Keshav Anand — Wright Application

1. Applicant Information

Required Information:
- First Name: Keshav
- Middle Name: Gopalan
- Last Name: Anand
- Scholar Email Address: keshavanandofficial@gmail.com
- Street Address: 3809 Sagewood Court
- City: Plano
- State: TX
- Zip Code: 75025
- Scholar Phone Number: (972) 520-4390
- Date of Birth: 07/03/2009 (MM/DD/YYYY)
- City, State, Country of Birth: Plano, Texas, USA
- US Citizen?: Yes

Optional Information:
- How did you learn about this program?: School or college counselor
- Gender: Male
- Race: Asian
- Disability: N
- Languages: Hindi, Other (Tamil)
- First Gen College: No

Required School Information:
- HS Name: Plano East Senior High School
- HS City: Plano
- HS State: Texas
- HS Phone:
- College Name(s) if accepted: MIT, CalTech
- Planned Program of Study: Computer Science

2. Applicant Certification and Commitment

Nothing to do here

3. Essay Section

- Current Grade: HS Junior
- HS GPA (Cumulative Unweighted): 4.0/4.0
- HS GPA (Weighted [Unspecified Cum or Not]): 4.73
- Planned Program of Study/Career Path: Computer Science

Prompt 1: List the five most advanced science and math courses you have taken or are taking in high school and the grade received if completed (AP , Honors, College-level and label as such). Include any engineering tech prep program classes that you are enrolled in at your school.

Science and Math Courses

1. Calculus III (Collin College): 99% (11th Grade Semester 1)
2. AP Chemistry: 99% (11th Grade Semester 1)

3. AP Calculus BC: 98%, 98% (10th Grade Semesters 1,2) — AP Exam 5/5
4. AP Physics 1: 97% (11th Grade Semester 1)
5. AP Environmental Science: 97%, 97% (10th Grade Semesters 1,2) — AP Exam 5/5

Engineering Tech Prep Program Courses

1. AP Computer Science Principles: 100%, 99% (9th Grade Semesters 1,2) — AP Exam 5/5
2. PLTW Introduction to Engineering Design: 97%, 99% (9th Grade Semesters 1, 2)
3. PLTW Engineering Science 98%, 98% (10th Grade Semesters 1, 2)
4. PLTW Digital Electronics 97% (11th Grade Semester 1)

Prompt 2: List participation in extra-curricular high school activities such as athletics, band, choir, orchestra, National Honor Society, school newspaper/yearbook, school officer, or any home school extracurriculars.

1. **First Tech Challenge (FTC) Robotics, Co-Captain, Software Lead** (9th-11th Grade): Helped found and lead community robotics team with fully custom robot design and software. Won multiple local awards for software and hardware innovation, becoming regional and state finalist alliance team, and global top-30 for the autonomous section.
2. **Member of School Science Fair Club** (9th-11th Grade): Completed independent research projects in engineering and computer science. 2x International Science and Engineering Fair (ISEF) finalist, and 3rd in Robotics and Intelligent Machines at ISEF ($1200 award). Won 1st in category at school, district, and regional science fairs competitions. Awarded multiple special awards, including TI Best Computing Project and US Air Force Certificate of Recognition.
3. **Officer of School Science Fair Club** (10th, 11th Grade): President and Vice President of school's science fair club, organizing meetings, mentoring new members, and leading outreach events for STEM awareness in local community. Conducted biweekly lunch meetings to guide students through project ideation, research methods, and presentation skills.
4. **Speech and Debate** (9th-11th Grade): National (NSDA) and State quarterfinalist in Impromptu Speaking, and National octofinalist in Extemporaneous Commentary. Won local and regional tournaments in Duo Acting and Extemporaneous Speaking. Coded powerful timer utility and congress PO app for team use, with positive testimonials from state and national competitors.
5. **Keyboardist for Local Band** (9th, 11th Grade): Performed as a self-taught keyboardist for a local band with popular ticketed shows and over millions of views on YouTube. Revenue from performances donated to local charities, raising over 200K through various platforms to support people in need of support for medical expenses. Volunteered over 100 hours for events, and earned President's Volunteer Service Award Silver (9th Grade).
6. **Original Music Arrangement and Composition** (9th-11th Grade): Created original film music arrangements and compositions using fully self-taught music production skills, keyboard, and bass guitar. Collaborated with local artists and renowned Tamil film music composer to produce musical compositions and melodies.
7. **NHS Member** (10th-11th Grade): Volunteered through judging local Middle School Debate Tournaments, organizing school-wide service events, and tutoring underclassmen in STEM subjects. Produced valuable educational resources (through school's tutoring program) to help with Calculus and Chemistry understanding.
8. **NHS Technology Officer** (11th Grade): Technology Officer for largest NHS chapter worldwide, coding a React-based full-stack web portal to streamline member management, event coordination, and service hour tracking. Hours are tracked through accurate QR code scanning, saved into Firebase database for easy and secure access by officers and members.
9. **Math Club** (9th-11th Grade): Competed in local math competitions, including AMC 10/12 and AIME (1x qualifier).
10. **Founder of School's Cricket Club** (11th Grade): Founded and organized school's first competitive cricket club, playing local high school teams. Helped organize and run practice, matches, and manage team logistics. Spread the sport to over 30 club members 15 new players.

11. **Owner of Class Discord Server** (9th-11th Grade): Founded and managed a Discord server for studying and resource sharing. Supported over 150 active members with strict moderation, with support from school teachers. Implemented structured channels for various subjects with a live voice channel for group study sessions.

Prompt 3: Provide 3 or more detailed examples of demonstrated leadership (team captain/class officer/scouts/running a lawn service/leading fund raiser/tutoring/community service/volunteer work). Explain your duties.

1. I founded the Cricket Club at my current high school. As a founder, I was responsible for popularizing the club itself by recruiting members and advertising through Instagram and word-of-mouth. I organized practice sessions and I had to act as both a player and a coach, teaching new players the rules and pushing them through the sport's steep learning curve. Each practice itself proved a hurdle, as I had to find enough people to play at a common place and time, manage equipment, and ensure that everyone was engaged. Due to the nature of a first year club, I had to help bridge the high delta between experienced and new players, ensuring that everyone had fun while still being challenged. Then, I had to organize matches with other local high school teams, which involved coordinating with their club leaders, arranging transportation, and managing logistics. Through sponsorships from local businesses and colleges (UTD, RICE, DBU), I was able to fund equipment and provide support for club matches.
2. I serve as the Co-Captain and Software Lead for my school's First Tech Challenge (FTC) Robotics team. As the only programmer of our initially rookie team, I was fully writing out every line of code for our robot. However, funds became a major hurdle, so I also filled in to help secure a $750 sponsorship from Texas Instruments through outreach events. As our team grew, I had to take on recruiting of new members, carefully selecting students who would be a good fit for our programming and engineering needs. Once our team reached 5 programmers, I fully transformed our repository into a GitHub organization, with multiple repositories for each team member to experiment with hands-on. I also had to delegate specific tasks and manage deadlines to ensure that our software development stayed on track. For the FTC competition, I was also in charge of documenting our software iterations and innovations, which proved crucial in winning multiple awards for software design and innovation.
3. I am the Vice President (and former underclassmen president) of my school's Science Fair Club. As an officer, it is my role to fully lead and plan our club's biweekly lunch meetings. This involves brainstorming engaging activities with other officers, and preparing 35-40 minutes detailed presentations on various aspects of science fair projects. I have prepared extensive materials on project brainstorming, project methodology, data analysis, and trifold tips to help guide over 90 active club members. Additionally, I help students one-on-one through email or in-person (after meetings) to share my experience to help students make the right decisions. Finally, as a student who has been intimidated by the science fair process, I plan and cater my presentations to help lower the barrier to entry for new students and underclassmen, recruiting members by making science fair more approachable.

Prompt 4: Provide detailed examples from high school that showcase your interest or participation in STEM platforms, such as FIRST Lego League, robotics competitions, science fairs, Science Olympiad, Math Olympiad, science/math clubs, 4-H competitions, etc. If your school does not offer these, provide detailed information on other hobbies/activities that demonstrate your interest in STEM, such as working with mechanical or electrical devices, building computers as a hobby, programming/coding skills, volunteering at a medical center, tutoring science/math, etc. Provide specific information that demonstrates your skills and capabilities in your area/s of interest.

In the last three years, STEM activities have been the focus of my high school experience, both through and outside of school. I have had a strong passion towards STEM activities since middle school, and I believe that these experiences have prepared me to fully utilize the research platforms and opportunities provided by AFRL.

1. From 9th to 11th grade, I have been an active member of my community First Tech Challenge (FTC) Robotics team, serving as Co-Captain and Software Lead. I started in my freshman year from square one, knowing no programming languages or concepts. Slowly, I picked up Java through the FTC SDK, and I eventually started writing functional code for our robot. As the season had progressed, I had become a decent programmer, and our team was able to win as a State Finalist alliance team and Area Innovate Award Winner for a unique fully-automated hang mechanism. In the following two years, I ramped up my time commitment and progressed my skills. By applying the Calculus knowledge I was learning in the classroom, I was able to implement a fully custom autonomous pathing system for our robot, using trigonometry, inverse kinematics, and PID control to achieve precise movement. In addition, I tinkered with computer vision, developing a custom TensorFlow model for failsafe object detection (with 100% match success). Our

team went on to champion our league, become an Area Finalist captain, and place in the global top-30 for autonomous performance.

2. In my 9th grade, my independent research project for Science Fair qualified as a finalist project for the International Science and Engineering Fair (ISEF). My project started from a very simple idea of utilizing available thermal energy in a cooking pot to also stir the contents (to save energy for cooking). From here, I learned about the world of thermoelectric generators (TEGs) and the Seebeck effect. Applying the CAD and simulation concepts I learned from my Engineering class in school, I designed an aluminum enclosure that used a TEG, a heat sink, and a motor to convert heat energy into mechanical stirring. I also learned about electrical circuits as I used a voltage and current sensor to effectively graph my TEG's performance relative to the temperature differential. My final prototype, although simple, was able to win 1st in Engineering Technology at my regional science fair, where I also won a special awards through the US Metric Association and the US Air Force Certificate of Recognition. At ISEF, I was able to present to domain experts and professors from around the world, gaining valuable insights and feedback to later improve my prototype and project.
3. In my 10th grade, my research project for Science Fair won 3rd in Robotics and Intelligent Machines at ISEF. After seeing many relatives of mine struggle with Parkinson's Disease, I wanted to help create a solution that could help them. Through research, I encountered an interesting method of using machine learning to aid in both walking and tremors. Using online published datasets, I applied a novel online signal processing approach that ensured real-time classification of gait patterns. After training multiple models and testing them through cross-validation, I ended up with a fully functional model with high accuracy and low inference times. However, I wanted to take this a step further and create a physical prototype. Using my engineering teacher's help, I designed a custom PCB with an ESP32 microcontroller and an IMU sensor, which I programmed to collect real time data to feed to my model. By using online resources and reading published literature methods, I was able to self-teach myself the needed Python and C++ to fully implement my working solution. My novel approach was recognized at the regional level, where I won 1st in Systems Software, TI Best Computing Project, and 2nd Grand Prize (qualifying me to ISEF). At ISEF, domain experts were equally impressed with my work, and I was awarded 3rd place in Robotics and Intelligent Machines, along with a $1200 award.
4. This year, I have started a passion project in maintaining a full-time server. After repurposing a decade-old budget laptop, I installed an Ubuntu Linux OS onto my machine and setup a home server. From here, I slowly the basics of bash scripting, networking, Linux, and service management through a hands-on approach. I set up multiple services, including a Matrix client used by my friends for communicating while in school. I also set up a Git server to host my code, which taught me a lot about permissions and how servers actually interact with clients. Most recently, I set up an SSH service which allows users to view a shell interactive I made to display my portfolio. While this extremely risky ,with over 1 million attacks in two months, I have learned a lot about security measured, and none of the attacks have been successful due to my proactive measures. While my server is mostly used for tinkering, I have learned a lot about networking and computing fundamentals through this project.
5.