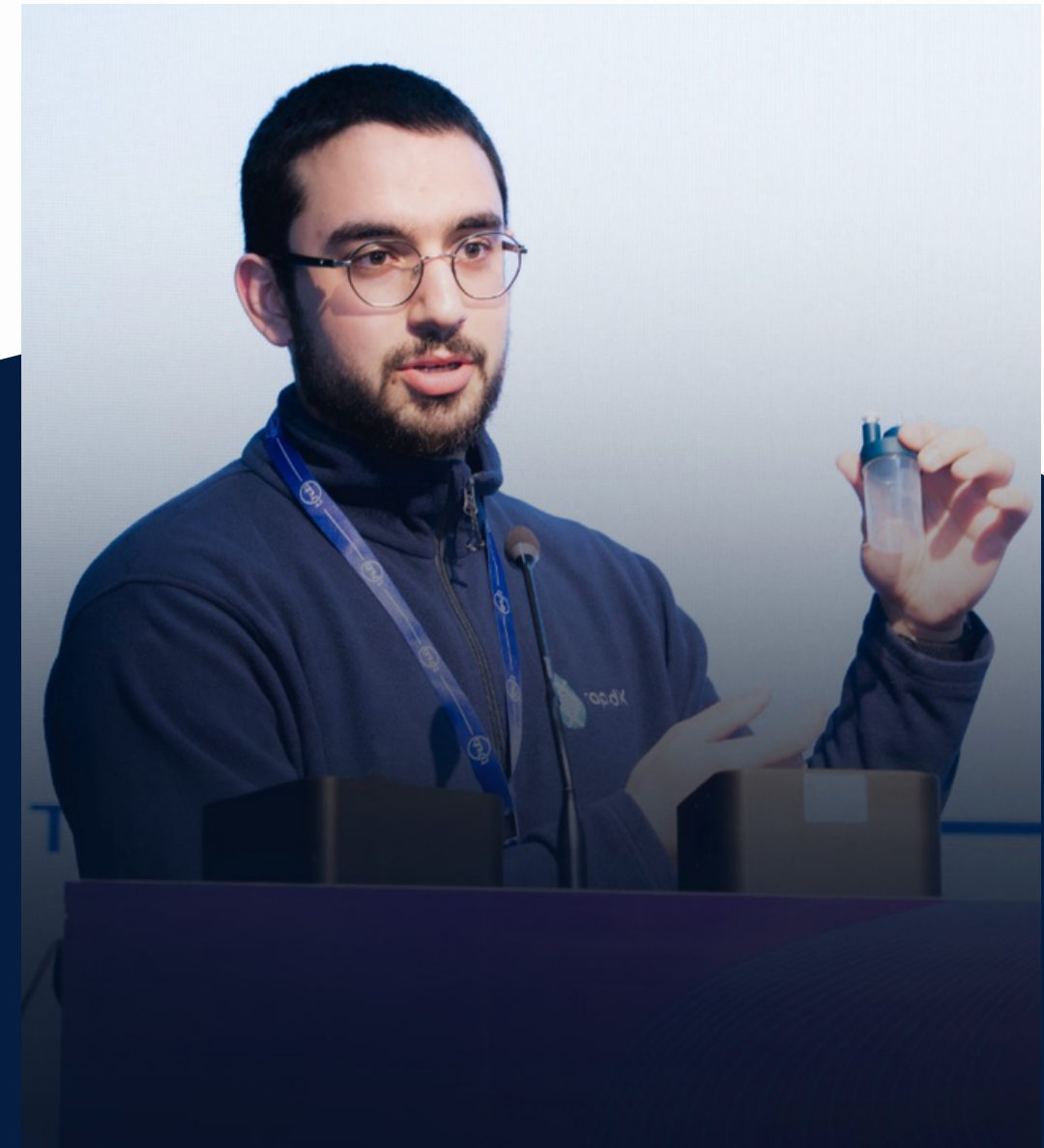


Mohamad Rammal

Design Portfolio

Award-winning mechanical design engineer with experience in Biotech, Robotics, and Automotive



About

Mechanical design engineer, currently building point-of-care diagnostic technology at RapidX Bio. Graduated from UCL with a First in MechEng. Work spans CAD, FEA/CFD simulation, manufacturing setup, and electro-mechanical integration. Notable projects include:

**Primary
inventor on 2
bitoech patents**



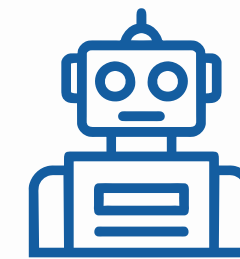
**Best undergrad
FYP Design
Project**



**Design of
Hydrogen Fuel
Cell System**



**Robotics
competitions
since 2015**



High-scale consumable for Point-of-Care testing

► Objectives

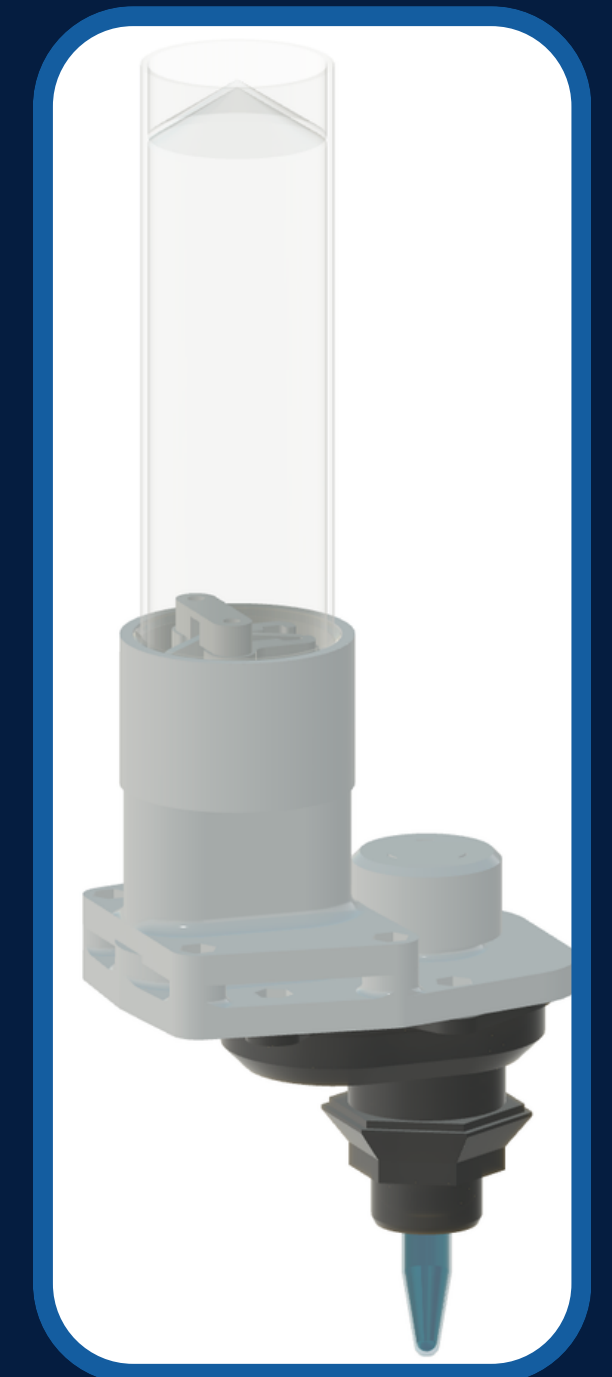
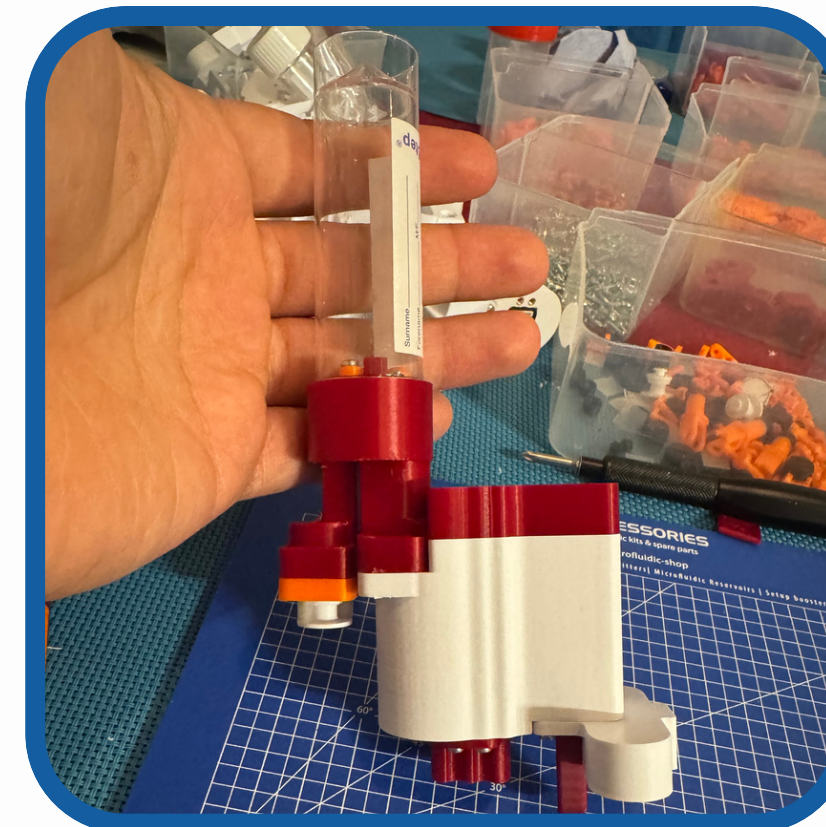
- Design a single-use cartridge to collect & prep biological samples (urine, blood, saliva, etc...) for PCR testing
- Ergonomic design
- DfM for 1M+ units per year

► Outcomes & Contributions

- 2 Patents ([WO2025114725A1](#) & [GB202506609D0](#)) as primary inventor
- Pilot projects with Vet clinics to start by winter 2026
- Leading the project since Feb 2025
- Pitched to Investors & Clients, most notably at Innovate UK's GIP in May 2025

► Tech details & Relevant Skills

- Prototyping using FormLabs resin printing and vacuum casting
- DfM & scalability considerations
- No use of microfluidics for liquid handling → cheaper & simpler to assemble & manufacture
- Repeatability & Reliability testing → validation after 100% success rate over 5 independent runs



Universal E-bike conversion kit Design & Fabrication

► Objectives

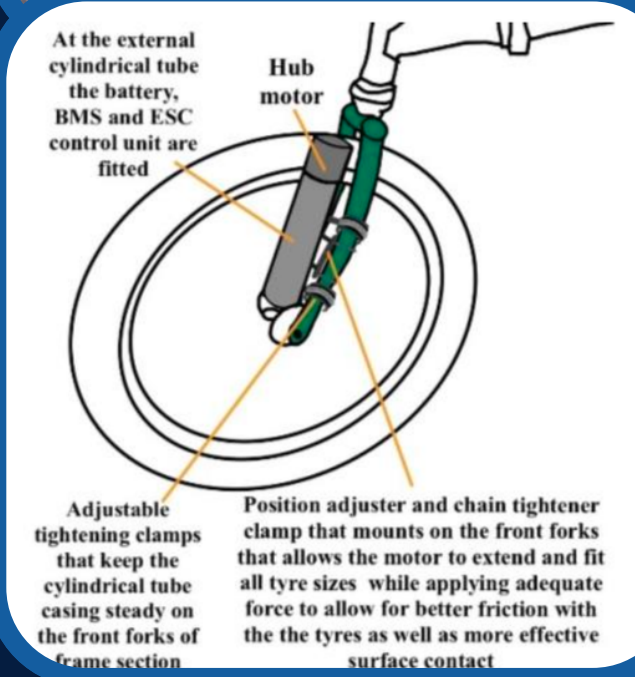
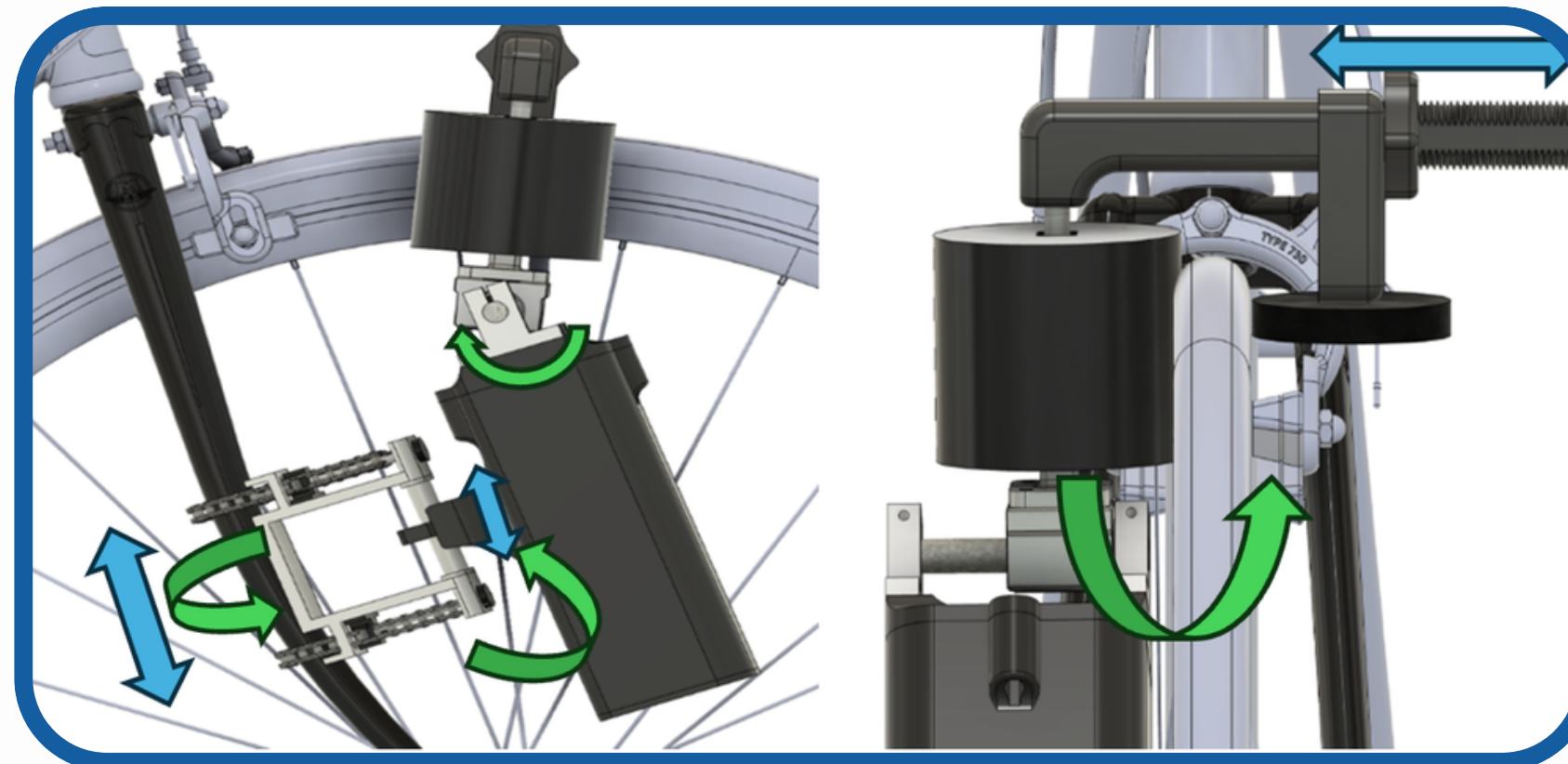
- Design & build an affordable E-bike conversion kit to fit on any bicycle
- Product description includes
 - Universal mounting → Fits all bikes
 - Battery capacity → 14km per charge
 - 3kg max weight + Fits in a backpack
 - Short & easy installation
 - > £400 per unit as sold

► Outcomes & Contributions

- Best undergrad design project
- Functional prototype with installation guide ([see here](#))
- Led the project + these areas:
 - Concept designs & sketches
 - Hand calculations, math models & FEA simulations
 - Parts manufacturing & kit assembly

► Tech details & Relevant Skills

- Prototyping with FDM 3D printing
- Li-ion (18650) battery pack assembly
- Machined critical components with Al 6061
- Legally compliant (motor power <250W, battery capacity <100Wh, top speed limited at 25 kph)
- 7 degrees of adjustability - fits any bike fork
- Installation time 3min 30sec



Leading the R&D for an ultra-efficient H2 vehicle

► Objectives

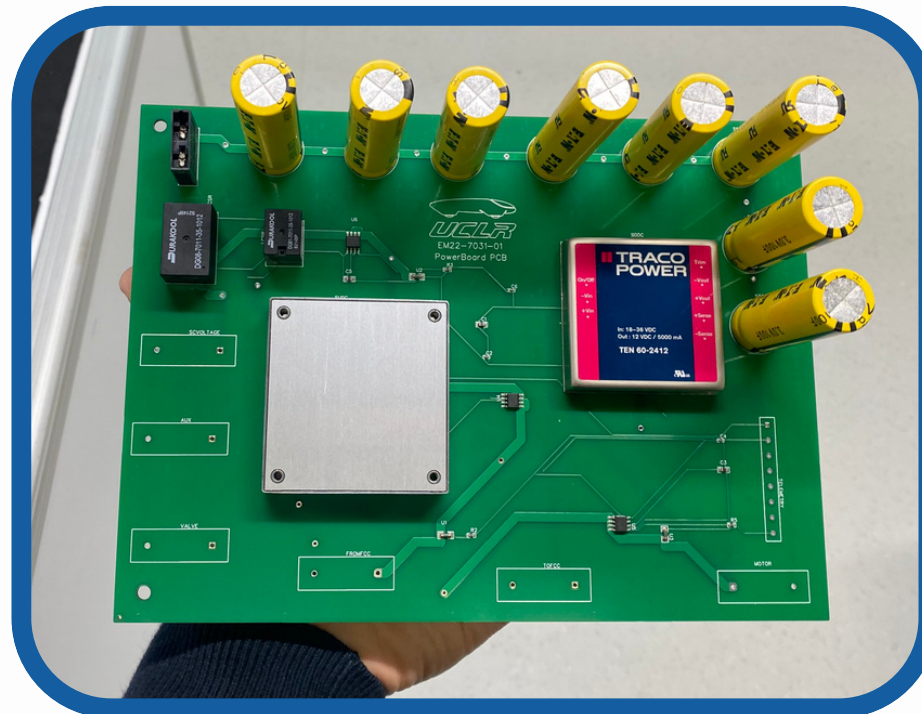
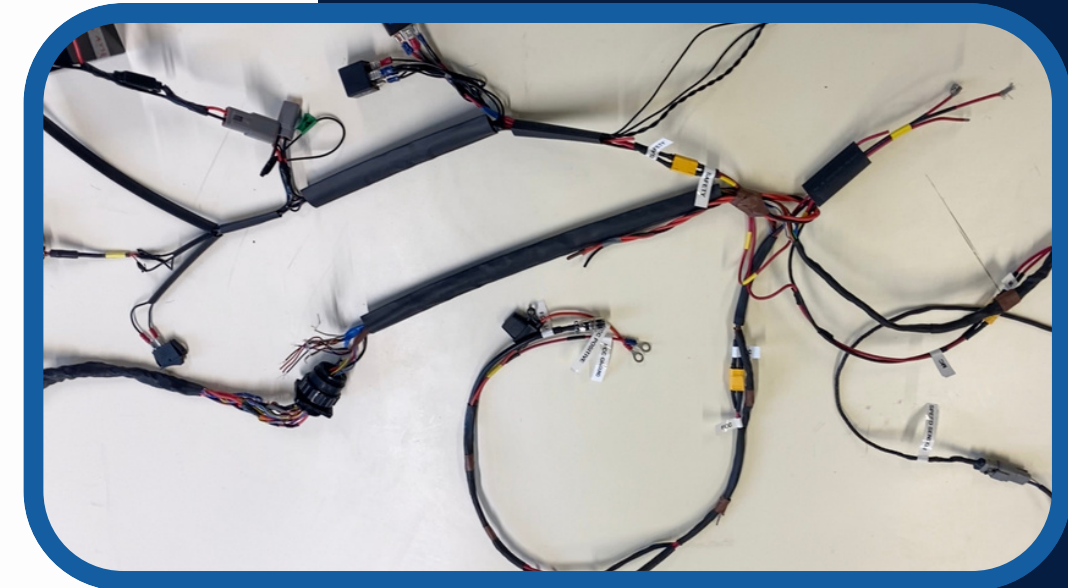
- Develop a powertrain running on H2 fuel for a prototype endurance vehicle
- Compete in Shell Eco-Marathon competition for most efficient vehicle (least m³ of H2 per km wins)

► Outcomes & Contributions

- Led the powertrain & telemetry system development in 2022 & 2023
- Custom powertrain mainboard PCB
- Est. mileage of 300 km / m³ of H2 fuel
- Prizes won
 - Best telemetry system
 - Best carbon footprint
 - Safety award

► Tech details & Relevant Skills

- Primary power source from H2 fuel cell
- Supercapacitor bank to provide power boosts
- Custom dead-man switch with ergonomic hand fit
- Custom in-house automotive harness
- Safety considerations include H2 leak sensing, voltage and current abnormalities, safety valve switching, and mechanical safety relays
- Chassis optimised for aerodynamics



Building mission-specific robots during High-School

► Objectives

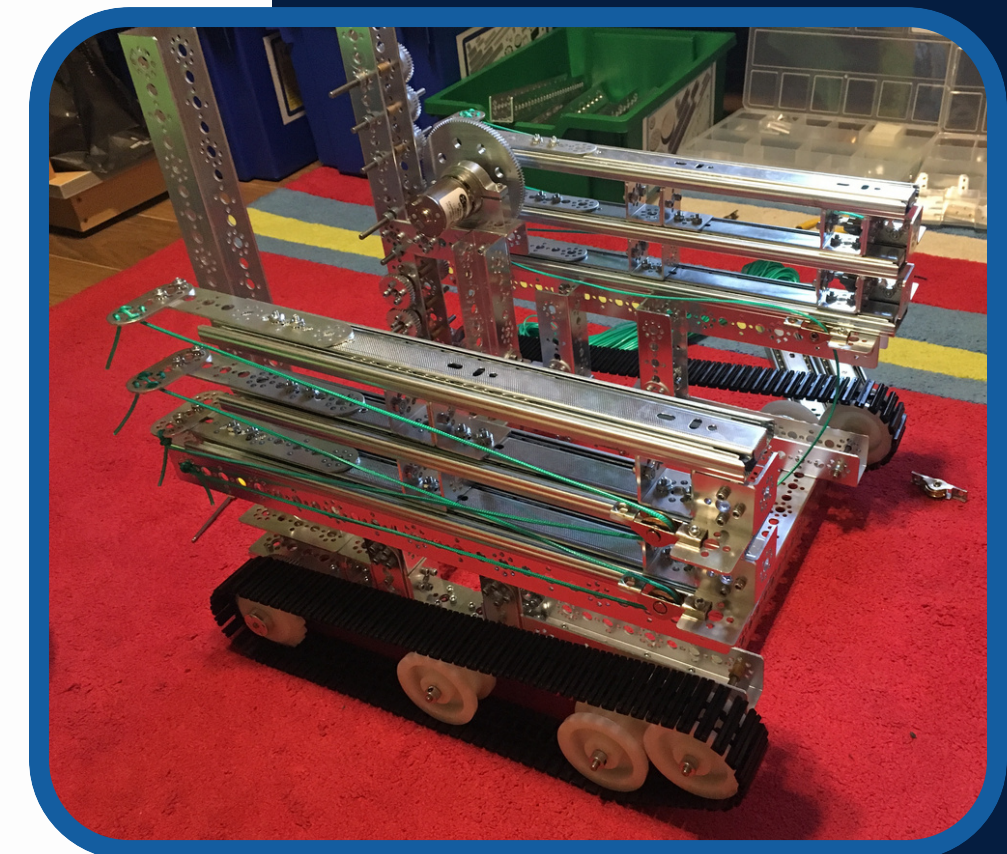
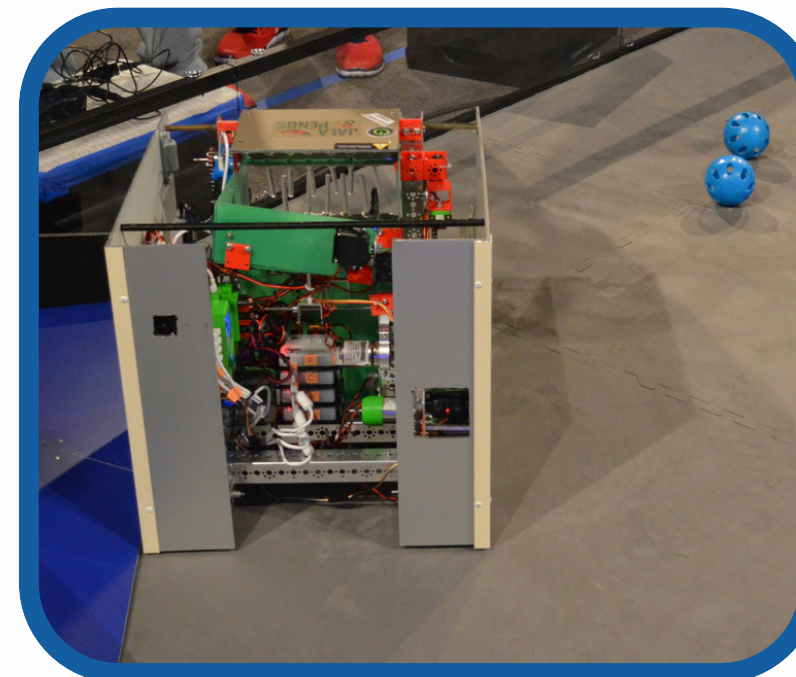
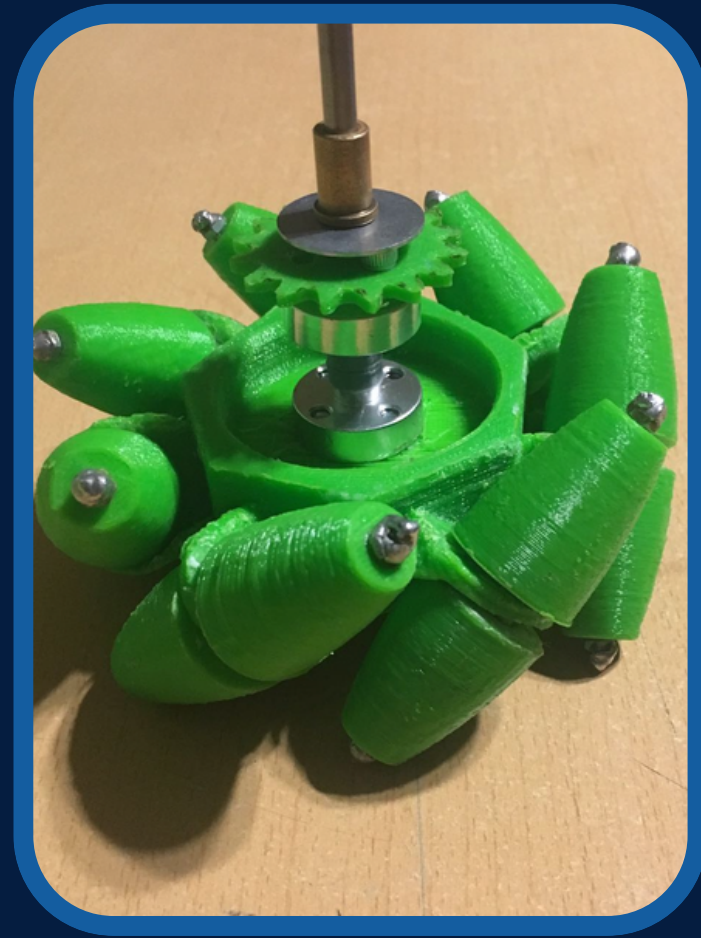
- Build robots to compete in FIRST Tech Challenge competitions
- Examples of missions include:
 - Ball collecting & scoring
 - Moving objects from A to B
 - Climbing over obstacles
 - Parking in specific marked areas

► Awards & Contributions

- National representatives at World Championships for 4 years
- 2018 Judges' Award in Houston, TX
- Leading mechanical design
- Small team → started with 2 and expanded to 8
- Raised ~ 50k USD to fund hardware and sponsor international travel

► Tech details & Relevant Skills

- Specific mechanisms designed:
 - Automated drawer-like linear rails
 - Mecanum wheel drive → ability to move sideways without turning
 - 3D printed swerve drive (different season)
 - Spring-loaded ball launcher
 - Servo-driven grippers
 - 4-bar linkage
- Tele-op & autonomous modes
- Custom Aluminium & Acrylic shielding panels



THANK YOU!



Mohamad Rammal

Mechanical Design Engineer

 [LinkedIn](#)

 London, UK

 morammal.com

