang Y**, Maier A, Fujimoto JG, Zhao PY, Won J, “High-Resolution OCT Reveals Prominent Photoreceptor Inner Segment Myoid Zone Thickening in Stargardt Disease”, *ARVO Imaging in the Eye* (2026)

Zhao PY, Won J, **Hwang Y**, Babiker F, Jamil MU, Ploner SB, Maier A, Fujimoto JG, Waheed NK, “High-Resolution OCT in Stargardt Disease Reveals Distinct Patterns of Degeneration”, *ARVO Imaging in the Eye* (2026)

Mechs L, **Hwang Y**, Ploner SB, Hassan AR, Waheed NK, Maier A, Fujimoto JG, “Automated Ellipsoid Zone Segmentation in OCT Images using a Transformer-based Framework”, *ARVO Imaging in the Eye* (2026)

Tanlak A, Hassan AR, **Hwang Y**, Ploner SB, Jamil MU, Maier A, Waheed NK, Fujimoto JG, “Association between Drusen Dynamics and Baseline Basal Lamina Deposit Surrogate on High-resolution OCT in AMD”, *ARVO Imaging in the Eye* (2026)

Mechs L, Ploner SB, **Hwang Y**, Jamil MU, Waheed NK, Fujimoto JG, Maier A, “Automated Segmentation and Biomarker Analysis in OCT Images using a Transformer-based Framework”, *BVM Workshop* (2026)

Islam MS, **Hwang Y**, Tse T, Chen Y, Navajas EV, Mammo Z, Fujimoto JG, Ju MJ, “Multi-scale quantification of choriocapillaris perfusion dynamics using MHz OCTA with variable interscan time analysis”, *SPIE Photonics West* (2026)

Babiker F, **Hwang Y**, Woo KM, Jamil MU, Mino T, Kuji R, Moriguchi Y, Kaiser S, Desai S, Witkin A, Tieger M, Akiba M, Fujimoto JG, Waheed NK, “Quantification of Capillary Blood Flow Speed and Vessel Density Across Different Severities of Diabetic Retinopathy using Variable Interscan Time Analysis OCT-A”, *ARVO Imaging in the Eye* (2025)

Woo KM, Babiker F, **Hwang Y**, Jamil MU, Mino T, Moriguchi Y, Tamura M, Kaiser S, Takahashi H, Raza K, Desai S, Witkin A, Akiba M, Fujimoto JG, Waheed NK, “Measuring Changes in Retinal Capillary Blood Flow Speed in Non-Exudative Age-Related Macular Degeneration Using Variable Interscan Time Analysis OCT Angiography”, *ARVO Imaging in the Eye* (2025)

Jamil MU, Ruggeri F, Woo KM, Babiker F, **Hwang Y**, Mino T, Moriguchi Y, Takahashi H, Kaiser S, Raza K, Desai S, Akiba M, Fujimoto JG, Waheed NK, “Comparing Qualitative OCT Angiography Parameters Between Raster and Ammonite Scan Patterns in the Superficial Capillary Plexus in Diabetic Patients”, *ARVO Imaging in the Eye* (2025)

Woo KM, Won J, Ploner SB, Jamil MU, Kaiser S, Abu-Qamar O, Takahashi H, **Hwang Y**, Zhao PY, Witkin A, Maier A, Fujimoto JG, Waheed NK, “High-resolution SD-OCT detects early interdigitation zone alterations in diabetic eyes without retinopathy”, *ARVO Annual Meeting* (2025)

Babiker F, **Hwang Y**, Yaghy A, Takahashi H, Jamil MU, Won J, Raza K, Tieger M, Zhao PY, Reichel E, Witkin A, Fujimoto JG, Waheed NK, “Capillary Blood Flow Speed as a Predictor of Anti-VEGF Response in Patients with Diabetic Macular Edema Quantified by VISTA OCTA”, *ARVO Annual Meeting* (2025)

Jayaraman V, Burgner C, Higgins G, Siedschlag SJ, **Hwang Y**, Fujimoto JG, “Swept-source optical coherence tomography at green wavelengths using broadband frequency doubling of NIR MEMS-VCSELs”, *SPIE Photonics West* (2025)

Takahashi H, **Hwang Y**, Won J, Jamil MU, Yaghy A, Liang MC, Bauman CR, Witkin AJ, Ohno-Matsui K, Duker JS, Fujimoto JG, “Blood Flow Speed of Retinal Microaneurysms in Eyes with Diabetic Retinopathy quantified by High Speed OCTA using Variable Interscan Time Analysis”, *ARVO Imaging in the Eye* (2024)

Jamil MU, Won J, Ploner SB, Marmalidou A, Kaiser S, Takahashi H, **Hwang Y**, Yaghy A, Maier A, Fujimoto JG, Waheed NK, “Age-Related Variations in the External Limiting Membrane and the Ellipsoid Zone”, *ARVO Annual Meeting* (2024)

Kaiser S, Won J, Yaghy A, Ploner SB, Jamil MU, Marmalidou A, Takahashi H, **Hwang Y**, Maier A, Fujimoto JG, Waheed NK, “Volumetric High-Resolution Optical Coherence Tomography Reveals Longitudinal Changes in Subretinal Drusenoid Deposits in Intermediate Dry Age-related Macular Degeneration”, *ARVO Annual Meeting* (2024)

Won J, Yaghy A, Ploner SB, Takahashi H, Reimann M, Girgis JM, Lam K, **Hwang Y**, Chen S, Maier A, Waheed NK, Fujimoto JG, “Motion correction and volume merging of ultrahigh resolution OCT enable 3D visualization and longitudinal tracking of hyperreflective foci”, *ARVO Imaging in the Eye* (2023)

Chen S, Potsaid B, Lin J, **Hwang Y**, Moulton EM, Li Y, Huang D, Fujimoto JG, “High-Speed, Long-Range Swept-Source Optical Coherence Tomography for the Anterior Segment of the Eye”, *ARVO Imaging in the Eye* (2021)

INVITED & SELECTED TALKS

Hwang Y, “Seeing Past Blindness: The Eye as a Window to Human Health”, 75th *Lindau Nobel Laureate Meeting, Lindau, Germany* (2026)

Hwang Y, “Hemodynamic Imaging using High-Speed OCT Angiography in Retinal Diseases”, *Center for Biomedical OCT Research, Massachusetts General Hospital, Boston, MA* (2026)

Hwang Y, “Choriocapillaris Hemodynamic Impairment in Hypertransmission Defects: VISTA OCTA”, *Angiogenesis, Exudation, and Degeneration (hosted by Bascom Palmer Eye Institute, virtual)* (2026)

Hwang Y, “Quantification of capillary blood flow speeds in diabetic retinopathy using variable interscan time analysis (VISTA) OCTA”, *Floretina ICOOR, Florence, Italy* (2024)

FELLOWSHIPS & HONORS

Lindau Nobel Laureate Meeting	2026
IntRIS Best Member-in-Training Abstract Award	2026
ARVO Gerhard Zinser Memorial Travel Grant	2026
MIT HEALS Graduate Fellowship	2025 – 2026
Helen Carr and William T. Peake Award (MIT EECS)	2024
Korea Foundation for Advanced Studies	2020 – 2025
Kwanjeong Educational Foundation Scholarship	2018 – 2019
National Science & Technology Scholarship (South Korea)	2014 – 2017

MENTORING

Lukas Mechs Visiting Master’s student, Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU); completed Master’s thesis research under my co-mentorship. Developed a hybrid transformer-CNN U-Net for ellipsoid zone segmentation in eyes with AMD. Two first-author abstracts accepted at BVM 2026 and ARVO Imaging in the Eye 2026.	Aug 2025 – Jan 2026
Julian Windeck Visiting Master’s student, Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU). Trained nnU-Net models for volumetric segmentation of inner retinal layers in eyes with diabetic retinopathy; developed image segmentation pipeline now in active use in the lab.	Sep 2023 – Dec 2023

TEACHING EXPERIENCE

Massachusetts Institute of Technology Teaching Assistant, Optics and Photonics – 6.631 Received perfect TA evaluations (7.0/7.0); Developed assessments, led office hours, and taught optical design software tutorials.	Cambridge, MA Sep 2021 – Jan 2022
MIT Kaufman Teaching Certificate Program Training in evidence-based teaching	Cambridge, MA Sep 2025 – Dec 2025
MIT Research Mentoring Certificate Training in pedagogy for supervising research trainees	Cambridge, MA Jan – Feb 2026

PROFESSIONAL SERVICE

ARVO Annual Meeting Moderator: OCT/OCTA Clinical Applications

2025, 2026

Peer Reviewer for Journals: *Optica*, *RETINA*, *Optics Express*, *Biomedical Optics Express*, *Optics Letters*, and *Scientific Reports*