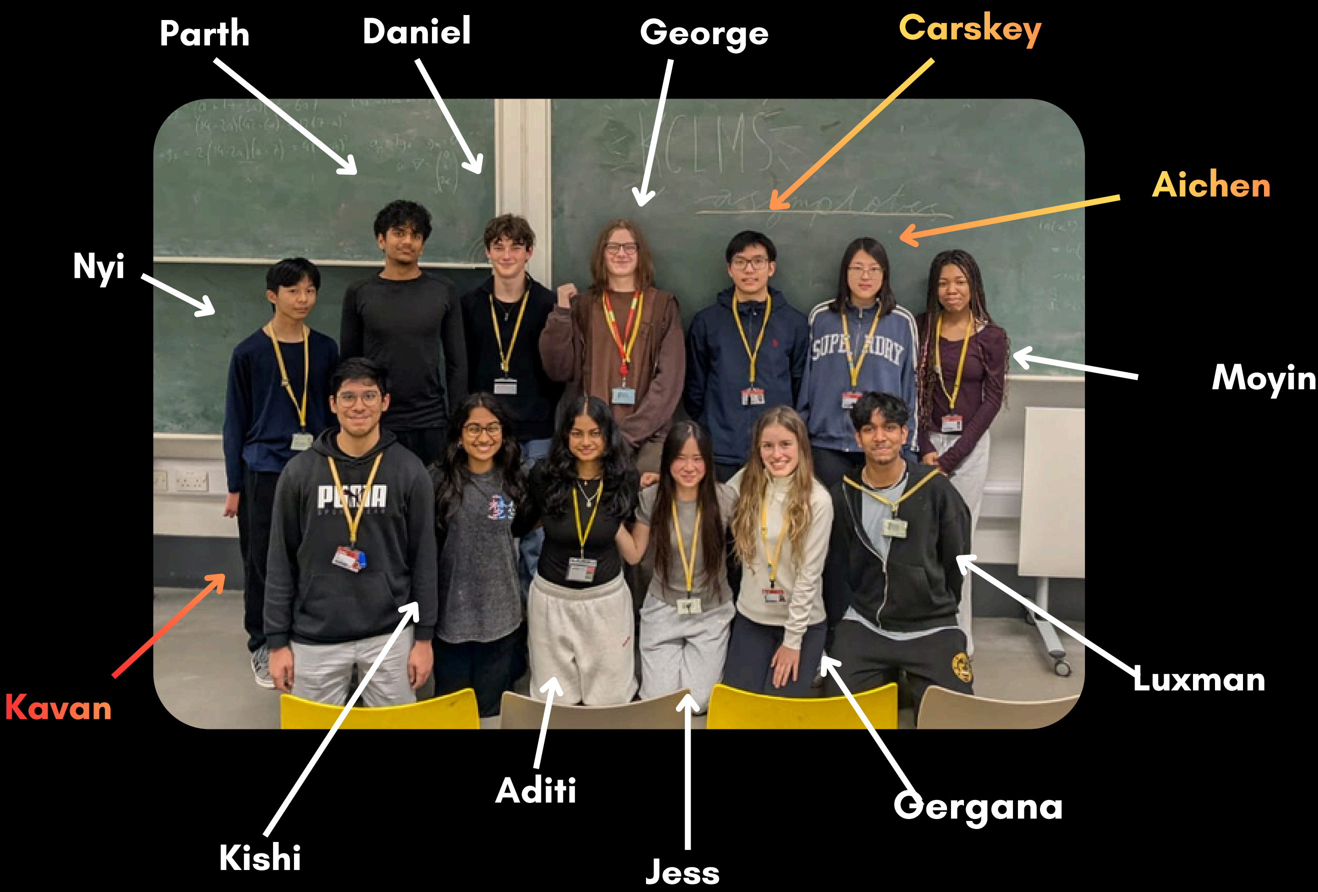
KCLMS ASYMPTOTES

ENGINEERING PORTFOLIO #32981

Meet KCLMS Asymptotes

KCLMS Asymptotes is a **rookie team** representing King's Maths School's entry into robotics. Drawing on prior experience in robotics as a hobby and passion for applied engineering, we're a team that combines mathematical precision with hands-on experience. Our name, **ASYMPTOTES**, reflects our continuous approach towards excellence – always striving, always improving, but never quite reaching the limit, as there's always more to achieve.

As a rookie team, we're not just competing—we're **establishing a legacy of robotics** at KCLMS that will inspire future generations of engineers and innovators.



Mechanical

Carskey (Team Lead) - Designer, CAD, Builder, Finance team
Aichen (Mechanical Lead) - Designer, CAD, Builder
Aditi - Builder, Auditor, Tester
Parth - Builder, Outreach, Tester
Luxman - Builder, Outreach, Portfolio team
Adam - 3D printing, CAD
Nyi - CAD for Turret and Intake wheels
Mustafa - Maths calculations, 3D printing

Programming

Kavan (Programming Lead) - Programmed drivetrain, Vision, managed GitHub
Gergana - Programmed Shooter and odometry, Portfolio team, Outreach team, Builder, Driver
Jessica - Programmed Intake, Portfolio team, Builder
Kishi - Programmed Vision, Lead for Autonomous, Finance Team
George - Programmed Vision, Finance Team
Moyin - General Programmer, Social Media Team
Daniel - General Programmer

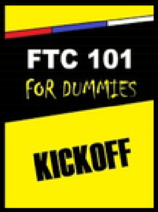
Timeline

October

We **established our workflow** using OneNote, SharePoint, and WhatsApp to ensure seamless communication. The team was structured into four specialized branches: Engineering, Programming, Finance, and Media.

November

By November, we **launched our website and Instagram** to kickstart outreach and sponsorship efforts. This month was largely spent studying Java, CAD and 3D design, making sure everyone in the team had a solid foundation.



December

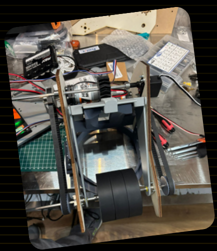
Initial sketches and designs done using Fusion360, whilst the programming team tackled java to program the required mechanisms. This was a pivotal month as, through **a school bake sale** and securing our first corporate sponsor, **Record Financial Group**, we successfully funded our initial hardware orders.

January

After a lot of dedication and hard work, we were able to **finalise the CAD designs** and finish the main programming sections for our bot whilst we awaited the second order of parts to arrive.

February

As most of the parts have now arrived, the engineering team was able to **begin assembling** the bot, mainly the shooter and turret component. During this, the programming team focused on finishing off the program for **autonomous part**. With this, our outreach team arranged many **virtual meetings with other teams** to discuss strategies and ideas.



March

Finally, with less than a month before our competition, we were able to complete **assembling the bot**, finishing intake and drivetrain. This allowed for vital drive practice and **collaborative testing**. Another successful milestone was reaching **over 100 followers** on Instagram, expanding our reach beyond just the STEM community!

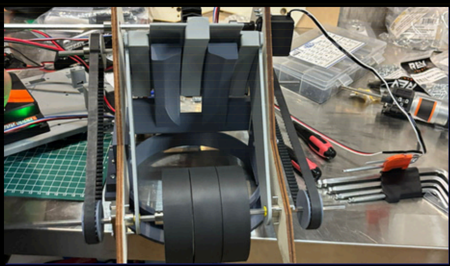
Competition Day!!
28/03/26 Sutton Tournament

Team Plan & Goals

THINK

In our inaugural year of competition, KCLMS Asymptotes aim to fully engage in and experience all the exciting aspects that FTC has to offer. Throughout our portfolio, we share the raw and unfiltered journey of building our bot. It captures the **challenges** we faced, **mistakes** we made, and **lessons** that we learnt along the way. From early setbacks by our budget, to breakthrough moments after testing, this report reflects how we navigated our rookie season, adapted as a team and grew stronger, and closer after every obstacle.

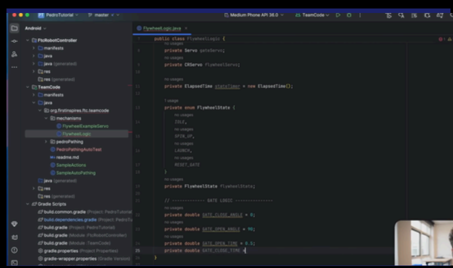
MECHANICAL



- To improve **collaboration** and **communication** within the team to meet design and assembly deadlines,
- To develop a reliable and **efficient robot** by testing and iterating designs, constantly improving them.

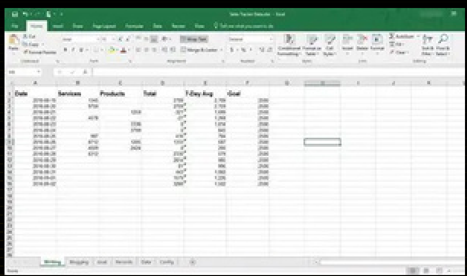
PROGRAMMING

- The programming team's objective is to write clean, efficient and readable code that will help **maximise the performance** of the robot
- Test and refine the **autonomous** and **driver-controlled** routines to ensure that it is consistent
- Work with the engineering team collaboratively so that the software and hardware **integrate smoothly**.



- **Organisation - GitHub, version control**
- **Teamwork - multiple people working simultaneously, collaborative approach using whiteboards**
- **Code Cleanliness - following conventions, different classes for different subsystems**
- **Reliability - constant testing and debugging**

FINANCE



- Ensure that we manage the team budget effectively by keeping **track of our expenses** and funding
- To actively **research** sponsorships and fundraising opportunities
- Maintain transparency and clear reporting to help the team plan and **prioritise** the most important purchases.

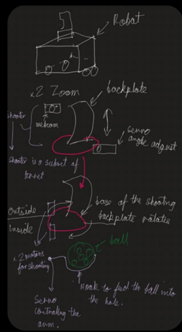
OUTREACH

- To organise and participate in more events that promote STEM, FTC and robotics in general in the **wider community**
- Increase **team visibility** through social media, presentations, and our website.
- To build **partnerships** with more schools, local organisations, and other teams to expand our impact, and possible attract sponsors.

Design Approach

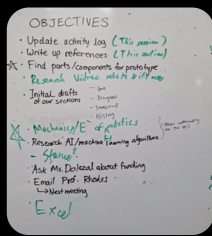
We define a specific mechanical challenge on the field—such as inconsistent intake or high-center of gravity—and establish the constraints we must work within.

The team generates a wide variety of ideas and concepts for mechanisms collaboratively on whiteboards without immediate judgement to ensure all potential solutions are explored.



MECHANICAL

Identify a problem → **Brainstorm** → **Weight up Pros and Cons** → **CAD** → **Build & Test Prototype** → **Reflect & Improve**



- Rigorous field testing
- Gather real-world performance data via telemetry
- Analyse test results to pinpoint failures or inefficiencies, then refine the design

We create a precise 3D model of the mechanism to verify fitment, ensure proper clearances, and streamline the manufacturing process.

PROGRAMMING

From the get go, we decided to adopt a **modular, object-oriented** architecture. By decomposing the robot into **discrete subsystem classes** (Drivetrain, Turret, Intake, etc.) and orchestrating them through a designated Red-Blue Teleop Opmode we achieved **high code reusability** and significantly reduced the risk of **regression errors.** This design allowed our software team to develop and test hardware features **in parallel**, accelerating our iteration cycle.

Level 1: OpMode

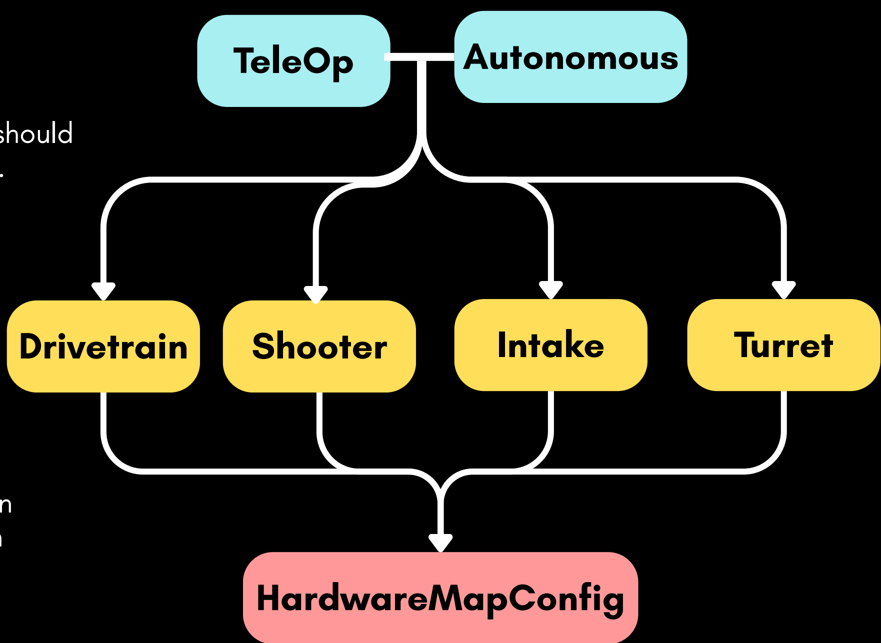
This is the only file the human driver actually touches on the Driver Hub. It decides **what** should happen and **when**, rather than how it works.

Level 2: Subsystems

Each of these java files contain the maths and logic for that specific mechanism.

Level 3: Hardware Configuration

Maps our java variables onto actual ports on the Control Hub. Instead of every subsystem referencing the hardware, we have a centralised location to do this.



Robot Design

Adjustable Hood

We decided to go with an adjustable hood to explore close and far zone shooting.

Backplates with Compression

After realising that we needed compression on our backplates we tested 5, 6, 7, 8, and 10mm compression and decided on 8mm compression.

Flywheels

We decided to use three flywheels to maximise contact surface. However when testing we found the grip wasn't sufficient which is why we added silicone tape onto the rims.

Lazy Susan Bearing

When doing our research into turret designs we decided that a simple off-the-coutner lazy susan would be sufficient for our purposes.

GT2 Belts

We found that HTD Belts were not sufficient in high speed applications like in our intake and transfer system which is why we decided to use GT2 2mm Belts wherever we could while using a belt tensioner calculator to ensure proper wrapping and tension.

Plywood Plates

We decided that extrusions and U channels were not flexible enough for our Intake and Transfer system which is why we decided to use plywood plates for our parallel plate drivetrain as well as all the other plates you can see with an eventual goal to move to aluminimum plates.

Vectored Intake Wheels

We found that vectored intake wheels to funnel the ball into the middle worked better than simple wheels with wedges on either side.

Bearing Inserts

When building we found that the clearances on the MDF Plates were often off by a little causing our flanged bearings to fall out which is why we decided to design inserts with a press fit clearance to ensure the bearings stay put!

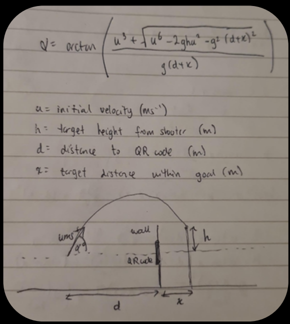
THINK

Shooter

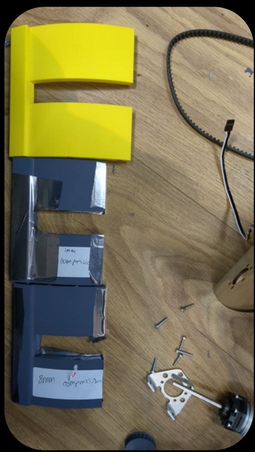
Objective: to ensure our trajectory was **adjustable** and stable **launch velocity**, with **consistent** shots

Initial design: A single fixed hood

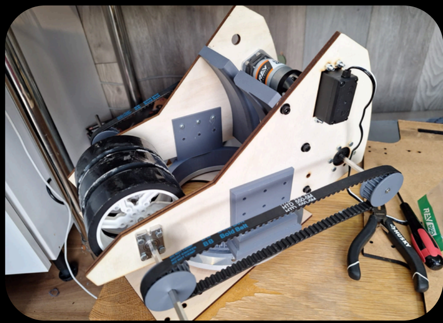
- Used a change of **speed of the flywheels** to get a difference in trajectory.
- **Trajectory variation** hindered our robot



Trajectory Mathematics



Some off our shooter plates with different compressions



Research:

- Realised an **adjustable hood** would be best, so we researched and tested ways.
- Consequences **like slower hood adjustments** led us to settle on our **current design.**

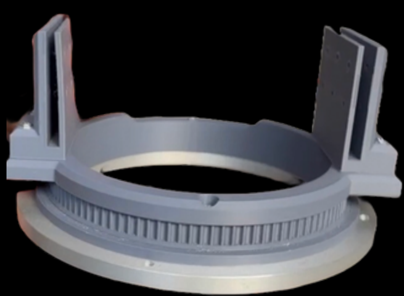
Testing outputs:

- **Maximum height was too low**, not enough interaction with the flywheel and the ball, so we added **high-friction tape.**
- Backspin was also an issue that **reduced the range the ball** could travel which is why we added **aluminium tape to reduce friction.** In the future we intend on having **backrollers** to counteract the backspin more consistently.
- **Excessive compression** lead to varied launches, **lower exit velocity**, so we **re-machined plates to lower compression**
- **Shooter angle** was too high reducing **maximum height**

Turret

Our initial design (fixed shooter) **lacked efficiency** as the whole robot had to pivot to aim.

To allow rotation we used a **Lazy Susan Bearing** as it allowed a **smooth rotation**, with even **weight distribution**.



It allowed **effortless** and **consistent** rotation which we were able to aim however we want

Problems and fixes:

Lack of tension of the pulley was an issue so we had to **recalculate** the pulley size and type. We also **experimented** with **HTD** and **GT2**

One problem was the ball **colliding** with the **turret structure** due thus we had to **realign our turret.**

Another probelm we had was the ball **struggling to reach** the shooter. To combat this, we changed the turret from **belt to gear**. This allowed us to shorten the height of our shooter

THINK

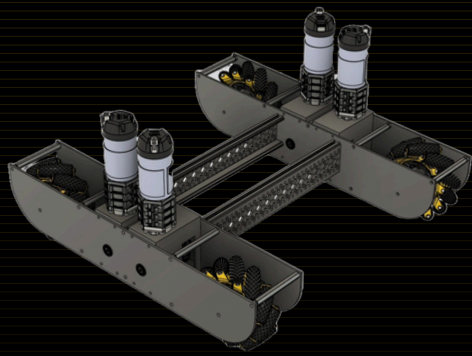
Drivetrain

Our drivetrain went through many stages of iteration, as it is vital to have the best drivetrain possible.

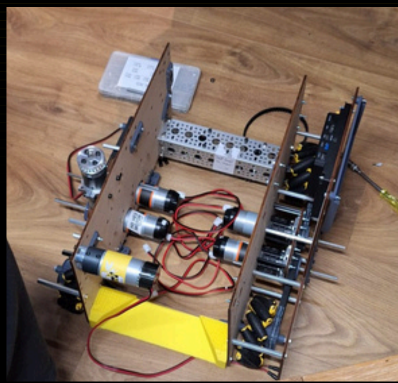
Lack of **internal space for mechanisms** meant difficulty accessing components for improvements and maintenance. So we **changed** from a H-shaped channel frame to a **U-shaped frame**.

Original parallel plates were about 75 mm long. After removing the gearbox, we **increased** the **plate height** to about 205 mm. The **taller** plates increased space and supported a longer intake ramp.

The **lack of a narrow drivetrain** was an issue, so we **changed** our **bevelled gearboxes** to **motors that slot** directly into the frame, leading to a **consistent route** for the ball reducing the chance of jamming and increasing the reliability of intake.



First design of drivetrain

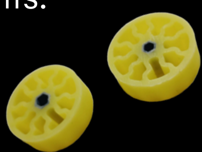


First time testing

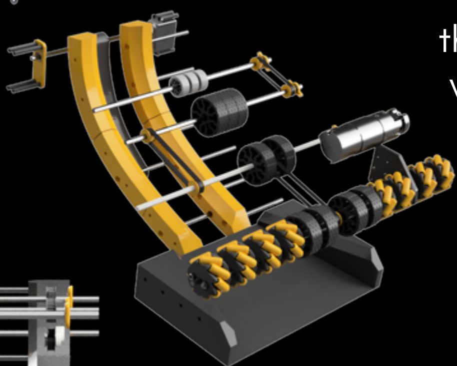
Intake

Through stages of iteration, we decided on wheel-based intake. Our initial designs led to **inconsistent entry** of the ball. Thus we had to keep testing and iterating.

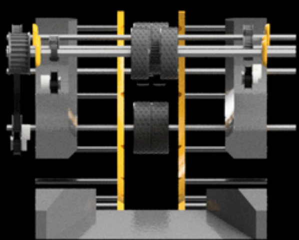
We **3D-printed moulds** to make our **silicone wheels**. This controlled wheel shape, grip properties, rigidity based wants.

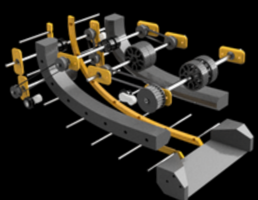


Latest Version of our CAD



We have **vectored intake wheels** with angled rollers to have a **controlled ball path** even in match conditions, **stopping jammings** and **collisions**.





Some iterations

We had issues with the ball getting **stuck through intake**, as the ball wasn't getting enough time on the intake wheels. This meant it struggled to **reach** the shooter.

We overcame this by **adding** a **servo arm**, to help push the ball up to the shooter, as well as adjusting the height of our shooter.

This was a significant design iteration that required however, we worked as a team to **consider multiple different approaches** before committing to the redesign, highlighting our ability to adapt and collaborate effectively.

Programming - TELEOP

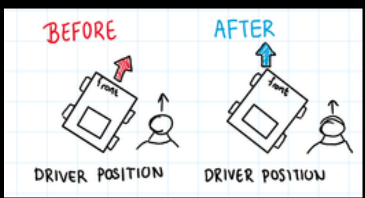
FTC LIB

We integrated **FTCLib framework** as a high-level wrapper for our hardware. It provides pre-built structures that allow us to treat robot functions as subsystems. It meant we can use **built-in utilities** for simplifying gamepad handling and PID control. By offloading low-level math, our programming team was able to focus on high-level logic and match strategy, saving time in the long run.

Our first version of teleop used **LinearOpmode**, which ran one big loop that managed all subsystems in one place. This means actions were **not able to run simultaneously**. We **redesigned** our programs to to use **opmode** which allows each subsystem (drivetrain, intake, shooter etc) to have their own loop method which is needed to provide rapid updates as teleop requires.
Using stable, periodic loops ensured **consistent timing** across all subsystems, preventing any one mechanism from slowing down the rest of the robot.
We found LinearOpmode to be a simple and intuitive way to instead test our separate components.

Field-Centric Drive

This requires the driver to constantly perform mental gymnastics to translate their perspective to the robot's orientation.
Field-Centric Drive fixes this by using a gyro sensor (usually the IMU inside the Control Hub) to track the robot's heading. No matter which way the robot is facing, pushing "up" on the joystick always moves the robot away from the driver



Controller Deadzones

Slight offsets of the joystick from the original position are ignored until a threshold is exceeded, to avoid accidental initiation of certain controls.

Problem: alignment of code, decentralised backups and messy code with no knowledge of what the most recently updated file was.
Solution: To fix this problem, we introduced to use of **GitHub desktop,** and established a **GitHub Organisation** to track changes in our repository and increase workflow efficiency.

- **Version Control** – Eliminated “messy code” and the risk of losing files by creating a single authoritative source for the latest code
- **Branching Strategy** – Enabled the programming team to work on different features simultaneously without the risk of overwriting each other’s work.
- **Coherent Collaboration** – Established a structured environment where team members could develop different modules of the program and then build efficiently upon one another’s files.

Programming - AUTO

AIM: Create an **efficient** and **reliable** system that consistently allows our robot to score points in autonomous, using **reusable subsystem** methods combined with **simple linear logic**

Reusability

Initially we started by programming our autonomous from scratch, however we quickly identified that we could reuse existing methods from our subsystems of driver and java.

Movement and Control

While the robot moves it maintains its heading as there are only 2 movments (first backwards and then left), so strafes and bacward movement don't cause unexpected rotation. This is important for shooting alignment after movement has happened.

Odometry

We implemented a dedicated Odometry Subsystem to provide the robot with real-time X, Y field coordinates and precise heading , independent of drivetrain motor slip. We utilized two "dead-wheel" encoders (Odometry Pods) mounted to the chassis. These free-spinning wheels track the robot's physical displacement across the floor tiles, converting raw encoder ticks into linear distance.

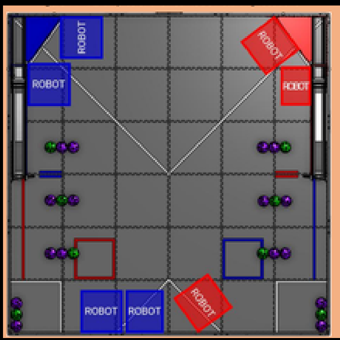
The IMU provides an absolute heading reference. This allows the software to account for the robot's orientation at every millisecond.

By applying a Rotation Matrix to the data from the pods and the IMU, the software translates "robot-relative" movement (sliding left or driving forward) into "field-relative" coordinates.

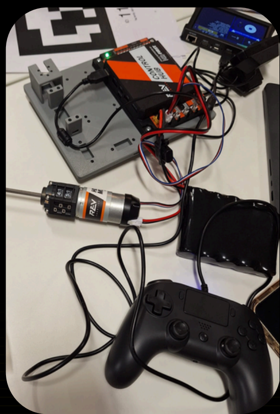
Strategy

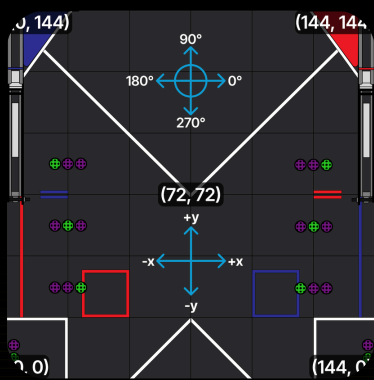
In this OpMode, the minimum we wish our program to achieve is for it to move our robot to a fixed location, shoot three balls, and then ensure it is not on a launch line (for 3 match points).

We used abstraction to simplify our goals into basic steps:



1. Start our robot in a fixed location (see further top right red robot
2. Move away from goal to shooting position
3. Shoot three balls
4. Move left until off launch line completely





FINITE STATE MACHINE
Auto Shooter States

IDLE

SPIN_UP

READY

FEEDING

CONFIRM_RPM

Strategy

INSPIRE

Brainstorming:
We first analysed the game manual and field layout to find **efficient scoring methods**. Our priorities were reliably scoring from one shooting location, developing a backup scoring method, and focusing on high-scoring actions whilst mitigating penalties.

Prototyping:
We **sketched** to visualise the placements of subsystems and evaluating how mechanisms interact. This helped us refine our initial design, and essential components.

CAD:
Our engineering team began creating detailed and **in-depth models** of our robot in Fusion 360, to plan overall structure. The CAD allowed us to 3D print, laser cut, order parts whilst reducing errors with design

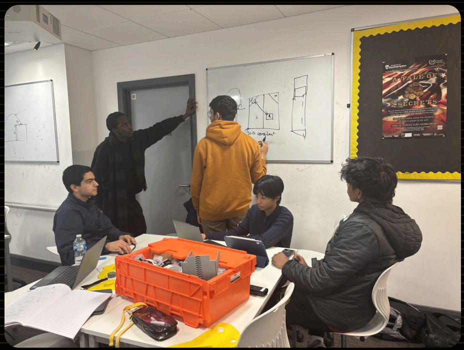
Research:
We **researched** from other teams on the "FUN robotics" YouTube channel and used Brogan Pratt's channel to ensure our competition logistics.

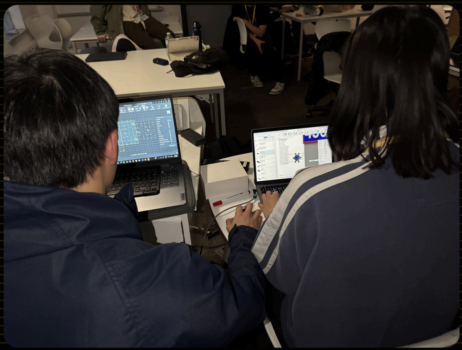
Testing:
We tested each subsystem to evaluate how well our robot performed. Testing our shooter revealed a lack of compression. Using the results from testing, we **iterated and refined** the CAD and the code, improving performance.

Autonomous:
Our robot will follow a pre-programmed routine to score points early whilst positioning itself strategically on the field. We focused on **maximising reliability** and consistency to ensure successful completion of tasks.

TeleOp:
We focused on completing scoring cycles as **accurately and efficiently** as possible. So we practised extensively on other team's fields to maintain shooting accuracy and consistency.

End Game:
We practised smooth transitions into the end game, maintaining **efficient and consistent** scoring throughout the match. This maximised points from both cycles and end game objectives even with the limited time





SUSTAIN

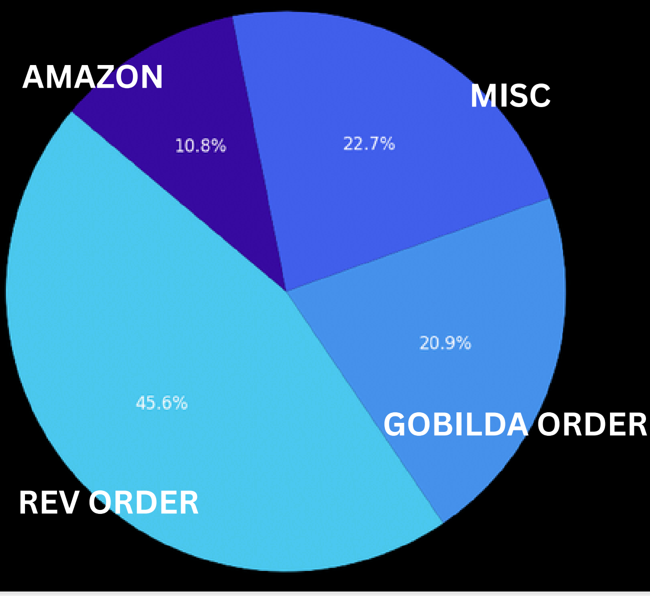
Sustainability

As a newly emerging team this season, financial sustainability was an important mission for us in order to ensure future members of the team have the capabilities and opportunities to achieve even more than we have been able to. This meant that we prioritised **buying durable, reusable equipment** that is **compatible across seasons**, whilst also striking a balance with cost. We opted for custom fabricated components only when we decided it would give us a competitive edge, saving us money in certain areas. Moreover, we made sure our inventory was organised in labelled storage containers and kept within one room in our school, as we recognise that any lost components are a significant hit to next year's budget.

	Link							Arrival
Length Amazon	PATIKIL M3	1	Amazon	comes in p	9.89	9.89	TRUE	Tomorrow
	https://www.amazon.		Amazon					Tomorrow
	https://ww	2	Amazon	5.59	11.18	comes in p	TRUE	Tomrrow
mm cut to 400 mm	https://ww	1	Amazon	13.48	13.48	comes in p	TRUE	Not viable
r hexshaft	https://am	1	Amazon	19	19		TRUE	Not viable
mm	https://www.amazon.co.uk/Timing-Closed-Loop-Synchronous-Printer-184-G							Not viable
mm	https://www.amazon.co.uk/Xuulan-Xianglaa-timing-Closed-Printer-Precise/d							Not viable
8mm	D							Tomorrow
0mm	https://www.amazon.co.uk/ACTINPANT-Perimeter-302mm-650mm-Synchror							Not viable
4mm	https://www.amazon.co.uk/1pc2GT-Timing-198mm-300mm-Printer-2GT-214							Not viable
y width	sourcing m	1	Amazon	4.99	4.99		TRUE	Not viable
13 Velcro straps	https://ww	1	Amazon	Cable man	4	4	TRUE	Tomorrow
14 Wire braids	https://ww	1	Amazon	Cable Man	6.79	6.79	TRUE	Tomorrow
15 Label	https://ww	1	Amazon		4	4	TRUE	Tomorrow
16 L brackets	https://ww	1						Tomorrow
17 M5 screws	https://am	1						Tomorrow

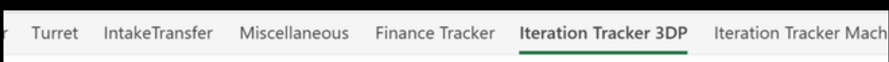
1	Parts	Link	Quantity	Manufactu	Add. Note:	Price	Total Price
2	M4 Bolts	https://ww	1	Amazon		7	7
3	3DP Filament	tbd	3	Amazon	Yellow		
4	Velcro straps	https://ww	1	Amazon	Cable man	4	4
5	Wire braids	https://ww	1	Amazon	Cable Man	6.79	6.79
6	Label	https://ww	1	Amazon		4	4
7	Customs		1	GoBilda	customs fr	105.7	105.7
8	MH-FC to Bullet Adapters	https://ww	2	GoBilda			
9	MDF Laser-Cut Plates	https://em	1	North London Laser		87.6	87.6
10	REV Expansion Hub	https://rev	1	REV		210.21	210.21
11	GoBilda Battery/REV Battery	https://ww	1	REV	whatever i:	46.25	46.25
12	REV sensor extra cables (50 cm)	https://rev	2	REV	Just buy it	8	16
13	REV power extenders	https://rev	2	REV	Buy it inca:	8	16
14	L brackets	https://ww	1				
15	M5 screws	https://am	1				

BUDGETING: Effective budgeting was a vital tool throughout the process, as it was our method of ensuring we do not overspend, and that we are buying from the most cost-effective suppliers. We compiled a spreadsheet of all the costs of 3d printing, machining and components; this meant that the finance team could easily report back to the rest of the team as well as our supervisor on where the funds were going.



Spending

By categorising our budget by **company**, we were able to buy as much from a single company to **reduce customs** costs. We also prioritised **local companies** to reduce transport emissions and **shipping** costs.Using a collaborative tracking spreadsheet, we maintain real-time subassembly data and provide transparent financial updates to our sponsors to ensure long-term partnerships for the KCLMS FTC team.



SPONSORSHIPS: Our team is grateful to have the support of our sponsors, **Record Financial Group** and **Jack Petchey Foundation**. We received a combined **£1800** worth of contributions from this, aiding us in buying essential components to level up our bot, such as the mecanum wheels that allowed omni-directional movement. We value their belief in our efforts and will proudly represent their support during our competitions.

SUSTAIN

Sustainability

T-Shirts

We collaborated as a team to create our shirt. Not only does this make us feel like a team, but also promotes our team and our sponsor. It also allowed us to have a clear branding.

KING'S MATHS SCHOOL

INSPIRING FUTURE ENGINEERS:

To inspire the next generation of engineers, we delivered a presentation to prospective Year 12 students about our First Tech Challenge journey. By sharing our experiences and STEM advice, we sparked significant interest, with many attendees eager to join the team next year.

King's Maths School FTC BAKE SALE!

Early on into the season, we hosted a bakesale in our school. This was an extremely successful event and helped us secure approximately **£200,** which was vital in helping us fund our initial parts orders in December.

We found that this was an extremely effective method of raising money for our robotics team, and simultaneously helped us gain more exposure in the KCLMS community.

FTC Robotics Team Funding Proposal

King's College London Mathematics School

Our Team

This year, we are launching an FTC (FIRST Tech Challenge) robotics team at King's College London Mathematics School; led by Carskey Chung and Kavan Vyas. The first tech challenge is an international robotics competition where teams of up to 15 students under 18 compete to build the best robot. Each year a new task is set, and new robots are built to score the most points possible. This year, our task is to read a sequence of green and purple balls using a QR code, a shoot balls called artificers into the hoop in the correct order. Opposing teams aim at hoops on opposite sides, playing defensively and focusing on getting more balls in or offensively by pushing their opponent.

As a rookie 15-person team competing for the first time, we hope to create a legacy of robotics at KCLMS and promote collaborative STEM – particularly by expanding robotics opportunities for both girls and boys at the school. Our members include aspiring engineers and programmers of all backgrounds, and we aim to show that everyone has a place in STEM. This year, our goal is to enter this competition as a strong challenger against well-established UK teams and experience the excitement of the competitive robotics scene.

Investments to date

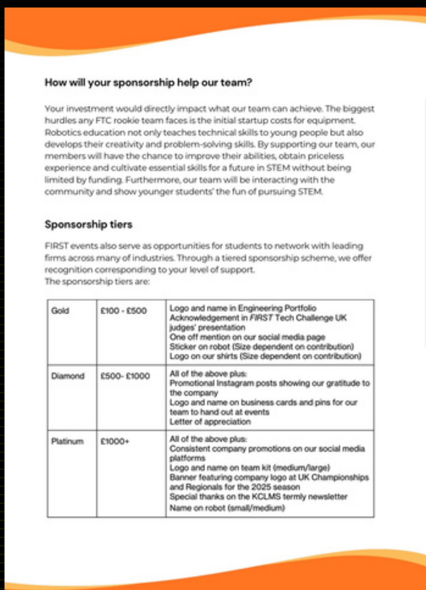
So far, £1,200 has been invested into the club including the £300 registration fee paid by the school and a £900 bursary generously provided by the FIRST organisation. However, to build a truly competitive robot, we estimate an additional £1,500-£3,500 is required for essential components such as mecanum wheels that would significantly improve our bot's performance. These features are vital if we are to compete a later stage of the competition.

The starter kit bought using the bursary includes the most basic parts for building a robot that can move but not perform well.

Sponsorship Packet

To maximise chances of sponsorship, we worked as a team to create a system that allowed sponsors to see what they will get in return, whilst allowing room for them to give us their input.

It also focused on ways their sponsorship will help, ensuring our potential sponsors had a clear idea about our goals and where their money and services will go.



How will your sponsorship help our team?

Your investment would directly impact what our team can achieve. The biggest hurdles any FTC rookie team faces is the initial startup costs for equipment. Robotics education not only teaches technical skills to young people but also develops their creativity and problem-solving skills. By supporting our team, our members will have the chance to improve their abilities, obtain priceless experience and cultivate essential skills for a future in STEM without being limited by funding. Furthermore, our team will be interacting with the community and show younger students' the fun of pursuing STEM.

Sponsorship tiers

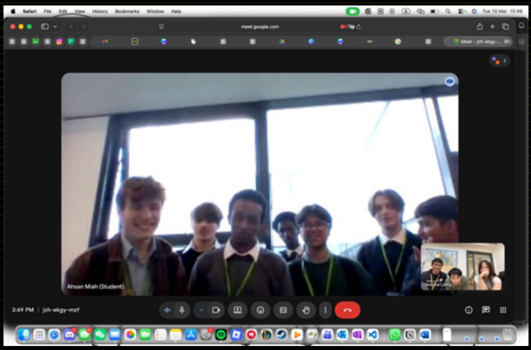
FIRST events also serve as opportunities for students to network with leading firms across many of industries. Through a tiered sponsorship scheme, we offer recognition corresponding to your level of support.
The sponsorship tiers are:

Gold	£100 - £500	Logo and name in Engineering Portfolio Acknowledgement in *FIRST* Tech Challenge UK judges' presentation One off mention on our social media page Sticker on robot (Size dependent on contribution) Logo on our shirts (Size dependent on contribution)
Diamond	£500- £1000	All of the above plus: Promotional Instagram posts showing our gratitude to the company Logo and name on business cards and pins for our team to hand out at events Letter of appreciation
Platinum	£1000+	All of the above plus: Consistent company promotions on our social media platforms Logo and name on team kit (medium/large) Banner featuring company logo at UK Championships and Regionals for the 2025 season Special thanks on the KCLMS termly newsletter Name on robot (small/medium)

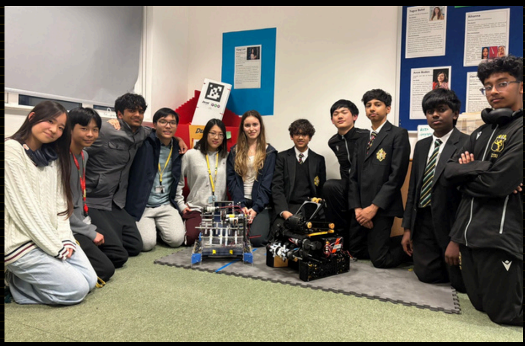
Outreach - First Community

REACH

Orion Alpha #28321

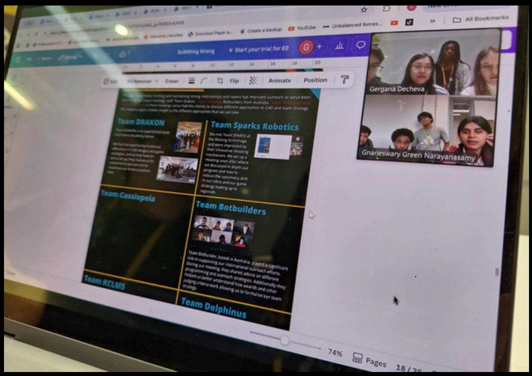


Wilsonic Boom #33001

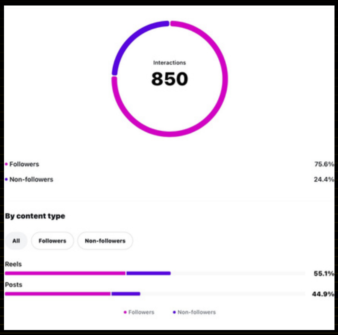


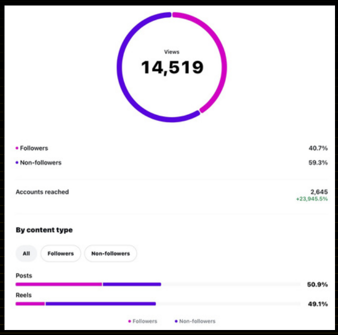
We were proactive in organising events to meet with **more experienced groups**, where we discussed our robot designs, programming approach, team organisation, and general tips. As a rookie group, we learnt a lot from their advice. Exchanging ideas with a several teams allowed us to get a **range of perspectives** about how to improve our robot and general advice. Furthermore, it helped us **build connections** within in the FTC community and engage with like minded individuals interested in engineering and technology.

Sumthings Wrong #32112



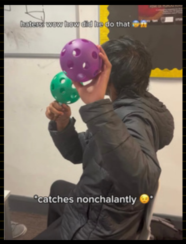
Robotics Creed #27902





We created a social media account to raise awareness about our team and FTC in general. This was through regular updates of **3 reels/posts a week**, and extra ones during events such as International Women's Day!

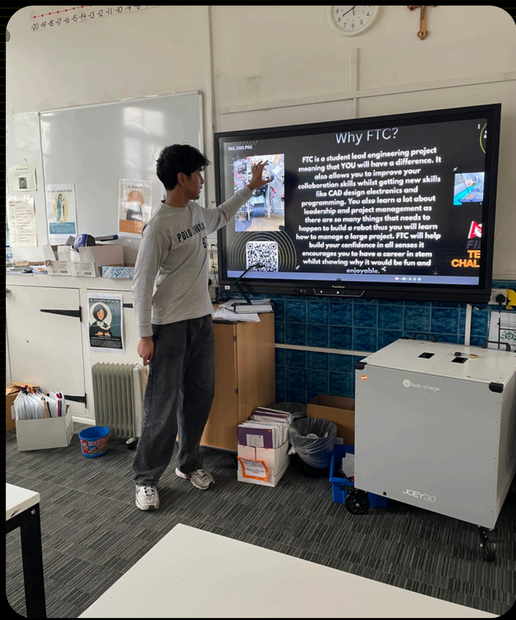
We recently reached an **100 followers** milestone and overall we have had **14.5k views**. Our content was able to reach and inspire a wide audience.



Outreach - Promoting STEM

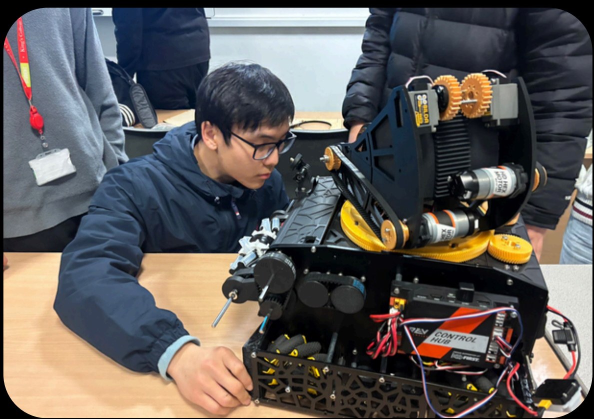
MOTIVATE

A few of our members had the opportunity to give a presentation about joining FTC to year 11 students at **Notre Dame RC School**.



During the session, we spoke about the opportunities available in STEM beyond GCSE, specifically, the value of taking maths-based subjects and **ways to get involved in robotics**. We also shared our experience taking part in FTC, highlighting the numerous skills students can develop.

Additionally, we answered questions from students about robotics, how the competition works and how to get started. We also gave them our emails and social media account, so any interested students could learn more about the programme and reach out for more details.

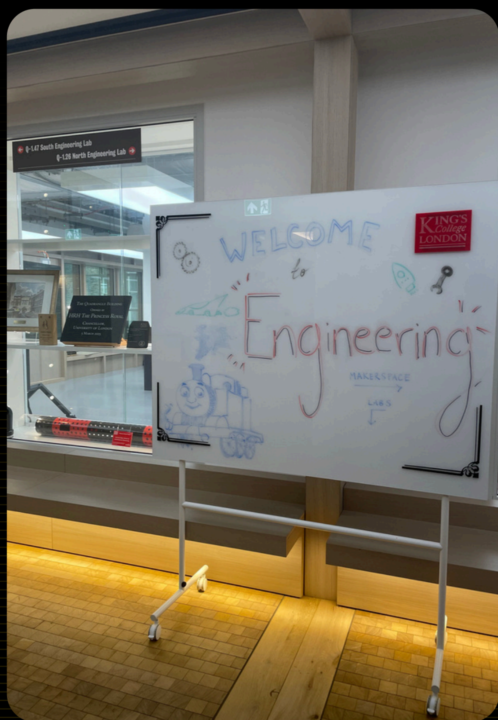


4 members of our team take part in **weekly outreach sessions**, helping younger students develop their STEM skills beyond the curriculum.

These sessions usually take place before and after school and focus mainly on maths and physics. We work with Year 9-Year 11 students.

Overall, this has totalled to over **128 hours** of mentoring altogether

Furthermore, some of our future plans include giving a presentation to students at the **KCLMS summer school** about FTC.



This STEM summer school is aimed at students who have just finished their GCSEs, and provides an insight to maths and science beyond the typical curriculum.

Our aim is to **introduce students to FTC** as many students at this age are not exposed to hands-on engineering or competitive robotics. We also hope to show the creative side of STEM, and inspire students to explore robotics further.




Team Reflections

Carskey - Team Lead

The main thing I have learnt from this season is the importance of team management and administration. Despite being proficient in CAD, I realised that without strong leadership skills to keep everything running smoothly, progress quickly becomes disorganised and inefficient.

Aichen - Mechanical Lead

I improved my CAD skills and the design process of building a robot.For example, prototyping, iterations and staying organised. I also learnt more on how to manage a team and delegating the correct amount of tasks to each person

Kavan - Programming Lead

I learnt that I had to be more resilient, and being independent through setting up a system for our programmers to work with. Also, I became stronger with managing our team and I improved my time-management as I had to ensure that meetings were set up every week for our team.

Mechanical

Nyi:
I became proficient with using Fusion 360 to design components and I learnt different mechanics used in robots. For example, how the ball's velocity can be affected by wheel slippage and compression, and learned how to manufacture parts instead of buying them.

Luxman:
Having started off as a rookie to robotics, joining FTC helped me understand the process of building a robot, as I was given a chance to learn and practise CAD, and understand the intricacies of building a robot.

Adam:
During my first FTC season, I was able to learn how to use fusion and through this, I have improved my slicing skills. Also, I was able to use 3D printers often, which was a fun learning experience.

Parth:
I learnt how to CAD, and was able to experience building with complex objects such as motors and belts, got insight into how 3D printing works, and discovered how to undergo rigorous testing. Also, through FTC, I improved my organisational skills.

Aditi:
It was my first time using CAD and how to use it to optimise the performance of our robot. Through building, I learnt about the complex mechanisms involved in our robot as well as the many aspects we need to worry about while testing

Programming

Moyin:
Before taking over the social media account, I spent some time programming. Although I only made minor contributions, I learnt a lot about coding in Java and the maths behind some features (e.g bézier curves in PedroPathing). Within my time on social media, I improved my editing abilities and my organisation skills.

Jessica:
During FTC, I learnt a lot of new things. These include how to program hardware using Java which I previously did not know, I was also able to learn how to build parts of the bot, such as the shooter and drivetrain, which was cool.

Gergana:
I learnt how to be proficient in java and many OOP concepts, such as classes. I also learnt that efficient communication of the upmost importance in a team setting like this, and that I should ask more questions if I'm unsure of anything.

George:
I learnt about the inner workings of robotics and how to collaborate with others on a project that can feel disjointed.

Kishi:
I had never programmed in Java before and spent a lot of time learning the language's structure so I could apply this to efficient programming for FTC. I also learnt about the importance of teamwork, communication, and sticking to deadlines.

Thank you for reading our portfolio!!