Keshav Anand — Full Portfolio

7th Grade

Schimelpfenig Middle School, Plano *August 2021 – May 2022*

- Algebra I Honors (MR): [99, 99]
- Band: Solo Contest Distinguished in City as Flute Player
- American Football B-Team (4th String) Quarterback and Safety (10+ hrs/week)
- School Cross Country Team Member (10+ hrs/week)
- Robotics — Joined school robotics club as programmer
  - Only programmer after COVID, build code from scratch
  - Won first place in local qualifier and semi qualifier (no regional advancement)
- MATHCOUNTS and AMC math competitions — no awards
- Whiz Quiz (Trivia) Team Captain — 3rd Place in City
- Science Fair Honorable Mention at District Level
  - Using Valakku Tiri (Cotton Wick) for Self Watered Plant (Capillary Action)
- Speech and Debate Local Tournaments — 5th in Musical Pantomime (Acting), Public Forum Debate 5th

Extracurriculars and Hobbies:

- Carnatic Vocal Music — Performed in One Major Concert; Started Self-Taught Carnatic Keyboard
- Cricket — 20 Hours a Week, Competed in Local and National Tournaments; U13
- Chess classes with VAV Rajesh IM, no tournaments (ELO 1100)
- Dropped Western Piano — learned for 7 years
- Baseball starting pitcher for club team
- Started self taught bass guitar on $80 bass guitar — no shows or awards
- Self taught Carnatic Keyboard — Using portamento and mono legato for gamakams
- Competitive Math Classes
- Started baking eggless cakes as a hobby with family — no sales or awards
- Started passion for hiking in national and state parks
  - Caprock Canyons, Palo Duro Canyon, Big Bend National Park
- Started arranging music
  - Created arrangements for Garage Arts Project (Vasupradha Raghav), mixing Carnatic and Western notes
  - Recreated popular Tamil songs as Kareoke / Cover tracks (Konjum Mainakkale, Thoda Thoda, Endhan Nenjil, etc.)

8th Grade

Schimelpfenig Middle School, Plano *August 2022 – May 2023*

- Geometry Honors (MR): [98, 100]
- Band: Band Flute Lead, UIL All Region 14th Chair Flute, Solo Contest Distinguished in City, Played in Numerous Band Solos
- American Football B-Team (3rd String) Quarterback and DB (15+ hrs/week)
- School Cross Country Team Member (10+ hrs/week)
- Robotics — 2nd Year FTC School Team
  - Coded basic driver controlled system, vision processing for autonomous
  - Won first place as alliance captain in local qualifier, ahead of all other area middle school teams
- Competition Math — Represented school in MATHCOUNTS State, ranking in top 60 of Texas (2nd in Reigon)
- Whiz Quiz (Trivia) Team Captain — First Place in City, District Recognition

- Science Fair First at School Level (Did not participate further)
  - Using a non-Newtonian fluid (Oobleck) to create a shock absorbing material for knee pads
  - Tested with egg drop tests
- Speech and Debate Local Tournaments (No Award)

Extracurriculars and Hobbies:

- Carnatic Vocal Music — Performed in One Major Concert
- Carnatic Keyboard — Played for major Bharatanatyam dance performance
- Cricket — 20 Hours a Week, Top Leg SPinner in Dallas — Represented City in Southwest U15 Zonals
- Started chess tournaments, dropped coaching (ELO 1250 USCF)
- Started producing true arrangement covers, getting input from Music Director Girishh Gopalakrishnan
  - Started solo unplucked arrangements, using MIDI for all tracks
- Dropped Baseball to focus on Cricket
- Continued bass guitar self taught (on and off)
- Continued hiking during holidays
- Got a perfect score (101/100) in Texas Music Teacher's Associated Music Theory Test
- Started learning carnatic mridangam from Vid. Raju Balan
  - Learned basic sollukai patterns and konnakol

Summer:

- Represented Dallas nationally in U15, U13 cricket tournaments
  - Won best bowler in U13 Independence Day tournament
- Performed in Carnatic Vocal Concert, and small carnatic keyboard accompaniment gigs
- CBE Algebra II — [96, 96]
- CBE Health [87]
- E School Lifetime Witness Semester I [96]
- CBE Tamil via Avant for 4 Language Credits
  - 100 in Reading, 100 in Listening, 99 in Speaking, 85 in Writing
- Continued baking eggless cakes as a hobby
- Started binge watching many Tamil movies (old to new)
- Continued producing music arrangements, learning live mixing in Garage Arts Project Dallas Exhibition

9th Grade

IB World School @ Plano East Senior High School, Plano *August 2023 – May 2024*

- PreCalculus Honors: [98, 98]
  - AP not offered at time
- AP Human Geography: [99, 100]: AP 5
- English I Honors: [99, 100] (blocked with AP HG)
- Biology Honors: [99, 97]
- AP Computer Science Principles: [100, 99]: AP 5
- Debate I: [100, 99]
- Introduction to Engineering Design: [97, 99]
- Math Club Secretary — Competed in many competitions
  - AIME Qualifier from AMC 10
- Joined CS Club — First introduction to Java and competitive programming
- Debated in Extemporaneous Speaking, no further qualifications
- Member of School's Quiz Bowl Team (never competed)
- PSAT (8/9) Score 1440/1440 [720 Reading, 720 Math]

- Member of Plano East's Science Fair Club (see below)
- Participated in History Fair — Group Website on Arab Spring (no awards)
- Debate judging for Middle Schoolers

Simply Stir: Highlight Research Project

Sole Researcher *Project Portfolio*

- Developed a thermoelectric energy-harvesting system using a TEG for autonomous stirring.
- Designed a compact aluminum enclosure enabling efficient heat transfer and stable thermal gradients.
- Implemented electrical conditioning and load-matching to maximize TEG power extraction.
- Tested power delivery across various R_{LOADS} using Vernier Probes
- Performed thermal, electrical, and mechanical characterization across multiple cooking conditions.
- Conducted viscosity-based stirring tests and identified mechanical design improvements for high-torque fluids.

Qualified to **The International Science and Engineering Fair**, 1st in Engineering @ Dallas

Extracurriculars and Hobbies:

- Dropped Carnatic Vocal Music in favor of Mridangam
- Continued tinkering with Carnatic Keyboard — no performances
- Cricket during Fall, dropped during Spring
- Continued Arranging Music through covers and original compositions
- Continued bass guitar self taught
- Joined High Octavez Band as a Keyboardist
    - Performed in 2 major concerts, one in Fall and one in Spring
    - Over 250 hours put in learning sound reproduction for live playing
    - Ticketed concerts with over 1000 attendees, profits go to charity
    - Won presidential award silver for community service through band
- Started private FTC robotics team with friends — Technical Turbulence
    - Fully Custom Build (100% CAD) and Java Codebase from Scratch
    - Reached State Finals as globally top team in Tele-operated period
    - Lead/Sole SW Developer, coded custom vision pipeline for object detection
    - Learned advanced path-planning and odometry algorithms through libraries
    - Implemented advanced driver control features to improve driver performance
    - Mentored former middle school team (Quantum Claw)
    - Learned further implementations of Java through a wrapper SDK
- Learned LaTeX in creating professional documents

Summer:

- Performed in Carnatic Vocal Concert, and small carnatic keyboard accompaniment gigs
- E School Lifetime Fitness Sem 2 — [98]
- E School Chemistry — [98, 97]
- Started intensively playing card games (56) with family
- Continued Keyboard and Bass Guitar Arrangements
    - Collaborated with High Octavez member (Jeev Thomas) for novel arrangements
    - Moved to include Hindi and Malayalam songs in covers (in addition to Tamil)
    - Started singing in covers — brought in vocal techniques learned from carnatic music
    - Started tinkering with Machine Learning, self taught basics of Python
- Started moving away from library pathing in robotics, coding custom pathing algorithms
    - Learned about Bezier curves, cubic splines, and custom odometry implementations

Presented findings in FLYSET workshop (1000+ views), TI "Take Kids to Work Day" event

- Fractured left wrist while playing gully cricket at school

  Completely halted my cricketing career (completely stopped playing)

10th Grade

IB World School @ Plano East Senior High School, Plano *August 2024 – May 2025*

- AP BC Calculus: [98, 98]: AP 5 (on both sections)
- AP World History: [98, 99]: AP 5
- English II Honors: [98, 99] (blocked with AP WH)
- AP Env. Sci.: [97, 97]: AP 5
- AP European History: [99, 97]: AP 5
- Debate II: [99, 98]
- Engineering Science: [98, 98]
- Self Taught and Took AP Precalculus Exam [5]
- Self taught and Took AP Music Theory Exam [5]
- Left Math Club and CS Club to focus on Robotics, Research, and Debate
- Debated in Extemporaneous Speaking, DUO Interpretation (Acting)

  Qualified to State in Extemp (Domestic), won Local Tournaments in DUO

  Qualified to Nationals in DUO Interpretation (1st in District) with Anshveer Kang

  Piece was "Pom Pom Boys" — about showing respect for all factions

  Quarterfinalist at Nationals in Impromptu Speaking, Octofinalist in Extemporaneous Commentary
- Joined NHS as member (36 hrs volunteer work completed)
- PSAT (10) Score 1450/1520 [700 Reading, 750 Math]
- 9/10 President of Plano East's Science Fair Club (see research below)

  Shared tips on various aspects of research and presentation to 120+ members
- Joined ACE (tutoring club) as tutor for Math and Science subjects

  Challenging review materials for Calculus still used

GaitGuardian: Highlight Research Project

Lead Researcher *Project Portfolio*

Met research partner, Viren Bankapur, by networking through ISEF 2024: Remotely collaborated on this project over Summer 2024 and the school year. GaitGuardian was Viren's project at ISEF 2024, and I joined to help expand the system with my embedded systems and ML expertise.

- Built **GaitGuardian**, an end-to-end ML system aiding advanced Parkinson's Disease patients.
- Designed a **custom PCB** and embedded stack with a 6-DoF IMU and ESP32-S3 for real-time sensing.
- Developed a **dual-attention CNN + biLSTM** model predicting Freezing-of-Gait up to 2s early.
- Created real-time algorithms for **fall detection** and **tremor classification** using IMU signals.
- Implemented a cloud-based **visual navigation module** with transformer object detection, depth estimation, and multimodal LLM scene descriptions.
- Optimized sensor pipelines via **signal filtering, feature engineering, oversampling**, and model tuning.
- Built two wearable devices (trunk and wrist) plus a BLE-connected **forehead camera** for vision tasks.
- Demonstrated performance exceeding existing FoG, fall, and tremor detection systems.

Won 3rd Place at **The International Science and Engineering Fair**, 2nd OVERALL in Dallas → over $1500 won

Extracurriculars and Hobbies:

- Continued Learning Mridangam — No performances
- Dropped cricket entirely after injury

- Continued Arranging Music through covers and bass covers
- Continued bass guitar self taught
- Presented TEG research at TJAS (Texas Junior Academy of Science) State Symposium
  Won 2nd Place in Engineering Category, receiving feedback from university professors
- Left High Octavez Band (due to time commit)
- Doubled down into FTC Robotics (see below)
- Built an automatic presiding website for Congress and Debate Timing
  Used by Plano East Debate Team for Tournaments, simplifying PO procedures
  Coded as a full stack React app, also used for practice rounds
- Started a school discord server (for Class of 2027) with 300+ members
  Contained over 50% of the class — used for studying and communications
  Led team of 8 moderators to manage swearing and inappropriate behavior
  Implemented rigorous verification system to avoid imposters from other schools
  Was approved and advertised by teachers and administration as a study resource

FTC Robotics

Lead Software Developer *Website*, *Code Repo*

- Designed and implemented **custom inverse kinematics and path-planning algorithms** for precise autonomous navigation.
- Integrated **computer vision pipelines** for object classification using TensorFlow Lite
- Developed novel driver control enhancements to improve driver performance
- Optimized accuracy and real-time performance through efficient sensor usage
- Lead software **Top 30 Worldwide** for autonomous programming; reached North TX Area Finals.
- Led software development, version control, and testing for a programming team of 4 members.

Summer:

- Accelerated Mridangam Learning
- Continued playing card games (56) and carrom with family
- Continued Keyboard and Bass Guitar Arrangements (with new Stingray Bass Guitar)
- Continued Research on GaitGuardian, looking at new approaches
  Learned about advanced ML architectures for time series data
  Learned more about electrical aspects to PCB building
- Presented robotics in FLYSET workshop (1000+ views)
- Solo hiked 14K Mountain in Denver, CO (Quandary Peak)
- Obtained Driver's License
- Started learning basic guitar maintenance and repair
- Continued developing new frameworks for Robotics software

11th Grade

Plano East Senior High School, Plano *August 2025 – Present*
STEM and Multidisciplinary Endorsement

- GPA: 4.73/4.0 (View Unnoficial Transcript)
- Class Rank: **1/1273**
- AP Chemistry: [99] (x2)
- AP US HIstory [99]
- AP English Language and Composition [99], grouped with APUSH
- Digital Electronics: [97*]
- AP Physics I [97]

- Calculus III (via Collin College): 99 (A+)
- Debated in Extemporaneous Speaking, DCongress
  - Almost qualified to state in Extemp, placed high in local tournaments
  - Finaled local tournaments in congress
- NHS technology officer for largest chapter (over 1000 members)
  - Coding and maintaining portal for event and hours logging
- PSAT (11) Score 1460/1520 [700 Reading, 760 Math]
- 11/12 Pre'sident of Plano East's Science Fair club
  - Shared tips on various aspects of research and presentation to 120+ members
  - Continued GaitGuardian research: School Fair Grand Prize Winner
- Continuing competition math through AMC and AIME
- Started Plano East's first cricket club
  - Helped coach beginners, manage team as captain, and play against other schools

Extracurriculars and Hobbies:

- Stopped Mridangam in place of more focus on bass guitar
- Dropped cricket entirely after injury
- Continued Arranging Music through covers and bass covers
- Joining High Octavez again for Spring concert
- Doubled down into FTC robotics
  - Applying Calculus and projectile concepts in coding a shooting mechanism
  - Team remains globally ranked for autonomous period
- Started home server on brother's old chromebook
  - Hosting personal website, portfolio, and various projects
  - Learning about web hosting, DNS, and server management
  - Learned about Linux and terminal fundamentals
- Hosted Music Server to house personal music library (my own music and music I listen to)
- Hosting personal Git server (using Gitea)
- Developed an shell that renders my portfolio as a terminal GUI (via SSH)
- Started learning about penetration testing and ethical hacking (using Kali Linux)
- Still maintaining school Discord server
- Learned Rust, C++, Toml, Yaml, and other language through projects
  - Learned at a surface level, still exploring deeper concepts

Notes

- Plano ISD grades subjects using GPA brackets, where 97-100 is an A+
- Plano ISD only considers "Ranking" courses for GPA, and CBE and E-School are excluded
- All honors courses have a 4.5 GPA, and all AP and Engineering courses have a 5.0 GPA weight
- My class rank will likely drop to 2 or 3 due to AP Precalculus mistake (District error)
- *Digital Electronics grade is still yet to be finalized