

# 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**

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#### **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 Unofficial 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**

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- 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