



UNIVERSITY OF BATH
TEAMBATH™

RACING ELECTRIC

2023
2024



Department of
Electronic & Electrical
Engineering



UNIVERSITY OF
BATH

Contents

- 04** About Us
- 06** Our History
- 08** Results
- 10** Our Technology
- 12** What We Can Offer
- 14** Sponsorship Packages
- 16** Sponsorship Testimonials
- 17** Our Sponsors
- 18** Faculty Staff
- 19** Contact Us

About Us

The University of Bath

The University of Bath is one of the UK's top universities, amassing an impressive amount of awards over recent years.

Strong links with industry have led to a high proportion of students taking on industrial placements, making Bath graduates some of the most employable in the country. Below are examples of some of the awards that show the university's commitment to its students.

THE TIMES
THE SUNDAY TIMES

GOOD
UNIVERSITY
GUIDE
2023

UNIVERSITY
OF THE
YEAR

TOP IN THE COMPLETE
10 UNIVERSITY GUIDE 2023

TEF Gold Teaching
Excellence
Framework

TOP UK UNIVERSITY
10 The Guardian 2023

6th FOR GRADUATE
PROSPECTS 2023
The Complete University Guide

Athena
SWAN
Silver Award

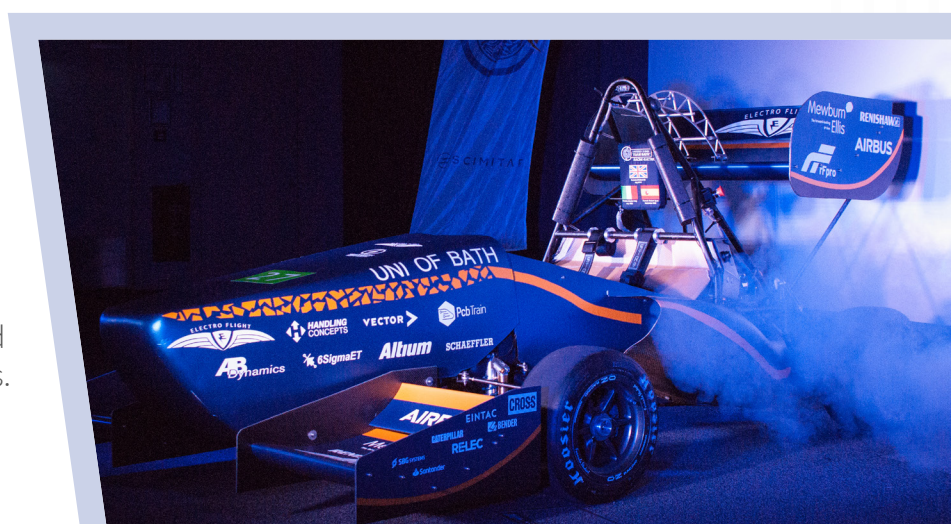
SAFEST UNIVERSITY
CITY IN ENGLAND AND WALES
2022
The Complete University Guide



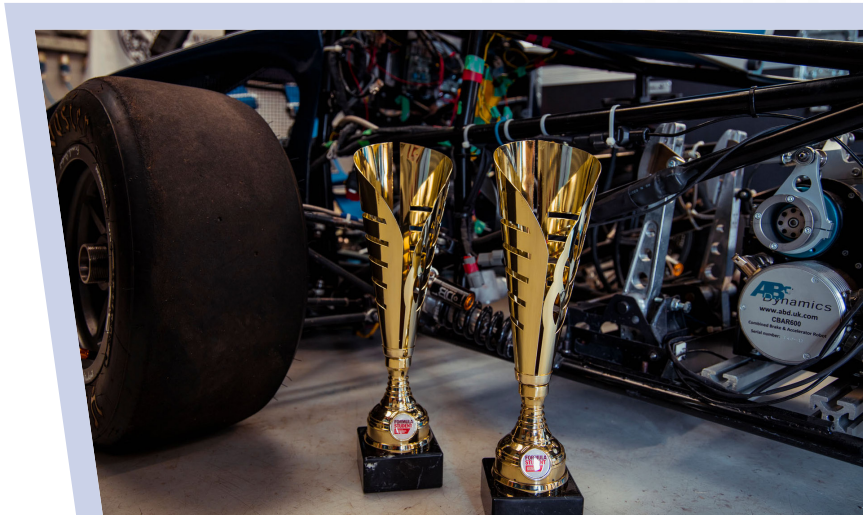
Team Bath Racing Electric

Team Bath Racing Electric is an electric Formula Student team based out of the University of Bath's Faculty of Engineering and Design. Formula Student is the world's largest student engineering competition, with over 600 universities taking part in its numerous competitions internationally.

Each year the teams are challenged to design, manufacture, test and race a formula-style single-seater racing car. We are proud to say that we have held the title of UK's top Electric Formula Student team for most of our history. The team comprises students from all academic years studying engineering, computer science and business, among other disciplines.



The core team consists primarily of fourth and fifth year students who take the lead roles in delivering the car. However, we are proud to have team members from all academic years playing crucial roles in the project.



For more information about our home competition, Formula Student UK (FSUK), please visit: www.imeche.org/events/formula-student

Our History

2015

- 9 members
- Initial support from university
- Proof of concept vehicle produced



2016

- 16 members
- Became established in the University and acquired lab space
- Attended FSUK 2016



2017

- 40 members
- Passed all technical inspections at FSUK 2017
- Crowned Top UK Electric Formula Student Team



2018

- 60 members
- Finished all FSUK 2018 events
- First UK team to attend FS China
- Top UK Electric Formula Student Team





2019

- 60 members
- First UK electric team to compete in Europe
- Top UK Electric Formula Student Team



2020 & 2021

- First fully designed TBrE Aerodynamics package
- Official Rankings maintained from 2019
- Cost & Manufacturing Event Winners
- Top UK Electric Formula Student Team
- Multiple successes for AI division

2022

- 60 members
- Completed dynamic events in Formula Student UK, Italy and Spain
- Designed and competed with both a drivered and driverless vehicle
- Top UK Electric Formula Student Team and top overall driverless car



2023

- 95 members
- First implementation of TBrE Business Operations, Vehicle Software and Driver Environment teams, as well as a new management structure which includes the introduction of a Programme Management role
- Ranked 3rd overall in Portugal, 4th in Spain



Results

2019

- 1 TOP**
UK EV team
- 1 FIRST**
UK Electric Team to attend Europe
- 1 WINNERS**
Driverless Business Presentation
- 1 WINNERS**
Driverless Design

2021

- 1 TOP**
UK EV team
- 1 WINNER**
Cost event
- 1 WINNER**
Overall driverless car
- 1 WINNER**
AI Simulation



What can

2022

- 1 TOP**
UK EV team
- 1 WINNER**
Overall driverless car
- 6 6TH**
Design event
- 8 8TH OVERALL**
FS UK at Silverstone
- 3 3RD**
Fastest EV at FS Italy

2023

- 1 WINNER**
Cost and Manufacturing
FSUK
- 3 3RD OVERALL**
FS Portugal
- 2 2ND**
Cost and manufacturing
FS Portugal
- 4 4TH OVERALL**
FS Spain
- 2 2ND**
Autocross FS Spain



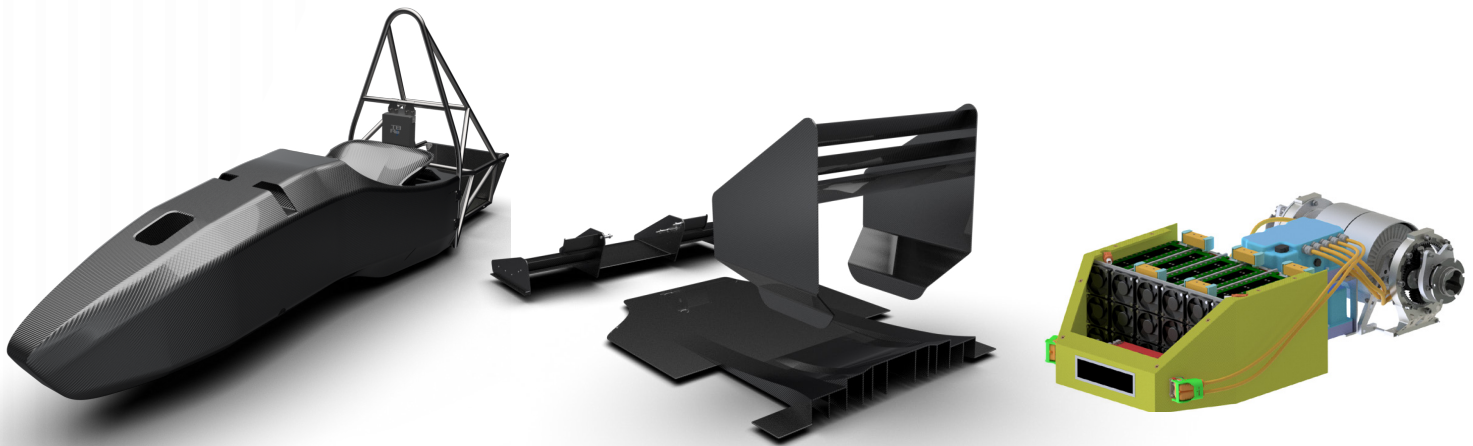
we accomplish **together?**



Technical Summary of TBRe

TBRe23 successfully showed a considerable increase in predictability and reliability of the vehicle, it currently stands as the car which has totalled the largest mileage of any previous TBRe prototype. Thanks to the consultancy of our sponsor MPC DesignWorks, along with the University of Bath's academic and technical support, the team has significantly improved its carbon fibre and general composites manufacturing capacity. For the 2024 season, the team finds itself at a very exciting turn of the vehicle's general design philosophy as we push for greater performance and competitiveness. Details on how we plan to meet our targets from a technical standpoint are provided below.

TBRe23 successfully showed a considerable increase in predictability and reliability of the vehicle, it currently stands as the car which has totalled the largest mileage of any previous TBRe prototype. Thanks to the consultancy of our sponsor MPC DesignWorks, along with the University of Bath's academic and technical support, the team has significantly improved its carbon fibre and general composites manufacturing capacity. For the 2024 season, the team finds itself at a very exciting turn of the vehicle's general design philosophy as we push for greater performance and competitiveness. Details on how we plan to meet our targets from a technical standpoint are provided below.



Structures

This season's key change in the vehicle architecture is in the primary structure as the chassis will be a single-piece carbon monocoque tub. The team ran a tubular steel spaceframe in 2022 and 2023, having also experimented with a hybrid chassis a few seasons prior. The full carbon tub embodies an efficient solution to the team's performance objectives. TBRe23 also met its target of high adjustability in vehicle set-up and dynamic response primarily through the introduction of anti-roll bars paired with the newly acquired Multimatic corner dampers. Overall, the secondary structures of the 2024 challenger will be a performance-orientated iteration of the suspension, steering, and brake systems of the vehicle thanks to the unparalleled amount of testing time and data acquired in 2023.

Aerodynamics

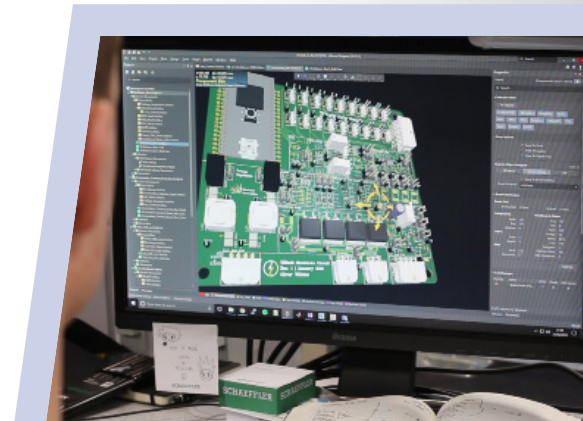
TBRe24 will be the team's third challenger to run an aerodynamic package. The experience gathered over the course of the previous seasons will allow for greater understanding of the system as a whole and is expected to be a key factor in raising the team's competitiveness. This sub-group has the most freedom in design choices, leading to the development of concepts combining various manufacturing methods and composite material elements within the construction of the aerodynamic appendices. A key strength of the team is its manufacturing know-how and the available infrastructure of the university which allows for nearly complete in-house manufacture of all aerodynamic elements.

Powertrain

The focus for TBRe during this season is to kick-start various R&D projects aimed at validating all systems required for the 2025 introduction of all-wheel drive technology. Such developments will certainly rely on sponsorship support. So far the team has been running a powertrain architecture relying on a single rear-mounted Emrax228 electric motor, powered by a custom 7.71kWh accumulator. With TBRe24, we hope to give a final demonstration of this tractive system's capabilities as it did in the 2023 competitions.

Striving for Excellence on the European Stage

Team Bath Racing electric is known to race beyond the domestic Formula Student UK competition, taking part in some of the largest European events every summer. Our technical ambitions are therefore to rise to excellence on the European stage. This season again, TBRe24 is being designed with the key aim to achieve podiums (top 3 EV overall) in all competitions it attends. The team finds itself at a very exciting turn of the vehicle's general design philosophy as we push for greater performance and competitiveness. Find out how below:



Tractive System R&D

As part of a transition to longer design cycles, we will start development of systems for future years of TBRe. This includes kick-starting R&D work for our 2025/26 accumulator, aiming to improve on mass-reduction, space-saving, and far greater performance. Additionally, a second field of focus will be the research in the implementation of in-hub motor technology, a promising upgrade to the TBRe vehicle architecture.



Motor Control

With attention to a host of control tools, the team aims to unlock the full potential of its electric powertrain to deliver even more sustained power. Through the thorough characterisation of the motor, we can design and implement advanced, adaptive control to customise performance for Formula Student competitions. Techniques such as regenerative braking and advanced traction control will ensure that the system is being used to its fullest capabilities.



Safety Systems

The mixture of high voltage electronics and competitive racing makes safety the team's highest priority. Automated systems are in place to shut down the output from the high voltage battery under any fault conditions and dual modular redundancy ensures our confidence in our electrical systems. The driver is protected from impact and mechanical failures through rigorous implementation of safety factors, professional manufacturing procedures and part testing.



What We Can Offer

We take great pride in our sponsors and take every possible action to maximise their exposure and benefits with us, as displayed by our numerous marketing and branding efforts.



Student Engagement

Close interaction with members of the team is an opportunity reserved for those in our Title, Platinum and Gold sponsorship packages.

We are happy to present the car and our project at corporate and promotional events for these categories of sponsors.



Vehicle Branding

Each year, the car represents the culmination of a year's work and is the centrepiece of attention.

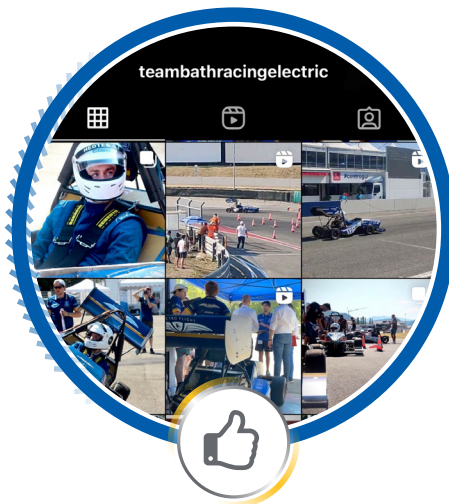
With our success propelling us to the international stage, on-car branding guarantees that your logo will be widely broadcast.



Apparel Branding

Our sponsors' logos are also branded on our team apparel, which is consistently worn at internal and external events throughout the season, guaranteeing the presence of your logo with the presence of our team members no matter where they are.





Social Media Promotion

We actively incorporate social media into our day-to-day life and update our followers on the progress of the team. This also includes social media promotion of our sponsors. We operate across multiple social media platforms and offer the opportunity for our sponsors to benefit from this exposure.

Our website also features a dedicated page for our sponsors.



Lab Promotion

Our lab is consistently used as a key stop on the tour of the University of Bath Engineering facilities. As our central location of work, the lab is visited by current and prospective students, visiting academics and industrial partners.

All of our sponsors' logos are proudly displayed on our sponsor wall for all to see.



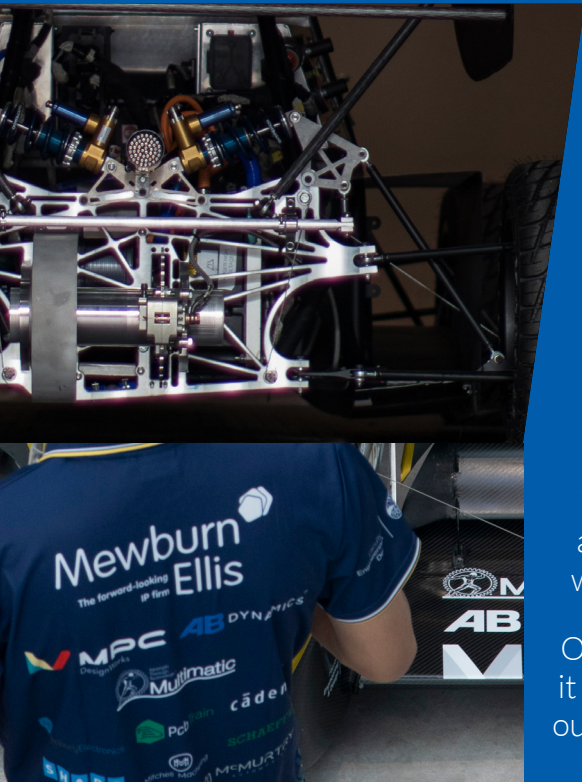
Pit Board Branding

The team's pit board acts as our sponsorship hub, and each sponsor is showcased here so that the huge amount of support we receive can be recognised and appreciated.

This pit board travels with the team to all internal and external events.



Our Sponsorship Packages



Title Sponsor

Title Sponsorship is our premium sponsorship package.

The sponsor taking this opportunity will benefit the most from TBRe's activities and will feature heavily in our media and branding.

Their logo will take pride of place at the front of our car and the top of our branded shirts, pit board and sponsor's wall in the lab.

Only one of these packages is available per season, and it is a great chance for the sponsoring company to utilise our sponsorship benefits to their full extent.

Event Sponsor

The Event Sponsorship package will increase a sponsor's exposure at a particular Formula Student event.

It is awarded to the company that covers the expenses the team incurs at that event, such as registration and transportation.

The additional exposure will be achieved through heavily increased branding and engagement in the build-up to and during the chosen event.



Sponsorship Tiers

The sponsorship tiers are ranked based on the contribution made towards the team, either financially, or in equivalent value products.

Gold, Platinum and Title Sponsorship benefits can be further negotiated.

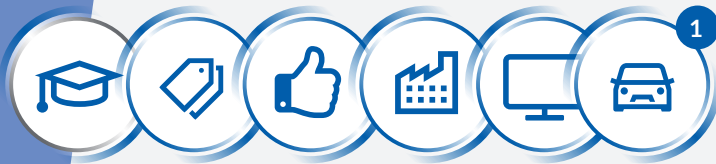
Title

sponsor with the largest contribution



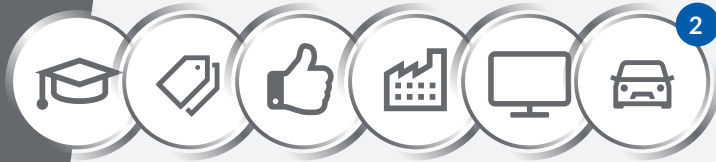
Diamond

Over £10,000



Platinum

£6,000 - £9,999



Gold

£4,000 - £5,999



Silver

£1,501 - £3,999



Bronze

up to £1500



DECAL GUIDE

- T** Minimum 2 of the largest logos in central positions
- 1** 2 large logos on each side of the vehicle
- 2** 2 medium logos on each side of the vehicle
- 3** 1 small logo on one side of the vehicle



Student Engagement



Vehicle Branding



Apparel Branding



Online Promotion



Lab Promotion



Pit Board Branding

*Title Sponsors will be heavily marketed on the team's social media platforms, including LinkedIn. The team can also attend an event organised by the title sponsor and exhibit the car. The Title Sponsor is announced at the end of the funding campaign

Our significantly high sponsor retention rate and outstanding quality of our existing sponsors is testimony to the benefits of sponsoring TBRe. To highlight this fact, we have asked two of our 2022 sponsors to describe their experience with TBRe sponsorship. Here is what those from our 2022 title sponsor, Electroflight, and one of our longest-standing sponsors, Mewburn Ellis, had to say:

Electroflight



2022 was our first year supporting Team Bath Racing Electric, having being introduced to them after recruiting ex team member, Taylor De Caux. It became clear early on that Taylor's experience gained from the team was key to his rounded capability and his immediate contributions to Electroflight's engineering. As a designer of aerospace propulsion systems, specialising in battery system design, we felt that there were some key areas that we could support the team with and took the decision to sponsor them for the 2021-22 campaign. We thoroughly enjoyed our engagement with the team during the season, providing design assurance, battery build and safety practice advice, alongside the donation of high performance cells used in the TBRe22 vehicle. This engagement allowed us to witness first hand the next round of talent coming through Team Bath Racing Electric and subsequently recruit a further three graduates from the team: Glen, Liam and Luke, who again have joined us at Electroflight and made an immediate impact, bringing real world hand on electrification engineering experience.



- Stjohn Youngman, Managing Director, Electroflight

Mewburn Ellis



Mewburn Ellis is proud to have sponsored Team Bath Racing Electric since 2016. We were initially drawn to become involved through an interest in automotive engineering and motorsport amongst a few of our engineering group partners. Whilst this sort of sponsorship was a bit of a step into the unknown for us at the time, we were very quickly rewarded by the resulting involvement with such an inspiring group of young people – the next generation of professional engineers.

It has been a pleasure to help the team fund their chassis development, and their attendance at the annual Silverstone event. I have also had the pleasure of working with team members after their graduation as they enter the world of professional engineering and find themselves encountering intellectual property in the real world. The team's success last year is a testament to their drive and dedication.



- Simon Parry, Chartered Patent Attorney, Partner, Mewburn Ellis

We are immensely grateful for our sponsors who supported us in 2023.

We hope to continue working with them for another successful year where we can bring as much value to them as they have to us.

These are the wonderful companies who helped turn our 2022-2023 vision into reality:



Faculty Staff

Our achievements wouldn't have been possible without the help of the dedicated members of the University of Bath's Engineering faculty who have supported and guided us throughout the years. Their passion towards TBRe has been a constant motivator for us, and their outstanding expertise in each of their fields has given us invaluable technical insight.



Dr. Benjamin Metcalfe
Head of Electronic and Electrical
Engineering Department



Prof. Andrew Plummer
Head of Mechanical Engineering
Department



Dr. Christopher Vagg
Lecturer, Institute for Advanced
Automotive Propulsion Systems
(IAAPS)



Dr. Jonathan Graham-Harper-Cater
Lecturer, Department of Electronic
& Electrical Engineering

We hope that our TBRe 2024 prospectus has provided valuable insight into the team and our ambitions for 2024 and beyond.

If you would like more information, or simply want to follow our progress, please follow us on our media platforms. Our platforms are very active and will provide continuous updates on all the new developments in our fast-moving project.

Whether you want to sponsor us or just want to find out more about what we do, we look forward to hearing from you in the near future.



www.TeamBathRacingElectric.com



TeamBathRacingElectric@gmail.com



[@TeamBathRacingElectric](https://www.instagram.com/TeamBathRacingElectric)



[@TeamBathRacingElectric](https://www.facebook.com/TeamBathRacingElectric)



[@TeamBathRacingE](https://twitter.com/TeamBathRacingE)



[Team Bath Racing Electric](https://www.linkedin.com/company/TeamBathRacingElectric)



[@TeamBathRacingElectric](https://www.youtube.com/TeamBathRacingElectric)



teambathracingelectric.com



