Shuhul Mujoo

Discovering the Universe, Inventing the Future

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Linkedin

Education

- Evergreen Valley High School (EVHS)
  - Unweighted GPA 4
  - SAT Score 1570/1600 (800/800 Math, 770/800 English)
  - 10 AP Courses (score out of 5): Calculus AB (5), Calculus BC (5), Physics 1 (5), Physics 2 (5), Computer Science Principles (5), Computer Science A (5), Physics C (5), Macroeconomics (5), Statistics (5), English Language (4)
- Dual Enrollment Community College Courses (Evergreen Valley College, San Jose City College)
  - GPA 4
  - Precalculus & Trigonometry (A), PhotoShop (A), Discrete Mathematics (A), Chemistry (A), Multivariable Calculus (A), Research Methodology (A), Introduction to Philosophy (A), Physics Electricity and Magnetism (A), Physics Special Relativity and Thermodynamics (A)
- MIT Beaver Works Summer Institute (BWSI), Quantum Computing
  - Learned and Implemented Quantum Computing (QC) Algorithms: Shor's, Deutsch-Jozsa, Grover's, and Quantum Teleportation
  - Mastered Quantum programming languages: Q# and Qiskit.
  - Ran algorithms written in Q# on Aer backend by porting over to Qiskit
  - Completed final team project: Quantum KNN algorithm, made of internal subroutines such as quantum phase estimation
- Student Ambassador, Inspirit AI High School Program, Taught by Stanford & MIT alumni
  - Published blog, deploying Keras models (TensorFlow Lite)
  - Taught AI/ML in STEM clubs.
  - Completed 2 projects on object detection (YOLO Deep Learning Architecture) & audio processing (FFT and filtering).
  - Attended 20+ expert sessions & organized outreach events.
  - Promoted AI in my school & community.
- Currently Caltech Undergraduate
  - Intended Major: Applied Physics

Publications

- HGI-SLAM: Loop Closure With Human and Geometric Importance Features
    - Published paper on loop closure to arXiv & submitted to ICRA 2023
    - Created novel method that combines geometric and salient features with better precision\recall than state of the art
    - Implemented and tested the algorithms in the paper as an independent researcher using a custom robot
- Quantum Computing for Self-Driving Cars and Pedestrian Detection
    - Submitted to High School Journal of Student Research (JSR)
    - Created a Quantum K-Nearest Neighbors (Q-KNN) implementation to classify objects for self-driving cars
    - Improved performance compared to the classical approach and designed a wireless networking framework based on quantum teleportation

Awards

- USA Physics Olympiad (USAPhO) Silver Medalist, 2022
- American Invitational Mathematics Examination (AIME) Qualifier, 2022
- National Merit Scholarship Winner, 2022
- Award of Excellence, California Space Consortium (CaSGC), NASA
- FIRST Tech Challenge (FTC) 1st In California and World Finalist, 2022
- FTC Dean's List Semi Finalist
- Le Grand Concours Silver Medalist (National French Contest)
- AP Scholar with Distinction
- Science Olympiad State Winner
- Speech & Debate Best Speaker Award
- Congressional App Challenge Participant: Created student carpooling app
- Coaches Award Water Polo
- Honorable Mention, Berkeley Math Tournament
- Honorable Mention, Synopsys Silicon Valley Science and Technology Championship

Employment

- Search For Extraterrestrial Intelligence (SETI) Institute, February-June 2023
    - Completed project and final presentation on "Gas Temperature Prediction For Accretion Disks"
    - Worked with Dr. Uma Gorti, head researcher at SETI on the formation of planetary disks
    - Coded using Fortran and Python, cleaned data and fixed exponent overflows
    - Created and trained neural network with dozens of iterations, reached 94% accuracy

    - Analyzed weights of network, collected runtime results, created 3d input space plots
    - Extensive use of packages: numpy, scikit learn, tensorflow, matplotlib, joblib
- Internship at Evergreen Valley College (EVC), California Space Consortium (CaSGC) by NASA, June-August 2022
    - Designed and constructed an Arduino powered prototype fire detection robot with distance/smoke sensors, motor controllers, 3D printed, and soldered components
    - Machined aluminum parts using a CNC, bandsaw and a drill press
    - Mentored group members through CAD, C++, and Arduino coding
- Internship at Dusty Robotics (Series A, VC funded), in Mountain View, CA, July-August 2021
    - Assembled printer robots from start to finish
    - Drove robots around sites to print construction markings on floor
    - Wrote unit test cases and debugged navigation issues
    - Documented a tutorial for new hires and indexed parts inventory
- Referee, Cal North Soccer, 2018-2022
    - Worked on the weekends as an Assistant or Center Referee across the Bay Area
    - Passed qualification referee exam for license activation
    - Refereed teams U8 to U12, ensured fair play, crowd control, and record keeping

Activities

- Founder and President of Quantum Computing Club (QCC), EVHS 2022
    - Instructor of EVHS QCC, created lesson plans, lectures, and mentored 6 officers
    - Created feedback forms and a website, organized meetings and finance
    - Outreached to UC Davis Quantum Club, increased membership to 25
- Founder and Captain of FTC Robotics Team Terrabats 14525, Jan 2017-2023
    - Designed robot using CNC machined and 3D printed parts
    - Modeled designs in Fusion 360 (CAD software)
    - Lead Programmer: Implemented Convolutional Neural Network for vision using Tensorflow Lite. Created splines to increase speed and performed a kinematic analysis for smooth movement. Tuned PID motor controllers, and used torque calculations to find optimal arm length. Created a simulation of the robot that displays the projected movements using real time data.
    - Team received multiple Inspire Awards and was 1st in California, and become a world finalist
- Competitive Soccer, San Jose Youth soccer league, Bronze Level, 2019
    - Played as Center defender in competitive matches
    - Dubbed the Most Valuable Defender
- Currently in Division III Men's Water Polo at Caltech

Skills

- Programming Languages: Java, Python, Fortran, C++, HTML/CSS/JS, Q#, Qiskit
- Frameworks: TensorFlow AI/ML, Fusion 360, Android Studio, GitHub, Keras
- Languages: English, French, Kashmiri
- Hobby Projects: Hybrid Kick Scooter, Connect 4 AI, Schlieren Imaging to Visualize Airflow, Motorized scooter, Automatic Orange Juicer

Community

- Robotics Instructor (Afterschool Programs & Community Libraries) Jan 2017 - 2022
    - Conducted multiple camps and sessions for EV3 and First Lego League Robotics in local elementary and middle school kids, while fundraising for Terrabats
    - Hosted two qualifiers, mentored 100+ rookies, and founded two teams
- SchoolHouse Tutor
    - SAT Math tutoring with positive feedback, 10+ students
    - AP Physics and Math
- Mentoring
    - Science Olympiad and Math Olympiad mentor for middle schools
    - Robotics instructor at after school programs and community Libraries
    - Tech Challenge and Odyssey of the Mind mentor for community teams
    - Robotics Booth at Bay Area Science Festival
    - Conducted robotics camps at worldwide

Traits

- Persevering, Hardworking, Dedication, Self-motivated
- Selfless, Honest, Helpful
- Self-learner, Extremely passionate about physics