

# Benson Lu Huang

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## EDUCATION

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### Half Hollow Hills High School West

- **GPA:** 98.9/100
- **Honor Societies:** Math, Science, National, and Music Honor Society Member
- **Awards:** University of Pennsylvania Book Award, Rochester Institute of Technology Business and Innovation Scholar
- **AP Courses:** Physics C Electricity & Magnetism, Physics C Mechanics, Calculus BC, Environmental Science, Biology, World History, Seminar, Physics 1, Physics 2, Research, United States History, Macroeconomics, Microeconomics, English Language and Composition, Spanish Language and Culture
- **Test Scores:** 1540 SAT (790 Math, 750 R/W), 1470 PSAT (NMSQT 223 w/ perfect R/W)

### MIT IDSS: Data Science and Machine Learning

- **GPA:** 100/100
- **Completed Courses:** courses on Python-based neural networks and predictive analytics

### Google Career AI/ML Essentials

- **GPA:** 100/100
- **Completed Courses:** LLM Self-supervised learning, supervised learning, reinforcement learning, AI Ethics/Prompt Engineering

### Hong Kong Polytechnic University Medicine

- **GPA:** 88/100
- **Completed Courses:** ANA101: Human Anatomy for Stroke

### University of Michigan Medicine

- **GPA:** 100/100
- **Completed Courses:** ANATOMY403.2: Cardiovascular, Urinary, and Respiratory Systems

## HONORS

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- Regeneron ISEF 3rd Place Biomedical Engineering Grand Award, Society for Science** 2025  
One of ~300 Grand Award Winners worldwide for building an innovative wave-based robotic surgery force sensor by modeling electricity-tissue interactions under force
- 1st Place Biomedical Engineering, New York State Science and Engineering Fair** 2025  
First place out of all biomedical engineering projects statewide for best overall project
- Live Más Scholar, Taco Bell Foundation** 2025  
A highly selective group of nationwide awardees for unconventional innovation beyond academics or athletics and the pursuit of accessible, impactful technology
- Semifinalist, National Merit Scholarship** 2025  
One of 16,000 semifinalists out of 1.3M qualified students nationwide (top 1.2%) for exceptional performance on the PSAT.
- Yale Most Outstanding Mathematics and Physics Exhibit, Yale Science and Engineering Association** 2025  
First place for excellence in scientific rigor, innovation, and the ability to clearly convey complex ideas to both expert judges and the public
- Caltech Up Close Scholar, California Institute of Technology** 2025  
One of 120 out of thousands of applicants nationwide for high achieving students from underrepresented backgrounds in science, technology, engineering, and mathematics

- x3 Gold Medalist, National Spanish Exam** 2022, 2024, 2025  
99<sup>th</sup> Percentile score nationally, awarded for exceptional proficiency in Spanish language comprehension, grammar, vocabulary, and cultural knowledge
- Finalist, Junior Scientists and Young Explorers Meta (JYEM)** 2025  
One of 50 out of 1,372 (3.6%) competitors worldwide for developing a novel force sensing and anomaly detection device and system for robotic surgery
- Semifinalist, Diamond Challenge** 2025  
Top 10% of competitors worldwide for developing a social media safety monitoring app as a top global student-entrepreneur
- x2 Gold Presidential Volunteer Service Award, AmeriCorps** 2023, 2024  
For service that strengthens America's civic spirit and inspires others to act in their communities through impactful, youth-driven education and leadership
- Youth Leadership Recognition Award, New York State Senate** 2024  
Recognized by New York State Senate for inspiring others through service, dedication, and a passion for creating change
- 2<sup>nd</sup> Place, American Chemical Society Mid-Atlantic Regional Meeting** 2024  
Second Place out of 35 competitors (5.7%) nationwide including PhD students for proposing a non-addictive hydrocode variant, Kalirouna
- National Certificate of Merit, USA Bio Olympiad** 2024  
For outstanding performance in the USA Biology Olympiad Open Exam
- Youth Ambassador for Science, Stanford Asian American Scholars Forum** 2024  
For creating viral online science communication content that reached 10K+ users on social media
- 5<sup>th</sup> Place Alliance Captain, First Tech Challenge Robotics Regional Championship** 2024  
One of 4 Alliance Captains out of 47 (8.5%) competitors across Long Island for outstanding competition performance and robot capability
- Control Award, First Tech Challenge Robotics Regional Championship** 2024  
First Place out of 47 competitors across Long Island for excellence in programming, autonomous operation, and use of sensors in robot performance
- Gold Award with Distinction, NYSSMA All-State Symphonic Orchestra** 2024  
For excellence in symphonic orchestra performance as evaluated by 3 PhD adjudicators

## WORK EXPERIENCE

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- President, Youth Entrepreneurship Finance Association (YEFA)** New York, NY | 2022 – Present
- Founded a global initiative promoting financial literacy in 15,000+ in 12 countries
  - Acquired \$60k+ in sponsorships from partners like AFI, Coke, Webflow, and Google
  - Partnered with the UN to explore Sustainable Development Goals (SDGs) through impact investing
  - Collaborated with Mastercard, Evercore, and Visa on emerging market seminars
- Intern, Stony Brook Medicine** Stony Brook, NY | 2023 — Present
- Kaczocha Lab, aiding Phase 1 FDA Trials for FABP5 as a non-opioid peripheral neuropathy medication, endocannabinoid transport and addiction
  - Gunn Lab, Pancreatic Triacylglycerol Lipase active site structure
  - Takemaru Lab, Polycystic Kidney Disease DZIP1/1L mutations and recruiting hierarchies
- Founder, Hawkeye App Inc.** Berkeley, CA | 2023 — 2024
- Launched a paid app promoting teen social media safety through digital footprint tracking
  - Awarded a \$50,000 grant for AI integration as a Microsoft for Startups Accelerator Hub member
  - Developed with colleagues at the LaunchX @Berkeley entrepreneurial institute

## LEADERSHIP EXPERIENCE

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### **President, HHH West FTC Robotics Club**

New York, NY | 2022 — Present

- Led a club of 3 teams and 70+ members
- Acquired sponsors from Lockheed Martin, Intuitive Surgical, and Makelabs
- Initiated community outreach that reached over 50 businesses and 200+ local educators and business owners

### **Student Body President, HHH HS West**

Dix Hills, NY | 2023 — Present

- Represented the 1000+ person school student body to district and county administrators
- Raised over \$15,000 in revenue through school apparel sales and events to support STEM clubs, athletics, and arts
- Organized homecoming, prom, junior prom, blood drive, etc.

### **Youth Hockey Ambassador, New York Islanders**

Dix Hills, NY | 2024 — Present

- Selected as an ambassador from the director of ice hockey in NYS for excellent sportsmanship, leadership, and service within the New York Hockey Community
- Spoke in front of 2,000,000+ viewers on ESPN and live fans at UBS Arena
- Featured on #1 Long Island radio station, 106.1 BLI as amateur athlete of the month

## PROJECTS

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### **BLADE: Bioimpedance-integrated, Laparoscopic, Articulated, Dual-purpose, EndoWrist System for Natural Control, Force Sensing, and Tissue Detection in the DaVinci S Robotic System (submitted to Regeneron Science Talent Search 2025)**

- Designing the next-generation human-robot interface system for surgery in my garage
- Combining bioimpedance sensors for tissue identification/force sensing and haptic glove for ergonomic hand control of EndoWrist into one comprehensive robotic surgery system compatible with the DaVinci S robotic system

### **Using Changes in Bioimpedance Values to Infer Applied Force for Tissue-Specific Force-Sensing During Minimally (ISEF 2025)**

- Designed and built a novel bioimpedance-based tissue-specific force sensor with haptic feedback for safer robotic surgery on sensitive tissues
- Uncovered previously hidden mathematical relationship correlating impedance values with applied force in biopsy procedures
- Built and validated DIY prototypes at home for under \$50 using disassembled scrap electronics compared to \$3000 commercial equivalents, performed experiments on supermarket meat
- My story was published in Stony Brook University Statesman Magazine
- Recognized at Northeast Bioengineering Conference 2025 @NYU and ISEF 2025; reviewed by Intuitive Surgical Patent Office, New York Presbyterian Hospital Queens, Brown University School of Engineering, and New York Institute of Technology

### **Dippin' Dots: Automated Quantification of Colocalized Puncta in Chromosomal Networks (Stony Brook Medicine)**

- Built an automated U-Net Convolutional Neural Network that integrates into microscopy software (ImageJ and AxioVision) to count colocalized immunofluorescence puncta on chromosomes using computer vision to better count colocalized proteins

### **Langevin Equations Applications in Organoid Computing (Al Kalfus Long Island Mathematics Fair)**

- Proposed application of differential Langevin equations to model stochastic neural dynamics in organoid-based computing systems
- Developed mathematical models for noise-driven learning, synaptic variability, and signal
- Established a theoretical framework bridging computational neuroscience and biohybrid intelligence to enable tunable, noise-enhanced biological computing

### **Kalirouna – The Future of Pain (American Chemical Society Conference)**

- Modeled a novel hydrocodone opioid derivative that theoretically reduced addictive potential while retaining pain treatment efficacy
- Utilized AutoDock and PyMOL to design a molecule optimized to avoid crossing the blood-brain barrier while maintain strong binding affinity to peripheral dorsal root mu-opioid receptors in the spinal cord

### **Investigating the Viability of Fatty Acid Binding Protein 5 (FABP5) in the Nucleus Accumbens as a Pharmaceutical Target to Treat Addiction (ISEF-affiliated Fair)**

- Conducted immunolocalization studies of Fatty Acid Binding Protein 5 (FABP5) in the mouse nucleus accumbens.
- First to discover FABP5 expression in glial cells in this region, mapped its distribution across Nucleus Accumbens and glia to evaluate therapeutic potential to treat addiction

### **Bye Bye Miss American Pie – A Diagnostic Analysis of U.S. Federal Debt compared to the 2008 Greek Debt Crisis as Function of Financial Literacy (Daniel G. Calugar Foundation)**

- Proposed strategies to enhance youth financial literacy to foster informed discussion on national debt to prompt more action
- Conducted comparative analyses of the current U.S. federal debt against historical global fiscal crises to assess severity

### **Staying Cool While the World Heats Up: Address to City of Memphis (MathWorks Math Modeling Challenge)**

- Modeled indoor heat dynamics using Fourier transforms and differential equations to simulate building-specific temperature retention in Memphis
- Forecasted peak AC-driven energy demand under climate change, projecting a 60K+ kWh/day increase by 2045
- Developed a solar deployment plan adding 48M+ kWh/day, guided by a custom vulnerability index to ensure equitable energy access

### **Reducing School Bus-Route Gas Consumption (Northwell Health Medical Marvels)**

- Applied clustering-based heuristics (K-Means, capacity-constrained partitioning) to group student pickups and reduce overlapping bus routes in my own school district
- Optimized intra-cluster paths with 2-opt local search, minimizing total fuel consumption while meeting capacity and time constraints

### **A Novel Gene repressor Method to Treat Atherosclerosis (HHH Research Symposium)**

- Proposed CRISPR interference gene repression of the Pancreatic Triacylglycerol Lipase (PTL) as a potential way to reduce fat content in blood from dietary consumption

## **ATHLETICS**

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- Team ranked 65th in the Nation (Long Island Royals 14U AAA) ([myhockeyrankings.com](http://myhockeyrankings.com))
- MAM Ice Hockey Prospect Development Camp (NHL, USHL, Harvard, and Yale Coaches)
- Half Hollow Hills Varsity Ice Hockey – Most Hat Tricks Award
- Half Hollow Hills Varsity Ice Hockey, x2 Student-Athlete Award
- New York State Varsity AAU Ice Hockey Championships, x1 Semi-Finalist, x1 Quarterfinalist
- International Silver Sticks Tournament – Quarterfinalists
- CCM World Invitational Semi-Finalists

## **MEDIA COVERAGE**

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- Stony Brook Statesman Magazine – Robotic Surgery Project
- Aired on MSNBC – New York Islanders Youth Hockey Ambassador
- Featured on Taco Bell Recipe Collection '25 Culture Cookoff Scramble – Chinese Steamed Eggs Recipe
- Asian American Scholar Forum Conference – Youth Ambassador for Science