

MIT (248633199)

- Is there anything about your military service you would like to share more information about? (This may include: how your military service shaped your goals, how your military service influenced your decision to continue your education, etc.) 250 words

I am a Singaporean Citizen, so I have a mandatory national military service after the conclusion of my high school. This means I have yet to complete my national service but will attend after my 12th grade. I hope this unique experience will

Growing up between India, Singapore, and the United States has endowed me with a rich tapestry of cultures and experiences. However, the trajectory of my journey diverges momentarily as I face the prospect of serving a mandatory two-year stint in the Singaporean military before pursuing my academic aspirations at MIT. At first glance, this deviation seems like a disruption, a detour from the streamlined path toward higher education that many of my peers are undertaking. The initial frustration is undeniable; the desire to seamlessly transition into college life and academic pursuits is strong.

However, amidst this juncture lies an opportunity for growth and enrichment. Rather than viewing this mandatory national service as an obstacle, I choose to perceive it as a unique chapter in my journey—one that offers invaluable lessons and perspectives. The call to serve is not merely a duty; it's a chance to hone discipline, leadership, and resilience, qualities that transcend boundaries and hold profound relevance in any sphere of life. The structured environment of the military will instill in me a sense of responsibility and fortitude that will undoubtedly shape my character and outlook.

While it may seem divergent from the norm, I embrace this deviation with a positive mindset. I am eager to immerse myself in the experiences that await, knowing that this period will not only enrich me personally but will also contribute significantly to my growth and development. As I embark on this mandatory service, I do so with an open mind and an unwavering determination to extract every bit of learning and growth from this unique chapter before setting foot on the academic grounds of MIT.

After my birth in India, my family relocated to Singapore, where we settled and gained citizenship. Unexpectedly, at 8, we moved to the US for a 2-year project in my father's job. However, as that job lengthened to various reassignments and the 2 years extended indefinitely, I have now lived in the US for the rest of these 9 years. However, as still a Singaporean citizen, I now face my mandatory military service term.

The prospect of diverging from the traditional trajectory and delaying my college experience is undeniably disheartening. While the excitement of higher academics approaches for many, I have to trudge on a different path. It's easy to perceive this as a setback, an interruption to the flow of education and personal growth, but I choose to cultivate a positive mindset. I see this national service commitment as a unique chapter in my life's narrative. It's an opportunity to embrace a change in lifestyle and forge bonds in my old home. By approaching this mandatory service with an open mind, I anticipate gaining valuable insights and skills that will enrich my future journey.

In the face of detours, I find strength in adaptability. Rather than viewing these two years as a delay, I see them as an investment in a more holistic self. I am eager to embrace every twist and turn in life's journey, knowing that each experience moulds me into a more resilient, open-minded individual, prepared for the challenges and opportunities that lie ahead.

After my birth in India, my family relocated to Singapore where we settled and gained citizenship. Unexpectedly, when I was eight, we moved to the US for a two-year project in my father's job. However, as this job lengthened to various reassignments and the two years extended indefinitely, I have now lived in the US for the remainder of these nine

years. Yet, as I am still a Singaporean citizen, I now face my mandatory military service term.

The prospect of diverging from the traditional trajectory of my peers and delaying my college experience is undeniably disheartening. While the excitement of higher academics approaches for many, I must embark on a different path. It's easy to perceive this as a setback, an interruption to the flow of education and personal growth, but I choose to cultivate a positive mindset. I see this national service commitment as a unique chapter in my life's narrative. It's an opportunity to embrace a change in lifestyle and forge bonds in my old home. By approaching this mandatory service with an open mind, I anticipate gaining valuable insights and skills that will enrich my future journey.

In the face of detours, I find strength in adaptability. Rather than viewing these service years as a delay, I see them as an investment in a more holistic self. After that, I am eager to continue my education through MIT. I hope to bring unique perspectives and valuable lessons from my military service to share with my communities.

- Tell us more about why this field of study at MIT appeals to you.*100 words or fewer

After being a long-time robotics enthusiast, the first time I saw my creations truly unlock their potential was in the 2022 FRC competition. In this challenge, our team was tasked to craft a robot capable of shooting large balls into a small 9-foot-high hoop. Through astute design, iterative engineering, and meticulous fine-tuning, our robot not only worked, but surpassed our own abilities! Witnessing our creation outperform its creators showed me engineering and computer science's enchanting potential. Today, my sights are on goals that extend beyond conquering robotics tournaments. I aspire to pioneer robots, tools, software, and concepts that have the power to improve the world. To realize this vision, I understand that I must propel myself forward, refining my skills, expanding my knowledge, and amassing invaluable experience. In this endeavor, I wish to double-major at MIT in Mechanical Engineering - CIR [2-A/6] and Computer Science & Engineering [6-3]. Both these majors' focus on 'service to society' and interdisciplinary customization with their penchant for learning by doing' (130,000+ square feet of maker-spaces + more scheduled to open at the Met!!) inspire me to make solutions that once again pass our own boundaries, conquering the world's unsolved problems.

A notable moment in my robotics journey was 2022's FRC challenge: a robot to score large balls into a 9-foot-high hoop. Through clever programming, iterative engineering, and meticulous fine-tuning, our robot not only worked but outperformed our own abilities!

I once had a robotics challenge that required a robot to collect and launch large balls into a 9-foot-high hoop.

My experiences through competitive robotics, passion projects and various other explorations have shown me the enchanting potential of engineering and computer science. From these, I aim to pioneer technologies that improve the world. To realise this vision, I understand that I must propel myself forward, refining my skills, expanding my knowledge, and amassing invaluable experience. To help me, I seek a double-major at MIT in Mechanical Engineering - CIR [2-A/6] and Computer Science & Engineering [6-3]. These programs' focus on 'service to society' and 'learning by doing' (130,000+ sq-ft. of makerspaces!!) lead an exciting path to fruitful education with tangible impacts.

My experiences in robotics tournaments, passion projects, and other learning explorations have shown me the enchanting potential of engineering and computer science. From these, I aim to develop

technologies that improve the world. To help me, I seek a double-major in Mechanical Engineering - CIR [2-A/6] and Computer Science & Engineering [6-3]. I admire these programs' focus on 'learning by doing', like the 130,000+ sq.ft. of makerspaces which contribute to projects that demonstrate service to society. MIT's teaching style and their status as an active community contributor draw me to these exciting paths of a fruitful education with tangible impacts.

To embark on this journey, my sights are set on pursuing a dual major at MIT in Mechanical Engineering - CIR [2-A/6] and Computer Science & Engineering [6-3]. What beckons me towards these disciplines is their unwavering focus on 'service to society' and their ethos of interdisciplinary customization, fostering a culture of 'learning by doing.' The expansive maker-spaces, encompassing over 130,000 square feet and the forthcoming additions at the Met, serve as bastions of inspiration. They symbolize not only the tools but also the spirit of innovation required to fashion solutions that transcend our current boundaries, effectively addressing the world's most pressing and unsolved problems.

- **If you have additional information about your family that you think is important for us to know, please include it here.optional; 100 words or fewer**

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- **If there is anything we should know about your school's course offerings, extenuating circumstances regarding your coursework, or school's grading system, please use the space below.optional; 250 words or fewer**

- When I began high school, I was unfamiliar with the GPA system's nuances. It wasn't until midway through my 10th grade that I realised my school had unique GPA weighting for certain courses. For instance, I discovered that the most rigorous engineering class (which I had chosen) was awarded only 4.0 out of 5.0. Additionally, I learned that my mandatory physical education course, which I swapped for JROTC, could negatively impact my GPA unless I utilised a PE exemption form. Upon recognizing this discrepancy, I promptly adjusted my course selections for 11th grade onward. However, I acknowledge that my initial oversight had a slight adverse impact on my GPA and class ranking.
- Theatre has been a significant passion of mine since the beginning of high school. Unfortunately, due to scheduling conflicts arising from my participation in the IB Diploma Programme, I was unable to continue taking theatre classes from

11th grade onward. This same conflict also prevented me from enrolling in a debate class during my 12th-grade year as well as pursuing the IB-level economics course. Nevertheless, despite not formally being enrolled in theatre or debate classes, I remain connected to the theatre department and continue to lead the debate team. Furthermore, I am committed to enrolling in a non-IB economics class to further my understanding in this subject.

- **We understand that sometimes things outside of your control impact your ability to complete tests to the best of your ability. If you have an extenuating circumstance, such as exam cancellations or illness, please let us know here. optional; 150 words or fewer**

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- **JOBS**

- ION

The ION Prototyping Lab is a local makerspace. I restored their professional CNC machine for community use, maintained their industrial manufacturing & engineering equipment, and assist in their showcase/demo projects.

- Steps For Dancing

- SFD is my mother's dance school business. I designed and programmed stepsfordancing.com to create and maintain their online presence. I also handle some marketing activities. These actions have attracted ~20 new customers.

- Champion Cubers

- Champion Cubers is a small business I started which teaches children to speedcube (solve Rubik's Cubes as quickly as possible). I have had 11 clients through weekly online and in-person classes and one summer camp.

- Dwayne Publishings

- Dwayne Publishings is a local authoring business. I recovered their 8+ year old website from SQL injection spam attacks and re-made their entire e-commerce platform (with better security) to restore their online bookstore.

- **ACTIVITIES (4)**

- Discobots Robotics Team: 13 hrs, 40 wks

- Managing and mentoring 50+ people across 5+ high schools to design, build, and program 12+ internationally competing robots for FIRST (FRC), Vex (VRC), and combat robotics. Also conducted 20+ outreach programs for advancing robotics education impacting 700+ people.

- DiscoBots FRC, Vex, and Combat Robotics Teams

- Captain/President
- Managed 100+ members & 10 teams to create industrial-level, internationally accomplished robots; made team history in most awards each season.
- 14 hrs per week; 40 weeks per year.

- Lamar Competition Debate Team: 7 hrs, 37 weeks
 - Managing 30
- Projects
-

- **SUMMER ACTIVITIES (6)**

- Learning Convolutional Neural Networks (AI) in image recognition
- Travelled to India to reunite with my cousins and relatives.
- Attended the Rise Elite Tech Camp on a scholarship.
- Completed 2 hours of rigorous exercise per day.
- Built new websites to hone my web-development skills.

- **ONE MORE**

- **COLLEGE ACCESS PROGRAMS (3)**

- CIS
- Lamar College Corner
- Lamar Writing Lab

- **SCHOLASTIC DISTINCTIONS (5)**

- FIRST Awards Vex Awards
- Houston Resilience Design Challenge
- Veteran's Pin Finalist
- Rise
- NMSQT

- **NON-SCHOLASTIC DISTINCTIONS (5)**

- Debate Awards
- Speeches
- AAX
- CCZJV
- "Superior"
- AU Speech

- **We know you lead a busy life, full of activities, many of which are required of you. Tell us about something you do simply for the pleasure of it.*150 words or fewer**

Twice a week, I am captivated by my Rubik's Cube. While I spot patterns, make decisive moves, and solve complex positions, the joys of mastering this puzzle are amplified by shared adventures with my younger brother.

His fascination was piqued when I initially solved the cube in eight minutes, and he begged to learn from "the master".

Since that moment seven years ago, we've embarked on this journey together. As time passed, I turned this into a small business: teaching neighbourhood kids the art of speedcubing while he recruited friends to pay for lessons.

Yet, the heart of speedcubing lies in the pleasure of personal growth. I marvel at competitive solvers who breeze through within five seconds while my

best is only 28.3 seconds. Speedcubing reminds me to savour the journey at my own pace, a source of endless fascination that inspires me to enhance my skills along the way.

- How has the world you come from—including your opportunities, experiences, and challenges—shaped your dreams and aspirations?*225 words or fewer

A few months into my Taekwondo journey, I struggled to find my balance in a basic set of moves. While other instructors advised mere repetition, Master Blazek introduced a unique exercise. He asked me to kick a foam helmet while he tossed it into the air to exploit my over-rotation. This creative exercise helped rewire my muscle-memory to improve my balance, leading me to later win a Gold-Medal in the International Open Taekanagwon Poomsae Championships.

Three years later, I earned my first black-belt and was offered the privilege of becoming an instructor myself.

In one of my teaching-classes, I noticed a young student struggling to express energy in his forms. Spotting an old foam helmet in the corner, I got inspired for a creative teaching exercise.

Holding it loosely, I encouraged him to punch the helmet from my hands. Starting with lazy taps, the novelty of knocking the helmet away and watching me retrieve it infused him with newfound excitement. Gradually increasing his force, he built the confidence and energy necessary to push new vigour into his forms.

Master Blazek's mentorship has been a rewarding experience and an excellent opportunity. His technical proficiency, empathy, and care inspires me to be a "Master Goyal" to my peers. I aspire to carry a legacy of expertise, wisdom, and selflessness, empowering my peers to tackle extraordinary challenges together.

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- MIT brings people with diverse backgrounds together to collaborate, from tackling the world's biggest challenges to lending a helping hand. Describe one way you have collaborated with others to learn from them, with them, or contribute to your community together.*225 words or fewer

- 2587v
- As if not winning the Vex Robotics World Championship last season wasn't difficult enough already, I decided to add another challenge to this year's competition season, opening a brand-new team. The DiscoBots, the robotics team I lead, has inspired me with its foundations of outreach and inclusion, so I decided to extend this open-door mindset by opening a new robotics team aiming to enroll 80% of our team from other non-robotics-teamed schools. After getting approved by my teachers and coaches, the struggle began to recruit members. Collaborating with my school administration, I connected with the admin of other local highschools to host interest demonstrations. Although it was hard to get other busy students to join me in my passion for robotics, I was able to collaborate with my
- Whether I working with my cybersecurity club, tuning my competition robot, building a CAD model, or crafting computer programs, I am always looking for exploits to make the situation better.

I just got asked by my history teacher to

"Soumil, since you have already finished the worksheet of today, can you help move some supplies?". I agreed and was led down to the teacher's only storage area. "I want you to move all these plastic dividers, they are not too heavy but can be sharp, is that alright?", my teacher asked, pointing to a horde of some knee-high, u-shaped plastic things. "No problem," I replied, "who do I deliver it to?". "Just leave it in the hallway so the janitor can take it to the trash". When I asked why all those were being thrown away, she explained that my school had bought hundreds of these tabletop COVID Dividers to act as barriers between students and teachers during the pandemic, however, after their initial use, they were just collecting dust in all the teachers' closets.

"They could probably be used for something useful, though", I pointed out. "If you want it, you can keep them, but I need to get rid of it regardless." I used to take cardboard boxes from my

teachers home when i was younger to use as spare material for arts-and-crafts, however, the thick, heavy, hard plastic was not suitable for home use (and I didnt have time for arts-and-crafts anymore)

Last May, after finishing my work early in a class, the teacher asked me to move some plastic dividers. Originally used as u-shaped COVID-19 tabletop barriers, they were now collecting dust and taking up storage space. Although they were meant for disposal, their straight, thick, clean and strong plastic sheets struck the idea of taking them to the robotics team instead for use as a stock material. This was especially useful since the 'supply chain crisis' was affecting our team's delivery of materials. In this way, I decided that each divider, once a pandemic safety fixture, can now bolster the engineering classroom's and robotics team's arsenal of materials. After taking the teacher, I enlisted the help of Guillermo to help carry the 7 dividers. I knew picking Guillermo was a good choice because out of all the robotics team members, he was the only dedicated 10th grader, and 10th graders had already finished their exams (so it was more likely he could help me during this class).

Arriving a few minutes after my message, his face marked recognition at the sight of the plastic "my teacher has a bunch of those too!". After we moved them into our robotics room, he mentioned "while we are both out of class right now, and there are still 20 minutes left, let's see if we can grab some from my teacher as well." When arriving to his teacher, not only did he give us his dividers as well, (now making a total of 12), but he was interested in our work and reasoning behind this activity. Inspired by the teacher's interest, I requested his help in our initiative by telling us where we could find a few more dividers, and he assured me he would think about it.

The next day, I found 4 new emails in my inbox from various other teachers asking me to clean their closets of the dividers. Turns out, Guillermo's teacher had sent a call for dividers across the whole 10th grade department. By the time school ended on that day, we ended up with almost 40 dividers recycled, and the 'Screen Salvagers' project was born. From that day forward, Guillermo and I were able to assemble a team of collectors and a steady stream of more hidden COVID Dividers. Additionally, an administrator later found out about our actions and was able to guide us by pointing out more sources of waste plastic in school signboards that we were able to use.

Till now, we have been able to collect 400+ pounds (180+ kg) of polymethyl methacrylate (PMMA), polycarbonate, and other plastics which have found a second life in structural robotics and engineering education applications in our school. Reflecting back on this ongoing journey I can see that our success came from many branches of collaboration. My initial teacher's willingness to collaborate with a high-schooler's impulsive idea, Guillermo's contribution through his helping hand and his proactive teacher, that teacher's acceptance of my request, our teammates who decided to join the mission, and many other teachers'/admins' furthering of our collection.

This collaboration taught me

Last May, my teacher requested help in disposing of COVID-19 tabletop dividers. Despite their intended disposal, the straight, sturdy plastic sheets sparked an idea for these dividers to be repurposed as stock material within our robotics team, easing our supply-chain-crisis-induced resource shortages.

First, I sought assistance from Guillermo, a dedicated sophomore of our robotics team. His willingness to lend a hand was crucial, and as we transported the dividers, Guillermo's recollection of similar dividers in another teacher's storage sparked an impromptu idea to expand our exploration.

Approaching Guillermo's teacher, we not only secured additional dividers but also piqued her interest in our endeavour. She later made a call asking for dividers to the whole 10th-grade department leading to a domino effect and an administrator even directing us towards other sources of plastic waste like discarded school signboards.

Reflecting on this ongoing journey, it's clear that our success stemmed from a network of collaborations: from my initial teacher's openness and Guillermo's proactive approach to the ripple effect sparked by collaborations with teachers and administrators who contributed to our cause.

Through these collaborative efforts, we eventually evolved into the 'Screen Salvagers' project, gathering a larger team to further our collection. So far, we have saved 400+ pounds of polymethyl-methacrylate (PMMA) and polycarbonate that have found a new life in our school's past, current, and future engineering projects.

- How did you manage a situation or challenge that you didn't expect? What did you learn from it?*225 words or fewer

None of our family knew what to expect, especially against days of dwindling resources and no electricity or water. This is because my family and I were facing the Texas Winter Freeze Disaster.

One challenge was the pipe failures forcing a ration of 2 water-bottles per day, but this was the easy part. Nonfunctional plumbing also eliminated flushing. At my suggestion, we reluctantly installed plastic bags in the toilet bowls to hold our waste in and tie that bag up for later disposal.

Meanwhile, the power-outage meant that we couldn't cook any meals on our electric stoves. Fortunately, I remembered the propane burners from my boy scouts supplies to cook up soups, eggs, and breads.

I also initiated some entertainment, as working through these problems still left plenty of empty time. Bringing out board games, crafts, and cards, it was rewarding to see hours of fun each day. This morale boost enabled us to face other oncoming disaster challenges.

Despite the bags of human waste, lukewarm meals, and cards played through woolen-gloved hands, we eventually left home to find shelter elsewhere anyways. This experience taught me gratitude for my amenities, the value of resourcefulness, and the gift of finding joy through crisis. I now recognize that these principles were crucial in my future successes, where I conquered other unexpected challenges with appreciation, adaptability, and awareness.

When the Texas Winter Freeze Disaster struck, my family and I were unprepared for the ensuing chaos.

One challenge was the pipe failures, forcing a ration of 2 water-bottles per day, but this wasn't the hard part. Nonfunctional plumbing also eliminated flushing. At my suggestion, we reluctantly installed plastic bags in the toilet bowls to hold our waste in and tie that bag up for later disposal.

Meanwhile, the power-outage meant that we couldn't cook any meals on our electric stoves. Fortunately, I remembered the propane burners from my Boy Scout supplies, allowing us to cook soups, eggs, and bread.

I also initiated some entertainment, as the lack of internet left plenty of empty time. Bringing out board games, crafts, and cards, it was rewarding to see some smiles despite our dire situation. This morale boost enabled us to face other challenges with a clearer mind and give us some fun memories of family-bonding time.

Ultimately, even after the bags of human-waste, lukewarm meals, and games played through woolen-gloved hands, the situation kept worsening and we had to find shelter elsewhere. This experience taught me gratitude for my amenities, the value of resourcefulness, and the gift of finding happy moments in crisis. I now recognize that these principles were

crucial in my future successes where I conquered other unexpected challenges with appreciation, adaptability, and awareness.

- No application can meet the needs of every individual. If there is significant information that you were not able to include elsewhere in the application, you may include it here. (Many students will leave this section blank—and that's okay.) 350 words or fewer

- As mentioned in my 'military service' essay, I was born in India, moved to Singapore, and now living in the US. One unique result of this is my proficiency in Hindi, English, and Mandarin. I hold the traditional backgrounds and perspectives of my heritage to be very valuable. This is one of the reasons I maintain a native proficiency in my mother tongue, Hindi. Along with this, my education has been in English, so I am also natively proficient in English. However, after immigrating to Singapore, I decided to pursue learning Mandarin so I could better connect with the vast majority of Singaporeans who are Chinese. Even after advice against learning this impossible language at that late age (especially since most Singaporeans speak English anyways), I worked hard to learn the language and surpassed some native speakers of my age. Although I am now in the US, where I lack much incentive to keep up my Mandarin, I still practise and improve. I have written essays, won speech contests, and can hold a proper conversation in Mandarin. I am especially proud of this skill because I do not have any Chinese relatives/background to build off of, I instead had to start independently and have successfully reached a respectable position.

In my 'military service' essay, I highlighted my upbringing: born in India, then a citizen of Singapore, and currently in the US. This journey honed my proficiency in Hindi, English, and Mandarin.

I deeply value my heritage's traditional backgrounds and perspectives, fostering native proficiency in Hindi. Simultaneously, my education in English nurtured a natural fluency in the language.

Upon moving to Singapore, I made a deliberate choice to learn Mandarin to better engage with the predominantly Chinese community. Despite discouragement due to my age and the prevalence of English, I dedicated myself to mastering the language. Despite the reduced incentive in the US, I continue to practise and enhance my Mandarin skills. I can win speech contests, compose essays, and hold fluent conversations in Mandarin. This accomplishment is particularly meaningful as I lack any Chinese background or familial support, starting from scratch and achieving a commendable proficiency independently.

- I once read in a blog that "MIT is where science and society meet". Hopefully I was able to give some insight into my sciency mindset till now, so I wanted to highlight the 'society' part a bit more with my community service hours log: <https://docs.google.com/document/d/1NMJOxV938IkRo2drqXECyAFeHCo1ZYmL/>.
- In my activities section, I have mentioned 'Robust Adaptive Network (RAN)' and 'Pedal Power', these are my two most proud passion projects. Inspired by my family and friends' experiences in the Mumbai Floods, Turkey Earthquakes, Hurricane Harvey, and Winter Storm Uri, RAN is a system of

drones and rovers that can deliver supplies, provide satellite communications, and relay live data during a natural disaster. It is a patent-pending upgrade to disaster response technologies which I am developing with the support of the Mayor of Houston's office, the Taco Bell Foundation, ION, and more.

Pedal Power is a separate project I have made for my school. It is a stationary bicycle that charges one's electronic devices through their own pedalling. After coming up with this project, I won \$750 from the National Wildlife Federation to implement the project that now encourages exercise, demonstrates off-grid power solutions, and raises awareness of electricity wastage.

Thanks for reviewing my application!

- Mindset
 - Initiative
 - Risk taking
 - interdisciplinary/Balance
- Community reciprocation

- In my 'military service' essay, I highlighted my upbringing: born in India, then a citizen of Singapore, and currently in the US. This journey developed my proficiency in Hindi, English, and Mandarin.

I deeply value my heritage's traditional backgrounds and perspectives, fostering native proficiency in Hindi. Simultaneously, my education in English nurtured a natural fluency in this language.

Upon moving to Singapore, I made a choice to learn Mandarin in order to better engage with the predominantly Chinese community. I dedicated myself to mastering this language. Although there is less incentive to maintain my mandarin in the US, I continue to practise and build my Mandarin skills. Today, I can win speech contests, compose essays, and hold fluent conversations in Mandarin. This accomplishment is particularly meaningful to me because I lack any Chinese background or familial support, making it even harder to learn the 'hardest language in the world'.

- In my activities section, I mentioned 'Robust Adaptive Network (RAN)' and 'Pedal Power'. These are my two most prized passion projects.

Inspired by my family and friends' experiences with the Mumbai Floods, Turkey Earthquakes, Hurricane Harvey, and Winter Storm Uri, RAN is a system of drones and rovers that delivers supplies, provides satellite communications, and relays live data during a natural disaster. This project won \$1500 in the National Ambition Accelerator competition (as noted in the distinctions). I am developing this patent-pending upgrade

to disaster response technologies with the support of the Mayor of Houston's office, the Taco Bell Foundation, ION, and more.

Pedal Power is another project I founded. It's a stationary bicycle that charges electronic devices through the rider's pedalling. This is project won \$750 from the National Wildlife Federation for its implementation (as noted in the distinctions). Pedal Power has now been installed in my school's common area, it encourages exercise, demonstrates off-grid power solutions, and raises awareness of electricity wastage.

- I once read in a blog that "MIT is where science and society meet". I wanted to highlight the 'society' part a bit more with my community service hours log:

<https://docs.google.com/document/d/1NMJOxV938lkRo2drqXECyAFeHCo1ZYmL/>.

Thank you for reviewing my application!

VIDEO:

- Hello everybody! In this video, I will be sharing a 'maker's portfolio' focusing on one of my recent robotics projects: the climbing system on my Vex team's current competition robot.
 - Although I have many projects that surpass the relatively low technical complexity of vex robotics, I want to focus more on the engineering design process rather than the advancedness of the product in this portfolio.
 - And even though I apply this engineering design process to all my adventures, this is the project that I had the most pictures/videos of, so let's begin.
- First, some background:
In this year's vex robotics competition, teams are tasked to make a robot that scores points by scoring green balls and ascending a climbing pole.
Here, I am focusing on the pole.
Noting that, let me cover the actual robot now. The first step to actually building any system is evaluating the goals and constraints:
 - 1We are restricted in the max size of the robot
 - 2We cannot touch the yellow cap at the end of the match
 - 3The mechanism has to grip tightly
 - Especially since the pole is glossy, not rough
 - 4And we must find a way to lift this 7kgs robot with the limited strength of the Vex robotics motors
- Its clear that the challenge will be tough.
 - Foldable arm
 - This foldable arm design involved keeping the arm folded down to roam within the size limit, but expand the arm once it was time to climb
 - We even designed a solid over-centerred locking claw for this idea
 - But it didn't work because the length of the arm bent the metal before we lifted off.
 - Chain Bar Arm
 - So, trying another arm, we reached the chain bar design. It boasts a much more robust, yet shorter arm.
 - The problem with this was that the arm's lengths induced too much torque demand that we couldn't meet.
 - Geared Wheel
 - Realising this, I decided to scrap the initial instinct of going with the arm, and instead focusing on a simpler wheel that could roll us up.
 - The result was promising, as you can see in this initial test, but we cant use our hands in the real competition! We needed some type of rolling claw
 - Final
 - To fix this, we swapped the massive gears for smaller, sprockets
 - This gave us room for the assistive claw!
 - So after fixing some other miscellaneous issues like this deadly gear separation... and this horrid noise... we finally had:
 - A successful climb!

- I carry a box around with me at all times. You may think “that’s inconvenient!”, but my box is quite lightweight, very aerodynamic, and (most importantly) I have been carrying it around for a long time. The trick in being able to keep carrying this box around is to ensure that anything stored in this box is quickly passed out.
- I have never lost a chess game to Magnus Carlsen, but if asked to defend my undefeated title, I would embrace the opportunity. This is not because I am arrogant or overconfident (that man can tell the best move in position when I haven’t yet registered whether the board is chess or checkers!), nor is it because I dream of Carlsen’s hand

specifically. Rather, it's because I would be accomplishing an aspect of my dream where I aspire to keep tackling new challenges.

How did you manage a situation or challenge that you didn't expect? What did you learn from it?"

Two years ago was the first time I experienced snow: it was a disaster. The experience of feeling that soft white powder was definitely surreal, but the frightening experience was even more real. This is because I was facing the Texas Winter Freeze Disaster. Before the storm hit, I decided to fill our home bathtub with water (to have a backup water supply if the plumbing doesn't survive). However, my mother said we already have a crate of water in the car, my father didn't believe the pipes would fail, and my brother was afraid it may be a waste of water. Unfortunately, they were wrong. The next day, power was out and all taps were down to a trickle. Importantly, this was not the time for me to hold a grudge. I swiftly activated all home faucets, ensuring that we can make use of the little water left. After about 30 minutes, there was no longer a flow from the tap, but we now had some full water bottles, a pail, and a half-filled tub. The next morning, that half-filled tub turned into a wet puddle. Seems like there was a leak that slowly drained the tub overnight. Refusing to be defeated, I scoured for other sources of liquid in the house. I found some juices and milk in the fridge, and then I had a brilliant idea: the ice dispenser! I collected as much ice as I could before it melted. That ice saved us for another day. This experience was more than just disaster tips & tricks, it was an important example of the value in making quick decisions, taking the initiative, and keeping a functional, calm mind during times of stress. I recognized that the incident, many of my future successes and achievements were attributed to adhering to these lessons, it allowed me to think more deeply, in the same way I was able to find more magic from the ice than with the snow.

Two years ago was the first time I experienced snow: it was a disaster. The experience of feeling that soft white powder was definitely surreal, but the days of dwindling resources and no end in sight was even more real. This is because I was facing the Texas Winter Freeze Disaster. Before the storm, I decided to fill our bathtub with water to have a backup supply in case the plumbing failed. However, my family refused. They believed we already had a crate of water in the car and doubted that the pipes would fail. Sadly, they were wrong. The next day, power was out, and the faucets barely trickled water. In a moment of crisis, I sprang into action, opening every faucet to maximize our remaining water supply. Despite the dwindling flow, I managed to secure several water bottles, a pail, and a half-filled bathtub. The following morning, I discovered a leak had drained the tub overnight, leaving only a puddle. Undeterred, I scoured the house for other sources of liquid, finding juices and milk in the fridge. A brilliant idea struck me: the fridge's ice dispenser! I collected as much ice as I could before it melted, which sustained us for another crucial day. This difficult experience was more than just a lesson in disaster preparedness; it underscored the importance of quick thinking, initiative, and a composed mind in moments of crisis. I now recognize that these principles were crucial in my future successes, enabling me to find hidden opportunities even in the midst of adversity. Just as I discovered more magic in the ice than in the snow, I uncovered a deeper reservoir of resilience within myself through this ordeal.

Two years ago, I experienced snow for the first time in my life. It was not a pleasant experience. I was caught in the Texas Winter Freeze Disaster, which left me and my family without power and water for days. Before the storm, I had the foresight to fill our bathtubs with water, but no one else supported my idea. They thought we had enough bottled water, or that the pipes would not freeze, or that it was a waste of water. They were wrong. The next day, the faucets stopped working and we had to rely on the water I had stored. However, one of the bathtubs had a leak and we lost half of our supply overnight. I searched for other sources of water in the house, such as juice, milk, and ice from the fridge. The ice was especially valuable, as it gave us another day of hydration. It was more precious than the snow outside.

Two years ago, I saw snow for the first time in my life. It was not a pleasant experience. I was in Texas during the Winter Freeze Disaster. The snow felt soft and surreal, but the reality was harsh and scary. We had no power, no water, and no idea what to do. I had tried to prepare for the storm by filling our bathtubs with water, but my family didn't support me. They thought we had enough water in the car, or that the pipes wouldn't freeze, or that we were wasting water. They were wrong. The next day, the water stopped running and we had to use whatever we could find. I managed to fill some bottles and a pail before the taps dried up. But then I discovered that our tub had leaked overnight and we lost half of our water supply. I didn't give up. I looked for other sources of water in the house. I found some juices and milk in the fridge, and then I had a brilliant idea: the ice dispenser! I collected as much ice as I could before it melted. That ice saved us for another day. It was more precious than the snow outside.

Amongst the preparations, I decided to organize and distribute flashlights and batteries (whenever it gets dark and the power is out). However, as I gathered all the supplies, I realized that we were short 2 AA batteries. Refusing to panic, I looked through all the remote controlled car toys: none in there. Opened up all the TV remotes: wrong size cells. Refusing to be defeated, I thought for a while on my available options; perhaps I could charge up all laptops and power banks to act as reserve power for phone flashlights... but that phone charge is probably better used in case of emergency. Instead, I decided to gather all matches, candles, and lighters as an illumination solution, but while walking to the drawer, the thermostat caught my eye. The AC thermostat used 2 AA batteries!

Twice a week, I have the power of 43252003274489856000 possibilities in my hands. Noticing patterns, making decisive moves, and solving complex positions, I am conquering my favourite toy: the Rubik's Cube.

Besides the enthrallment in repeatedly solving an impossible problem, I enjoy speedcubing because it reminds me of time well-spent with my younger brother. After witnessing my initial accomplishment of solving the puzzle in under 8 minutes, he pleaded to learn from "the master". Ever since that time 7 years ago, we have progressed through this journey together. Some years later, I even made a small business out of teaching neighbourhood kids to speedcube, and he convinced a few of his friends to join.

Perhaps most importantly however, speedcubing is fun as it's an essential reminder to me of my potential to improve, and the long journey I still have. Competitive solvers complete the solve in less than 5 seconds! Even hobbyists effortlessly perform sub-20-second solves. On the other hand, my average hovers in

the 30s and 40s with my personal best being 28.3 seconds. Speedcubing is a comforting avenue of an interesting hobby I don't have to compete for and an indication to take my time to enjoy this journey along the way.

“Let's walk around this way” someone says, but I can't hear them. While all others are on their detour, I am spellbound to this hulking giant. Its rusty forks unfold with a practiced ease, aligning perfectly with the sleeves of the commercial waste unit. The machine raises this vessel with a confidence born of experience, feeling the weight through the depression of its front-axle suspension. A tonal battle-cry echoes as the truck maneuvers backward for its full range of motion, emitting a series of 'beep beep beep' signals. Once in the perfect position, the hydraulic arms spring into action, swinging the massive load over the front, creating resonating clanking vibrations that ripple through the surroundings; turning the mundane act of waste disposal into my captivating spectacle. As the payload is turned upside down, it's hung high over the receiving hopper, dumping the avalanche of waste. In this moment, the dump truck is more than just a machine; it's a reminder of my identity, interests, and mindset.

Whenever I find a fascinating piece of software, structure, or science, I lose track of time putting myself in the position of that product developer. I observantly ponder on the foresight the engineers had to make sure that the garbage truck's forks are still usable even if the vehicle is on an incline. I admire the programmers that created robust threads of continuous sensor-checks that protect from thousands of failures. I look up to the designers that had to make sure the garbage truck's center of gravity would remain positioned well enough that swinging the heavy bin over the front wouldn't be a hazard.

All of these ingenious thinkers juggled countless factors like durability, cost, safety, manufacturing difficulty, regulations, repairability, and time-constraints to finish this spectacular product; an invention that performs as the backbone of essential infrastructure. As I look up to being part of that impactful community, I am also continuously thankful that I have the opportunity to lead in a similar way. From my current experience as the team captain of a large, growing robotics team, I practice the intricate trade-offs, balances, and decision making required of a successful leader. I manage 50+ students across 7 separate schools to develop industrial-level, internationally competing robots.

I regularly come across crossroads where all decisions come with a list of cons and wishes of pros. Every path is uncertain: every path looks good, yet every path seems bad. Although such a position repels the majority of minds, I find myself, again, spellbound by the role of this leader. I swiftly, yet level-headedly, analyze possibilities to proceed on the best path, conquering obstacles, failures, and surprises along the way. Rewardingly, these successes never happen alone, in the same way that garbage trucks don't function without waste containers, and how the whole system doesn't work without landfills. Whether it's friends, colleagues, acquaintances, or rivals, I recognize the vitality of collaboration and work with all to achieve greater accomplishments.

Additionally, as I advance through this maze of choices, I make use of my deeply reflective nature to squeeze all the lessons learned from any result through the process. This builds a collection of clues and maps, an arsenal of experience to guide future journeys. Moreover, I am always ready to discard any opinion or notion proven wrong along the way, disciplining myself that my attachment to any beliefs should not restrict my potential and my actions.

This combination of observation, decision-making, leadership, and reflection is a core talent so meaningful to me, that all my successes are attributed to this critical mindset. More importantly, all my failures are systematically reflected upon and built from to enhance my overall foresight and character for the future. With this talent, a cornerstone of my identity, I hope to create for the world many collections of new, insightful developments, providing others the opportunity of finding their own version of my dump truck.

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Outline

One paragraph - identity

Intro

Chronology

Early childhood experiences of engineering

Middle school

High school

3 examples of engineering experience / accomplishments and connect them to identity / interest