Rishi Bala

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Education

Newark Academy, Livingston, New Jersey   September 2018 – Present
- IB Diploma Candidate, AP Scholar: AP US History, AP Calculus AB/BC
- 36/36 ACT, National Merit Commended Scholar

Extracurriculars

Competitive VEX Robotics | Summit, New Jersey   September 2020 – Present
Captain, Lead Builder, Design/CAD, Engineering Notebook
- Captain of a six person VEX team; spent 20+ hours each week holding team meetings for our robot and mentoring younger students.
- Engineered monthly design revisions of each season's robot based on performance metrics, employing CAD software such as Autodesk Fusion 360 or Onshape and programming languages such as VEXCode Pro V5 and Purdue PROS (based off C++).
- Documented the design stages, debugging process, and engineering theory in a 800+ page engineering notebook, winning 5 local and signature awards; recorded the engineering design process and tracked all machinery and programming skills.
- 2022 World Finalist, 2022 Worlds Innovate Division Champion, 2022 New Jersey Excellence Award, 2024 New Jersey 2nd Place, 2x World Championships Qualifier, 2x Tournament Champion, 3x Regional Tournament Finalist, 3x Regional Design Award

Minuteman Newspaper   October 2022 – Present
Editor-in-Chief (12), Editor (11), Staff Writer (10) (Selected through applications and interviews)
- Led weekly meetings for 14 section editors (8 different sections) to coordinate the production of 6-8 printed/online article sets per year.
- Managed contracts with the local printing press and facilitated distribution of the newspaper to the school community.
- Responsible for writing monthly editorials, editing staff articles, programming the Minuteman website, and selecting staff members.

Newark Academy Big Band   September 2021 – Present
Lead Drummer (Selected through an audition process)
- Led the rhythm section as the 1st-chair drummer for a Jazz Big Band; top 3 finisher at the NJAJE State Finals (2021-2024).
- Selected via an audition where I demonstrated rudiments, styles, and improvisation; finished as a finalist at various local competitions.

Newark Academy Yearbook   September 2022 – Present
Lead Proof Editor (11), Assistant Proof Editor (10) (Selected through an application)
- Oversaw the management and proofreading of the school yearbook; led a team of three assistant proof editors and staff members.
- Collaborated with section editors and faculty advisors to facilitate timely and error-free production over a 10-week period in the Spring.

Curriculum Committee   September 2023 - Present
Grade Representative (Selected by the school administration via an application and essay)
- Collaborated with department chairs and admins to shape the school curriculum; one of two students chosen to represent the grade.
- Assessed and voted on new course proposals; promoted gender equality in the makeup of Upper School STEM courses.

Cricket Club   September 2021 - Present
Captain (12), Vice-Captain (11), Member (9-10)
- Introduced students to cricket strategies/skills through weekly practices and scrimmages; responsible for increasing club engagement.
- Created an annual faculty v. student match in the week before Spring Break and oversaw the yearly cricket banquet tradition.

Clubs Committee   September 2023 - Present
Staff Member (11-12) (Selected through an application)
- Spearheaded the establishment of a student/faculty Clubs Committee; oversaw and promoted Newark Academy extracurricular clubs.
- Collaborated with student/faculty leaders to plan club initiatives; analyzed and promoted student interest in extracurricular programs.

Newark Academy Boys Tennis Team   September 2021 - Present
Varsity (12), Junior Varsity (9-11)
- Competed in state-wide tournaments with the #1 tennis team in New Jersey; attended daily practices every week for 2.5 hrs/day.

Research, Summer, and Job Experiences

New Jersey Institute of Technology Intern | Physics and Mechanical Engineering Laboratory   Summer 2024
Intern – Prof. Nuggehalli Ravindra and Prof. Balraj Mani
- Worked and researched as a primary author for two review papers on magnetotactic bacteria (MTB) and ferrofluids, respectively.
- Researched and wrote about the applications and properties of MTB and magnetosomes; created a list of MTB patents and companies.
- Studied the history, properties, applications, and benefits of the usage of ferrofluids, especially in relation to cancer therapies.
- Utilized CAD to design a prototype magnetic-field-assisted robotic assembly machine for nanoscale semiconductor devices.
- Produced an array of milli-scale electromagnetic coils driven by H-bridges to control miniature robots and robotic arms.

PACT – Program in Algorithmic and Combinatorial Thinking   Summer 2023
Studied under Prof. Rajiv Gandhi | Selected through an application
- Studied discrete mathematics and theoretical CS; explored topics such as combinatorics, probability, graph theory, and algorithms.
- Completed several proof problems each day using basic proof techniques such as induction; worked with set theory, advanced permutations and combinations, conditional probability, independent events, random variables, and linearity of expectation.
- Worked with guest lecturers on topics like Big-O notation and the Euclidean GCD algorithm.

Robotics and Programming at NJIT   Summer 2022
Selected through an application
- Accepted into a program enhancing prior robotics experience, covering multiple programming languages and electronic components.

VEX IQ Instructor   November 2021 – Present
Teacher, Judge, Live Competition Help
- Volunteered in elementary and middle school robotics competitions as the Head Referee and Head Judge.
- Taught VEX IQ students throughout the year, mentoring and introducing students to basic robotics techniques and block coding.

Projects | www.rishibala.com

6502 Breadboard Computer   August 2024 – Present
Hardware Pictures
- Built a breadboard computer using the classic 6502 microprocessor; programmed simple instructions and games in assembly.
- Created a custom clock module using a separate Arduino Uno; used an Arduino Mega to communicate with the 6502 computer.
- Utilized an EEPROM programmer to transfer code to the processor; used several LCD displays and an array of electronics.

Word Hunt Robot   July 2024
Github Repository | *Demo*
- Created an Arduino robot that uses three servo motors running on a voltage divider to play the popular iMessage game Word Hunt.
- Used a custom, conductive stylus made from aluminum foil, electrical current from the Arduino, and a cut up pen.
- Runs on a Java program that creates a Trie data structure by parsing the entire Collins Dictionary, finding all possible words; communicates information through socket communication to a Python script and serial communication to the Arduino.

Formula 1 Elo Engine   June 2024
Github Repository | *Demo*
- Used historical data from every Formula 1 race provided by the Ergast API to calculate each driver's peak and final Elo ranking.
- Created several algorithms loosely based off the Chess.com ranking system to calculate every Elo ranking.
- Adapted the Elo system such that each driver's ranking changes based off if they place ahead of their teammate in a race.

JavaXchange   July 2023 – August 2023
Github Repository | *Demo*
- Developed a multithreaded mock stock market that records transactions, matches BUY/SELL orders, and uses serialization to commnunicate with trading bots running different strategies, such as EWMA or RSI, in an attempt to generate the most profit.
- Used the Twelve Data API to generate a data file containing the price of AAPL for every minute between June 2021 and January 2023.
- Parsed this data file to create a Market Making Bot which sends a new order based off each AAPL price point every 10ms.

VRC Scouting Website   August 2022 – October 2022
Github Repository | *Demo*
- Developed a live competition scouting tool that ranks active VRC teams to assist with scouting and alliance selection.
- Utilized an algorithm based on thousands of GET requests to create a ranking and overall 'score' for each team, while displaying each team's robot features and awards, allowing for efficient in-person scouting.
- JavaScript, HTML5, CSS3; Node.js, Express.js, EJS, MongoDB, Mongoose, AWS EC2

VEX Robotics CAD and Documentation   May 2020 – Present
Renders/Files | *Engineering Notebooks*
- CADded and designed each of my team's robots with several intermediate prototyping stages and numerous design stages every year.
- Used industry-standard software such as Autodesk Fusion360, Autodesk Inventor, AutoCAD, Onshape, and Protobot.
- Documented the engineering design process and robot progress in our award-winning engineering notebook as head of documentation.

Technical Skills

Languages: Java, Python, JavaScript, HTML, CSS, VEXCode Pro V5, PROS, C++
Skills: AWS, Node.js, Express.js, MongoDB, Crontab, Multithreading, CAD, Arduino
CAD Software: Autodesk Fusion360, Autodesk Inventor, AutoCAD, Protobot, Onshape