BA2

THE MAGAZINE FOR ALUMNI AND FRIENDS OF THE UNIVERSITY OF BATH
ISSUE 30

ENERGY INNOVATORS

HOW BATH RESEARCH IS HELPING TO POWER A CLEANER, GREENER PLANET

UNIVERSITY OF BATH

As the world has opened up again, so have the possibilities. In this *BA2*, you'll uncover some of the incredible ways our Bath community are protecting people, the planet and penguins! Get to grips with the science behind sustainable energy, as our experts explain how they're combatting the current crisis in our cover story. Also in this issue, you'll meet some of our enterprising students and alumni who are turning their big ideas into businesses for good. Plus, in *BA2* Extra, you can enjoy some extracurricular activities as we look back on over 50 years of student groups.

***BA2* Issue 30**
University of Bath
Department of Development & Alumni Relations
Claverton Down
Bath BA2 7AY

Alumni enquiries
+44 (0)1225 386824
alumni@bath.ac.uk
facebook.com/bath.alumni.community
@uniofbathalumni
@uniofbathalumni
linkedin.com/groups/91204/

Editorial team
Jodie Tyley
Emma Senior

Design
Steers McGillan Eves

Photography
© University of Bath, unless otherwise stated.

The opinions expressed in *BA2* are those of the contributors and not necessarily those of the University of Bath. All content correct at the time of going to print.

CONTENTS

ON PARADE

FEATURES

BA2 EXTRA

ON PARADE

Highlights from the University of Bath

Welcome

Welcome to the latest edition of BA2

As we approach the end of this academic year, there is much to reflect on and be thankful for. It has been a particular joy to see a return to campus following two years of uncertainty and disruption. We have welcomed the return to in-person teaching and extracurricular activities, and especially the opportunity to celebrate the successes of our students as graduation ceremonies resume in the magnificent setting of Bath Abbey.

Nationally, our reputation remains strong, with the University placing in the top ten of all three major UK rankings. It is particularly pleasing that the National Student Survey 2022 shows our student satisfaction 10% above the national average, ranking us first in England and third in the UK when comparing Guardian University Guide institutions. Our continued popularity is borne out by rising undergraduate applications, up 4.9% in 2021.

A significant increase in UK students from widening participation backgrounds attests to our aspiration and commitment to promote an inclusive community. Our Gold Scholarship Programme has gone from strength to strength, winning the Highest Impact University Initiative Award at the 2021 upReach Student Social Mobility Awards. We are also thankful to have been able to support directly some of those affected by the conflict elsewhere in the world and welcome students seeking asylum into our community under our new Sanctuary Scholarship scheme.

Congratulations must go to our research community who continue to make major advances. We are aware that alumni have wanted to learn more of our research activities and as a result I am delighted that our new Research with Impact initiative has been launched. I hope you will take some time to enjoy the mini-podcast series, videos and research stories on our webpages and social media channels.

The REF 2021 research assessment exercise has demonstrated clear strengthening of our research intensity since the previous assessment where only a subset of research in the University was submitted. Having submitted all eligible staff, more than 90% of the publications by the University of Bath were ranked as 'world-leading' or 'internationally excellent', placing the University 11th among Guardian-ranked universities.

Three major enterprise activities are now underway, including the Institute for Advanced Automotive Propulsion Systems, the launch of an Institute for Sustainable Chemical Technologies and a new initiative using Digital Technologies for Healthcare and Performance Sports. These business-led innovation clusters have seen major investment exceeding £140m. We were also very pleased to open our important new School of Management building, which we hope will facilitate further new enterprise.

We are delighted that Bath has again been named one of the top ten places in the world to study Sport in the QS World University Rankings by Subject 2022. We continue to build on the success of Bath-based athletes at Tokyo 2020, with nine receiving MBEs in the most recent New Year Honours List and success in our joint bid to host the UIPM Modern Pentathlon and Laser Run Word Championships in 2023.

There is indeed much to celebrate, and we are truly grateful to all those who have made these achievements possible.

With warm good wishes,

Ian White

Professor Ian White DL FREng
Vice-Chancellor and President

5,190 class of 2020 and 2021 graduates returned for ceremonies

Research

We're developing better products with our industrial partners

Recognition for our world-leading research

92% of the Bath research submitted to the Research Excellence Framework (REF) 2021 has been ranked as 'world leading' or 'internationally excellent' – the two highest classifications on offer. The results, which were announced in May 2022, represent a five percentage-point increase on our REF 2014 score, where 87% of our research achieved these rankings.

REF reviews and analyses research from institutions across the UK, benchmarking it for quality and real-world impact at both a national and global level.

Case studies submitted by the University for REF 2021 include improving our response to biosecurity threats; using underwater soundwaves to avoid harm to sea life during industrial work; developing more comfortable devices for amputees; and helping hospitals in the South West to best manage their capacity.

"I'm really pleased to see such a strong performance and want to congratulate our entire research community," says Professor Sarah Hainsworth, Pro-Vice-Chancellor (Research). "I was also pleased to see the substantial role that the work of Bath's early career academics played in our REF submission, and the significant increase in our research involving international partnerships."

This year we also launched our Bath Beacons research initiative. The five beacons are multidisciplinary projects that are tackling global issues such as public health, reducing the impact of climate change, and finding new ways for technology to enhance human performance.

To showcase the tangible impact our work has on the world around us, our Research with Impact initiative takes deep dives into projects from across the University – from stemming the flow of drugs into prisons to developing sustainable palm oil alternatives.

Find out more at **go.bath.ac.uk/research-with-impact**

Community

Welcoming back the classes of 2020 and 2021

This summer, we were delighted to hold graduation ceremonies for the classes of 2020 and 2021, whose events were postponed due to the Covid-19 pandemic.

Over seven days throughout May, June and July, we held a total of 28 ceremonies, welcoming graduates and their friends and families to Bath Abbey to celebrate their achievements.

Writer and broadcaster Professor Alice Roberts, a member of the Advisory Board of the University's Milner Centre for Evolution, was among the honorary graduates to join our alumni community.

"The real value of what you have learned at university will emerge when you pass it on… It's what humans do, it's how human societies work, and it is how we find and create the meaning in our own lives," she said in her oration.

"Connections with other people, the way that we learn knowledge and pass it on are perhaps the greatest gifts that we have. They go right to the heart of what it is to be human."

Professor Alice Roberts received an honorary Doctorate of Education

Research

Buzzwords

What our researchers are talking about

Luck
People who believe in luck are unhappier, more pessimistic and more neurotic than those who do not, according to research carried out by our School of Management.

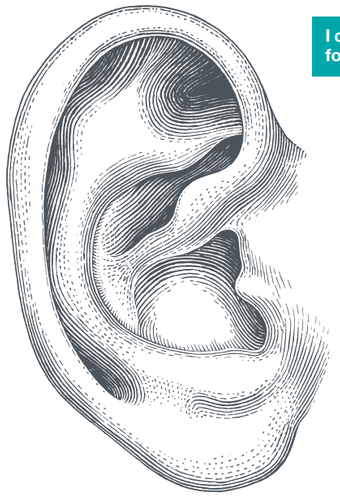
Tensor tympani
Bath researchers are working on a device to help people with conditions such as Motor Neurone Disease to communicate using this muscle in the ear.

Vaults
A team led by our Department of Architecture & Civil Engineering has devised a new vaulted style of floor that uses 75% less concrete.

Vectiraptor greeni
This new, bird-like dinosaur was unearthed among fossils from the Isle of Wight by Dr Nick Longrich from our Milner Centre for Evolution.

Aquifiers
Scientists from our Department of Physics have found that pools of brine beneath the seabed – also known as aquifiers – could offer a safe way of storing CO_2 in the future.

Grass
Researchers from our Department of Chemical Engineering have begun work on a £2.5m project to create low-carbon meat and dairy substitutes using grass.



I could be used for talking, too!

Sport

Sports scholar Tom Dean became Team England's most decorated swimmer at a single Games

Commonwealth Games glory for Bath athletes

37 Bath-based athletes were selected to represent their country at the Birmingham 2022 Commonwealth Games, across a range of disciplines. Competitors included swimmer and Bill Whiteley Sports Scholar Tom Dean MBE (MEng Mechanical Engineering 2025); triathlete Niall Caley (BSc Economics & Mathematics 2023); and hurdler and former King Sports Scholar Alastair Chalmers (FdSc Sports Performance 2020).

Between them, the sportspeople brought home an impressive 33 medals – seven gold, 17 silver and nine bronze. This follows on from Bath's incredible results at the Tokyo 2020 Olympics, where athletes who train or studied at the University won 21 medals, 11 of them gold.

Bath's successes in the pool were recognised in February 2022, when British Swimming coach David McNulty – who is based at the Sports Training Village – was inducted into the Team Bath Hall of Fame.

Following the recent Games, Tom Dean said: "It's been a tough week and after six silvers, to finally get the big G at the end means the world. A big shout-out to our coach Dave – that's 25 Commonwealth medals for his swimmers at these Games and what an honour to do it for him."

10 million

new 'transient objects' such as supernovae will be discovered by 4MOST each night

Research

Studying the stars

The University of Bath has joined the 4MOST (4-metre Multi-Object Spectroscopic Telescope) consortium, a cutting-edge telescope facility that will pave the way for new breakthroughs in astrophysics.

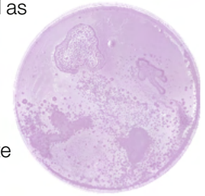
Based at the European Southern Observatory in Chile, 4MOST begins operation in 2023. It will be used to study galaxies, exploding stars and black holes, as well as to test new theories of gravity. Bath will be supplying a software platform for the facility's scientific work, which will crunch huge amounts of data.

Professor Carole Mundell, Head of Astrophysics; Hiroko Sherwin Chair in Extragalactic Astronomy; and President of the UK Science Council, says: "Involvement in these projects will drive the world-leading astrophysics research we do here at Bath to a new level over the next decade, and open exciting new opportunities for the next generation of researchers who join our department."

Research

New Life Sciences department created

The University has established a new Department of Life Sciences, bringing together the expertise of our existing Departments of Biology & Biochemistry and Pharmacy & Pharmacology. The new Department will foster stronger relationships between these disciplines and create a collaborative base for our research, as well as enable us to develop our ambitious portfolio of undergraduate and postgraduate programmes.



Research

In a nutshell

What's that smell?

Delicious, eh? I think it might be cinnamon. Toasty in here, isn't it?

Feels like a normal temperature to me.

It's probably the scent. According to Dr Adriana Madzharov, a researcher from our School of Management, we associate aromas such as cinnamon and vanilla with warmth, and peppermint with cool. Interestingly, warm scents also give us the impression of a smaller, busier space – a phenomenon that could be used by businesses to manipulate our perceptions of our surroundings.

Like how supermarkets pump out the smell of freshly baked bread to get us loading loaves into our trolleys?

Exactly. That said, warm scents might have the opposite effect on your appetite – and indulgent or 'gourmand' scents might actually steer you towards healthier menu choices.

It seems slightly counter-intuitive, but studies show that if people are exposed to indulgent aromas for some time, such as the smell of chocolate cookies, they are less likely to choose unhealthy food options. So these rich scents could be used to nudge tourists towards healthier food choices and consumption in situations where they might be more susceptible to unhealthy eating, such as airport lounges.

Shame. I rely on a good snack to get me through the wait for my flight.

You might not need it, though, if the airport is canny with its choice of fragrances. Adriana says: "The emotional impact of smells might be more pronounced while we're travelling – likely because we're experiencing so many more new sights, sounds and smells than we would in day-to-day life." As a result, the right combination of warm and cool scents could make your wait in the queue for security, for example, a much more pleasant one.

A less stressful aviation excursion? Pump those olfactory sensations my way!

After a long flight you'll need to wake up and smell the coffee. Adriana's research shows that similar scents can mimic the stimulant's effects, making you feel more energetic and alert even without a cup of the good stuff – so airlines using the aroma at the end of an overnight flight could make travellers feel less tired.

I smell piña coladas

Below: Since her time at Bath, Jacklyne has worked in data science roles

Community

60 seconds with...

Jacklyne Betty Njeri (MSc Business Analytics 2017) is from Kenya and studied at Bath as an international student. She now works as a commercial planner at Copia Global, a mobile commerce company based near Nairobi.

What was your experience of studying at the University?

The cultural exposure from both the School of Management staff and my fellow students was an incredible experience. I truly enjoyed getting to learn more about different cultures, and different ways of solving the same problem – particularly during seminars. My friends also made the experience worthwhile, and I cherish them deeply to this day.

How did you find being an international student studying in the UK?

It was an experience full of curiosity. There was a lot to learn from those I interacted with, and I enjoyed it. My advice to other international students would be to take it slow, and to be completely present in the experience because it doesn't last very long. Here I am, five years since I graduated, and I still have very vivid memories of Bath – which I share on Bath Connection as an alumni Expert and Ambassador.

How did your studies help you to develop?

Professor of Operational Research, Güneş Erdoğan, truly and positively contributed to my confidence both as a professional and as a person. There's no shame in not having a solution to a problem, and I have found that that's sometimes the best place to start. No timidity, just curiosity and an unmatched work ethic.

Give and receive careers advice by joining our networking site Bath Connection at go.bath.ac.uk/bath-connection or by scanning the QR code.

Community

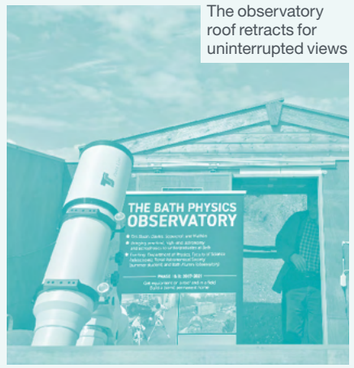
Observatory opens on campus

Thanks to your donations, physics students are now able to photograph the night skies as part of hands-on projects.

The Bath Physics Observatory officially opened in May 2022 and consists of a small roll-top building on the eastern outskirts of campus, housing two telescopes and a 'warm room' for shelter. The building of the structure itself was funded by a grant of £7,350 from your Alumni Fund.

"It's given us a permanent base where the students can work on undergraduate projects at night, but in a reasonably controlled, nice environment – which means they can focus on the science," says Dr Peter Sloan.

"Before it's only been those who are super keen and want to be in a field at two in the morning! This really opens things up to so many students."



The observatory roof retracts for uninterrupted views

Below: Bath Abbey lit up blue and yellow in March 2022

Community

Supporting students from Ukraine

In April 2022, we launched a crowdfunding appeal in response to the crisis in Ukraine.

91 donors gave £18,615 to the appeal, which includes £7,000 from the Alumni Fund. This will go towards the Student Hardship Fund, which has seen an increase in demand from students from the region due to the conflict's impact on family income and savings, as well as difficulties with exchange rates and accessing money.

One beneficiary of the Fund said: "I'd like to say thank you to donors who are helping students suffering as a result of the war in Ukraine. Those of us with families in the region have a lot to worry about right now, so eliminating financial concerns is a big help."

8th

Our rank in the UK according to the Complete University Guide 2023

Teaching

We're in the top 10 universities to study sport in the world

New course kicks off

Here at Bath, we're changing the game when it comes to sports medicine with our new MSc in Football Medicine in association with FIFA – launching in autumn 2022.

This collaboration with the global football governing body will offer qualified doctors the opportunity to develop their academic and clinical skills, covering topics such as emergency pitchside care, injury prevention and rehabilitation, and mental health in sport.

In addition, students will learn from guest speakers and build their professional networks. The course is offered on a part-time basis over three to five years, through a combination of distance learning and residentials in Bath and Zurich.

"This is a really exciting course to launch, which aims to significantly improve access to high-quality, postgraduate education for football medicine internationally," explains Dr Carly McKay from our Department for Health, who is Director of Studies for the course.

She continues: "Through Bath's world-leading experts and FIFA's industry insights, students on the course will learn from the latest research and developments within football medicine, building key skills that will enable them to apply their learning to pitchside clinical practice."

Professor David Galbreath, former Dean of the Faculty of Humanities and Social Sciences, adds: "This unique course demonstrates how our cutting-edge sports science research, underpinned by our long-established sporting prowess, can be applied to help those working in the game at all levels."

The University's excellence in sport has been widely recognised across league tables. We were ranked second in the UK for sports science by the Guardian University Guide 2022 and in the Complete University Guide 2023's top five. We also have a number of research partnerships with sporting bodies.

For more on our work with British Skeleton, turn to page 16.

Teaching

Bath engineer wins Covid Unsung Hero Award

Lecturer Dr Anna Young from our Department of Mechanical Engineering won the New Educator Award at the Women in Science and Engineering 2022 Covid Unsung Hero Awards.

Anna was recognised for her outstanding work to engage students with online learning during the pandemic, and to ease their transition to remote and blended learning.

One of the key tools she led the department to adopt was 'visualisers' – small cameras that capture handwritten notes or calculations. These meant that lecturers were able to talk through equations as they wrote them out step by step, rather than relying on static slides for online lectures.

She said: "To win the award is a real honour. I was very pleased to be nominated and privileged to be at the ceremony among some amazing people who have done incredible work during the pandemic.

Research

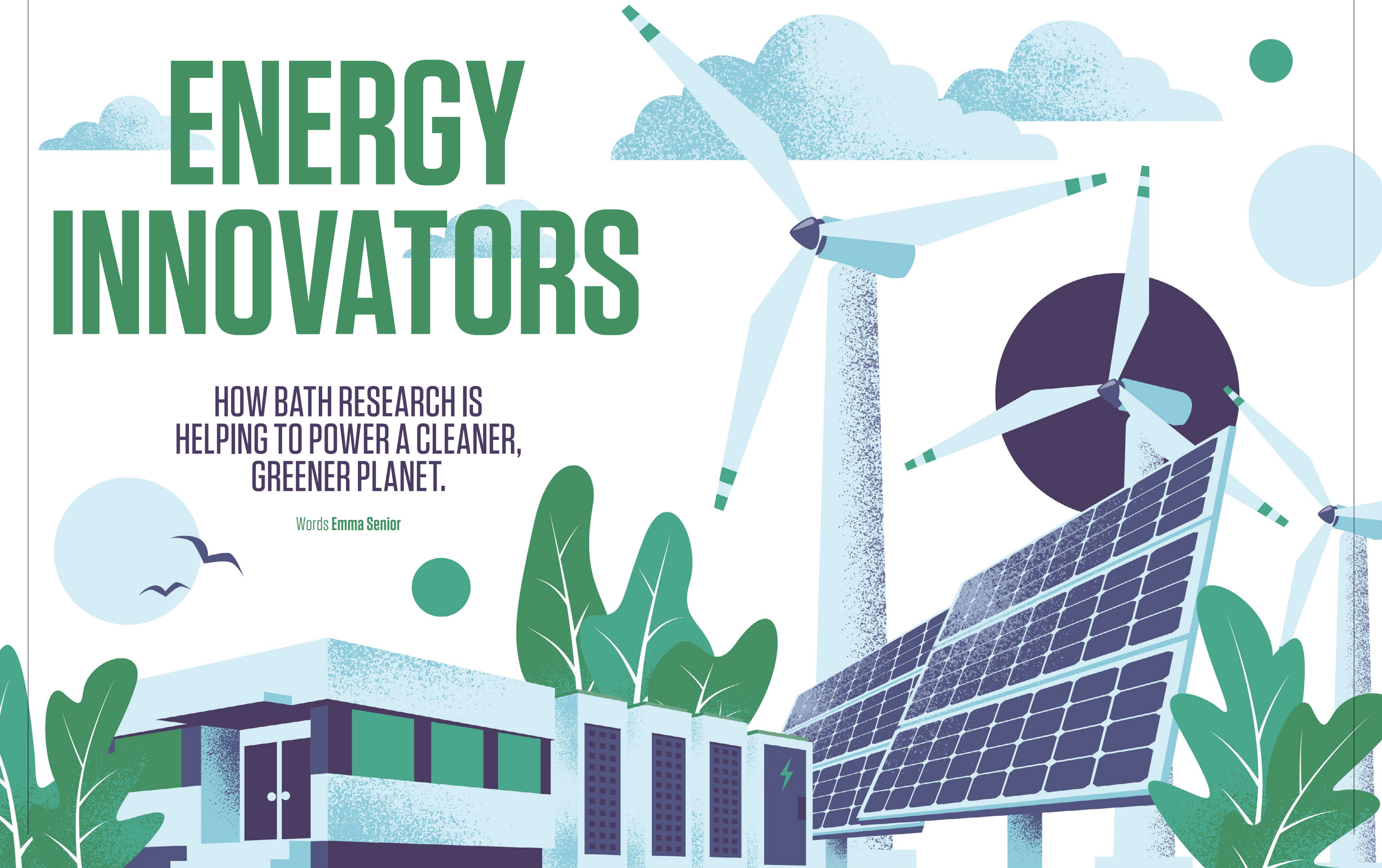
Nimbus powers up

A new cloud supercomputer has been built at the University, enabling researchers to work with huge amounts of data in a fraction of the time usually required. The highly powerful computer has been named Nimbus, after a competition run by the Research Computing Group drew over 70 suggestions from students and staff.

ENERGY INNOVATORS

HOW BATH RESEARCH IS HELPING TO POWER A CLEANER, GREENER PLANET.

Words **Emma Senior**



We are at a crucial moment for energy. Prices are higher than they've ever been, contributing to the UK's spiralling cost of living crisis. The conflict in Ukraine poses a continuing threat to the security of natural gas supplies to Europe. And, despite the clear and urgent dangers of global warming, over 80% of our global energy consumption came from oil, coal or gas in 2021. It's clear that things can't continue as they are: we need sweeping change for the better across the energy sector. But how?

Here at Bath, we're tackling this key issue head-on. Academics from across our University are working to drive a sustainable energy future. Our projects are crossing traditional lines between disciplines and bringing together researchers in a bid to make our energy cleaner and greener. Over the next few pages, find out more about how we're improving the delivery of sustainable fuels, making renewables more efficient and empowering consumers to make eco-friendly choices.

One of the most promising future fuels is hydrogen. When consumed – whether via combustion (burning) or through electrochemical processes in a fuel cell – hydrogen's only by-product is water. It's also incredibly energy-dense, delivering three times the amount of energy per kilogram compared to other fuels such as petrol, and has a broad spectrum of applications, from heating through to powering vehicles.

"Before 2019, when the UK's Net Zero 2050 initiative came in for carbon emissions, hydrogen was seen as a rather nice, obscure, interesting, but not very practical area," says Professor Tim Mays from Bath's Department of Chemical Engineering. He's been researching hydrogen since 2003 and is leading the University's Future Fuels research beacon. "But of course, after Net Zero came in, everyone went, 'Wow, what do we do now?' My research has since become very visible and popular."

Tim recently won a £400,000 UK Research and Innovation grant to set up a national research programme, UK-HyRES, and establish Bath as a UK Centre of Excellence for Hydrogen Research. Kicking off in April 2023, this will cover all aspects of hydrogen as an energy carrier, from production to storage and end use – all key challenges that need to be overcome.

Our impact in numbers

Bath research submitted by the Faculty of Engineering & Design to the Research Excellence Framework 2021 has saved...

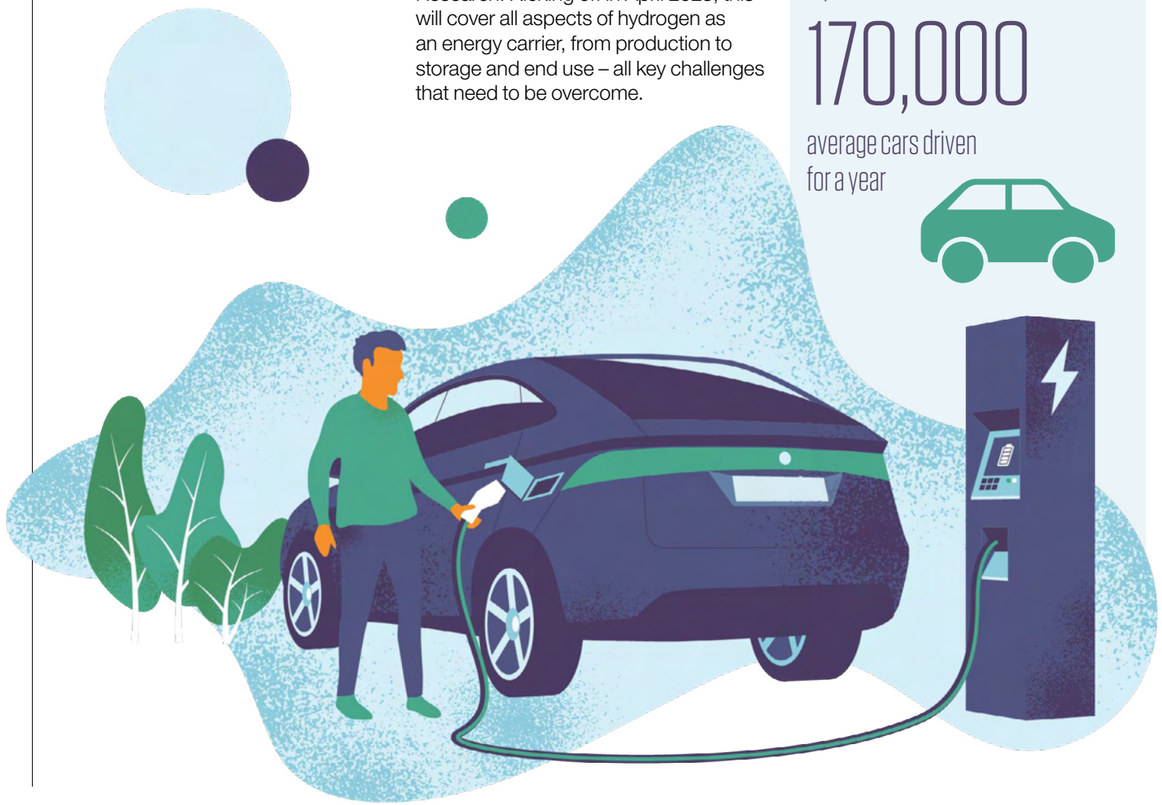
788,000

tonnes of CO_2 per year...

Equivalent to

170,000

average cars driven for a year



While hydrogen is very clean at the point of use, its production at present is primarily carried out by reacting steam with natural gas – creating so-called 'grey hydrogen' if the resulting carbon dioxide is not captured. Not only is this energy-intensive, it also relies upon a fossil fuel with ever-declining reserves. One option is to capture this carbon dioxide to produce 'blue hydrogen'. However, the environmental ideal is 'green hydrogen', made either by the thermochemical treatment of biomass or, more commonly, by splitting water into its constituent parts of hydrogen and oxygen through a process called electrolysis, powered by electricity from a renewable source.

Going green

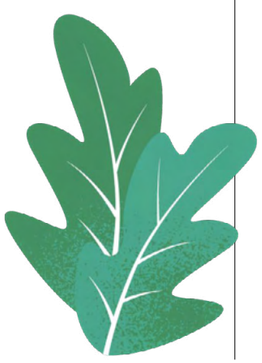
Currently, the UK doesn't produce a lot of green hydrogen – although the South West's first production facility is set to open at our new Institute for Advanced Automotive Propulsion Systems (IAAPS) research facility in 2023. One of the areas Tim will focus on includes expanding hydrogen's use as a 'buffer fuel' to store energy when supply from renewable sources outstrips demand. He explains: "If you have the Sun shining all day, but you don't need a lot of electricity consumption, what do you do with the excess? You can electrolyse water and generate hydrogen."

Storing hydrogen also throws up its own hurdles. As it's an incredibly light element, you need a lot of it in terms of volume. Powering your car, for example, might only take 5kg of the stuff – but in normal atmospheric conditions that's 60m^3. This means that, to store it efficiently, you need to either compress or liquefy the gas.

"There's a lot of energy spent on densifying hydrogen and there's a lot of energy and investment in materials to keep it there," says Tim. "But you need to weigh that up against the benefits of the lower storage volumes."

Tim is working alongside several industrial partners, including GKN Aerospace, Siemens Energy and ITM Power, to ensure that the research will make a real-world impact. He concludes: "We will make sure that, while our projects are fundamental academic work, industry will help us to co-create them so there are tangible impacts including carbon reduction, lower costs and potential commercialisation."

> "Hydrogen is very clean at the point of use"



As well as looking to new fuels for the future, we also need to focus on improving our current renewable energy sources. Professor Alison Walker from our Department of Physics is working on enhancing solar power technology using thin films of materials called perovskites to convert the Sun's energy into electricity very efficiently. Professor Petra Cameron's group in Chemistry, with whom Alison collaborates, are undertaking experimental studies on this type of solar cell.

"The point about perovskite cells is that they're cheap to make," Alison explains. "They're also low-budget in terms of the energy you need because you can produce them at low temperatures. With silicon, which is currently widely used, you have to purify it at very high temperatures."

Built to last

The current issue with perovskites, however, is that they degrade quickly in comparison to traditional silicon solar cells – after around one year instead of 25 years, although this lifetime depends considerably on the type of cell and is constantly being improved.

This degradation is caused by the way in which electrical charges move through the cells to generate electrical power and is affected by the cells being soft and easily deformed. Alison and her team are using computer models and machine learning to identify and better understand how these charges move, so they can suggest ways of reducing degradation when designing new perovskite cells. This increased longevity will in turn make them more cost-efficient.

"We've produced models, which are now widely used across the community, to explain how the charges created by solar illumination generate electrical currents," she says. "But these charges have to get out of the cell and into the circuit, and sometimes on the way out the generated electrical power is lost. So we are working on understanding those mechanisms with our models."

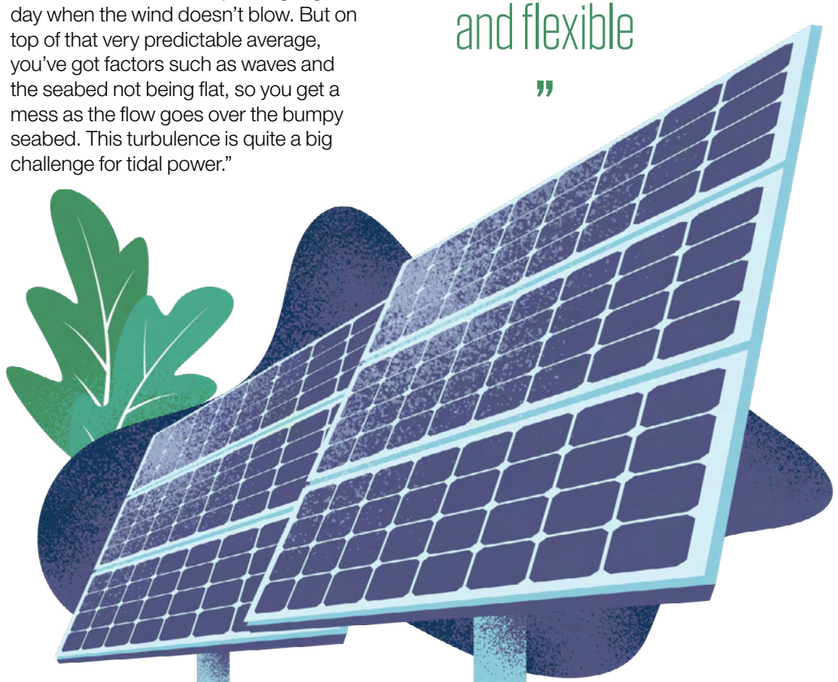
For now, stacking a perovskite solar cell on top of a traditional silicon solar cell boosts the energy output of the silicon cells. These stacked cells can be more quickly commercialised and are just a few years away from being widely available. However, Alison believes that her modelling will help to pave the way for all-perovskite cells.

Most silicon solar cells are currently produced in China, meaning that they're not just energy-intensive to produce, but also need to be transported great distances. Alison's hope is that ease of production will mean all-perovskite cells can be produced locally to their use, minimising carbon emissions. All-perovskite cells have other advantages, such as being lightweight and flexible, that will create many more applications for the cells.

Also seeking to improve renewables' reliability is Dr Anna Young, a lecturer in our Department of Mechanical Engineering, who is leading a developing Bath Beacon on zero-carbon offshore power. Her research takes concepts previously used in aerospace engineering and adapts them to tidal power, where she's applying her knowledge of fluid mechanics to tackle underwater turbulence.

"The tide is really predictable, which is great – on average the flow does what you're expecting it to do," she says. "It's not like with wind where you might get a day when the wind doesn't blow. But on top of that very predictable average, you've got factors such as waves and the seabed not being flat, so you get a mess as the flow goes over the bumpy seabed. This turbulence is quite a big challenge for tidal power."

> "Perovskite cells are lightweight and flexible"



Calculating the cost

Turning emissions impact into economics.

How do you quantify the risks of environmental damage? According to Professor Anil Markandya and Dr Alistair Hunt from our Department of Economics, 'green accounting' is the way forward. This concept considers the monetary cost of environmental damage caused by businesses' activities, including factors such as the effects of air pollution on our health. The increased awareness then gives companies the opportunity to compare their profitability against their environmental goals, and to consider the costs and benefits of adapting to more eco-friendly solutions.

Anna has recently developed a probe named the Barnacle – so-called because "you can stick it anywhere" – that's cheaper, more robust and more accurate than those currently in use. It measures turbulence by comparing pressure readings from different sensors to model its flow. So far, the Barnacle has been tested in Northern Ireland's Strangford Narrows, and Anna is hoping to carry out larger-scale trials using 20 of the devices.

Go with the flow

One of the biggest problems caused by turbulence is its detrimental effects on machinery, such as the turbines used to generate tidal power. By developing more precise ways of understanding turbulence flow, Anna hopes that turbines can be developed to better withstand it – and that manufacturers can also give a more accurate estimation of products' lifespans.

"We want to be more certain about how long tidal turbines are going to last, because that feeds into cost models," she says. "If you're not very certain, you have to be very pessimistic. Let's say you think your blades will last five years and they last five months: you've got a big problem because you've suddenly got to buy loads of extra blades. If you think they're going to last five months and they could have lasted five years, then you're going to have replaced parts when you didn't need to."

> "You want to be as close to correct as possible"

This greater certainty, she believes, will lead to wider buy-in on tidal power from industry: "You want to be as close to correct as possible."

As well as being able to predict supply, it's vital to be able to anticipate network energy usage patterns to make greater use of the existing networks when integrating new tech such as electric vehicles. Monitoring the entirety of the UK's electricity network would be a vast, prohibitively expensive undertaking. But Professor Furong Li from Bath's Department of Electronic & Electrical Engineering, and Director of the Centre for Sustainable Power Distribution, has developed a method of predicting energy usage patterns for the last miles of electrical distribution system from just a small proportion of the network.

Tackling transport

How projects at our Institute for Advanced Automotive Propulsion Systems are aiming to make your travel more sustainable in future.

Vetting vehicles

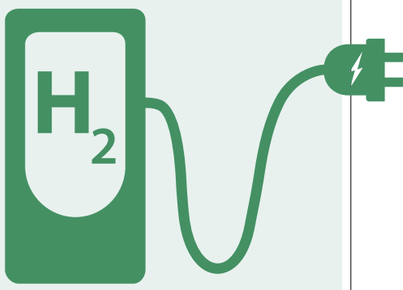
Joris Simaitis is building tools that anticipate how future environmental impacts of electric vehicles may unfold. These help to explore the required decisions to achieve the most desirable impact pathways, informing future vehicle design approaches and policy.

Seamless service

Rita Prior Filipe is investigating the feasibility of implementing 'mobility as a service' – a type of digital platform that acts as a one-stop shop for you to plan, book and pay for journeys involving multiple modes of transport – in more suburban and rural settings.

Going beyond gasoline

Julian Wilkinson is investigating the potential of hydrogen fuel cells to power larger vehicles, which are currently hamstrung by the limited range of battery technology for electric vehicles.



Furong has been working in partnership with network operator Western Power Distribution on developing an understanding of how low-voltage electricity networks can best cope with the future, low-carbon world. The Low Voltage Network Template project involved setting up monitoring equipment in 800 substations across South Wales. “It was an area spanning from Newport to Swansea,” she explains. “In between, you have major industries; you have big cities, small cities and countryside. The questions we set out to answer were, do we need to monitor every single substation? Are there common patterns? Can we use readily available information to estimate energy usage patterns without expensive monitoring?”

Finding patterns

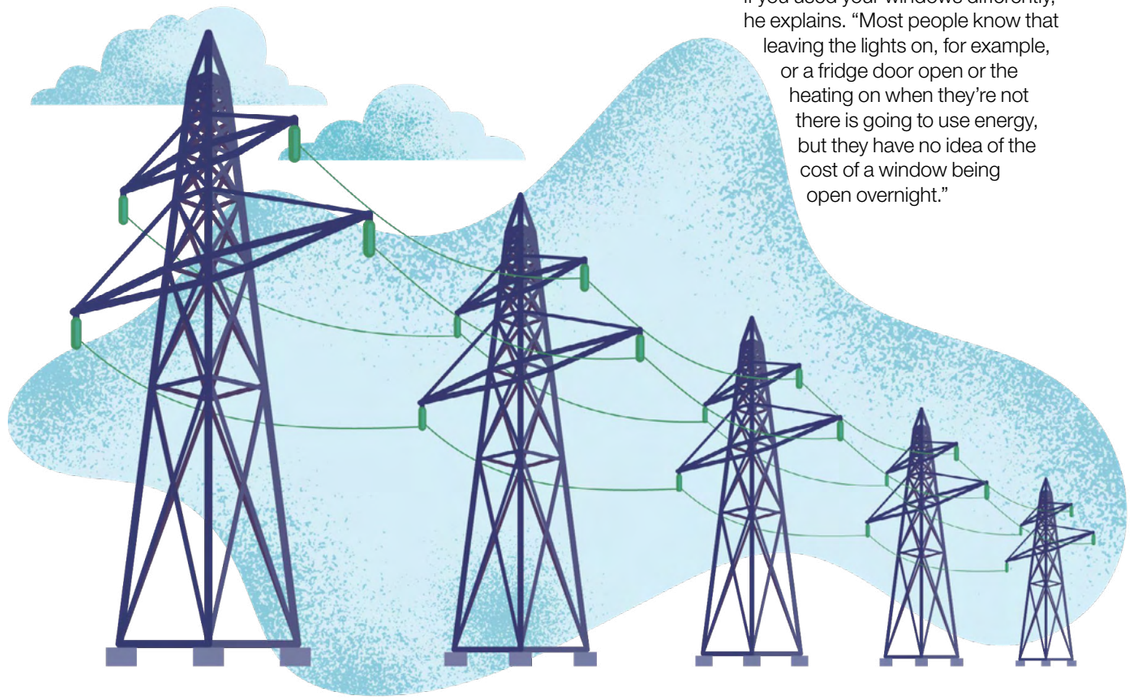
What Furong uncovered is that we don’t need to monitor every single distribution substation, which would cost over £1bn to install monitoring devices: “In fact, we can find ten typical patterns representing energy usage, including one designated to street lighting. Using these, we were able to use fixed information, such as customer mixes and the details of the network’s infrastructure to infer demand for a given area without the need to install monitoring devices.”

Understanding these patterns is particularly important in identifying any bottlenecks for the takeup of electric vehicles or heat pumps, to inform when and where demand management offers the greatest rewards for energy customers.

The ideal next step, according to Furong, is making consumers more aware of these fluctuations in availability, and even incentivising users with lower prices for green electricity when supply is at a peak.

But how can we make customers more aware of their energy use in general? “Fundamentally, we think smart meters are a bit boring as far as the customer is concerned,” says Professor David Coley from our Department of Architecture & Civil Engineering. “People lose interest relatively quickly.”

> “Smart meters are a bit boring for customers”



Getting smarter

David carried out a piece of research where sensors were placed into 40 homes to track energy use. From this, he was able to deduce things such as the insulation level in the buildings and how people used windows.

“We managed to predict things like how much money you would save if you used your windows differently,” he explains. “Most people know that leaving the lights on, for example, or a fridge door open or the heating on when they’re not there is going to use energy, but they have no idea of the cost of a window being open overnight.”

He continues: “It’s also to make sure people don’t make incorrect choices and shut all their windows when at least one should be open, or get paranoid about the lights being on when actually it’s something else using energy.”

David’s work on educating people about the environmental consequences of their decisions includes the design of buildings themselves. He uses the Latin phrase *defornocere*, meaning ‘ugly through harm’, to describe the concept that our moral values should inform our aesthetic choices. If a traditionally ‘beautiful’ building is responsible for large amounts of carbon emissions, should we still consider it attractive?

In addition, David has also developed a free modelling tool called ZEBRA – or Zero Energy Building Reduced Algorithm. This enables architects to input their moral positions in terms of energy use and carbon emissions at the start of a building project, predict the building’s energy use and carbon footprint, to quickly see where the biggest issues are and adjust their design to reduce the harm the building will do. Thanks to Bath’s close links with the architecture industry and our placement students, David hopes that ZEBRA will soon be widely used in industry and other universities.

ZEBRA can be downloaded from **zebra-model.org**

From every angle

It’s not just designing our buildings that calls for careful consideration. Professor Marcelle McManus from our Department of Mechanical Engineering, Co-Director of the Centre for Sustainable and Circular Technologies (CSCT), has spent years investigating life cycle assessment. This technique examines every aspect of a product, process or technology to determine its environmental impact from start to finish.

For example, to calculate the life cycle impact of a cup of tea, you’d not only need to consider the electricity used to boil the water, but also everything from the materials used to manufacture the mug through to the air miles required to transport the tea leaves.

Marcelle explains: “Basically, with life cycle assessment, you’re looking at everything that goes into the system and everything that comes out of it, and you’re modelling the impact of that on the wider environment.

“It’s important when we’re talking about renewable technologies such as solar and wind power, for example, and we talk about them as being zero carbon – they’re never actually zero carbon,” she continues. “Even though the Sun and the wind don’t have an environmental impact when used in energy production, the actual aspect of making the solar panels or wind turbines does. By using life cycle assessment, we can really understand where the impacts occur and how we can reduce them.”

> “We’re halfway there”

Marcelle has worked with wind turbine companies to help them reduce the environmental impact of their products through steps such as increasing the amount of recycled aluminium in the turbines themselves, or minimising the amount of concrete used to lay their foundations. She also works with companies producing bioenergy and is exploring options for making new materials and power from waste emissions from large industry.

She is working to decarbonise industry and energy provision through the new Industrial Decarbonisation Research and Innovation Centre (IDRIC), where she is a Research Director.

“A lot of the new technologies need to be built, and building them will produce a spike in greenhouse gases at the very time that we do not want this,” she concludes. “How we overcome that is critical. We don’t want to be building a ton of solar panels or wind turbines and, in the process, emitting a huge amount of greenhouse gas.”

“We’re halfway there in terms of the Net Zero target,” adds Tim. “But the next half is going to be about ten times as difficult as the first half.” We may have a long way yet to go, but here at Bath, we’re proud to be working towards powering a more sustainable future.

LIGHTS, CAMERA, ACTION!

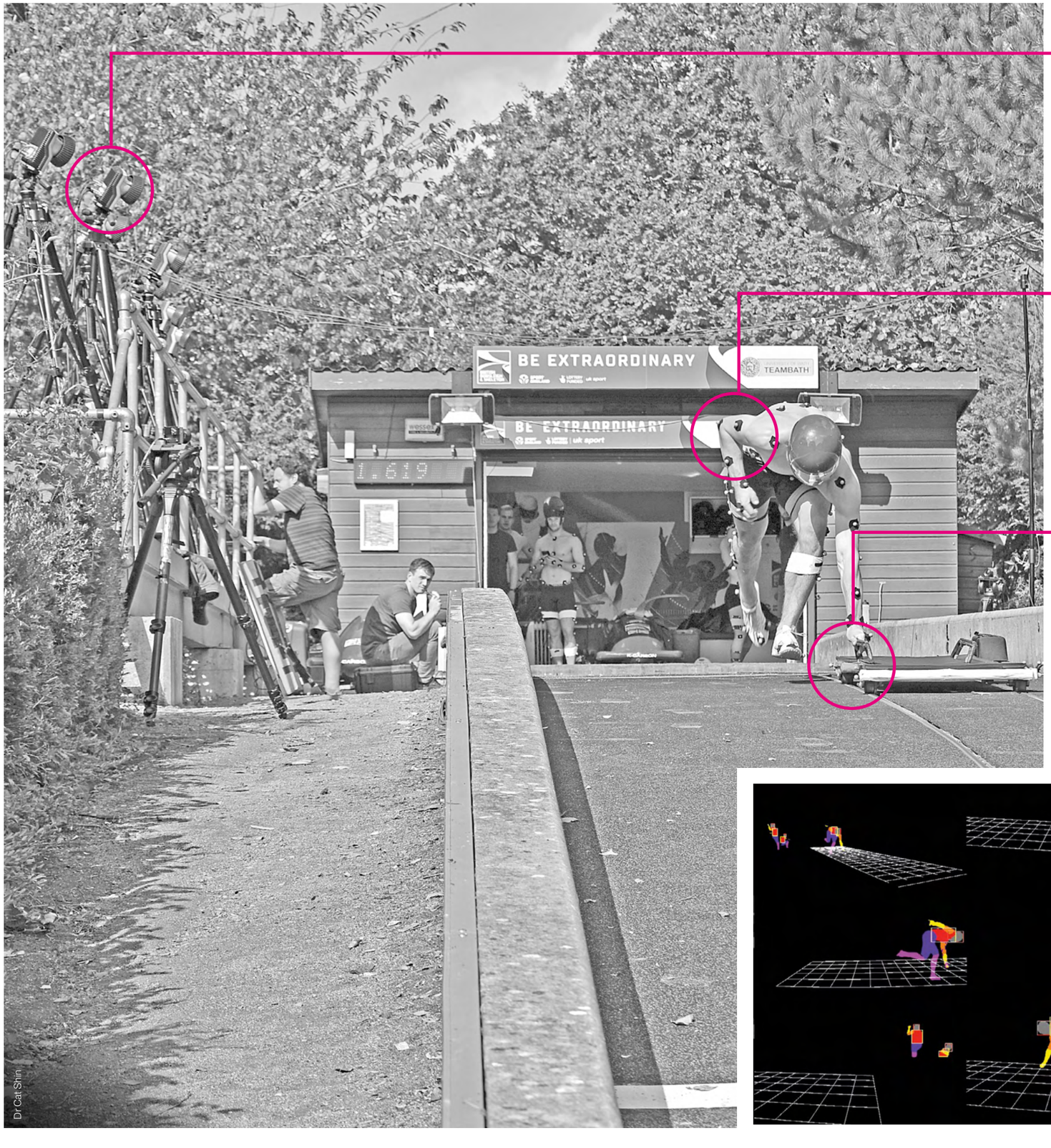
HOW OUR RESEARCHERS ARE USING MOTION CAPTURE TO IMPROVE SPORTING PERFORMANCE.

When it comes to skeleton, the first few seconds are your one critical opportunity to gain momentum. But where do you practise for an ice-based sport in a mild climate like Britain's? Here at Bath, we're home to the UK's only push-start track, which turns 20 this year – as well as researchers working on innovative ways of measuring these dynamic bursts of sprinting.

Traditional motion capture may conjure up visions of Lycra suits and green screens, but a team from our Centre for the Analysis of Motion, Entertainment Research and Applications (CAMERA) have developed a new, non-invasive technique that can be applied to real-world training environments. This could offer coaches detailed insight into how their athletes are performing, in a sport where even a few milliseconds can make the difference between podium positions.

"Our latest system allows us to break out of the laboratory and take biomechanics into the wild," says Dr Laurie Needham, a research fellow at Bath's Department for Health. "We now have a tool for coaches to monitor technique where traditional motion capture approaches may not be applicable."

In addition to their partnership with British Skeleton, CAMERA researchers are working on projects to create assistive technology for people with disabilities, improve prosthetics and measure physical function. Find out more at **camera.ac.uk**.



Dr Cat Shin

THROUGH THE LENS

A set of 24 carefully calibrated cameras were used to capture a squad of 12 GB Skeleton athletes as they each completed three maximum-effort runs of the push-start track.

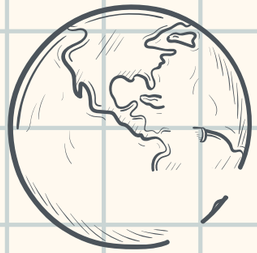
ON YOUR MARK

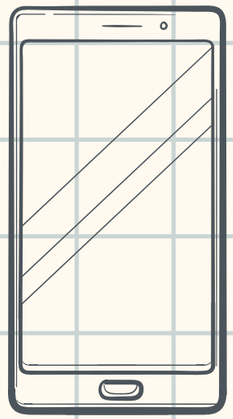
Each athlete was fitted with a full-body set of motion capture markers, as well as a further four markers on the sled. These were tracked by the cameras to provide data on their movement.

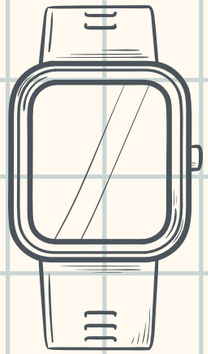
STARTING STRONG

The data was analysed using machine learning to provide computerised models of the athletes (see inset image) in motion. These can provide insight into technique elements such as step length and frequency, ground contact time and centre of mass.

BATH TO BUSINESS







OUR ENTERPRISING STUDENTS AND ALUMNI ARE TURNING THEIR BIG IDEAS INTO BUSINESSES THAT HAVE A POSITIVE IMPACT ON PEOPLE AND THE PLANET. HERE, FOUR BATH GRADS SHARE THEIR START-UP STORIES.

Words **Jodie Tyley**

Bath is fast becoming a hub for start-ups, as more and more students are using their drive and ambition to build their own businesses. These budding entrepreneurs are driven by the potential to make a difference – and we're helping them to turn their innovative ideas into a reality.

Through the University's membership of SETsquared – the world's number one university-based business incubator – students can access investment opportunities, as well as develop their practical skills and connections through workshops and networking events.

Since 2002, SETsquared has supported over 5,000 entrepreneurs and helped them raise over £2 billion investment.

On campus, the School of Management will have a dedicated hub for entrepreneurship. The new building, 10 East, opened in June 2022 and will include a Student Entrepreneurship Lab.

This year also marked our inaugural Enterprise Day, which brought together industry leaders, academics, students and alumni to talk about how business can create a green and resilient future. It was an opportunity to showcase student start-ups, including the Washing Machine Project, founded by Nav Sawhney (MSc Humanitarianism, Conflict & Development 2020), who created a hand-cranked device to ease the burden of handwashing clothes for people in refugee camps.

Over the next few pages, you'll meet just some of our Bath community who, like Nav, hope to build a better future through business.

"I had a lightbulb moment – this could be used for women's safety"

E-J Roodt (BSc Business 2022)

Business: Epowar

The big idea: A smartwatch safety app that can sense the wearer's distress and trigger an alert.

Supported by: Innovation Award; Dragons' Den alumni grants; Enterprise Bath, SETsquared

"In my first year, we were asked to write a business card for ourselves in 20 years' time. I wrote 'founder of a female empowerment business'," recalls E-J Roodt. It's something she's felt passionate about since school, when she set up a group called 'Ms. Empowered' – organising talks on gender equality and raising money for sanitary products for homeless women.

Inspiration for what to do next came while E-J was jogging in a badly lit park and feeling vulnerable. She explains: "I've always felt worried about being out alone at night so when I saw that smartwatches could be used to detect heart attacks, I had a kind of lightbulb moment, and thought 'maybe this can be applied to women's safety'."

She took her idea to Maks Rahman (MEng Integrated Mechanical & Electrical Engineering 2021), who had just returned from a placement year in a medical engineering organisation. Together, they co-founded Epowar – a smartwatch app that can detect distress. "The School of Management allowed me to work on it full-time during my placement, with support from an alumni grant," she says. "Having a network of lecturers and alumni has been really helpful, answering any questions and giving us advice on things like strategy and filing a patent."

Epowar monitors body motion and heartrate to distinguish between physical and psychological distress. In the event of an attack, it sends an alert to the wearer's emergency contacts, activates a loud alarm and records evidence. The AI-powered system was built on extensive research and testing, supported by Enterprise Bath – an extracurricular programme for aspiring entrepreneurs. "The programme provides masterclasses, investment opportunities and expert talks," says E-J. "I was also paired with a mentor, alumnus Laurence James (BSc Statistics 1976), who's been incredibly supportive."

E-J has now won a coveted £15,000 Innovation Award, donated by alumnus His Excellency Khalil Foulathi (BSc Economics 1975; Hon LLD 2011). The investment will enable her and Maks to refine the prototype, and they hope to launch at the end of 2022. "Bath is becoming such a hub for techy start-ups," she continues. "There are a lot of cross-degree collaborations happening between business, science and engineering students, and so many incredible ideas. Bath's a really exciting place to be."

James Russ (MEng Integrated Design Engineering 2021)

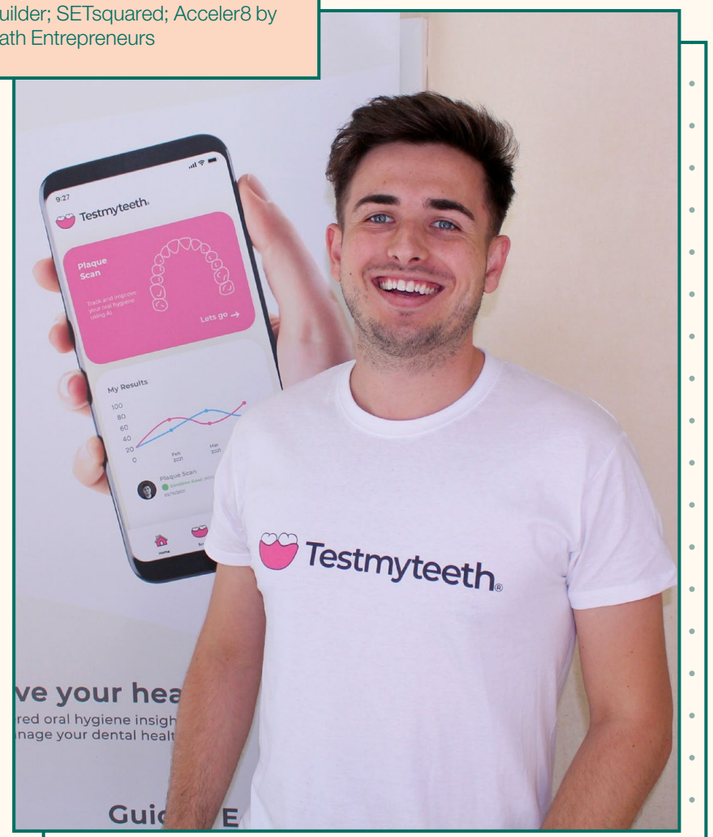
Business: Testmyteeth

The big idea: An app that helps people to identify, track and manage their own dental health at home.

Supported by: Innovation Award; Dragons' Den; NatWest Business Builder; SETsquared; Acceler8 by Bath Entrepreneurs

"I was in my first year of university when I had trouble with my wisdom tooth," says James Russ. "The treatment ended up costing over £100 of my limited student budget, which really hit a nerve. Especially when I found out it could have been prevented through better dental care at home." He discovered he wasn't alone. Oral disease affects around 3.5 billion people worldwide and the cost, inconvenience and high demand for appointments prompted James to come up with a solution.

"I thought it would be great to have an app that focuses on the preventative side of dentistry," he says. Feeling inspired after a placement in Dyson's design and development team, James decided to work on his idea: "I wanted to get as much software exposure as possible, so I chose every computer vision module on my course. The practical, hands-on work really set me up with the skills I needed to take this forward as my final-year project."



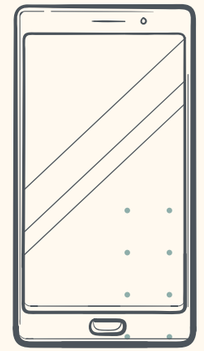
"The support made such a difference"

Using AI, Testmyteeth performs a plaque scan from photos of your pearly whites. "It will tell you where you missed when brushing and highlight where you've got low, medium or high build-up," James explains. "More than that, we'll also provide educational videos on how to improve your brushing technique; what the early signs of tooth decay and gum disease look like; and when you should see your dentist."

While his studies helped with the practical side of building an app, James developed his business acumen through opportunities such as Dragons' Den. This is where Bath students pitch their start-up to a panel of alumni donors for investment – but unlike the television show, there are no equity or stakes taken. James says the experience gave him the confidence and the means to turn Testmyteeth into a reality.

"Since graduating, I was granted an alumni Innovation Award and that's been a game-changer," he adds. "It's enabled me to work on the business full-time. I've taught myself full stack app development, built the AI and now I'm ready to start beta trials. The support has made such a huge difference to what I've been able to achieve in a year. I can't thank alumni enough."

James continues, "In future, I'd love to give back so that future generations can benefit from the same opportunities that I've had at Bath."



"I see the opportunity to create a solution"

Helen Liang (PhD in Sustainable & Circular Technologies 2022)

Business: LabCycle

The big idea: A company that specialises in recycling single-use plastic from laboratories.

Supported by: Innovation Award; Dragons' Den; SETsquared; Santander Entrepreneurship Fund

"We use research to solve mysteries, make discoveries and cure diseases, but along this journey a huge amount of single-use plastic waste is generated," says Dr Helen Liang. "At the moment, this waste is sent to landfills or incineration due to concerns about health and safety, and the lack of appropriate recycling services."

Research institutions worldwide are estimated to produce 5.5 million tonnes of plastic waste per year. As a PhD student, Helen saw the problem first-hand and wanted to find a way to make research more sustainable. "Researchers are aware of this problem, and many of them have been calling for a change to this waste culture," she explains. "Working at that interface of being both an entrepreneur and a researcher, I feel the responsibility and see the opportunity to create a solution."

An Innovation Award in 2020 enabled Helen to develop the company LabCycle, together with her co-founders, who she met at a SETsquared training workshop for start-ups. "The support from alumni is really important for young entrepreneurs like me," she says. "The money is important, but it's more about people saying, 'Yes, we see the opportunity in this'. It makes you feel that you can make an impact."

The precise method of recycling lab plastics is a closely guarded secret, but Helen tells us it's a combination of chemical and mechanical processes that removes hazardous contaminants. "It's been developed according to the standards of the NHS, and the health and safety protocols from different research institutes," she adds.

Following a successful pilot within our biology and biochemistry labs, Helen is working with the University to roll it out across chemistry, chemical engineering, pharmacy and health. "Tests showed that our process creates 10 times fewer CO_2 emissions compared with sending the waste to landfill," says Helen, who was recently awarded a Royal Academy of Engineering and Enterprise Fellowship for her work with LabCycle. The Fellowship provides a further cash injection for the business, as well as mentoring, training and networking opportunities.

"I sincerely appreciate the support from the Centre for Sustainable and Circular Technologies, Department of Life Sciences, the health and safety team, SETsquared and alumni," Helen continues. "We've had a lot of interest from external organisations eager to reduce their environmental impact. We hope to move as fast as possible to help them become more sustainable."

Taking Bath by Storm

STORM CEO AND CO-FOUNDER **DAVE KELLY** ON WHY HE DECIDED TO BRANCH OUT FROM TECH AND PLANT HIS OWN FOREST

Dave Kelly (BSc Business Administration 2009) co-founded Bath-based digital tech agency Storm Consultancy with fellow graduate Adam Pope (BSc Computer Science 2009) during their final year of university.

In 2013, Storm entered into a joint venture with the University of Bath and created CiteAb – now the world's leading life science data company, which is estimated to save the industry over $1bn a year. Both companies received the Queen's Award for Enterprise for innovation in 2022.

Why did you choose to study at Bath?
One of the things that attracted me to studying a business course was the breadth of opportunities – you learn about finance, economics, HR, marketing – the whole lot. What really impressed me about the Business Administration course at Bath was the level of integration with industry.

How did your studies help you to develop?
I'm from a place in Cornwall where buses came every other Tuesday if you were lucky, so university was a big change. It gave me a confidence boost and I grew up quite quickly. I also benefited from the connections I made through the course – not just with peers but also within the business community.

Even now that I'm an alumnus, the University still invites me to events such as guest lectures, and I love that I'm asked to chip in and speak to students, too. As a graduate, you know how valuable a network can be because you've experienced it first-hand, so it's a no-brainer to give back to Bath in some way.

Why did you decide to 'branch' out from tech and plant your own forest?
This stemmed from Storm's 10th anniversary. We made three pledges: to become a B Corp; to create a forest to offset our carbon legacy; and to win the Queen's Award for Enterprise – and now we've achieved all three!

Co-forest was inspired by my eldest daughter, who was asking what we can do to help combat climate change. With a healthy dose of naïve optimism, we decided to set an example and plant our own forest. Immediately, our clients wanted to get involved and within a month we had raised £250,000 and were on our way to buying land in Bristol and planting 10,000 trees. Hundreds of volunteers made it possible, which shows what can be achieved by coming together. Co-forest will be a lasting reminder of that.

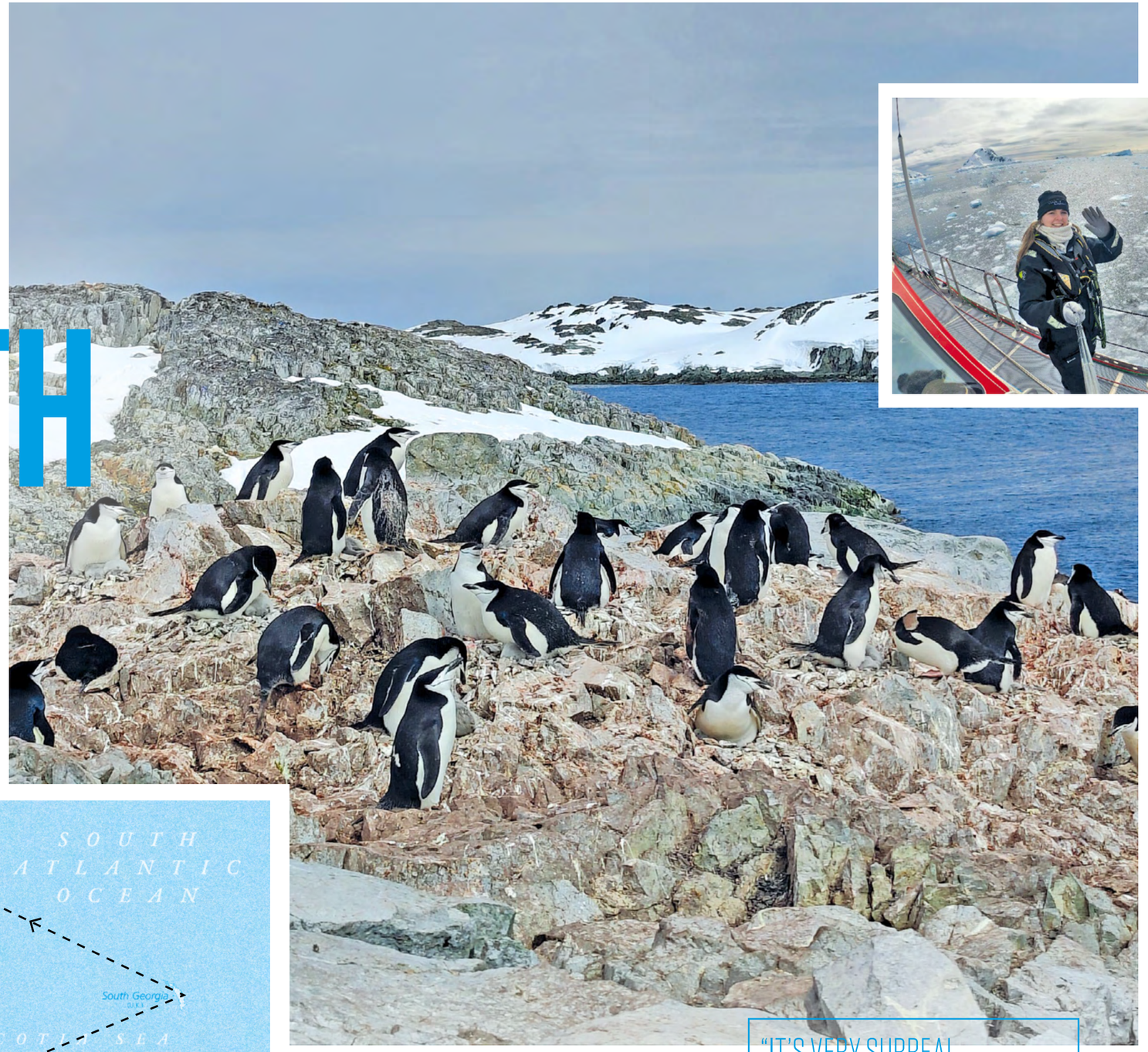
The School of Management encourages students to think ambitious. What does ambition mean to you?
For me, ambition is essentially your end point, your dream – but it's meaningless unless you have the drive and desire to make it happen.

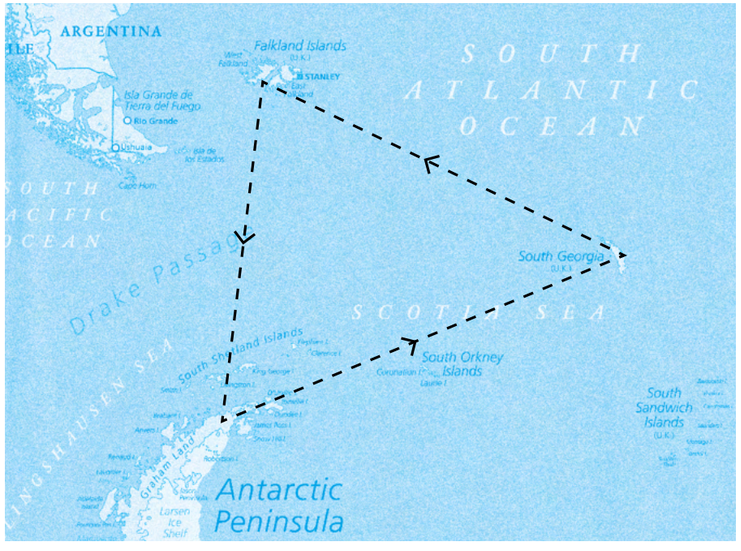
Journey to the

ENDS OF THE EARTH

IN 2022, BATH RESEARCHERS WENT ON AN EPIC VOYAGE TO THE ANTARCTIC. HERE, THEY SHARE THEIR EXPERIENCES OF BRAVING FREEZING TEMPERATURES AND PICKING UP PENGUIN POO TO UNDERSTAND THE EFFECTS OF CLIMATE CHANGE.

Words **Emma Senior** / Diary entries **Katie O'Brien**
Photography **Katie O'Brien and Jane Younger**





27 December 2021

LEFT BATH AROUND 4PM TO SET OFF FOR THE FALKLAND ISLANDS.

FLEW FROM BRIZE NORTON MILITARY BASE TO DAKAR (SENEGAL) THEN ON TO THE MOUNT PLEASANT COMPLEX IN THE FALKLAND ISLANDS.

TOTAL JOURNEY TIME FROM UNI TO THE BOAT – 27 HOURS.

29 December

FIRST DAY OF SAILING, DIDN'T FEEL TOO SEASICK AT THE START. SAW MY FIRST WILD PENGUIN (MAGELLANIC) IN PORT STANLEY.

> "IT'S VERY SURREAL REALISING HOW FAR AWAY FROM THE REST OF THE WORLD WE ARE RIGHT NOW"

1 January 2022

SAW LAND FOR FIRST TIME IN A FEW DAYS.

TOOK THE NIGHT WATCH ON THE BOAT AS WE WERE HEADING INTO ANTARCTICA'S CROKER PASSAGE – VERY SURREAL REALISING HOW FAR AWAY FROM THE REST OF THE WORLD WE ARE RIGHT NOW.

2 January

THE MOST AMAZING MORNING OF MY LIFE – WOKE UP IN ANTARCTICA WITH THE BOAT SURROUNDED BY A POD OF HUMPBACK WHALES.

PENGUIN COLONIES EVERYWHERE – GENTOOS AND CHINSTRAPS.

ANCHORED FOR FIRST TIME, HAD A LOVELY DINNER AND SOME WINE WITH THE CREW TO CELEBRATE.

As you approach the remote island of South Georgia, Sir David Attenborough welcomes you via an official government video. The famous broadcaster (and Bath honorary graduate) warns of the need for strict biosecurity measures to protect the pristine, richly biodiverse environment. Rats are forbidden, with specialist dogs used to scour boats for any rodent stowaways before they depart for the island. "That's when it hit me: oh wow, this is big time," says PhD researcher Katie O'Brien.

> "I'VE LEARNED TO BE VERY QUIET, CRAWL ON THE GROUND AND BE QUITE SNEAKY TO NOT DISTURB THE PENGUINS!"

"Arriving in South Georgia was a highlight for me," she continues. "I've never seen so many animals in my life. It's one of those places in the world that very few people have actually set foot in. It's almost bewildering to think back on it; it was just such an amazing experience."

Second-year biology PhD student Katie and her supervisor, Dr Jane Younger, were part of an international team of scientists studying penguin colonies, such as South Georgia's 500,000-strong King Penguin population – the largest of its kind in the world.

The island was one of the stops on a 30-day voyage aboard specialist polar expedition yacht Vinson of Antarctica, which set off from the Falkland Islands and went south to the Antarctic Peninsula, before heading north-east to South Georgia and then returning back to the Falklands. The field work took in six species of the sea bird, from the Magellanic penguins that you might typically see in zoos, through to agile Rockhoppers and mohawk-crested Macaroni penguins.

Sampling species

Jane and Katie's research focuses on how penguin populations are responding to climate change. This includes analysing samples of blood and droppings from the birds to identify which viruses and parasites are present in their bodies, as well as how their diets and ecological associations are adapting as climate change affects prey availability. The effects of climate change are an especially pressing issue for the Antarctic Peninsula, where temperatures rose by an alarming 3°C between 1970 and 2020.

"What we would expect as things warm up is that new parasites and diseases might be able to move further south into areas such as Antarctica, where they weren't before," explains Jane. "That's what we think is maybe happening, but no one's really monitoring it. It's definitely something we need to look at and see if certain diseases might be a new problem for penguins in the future."

This information will then help scientists to identify penguin species that may be particularly vulnerable to the effects of climate change and aid in future conservation work.

Jane continues: "Our results from the trip will help to establish a baseline, and hopefully I'll be able to go back every few years and keep sampling to see how things are changing over time."

During the trip, the team collected over 500 samples of penguin droppings, as well as around 200 blood samples. They are now preparing to analyse the DNA from these, which will reveal an amazing level of detail. For example, the pathogens present in the faeces can be compared with infection markers in the same bird's blood, which can show whether they are actually ill as a result.

Getting the samples wasn't always a clean and easy process for the researchers, however: "One person will hold onto the penguin so it's not struggling. You tuck their head under your arm so they can't bite – although I think we all got bitten during the trip. They don't like being picked up!" says Jane.

"A second person takes a quick blood draw from their foot. It doesn't take long, less than five minutes – the penguin will usually poo on you during that process, which gives you another sample."

Katie adds: "As scientists, we're there to do research; we're not there to damage the environment that we're trying to conserve and understand more about. One of the main things that I learned during the trip was how to avoid disturbing colonies. I've learned to be very quiet, crawl on the ground and be quite sneaky!"

Jane and Katie are both members of the University's Milner Centre for Evolution,

3 January

FIRST DAY OF FIELDWORK; BRAIN AND BODY ARE TIRED AFTER BUT IT WAS SO MUCH FUN.

VISITED THREE DIFFERENT SITES AND SAW PENGUINS UP CLOSE.

SEALS ALL OVER THE ICE.

5 January

GERLACH ISLAND, ANTARCTICA — BEAUTIFUL SITE THAT HAS CHINSTRAPS, GENTOOS AND ADELIES.

I SMELL LIKE PENGUIN POO ALL THE TIME NOW.

STARTING TO FORGET WHAT MY NORMAL LIFE WAS LIKE.

11 January

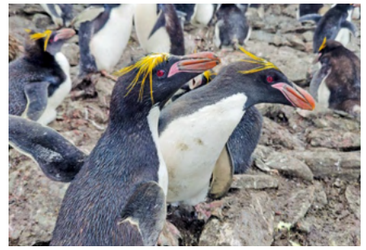
SAW A NIGHT SKY FOR THE FIRST TIME SINCE LEAVING FOR THE FALKLANDS (IN ANTARCTICA THE SUN NEVER WENT FULLY DOWN — JUST LOOKED LIKE A DUSKY AFTERNOON).

12 January

COOPER BAY, SOUTH GEORGIA — MACARONIS, CHINSTRAPS AND GENTOOS.

MACARONIS LIVED ON A CLIFF FACE — VERY HARD SITE AND MUCKY, TOO.

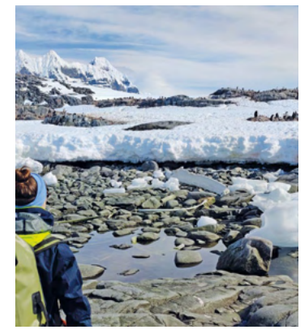
SAILED TO GOLD HARBOUR, SLEPT NEXT TO A GLACIER AND AROUND 25,000 KING PENGUINS.



15 January

SAW A BABY SOUTH GEORGIA PIPIT BY CHANCE WHILE WALKING TO THE FIELD SITE, WHAT A TREAT! FIELDWORK AT COBBLER'S COVE.

LANDED BOAT AT GRYTVIKEN — USED TO BE A WHALING HARBOUR, FIRST BUILDINGS I'VE SEEN IN WEEKS.



which opened in 2018 thanks to a £5 million gift from alumnus Dr Jonathan Milner (BSc Applied Biology 1988; Hon DSc 2013). The Centre aims to ask the big evolutionary questions, as well as to conduct research and community outreach work.

Evolving support

The trip was also supported by a £2,500 grant from the Alumni Fund. This was used in part to purchase cold-weather gear to help the team brave the extreme conditions. Taking place in December 2021 and January 2022, the expedition fell at the height of summer for the Southern Hemisphere. While this meant the weather was at its warmest, it still involved temperatures of a chilly -5°C, plenty of layers and socks that more closely resembled mittens.

You might think of the Antarctic and its surrounding territories as plain, flat expanses of icy tundra, the team were in fact greeted by a vista of craggy mountains – a beautiful contrast to the potentially claustrophobic quarters of the 23.5m, six-cabin yacht. The team then ran ashore in small boats called Zodiacs that enabled them to reach remote colonies.

"Using a small vessel meant we could access more areas, taking samples from regions that hadn't been surveyed for several decades, which will give us a much better picture of what's happening across the Antarctic," explains Jane.

The expedition was lucky to rarely run into rough seas, when high winds cause swells that prevent the Zodiacs from making trips ashore. The isolated environment kept the team on their toes, though, such as when a large block of ice sheared off a cliff and into the water near the yacht.

"A wave went over most of the boat, we rocked over onto our side and things were thrown around," shares Jane. "Even the captain said they'd never seen a chunk of ice that big fall that close before!"

But the occasional scare was worth it, as Jane and Katie are both incredibly positive about their experience onboard the Vinson of Antarctica – and about the future of their research.

"No one's really done an in-depth study of this type on animals before," adds Katie, "especially on something as mad as a penguin!"

18 January

Fortuna Bay – king penguins, weather conditions were quite chilly.

Don't want to go home, could stay here forever.

27 January

Landed in the Falklands! Spent the day in the gift shops and went birding.

Went to the pub and met some locals.

21 January

Last day on South Georgia – so sad to be leaving.

Macaronis, gentoos and kings at elsehul.

My body is exhausted but I loved every single minute.

28 January

Moved everything out of the boat. Very strange saying goodbye to the crew, they were like family to me while we were away.

Went to a hotel and had my first long shower since the end of December.

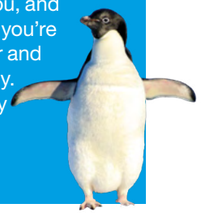
Turned my internet back on and had over 1,000 messages – going to take me all night to catch up with everyone I missed back home.

It's not all black and white

Our researchers on their preferred penguins

Jane: "Emperors, because they're the species I've worked on most throughout my career, and they're so extreme in their lifestyle. They actually lay their egg in the coldest part of the year and then stand on the Antarctic continent incubating it through temperatures of -40 or -50°C!"

Katie: "I love them all, but I think the Adélies are my favourite because they're really spunky. They kind of watch you, and if they don't like what you're doing they come over and start getting a bit aggy. They have these really big, googly eyes, as well, which are just so adorable!"



March 1973: Love was in the air at Claverton Down as our Chaplaincy Centre saw its first ever on-campus marriage ceremony.

The wedding took place between students Don Cole (BSc Economics & Administration 1973) and Kris Bax (BSc Sociology 1974) and was carried out by University Chaplain Hugh Farlie.

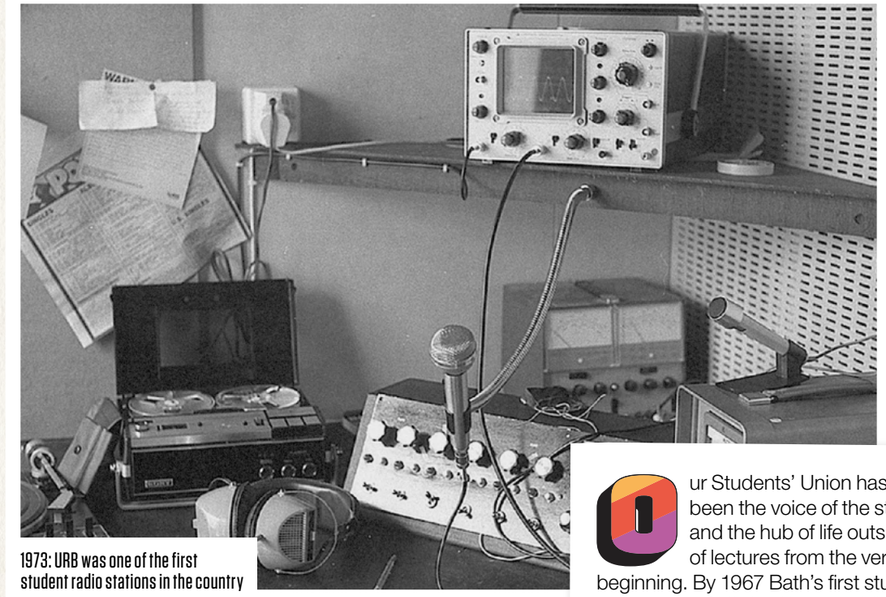
Share your memories of campus by emailing alumni@bath.ac.uk

BA2 Extra

BELONGING AT BATH

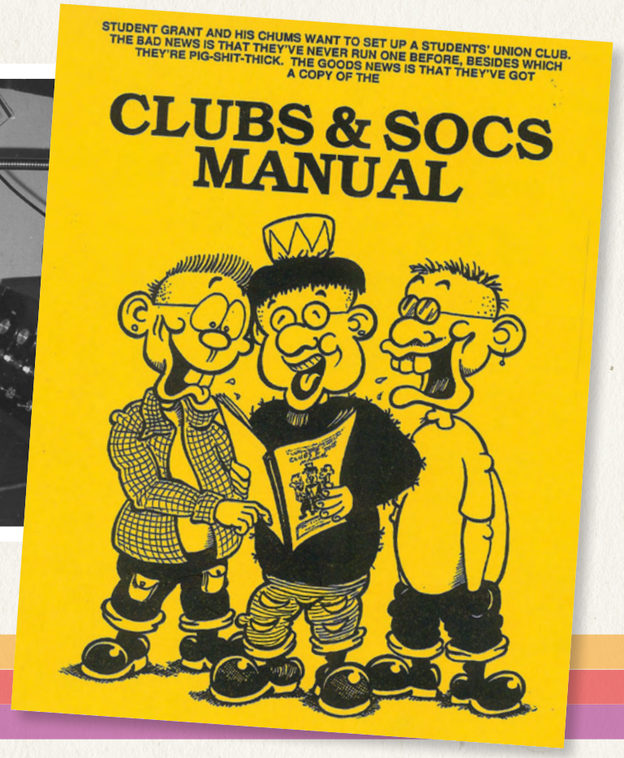
STUDENT GROUPS HAVE PLAYED A BIG PART OF MANY BATH GRADS' EXPERIENCES – SETTING YOU UP FOR SUCCESS, FORGING FRIENDSHIPS AND EVEN LEADING TO GOLD MEDALS. WE LOOK BACK ON OVER 50 YEARS OF SU SOCIETIES.

Words **Jodie Tyley**



1973: URB was one of the first student radio stations in the country

1973: Annie Nightingale, Radio 1's first female DJ, at the launch of URB



Right: A students' guide to setting up a club, 1992

1990: Members of the University Sub Aqua Club in the Laura Place fountain, raising money for charity

Our Students' Union has been the voice of the students and the hub of life outside of lectures from the very beginning. By 1967 Bath's first student newspaper, *SUL*, had been published and the first RAG fundraising event hosted.

Tim Pluck (BSc Sociology 1970) was editor of *SUL* – now known as *Bath Time* – in the early years. He returned for the University's 50th anniversary celebrations in 2016. "I was introduced to the students in the media group," he recalls. "One of them asked me what equipment I used, so I told them: my mother's Second World War typewriter."

By the time the first official SU facilities were completed in 1973, University Radio Bath (URB) was already setting the airwaves alight across campus. BBC Radio 1 had been rocking the nation since '67, and it was time for pioneering Bath students to create one of the first university stations in the country. URB was officially opened by Radio 1 DJ Annie Nightingale and will celebrate its 50th anniversary in 2023.

Former Media Officer and current SU President Alexander Robinson (BEng Civil Engineering 2022) says: "As URB enters its 50th year, we're celebrating the impact of student media and the crucial voice it lends to students. Bouncing back from the pandemic there's a sense of ambition among media members and a motivation to provide a real benefit to students – keeping them informed about campus life from their new home in the Student Media Hub within the SU." ›

1994: RAG members compete in a pizza-eating contest to raise money for charity

RAG to riches

One of the oldest societies at Bath is the student fundraising group Raise and Give, better known as RAG. Professor Richard Mawditt OBE (MSc Business Administration 1983; Hon LLD 2008) joined the University as its first accountant in 1966 and has fond memories of the now-defunct RAG procession. “Students would dress up and make their own floats to go on the back of lorries,” he recalls. “They’d line up in Victoria Park and the best float would win the Registrar’s Cup. The procession then went all around the city – the traffic in Bath wasn’t quite so busy back then!”

For Siôn Lutley (BSc Economics 1992), his experiences with RAG kickstarted a career as a fundraiser for charities and universities, including Bath. “I feel very proud of being part of the team that had a record year when I was RAG Sabbatical Officer in 1992-3,” he says. “We raised over £90,000 for local and national charities, which wasn’t bad for a bunch of students doing all manner of things in their spare time. The annual RAG Week with its ‘Stunts Day’ featured everything from trifle wrestling through to ‘climbing’ Milsom Street with ropes courtesy of the climbing club, to hitchhiking from Bath to Paris.”

While some student groups have been going for decades, others have been a more fleeting reflection of the changing times. The sewing and pedal-car clubs of the ’70s were replaced by activities such as salsa and skateboarding. But like sport, the arts have always been a constant here at Bath. A dedicated space on campus was created in 1974, when an outhouse from the original Norwood Farm was turned into the Arts Barn.

1973: RAG procession featuring the Maths Society’s table football float. Photo courtesy of alumnus Simon Holt

“We raised over £90,000 for charity”

Right: Students pose in fancy dress during RAG Week 1990

BUSMS to BUST

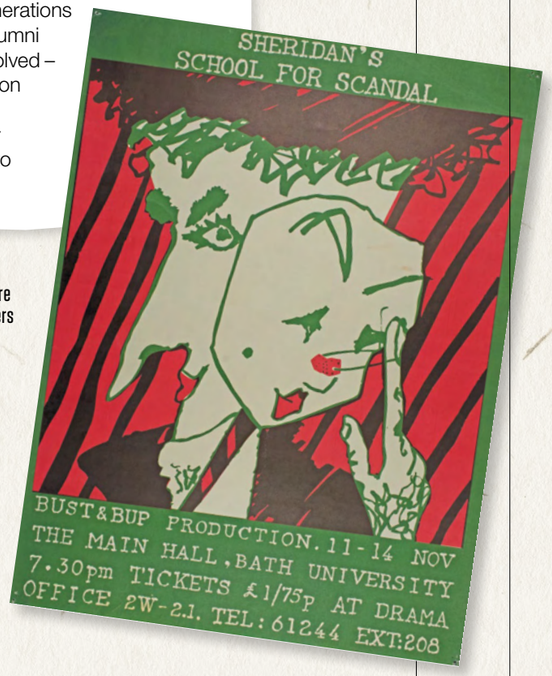
“We may be a science-based university, but student drama has thrived from the outset,” says Richard. “Both students and staff would be involved in productions; it was a pleasure to watch them perform with such enthusiasm.” What started as the drama society more than 50 years ago became known as Bath University Student Theatre (BUST), and the Arts Barn evolved into The Edge to accommodate the ever-growing popularity of dance, drama and the arts. Today there are 16 societies dedicated to these areas alone.

BUST became so big that a second group was formed, called BUSMS (Bath University Student Musicals Society). 2021-22 Chair, Lauren Green, tells us they work very closely with Backstage – an SU group that provide tech support for live events – and together, they’re known as TITS (Totally Integrated Theatre Societies). “I’m so immersed in this world that I forget about the acronyms and get funny looks when I say I’m going to a TITS social,” she laughs.

Lauren has been involved in BUSMS since Freshers’ Week 2018, when she began studying for a degree in sports science: “The best thing about it is the community,” she says. “Joining a society means you’re automatically going to meet people with similar interests. We’re really close, despite having over 50 active members, and alumni often come back to watch our shows. It was really nice to meet so many former members at our virtual 25th anniversary celebrations during the 2021 lockdown and to hear their memories.”

All student groups require a level of commitment, but arts and sports demand more than most. “We do five shows a year, and each one takes a month of rehearsing four times a week. It’s very intense,” she adds. Students, staff and the public alike can come along to The Edge and watch the productions. They often venture into the city centre, too. It’s not unusual to hear the harmonies of multi-award-winning a cappella group Aquapella in SouthGate for the enjoyment of tourists and fellow Bathonians.

“Busking is a big part of our week and a fun way to make extra income for the group,” says Aquapella’s marketing director Ellie Baldwin (BSc Biochemistry 2022). “The songs we perform have been passed down through the generations of members. Alumni are still very involved – we have a reunion every year and it’s a chance for new members to meet them.” ›



Right: Poster for a Bath University Student Theatre and Bath University Players production of School for Scandal, November 1981

1994/5: Students in a BUST production of Cabaret

Did you know?
Alumni support a vibrant and inclusive range of student clubs and societies through the Alumni Fund.

Bath together

Student groups are a great way to try something new, develop skills and maybe even uncover hidden talents. Heather Stanning OBE (BSc Sports Technology 2007; Hon LLD 2018) initially joined the Bath University Boat Club in 2003 for the social life, but went on to become an Olympic, World and European rowing champion.

"I wanted to meet great people, have a good time, have great nights out in Bath and that's exactly what I did – but I also learnt an amazing sport," she said when she was inducted into the Team Bath Hall of Fame in 2016. "Most of the friends from university that I am still in touch with are the ones I rowed alongside. The guys that you train with at six in the morning down on the river, they are the ones you'll still be in touch with."

There are currently up to 50 sports clubs and more than 160 student groups at Bath. They span cultural values, the arts, ethical and political issues, as well as diversity and support groups. There are activities, too, from hip hop to Harry Potter, animation to entrepreneurship and so much more.

As a student, Zoë Paumelle (BSc Management 2021) tried out as many as she could. "I was involved in so many different faith and cultural societies, and going to socials all the time," she says. "The Scandinavian society would have an ABBA night, and the Malaysian group would make traditional dishes for you to try – it's a great way to learn about different cultures and that's really enriching no matter where you're from."

It's perhaps no wonder she became the 2021-22 SU Activities Officer. "I just really, really love societies – they're like a home away from home," she says. "I'm from France and moving to the UK for university was daunting. In a new city with people you don't know, you feel like you want to belong somewhere. Societies are like a ready-made community that want to welcome you as much as you want to join them. It's a massive part of making people feel like they belong at Bath."

1979: Members of the women's University hockey team

"Societies are like a home away from home"

1973/4: Men's cross country team

2010: Bath University Boat Club recruiting new rowers during Freshers' Week

Left: A member of our Bath University Latin & Ballroom (BULB) club dancing in the rain

We'd love to hear about your experience! Send us your memories and photos to **alumni@bath.ac.uk**

ALUMNI SPOTLIGHT

School of Management alumna and record-breaking rower Flo Ward on how Bath set her up to face any challenge.

Interview by **Emma Senior**

Participating in the Talisker Whisky Atlantic Rowing Challenge, Flo Ward (MSc Management with Marketing 2016) rowed 3,000 miles from the Canary Islands to Antigua – breaking the world record for the youngest female trio to have rowed any ocean and raising over £15,000 for charity.

Flo (left) and her teammates at the finish line in Antigua

What's your career journey been since leaving the University?
I started work at a boutique digital marketing and research agency, then moved on to work as a data analyst on accounts such as Samsung, Nivea, EE and so on. I took a sabbatical to row across the Atlantic in December 2020, and when I came back, I realised I needed a change. I joined Accenture in November 2021, where I'm working as a growth marketing consultant.

The beauty of being out on the ocean is that your routine is so simple – just row, eat, sleep, repeat. It gives you an opportunity to think about who you are as a person and what you want from life.

What were the high and low points of the row?
Before we left, a friend of mine said, 'You've got to enjoy the lows as much as the highs, because you'll never be this low again' and I thought these were great words to live by. When things went wrong, something amazing would always happen. For example, we got to a point at night where we had to turn off all our electrics to save power for emergencies – but without that we wouldn't have seen bioluminescence, which is just the most incredible phenomenon. It looks like the whole ocean is illuminated.

Did your time at Bath help to prepare you in any way?
In terms of physical training for the row, we did five or six sessions a week in the gym – which was slightly easier for me as a Bath University Boat Club alumna, because we trained 12 times a week!

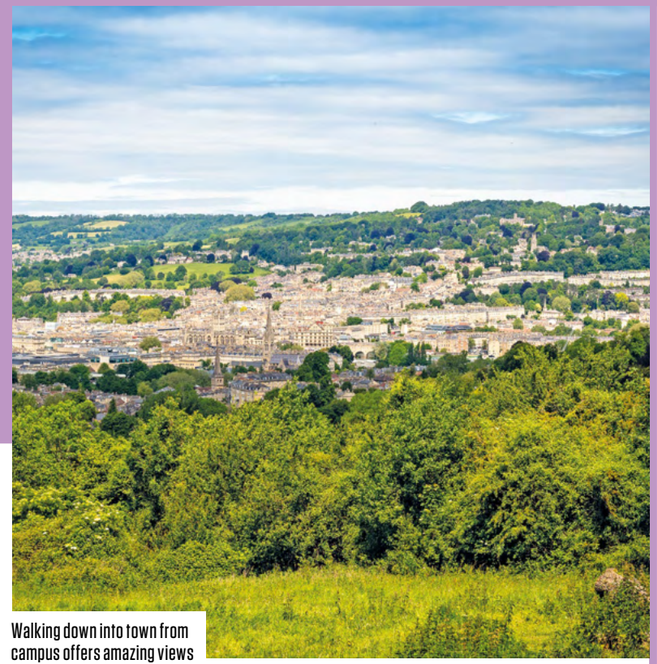
I learned great teamwork skills from competing at things like BUCS. Also, meeting such a range of people from my course made me more open-minded and sympathetic when I'm trying to compromise and learn to adjust to different people's ways.

Any favourite moments from your time here?
It was such a whirlwind of a year! I had two favourite lecturers. There was Professor Brian Squire, who did business analytics, and Mike Willis, who taught accounting. Mike's lectures were phenomenal, because I've never seen someone who's so bright and enthusiastic about accounting at 9am on a Thursday morning.

You recently spoke at the School of Management's Bath Link alumni event. How does it feel to be able to share your experiences in order to inspire others?
One of the reasons I did the row was to show what women are capable of in sports and how we can be just as successful as men. I hope it helps to shape people's perceptions of what we can do, and also to inspire women to take on their own challenges – whatever they might be. I want to give women the confidence to know that they can do whatever they put their minds to. An event like this is also a great opportunity to reconnect and see what everyone has gone on to do with their degree. Having a master's in management puts you in good stead to go on and do anything.

BATH'S BEST DAY OUT

Harisa Raja
(BSc Sociology with Social Policy 2025), Social Science Gold Scholar


Walking down into town from campus offers amazing views

Allow me to set the scene: my ideal day out in Bath, starting with a serene stroll down from campus to the city with my friends. With Claverton Down being on a hill, the walk down is almost effortless – at least compared to the walk back up! The beautiful sights of Bath, from the Georgian buildings to the greenery surrounding them, makes any walk around the city a breathtaking one.

Halfway down Bathwick Hill, a gravelled path off to the left leads us to part of the Skyline trail, where we continue our walk on neatly kept fields, with the beautiful view out over our city. Regardless of the number of times I walk down that hill, I could never get bored of the scenery! Having moved from a non-stop city in the Midlands, the serenity of Bath is what I appreciate the most. I love being around the tranquillity of nature. Just before reaching the city centre, we cross a little bridge, leading to a walk alongside the Kennet and Avon Canal.

Once in town, there are so many things my friends and I enjoy doing or seeing. Quite often we decide to grab some lunch at local pubs or cafés, with each place providing a unique atmosphere and experience. Some of my personal favourites have been The Huntsman, Wetherspoons, Boston Tea Party and a good old Costa to remind me of home!

On days when we're blessed with sunny weather, we make the most of it by going for picnics instead, sometimes by the lake on campus, but also at the famous Alexandra Park. Although walking up a huge hill while carrying food and drinks in the scorching sun doesn't feel like the easiest, the views at to the top make the trek all worth it!

A few hours of eating delicious food, chatting and laughing my head off with some of my best friends is enough to make for an ideal day, but the experiences on offer in Bath mean that's not the end of the fun. There are plenty of shops to wander around, and quite often someone putting on some form of mini circus show in SouthGate shopping centre to stop and watch! Bath truly is full of life, and it's an amazing feeling to be surrounded by it every day.

Now it's time for the dreaded walk back up the hill. During spring especially, an evening walk up to campus means getting back just in time to catch the sunset over the city, which has to be one of my favourite parts of living here. On many occasions, my friends and I have stopped and sat on the hill, simply watching life go by below us while we chat away. Each time, we look to our left and point to the top of the super-steep incline that leads to Alexandra Park, amazed at ourselves for walking it!

Back on campus, a late-night game of pool at the Students' Union or a bunch of boardgames back at our accommodation is one of the best ends to the evening. Alongside a selection of snacks, of course!

For me, my first year of university has definitely been shaped around my friendships. Meeting so many wonderful, caring people from all around the country, and even around the world, has made me feel so welcomed so quickly. Bath truly does feel like home, and I can't wait for the next few years here.

Do you agree? Let us know!
alumni@bath.ac.uk
@UniofBathAlumni
@bath.alumni.community





BATH ALUMNI BENEFITS

DID YOU KNOW AS A BATH GRAD YOU CAN...?

Join the Library
Bath alumni can apply for free lifelong Library membership

Network via Bath Connection
Swap careers advice with students and graduates all around the world

Attend alumni events
Check your emails for regular careers and social events in the UK and overseas

Access the Careers Service
Appointments and information services are available to you indefinitely after graduation

Work out in the Sports Training Village
Alumni pay no membership joining fee and can take advantage of concession rates

Stay on campus
Planning a summer trip to Bath? Alumni get 10% discount on all campus accommodation

Keep in touch!
Search 'Uni of Bath Alumni'

Find out more: www.bath.ac.uk/alumni

UNIVERSITY OF BATH