

YUMIN LEE

yumin.lee@thewalkerschool.org

EDUCATION

The Walker School

High School Diploma, Class of 2027

Marietta, GA

GPA: 99.22 weighted / 94.62 unweighted SAT: 1470 (EBRW 700, Math 770)

HONORS & AWARDS

- **AP Scholar Award** 2025, 2026
- **John Philip Sousa Award** – outstanding contribution to the band program 10th Grade
- **Outstanding International Student Award** – The Walker School's top-performing international student 9th Grade
- **UGA High School Math Tournament** – placed approximately 10th 10th Grade

RESEARCH EXPERIENCE

Beverage-Induced Staining of Dental Restorative Materials

Apr – Sep 2026

Independent Research | Student Researcher with EN Dental Clinic Center (Mentor: Dr. Chungho Lee)

Daegu, South Korea

- **Manuscript submitted to the *Journal of Emerging Investigators (JEI)***
- Designed and conducted a two-week immersion study testing how four beverages (coffee, coke, black tea, grape juice) stain four dental/orthodontic materials (composite resin, PMMA, thermoplastic acrylic, orthodontic wax)
- Tracked staining progression using daily grayscale brightness analysis of photographs and identified beverage-specific compounds via Raman spectroscopy
- Found black tea and grape juice caused the strongest staining, contrary to the initial hypothesis favoring coffee, and quantified how daily brushing slowed but did not eliminate discoloration

OrthoLens: AI Orthodontic Screening Web App

May 2026 – Present

Independent Project | Student Developer | PyTorch, Streamlit | yl-dental-ai.streamlit.app

- Built a ResNet-18 transfer-learning classifier for dental crowding detection, achieving 0.93 AUC and 86% accuracy on a 390-image held-out validation set
- Curated a 1,953-image labeled dataset from a 9.5K-image dental photo corpus via an automated Claude Vision API labeling pipeline with confidence filtering (≥ 0.80)
- Handled class imbalance with weighted sampling and a weighted loss, and tuned the decision threshold for F1
- Added Grad-CAM heatmaps that show which regions drove each prediction, and deployed it as a Streamlit app that generates patient reports

Smart Toothbrush: Sensor-Fused Brushing Position Tracking

Aug 2026 – Present

Guided Science Research (GSR) Course Project | Student Researcher | In Progress

The Walker School

- Developing a smart toothbrush that tracks brushing position and movement using an Arduino-based IMU sensor and a camera-based sensor
- Comparing IMU-only, camera-only, and sensor-fusion approaches to determine which delivers the most reliable tracking
- Building companion software and testing on a tooth model whether real-time tracking improves brushing effectiveness

Machine Learning for Orthodontic Treatment Planning from Cephalometric Data

Summer 2026

Independent Project | Student Researcher

- Investigated machine-learning approaches (Random Forest, SVM, neural networks) for predicting orthodontic force and tooth-movement direction from cephalometric measurements (SNA, SNB, ANB, FMA, IMPA)
- Drafted a research paper outlining model design, input variables, and evaluation framework for a clinical decision-support tool

Climate Change, Sleep Disruption, and the Gut Microbiome

Jun – Dec 2025

Independent Research | Student Researcher (sole author)

- Authored a literature-based predictive model examining a hypothesized pathway linking rising nighttime temperatures to reduced sleep quality and downstream changes in gut microbiome health
- Quantified 1975–2025 warming trends using NASA GISTEMP and Berkeley Earth nighttime-minimum-temperature data, finding a trend of roughly 0.207°C per decade

- Synthesized human and animal sleep and gut-microbiome literature to formulate four testable hypotheses linking heat, sleep loss, and microbiome function
- Built an exploratory projection model using IPCC SSP scenarios to estimate sleep loss and gut-microbiome risk in five-year increments from 2025 to 2055

CLINICAL EXPERIENCE

Yonsei Baro Dental Clinic
Clinical Shadow under Dr. Chang-beom Park

- Shadowed a practicing dentist across general and orthodontic patient visits, observing diagnostic and treatment workflows

May – Aug 2026
Dongtan, South Korea

LEADERSHIP & ACTIVITIES

MUSIC

The Walker School Band
Kennesaw, GA

- **12th Grade:** Section Leader; Woodwind Captain
- **11th Grade:** Student Conductor
- **10th Grade:** Community Leader
- Progressed through successive leadership roles, taking on increasing responsibility for section coordination, rehearsal leadership, and conducting

2024 – Present

Georgia All-State Band
Section Group Leader, Clarinet

- Selected to the statewide honor ensemble; led the clarinet section through rehearsals

10th Grade
Georgia

Honors Performance Series
Section Group Leader, Clarinet

- Performed with a nationally/internationally selected honor ensemble at Carnegie Hall and the Sydney Opera House; led the clarinet section

10th Grade (Summer & Winter)
Carnegie Hall, NY & Sydney Opera House, Australia

District Honor Band
Clarinet

- Selected to the district-level honor band through competitive audition

11th Grade
Georgia

SERVICE & LEADERSHIP

ESC (Education Sharing Club)
Member & Officer | 152 volunteer hours

- Completed 152 hours of education-focused volunteer service for underserved children with an independent nonprofit; as an officer, coordinated club activities
- Supported education-outreach programming, developed learning materials, ran education programs for a local children's center, and helped plan/run a science camp with a partner high school

Feb 2024 – Jul 2026
South Korea

National Honor Society (NHS), The Walker School
Member

- Inducted based on scholarship, leadership, service, and character

11th Grade

STEM Club | *Member (11th) → Vice President (12th)*

11th – 12th Grade

HOSA (Health Occupations Students of America) | *Member*

11th – 12th Grade

Math Team | *Member*

10th – 12th Grade

ATHLETICS (The Walker School)

Wrestling | *Team Captain (11th Grade)*

9th – 11th Grade

Lacrosse | *Team Member*

9th – 11th Grade

Football | *Team Member*

9th Grade

SKILLS & INTERESTS

Technical: Python (PyTorch, Streamlit, Grad-CAM, Claude API), CNN/ResNet transfer learning, Arduino IMU sensing
Laboratory: Raman spectroscopy, grayscale image brightness analysis
Languages: Fluent in Korean and English