JOHNIAN

ISSUE 47

ST JOHN'S COLLEGE
UNIVERSITY OF CAMBRIDGE

Around the world in 110 days:

Sam Davies shares the highs and lows of her solo sailing adventure 08

At times like these we need our friends. Thank you for being part of the Johnian community.

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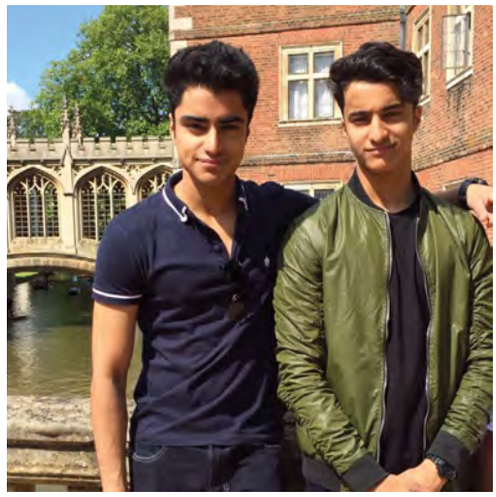

Beaufort Society

Stay connected online until we can come together again in person. Explore our new website at **johnian.joh.cam.ac.uk**

Editor's note

HANNAH SHARPLES
EDITOR & ALUMNI PUBLICATIONS OFFICER
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The vaccine offers tangible hope for an end to this pandemic. As we navigate the transition period of gradually easing restrictions, though, we must continue to rely on our reserves of resilience, our capacity for empathy and our willingness to both offer and accept help.

Sam Davies, who chose to live the length of a full lockdown alone on the water during an around-the-world sailing race from November to February, spoke to me from her boat for the profile feature on pages 8–12. Following a collision with an unidentified floating object and the aid of her on-shore team, she challenged herself to continue the course to overcome her fear.

On page 19 **Eric Ho** explains how facing burnout and reprioritising his health ultimately led to him helping others balance work and wellbeing. And on pages 16–18, **Sophie Callis** shares her experience of the community spirit among NHS hospital staff and the challenge of connecting therapeutically with patients while wearing full PPE.

Computers are not yet adept at assessing or responding to nuanced emotional states, but advances in technology are bringing them ever closer to human-level artificial intelligence. On pages 13–15 **Cameron Taylor** explores the conversational lessons that we can teach robots, and how human-robot interactions can help us in turn.

Read more about the relative strengths and weaknesses of human brains and computers on pages 23–5. Involved in developing the ARM microprocessor, **Steve Furber** has since dedicated 20 years of research to building a neuromorphic computing system that will increase our understanding of how the brain operates.

Neil Lawrence, who worked with Steve in Manchester and is now a Professor in the Cambridge Computer Lab, closes the magazine with an overview of his machine-learning career, his collection of old computers and his love of cycling.

Connections, whether in person or facilitated by technology, give us strength. I hope these articles remind you of the diverse community you are a part of, and I encourage you to reach out to the contributors and other alumni on **JohnianHub.com**

Hannah

PS Please email me your thoughts on the magazine, and look out for more College updates and Johnian stories on our alumni blog: **johnian.joh.cam.ac.uk/news**

Contributors

Sam Davies

Sam took her first steps on her parents' boat and spent family holidays sailing. Straight after graduating from Engineering, she began her competitive career as a yachtswoman. On pages 8–12 she talks about her third solo, around-the-world Vendée Globe experience.

Victoria Harvey

Since joining St John's as Admissions Tutor last year, Victoria has overseen virtual Open Days, online interviews and the implementation of new Access schemes. On pages 20–21 she details an exciting new collaboration with Generating Genius, a charty that works with Black African and Caribbean pupils.

Cameron Taylor

Gates Cambridge Scholar and Executive Director of the Inspire Dialogue Foundation, Cameron has studied and lived in the US, Italy, the UK and Norway. Read about his work improving robot-human chatbot interactions on pages 13–15.

Steve Furber

On pages 23–5 Steve shares five favourite songs and summarises his work as ICL Professor of Computer Engineering in Manchester, including a project to build a neuromorphic model of the human brain.

Sophie Callis

On pages 16–18 Sophie relates the ups and downs of her first year working for the NHS as a qualified Clinical Psychologist.

Neil Lawrence

From being the first PhD student at Cambridge studying machine learning to becoming the University's first DeepMind Professor of Machine Learning, Neil gives us a glimpse of his life so far on page 26.

Eric Ho

On page 19 Eric explains what led to him training as a Leadership Health Coach alongside his corporate law career.

Connect with contributors directly on JohnianHub.com, or email your responses to development@joh.cam.ac.uk and we'll ensure your message reaches the Johnian in question.

JOHNIAN

In this issue

EDITOR
Hannah Sharples

DESIGN
dogeatcog;
dogeatcog.co.uk

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Top centre: Professor Peter Johnstone receiving the vaccine
Middle left: the Admission of Scholars Ceremony
Middle right: brothers Aman and Kavi Mehan, who founded the Cost Price PPE company
Bottom centre: rower Alex Kingston exercising in Cripps
Bottom right: Heather Hancock speaking to students

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The opinions expressed in *Johnian* magazine are those of the contributors and not necessarily those of St John's College and the University of Cambridge.

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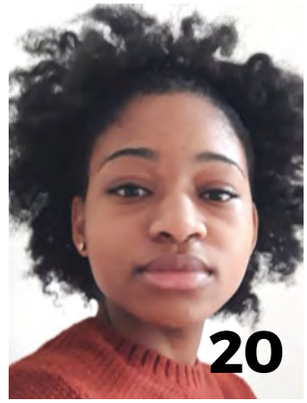

EDITORIAL

FEATURES

REAL LIVES

Letters

WHAT YOU'RE SAYING

Share your thoughts

We love receiving your letters and emails.

Express your thoughts on this issue, tell us about your latest projects or share anything else the Johnian community may like to know about.

Email your letters to **development@joh.cam.ac.uk** with the subject 'Johnian letter'.

Or write to us at
Johnian magazine,
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Please mark your letter 'for publication'. Letters may be edited for length and are published at the discretion of the Editor.

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As the years pass, I notice two things. First, that each College annual seems to follow ever quicker on the previous; and second, that as my time at St John's recedes further into hazy memory, *The Eagle* somehow brings it back with ever more clarity.

The obituaries of Christopher Dobson captured movingly his warmth and kindness – and brought to mind the occasion when I had the pleasure of meeting him, briefly, at a reception in the Master's Lodge some years ago. Perhaps I was looking rather lost; in any case, I recall he went out of his way to welcome me and ask about my connection to the College. It was only towards the end of our conversation that I had the opportunity to ask him the same question, and he was obliged to tell me, with rather charming diffidence, that he was in fact the Master.
Edward Genochio (1996)

Healthspan in decline

One of the joys of the biannual arrival of *Johnian* is hearing from public figures whose Johnian credentials had been unknown to me. One such has been Nigel Crisp, whose contribution shows that the good sense given him by his time at St John's has stayed with him, despite his eminent position in the NHS.

Nigel emphasises the importance of the individual in determining the health of society. As he says, we need politicians who will provide the conditions in which people can be healthy and then encourage them to make the best use of those conditions.

Even before COVID-19, the health of the nation has been deteriorating. Lifespan, which had steadily increased over the past few decades, has recently hit the buffers and is now in decline.

More seriously healthspan, the period of life during which we are fit and healthy, has declined disproportionately.

The average UK citizen can now expect to spend the last 20% of his or her life with some sort of disability or chronic illness. The main culprits have been too much food and too little exercise, leading to obesity and the host of non-communicable diseases that plague us during our autumn years.

With Lockdown easing, our politicians have an ideal opportunity to promote better eating and increased physical activity and help their constituents improve their own health. Let us hope that the government still consults Nigel Crisp.
Hugh Bethell (1960)

exercisefitnessandhealth.info

EMMA CORRIN (2015)

PHOTOGRAPHY FAYE THOMAS

Top stories

New Foundation Year

In January 2021 the University of Cambridge launched their Foundation Year for disadvantaged students. St John's is taking part in the pioneering scheme, which offers a free foundational year of study at Cambridge for students who have performed well at school but have been unable to meet their full potential due to unfortunate extenuating circumstances such as bereavement, being in care or experiencing socio-economic deprivation.

Find out more about the scheme: **bit.ly/Cam-Foundation-Year**

Golden Globe

In February 2021 **Emma Corrin** (2015), who was involved in many student theatrical productions in Cambridge as a student, won the Golden Globe for Best Television Actress in a Drama Series for her performance as Princess Diana in season four of *The Crown*. We look forward to seeing her on our screens again soon.

From pulp to fictions

Dr Orietta Da Rold, St John's Fellow and University Lecturer in Medieval Literature and the Material Text 1100–1500, examines the coming of paper to England during the Middle Ages in her new book, *Paper in Medieval England: From Pulp to Fictions*. Her research explores the early uses of paper, its influence on the culture and society of the period, and its success as a technology.

Orietta gave a talk to alumni on 3 February 2021 as part of our Let's Talk Academia event series. Find more events: **johnian.joh.cam.ac.uk/events**

More on Orietta's book: **bit.ly/OriettaBook**

Maternal and infant health

Dr Amanda Sferruzzi-Perri, St John's Fellow and University Lecturer in the Department of Physiology, Development and Neuroscience, won the Hans Sigrist Prize for her ground-breaking research into the causes of complications in pregnancy that lead to poor health for mothers and their children.

She will receive 100,000 Swiss francs (*c* £82,000) to dedicate to her pioneering research in maternal-fetal communication during pregnancy. She said that the prize 'opens lots of opportunities for me to collaborate with researchers at the University of Berne in Switzerland, who have complementary expertise and models. I'm absolutely overwhelmed with joy.'

Read more: **joh.cam.ac.uk/pioneering-biologist-wins-prize-mother-and-baby-research**

PROFESSOR SIR PARTHA DASGUPTA

The economics of biodiversity

Professor Sir Partha Dasgupta, Frank Ramsey Professor Emeritus of Economics and St John's Fellow, led a report into how a better understanding of Nature can help us build resilient economies and achieve sustainable prosperity for all. The independent, global Dasgupta review into the economics of biodiversity was commissioned by the UK Government in March 2019 and the findings were made public in February 2021.

Access the Dasgupta Review, including the full report, abridged version, headline messages and reactions: **gov.uk/government/collections/the-economics-of-biodiversity-the-dasgupta-review**

Hear from **Emily McKenzie** (2002), who worked on the report: **johnian.joh.cam.ac.uk/news/the-economics-of-biodiversity-the-dasgupta-review**

Honoured alumni

Five Johnians were mentioned in the Queen's New Year Honours List 2021:

- **Dr Paul van Heyningen** (1993) is Deputy Director in the Department for Business, Energy and Industrial Strategy (BEIS). He was awarded an OBE for services to energy policy.
- **Sarah Docherty** (2008) has worked for the Rt Hon. Dominic Raab and his predecessor the Rt Hon. Jeremy Hunt as Deputy Principal Private Secretary to the Foreign Secretary. She was awarded an OBE for services to British foreign policy.
- **Professor Alan Maryon-Davis** (1962) has chaired the Public Health Advisory Committee for the National Institute for Health and Care Excellence (NICE) for the past ten years. He was awarded an MBE for services to public health.
- **Professor Usha Goswami** (1990) is Director for the Centre for Neuroscience in Education and Professor of Cognitive Developmental Neuroscience. She was awarded a CBE for services to educational research.
- **Dr Michael Weekes** (1992) works at the Cambridge Institute for Medical Research and was involved in asymptomatic testing for staff at Addenbrooke's. He was awarded a BEM for services to the NHS during COVID-19.

Read more: **johnian.joh.cam.ac.uk/news/new-year-honours-list-2021**


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Profile

Sam Davies (1993)

Sam graduated from Engineering at St John's and immediately began her career as a yachtswoman with her first around-the-world crewed race for the Jules Verne Trophy in 1994. Since then she has competed in more than 25 transatlantic races, including three Vendée Globes, in which contestants aim to sail around the world solo, non-stop and without assistance. Early in February, three months after the start of her third Vendée Globe and while she was still sailing the course, Sam answered my questions from her constantly moving boat.

INTERVIEW HANNAH SHARPLES **PHOTOGRAPHY** ANNE BEAUGÉ, SOPHIE ANITA, YANN RIOU AND INITIATIVES COEUR

Where did your passion for sailing come from?

It's in my genes, from both sides of my family. My paternal grandfather, who is one of my heroes, became a submarine commander aged 26 and survived the war. My maternal grandfather had a boatyard and raced powerboats offshore.

My parents love sailing, so I learnt to handle a boat and enjoy life on the water from an early age. When I was growing up, sailing was reserved for weekends and holidays. It was purely a family fun activity, and it wasn't until I was in my late-teens that I began racing with friends at the local yacht club.

During this race are you mostly reacting to situations or planning next steps?

The objective is to keep the boat sailing at 100% of its potential all the time, so there's lots of sail-changing and sail-trimming and working the boat to ensure it is travelling at the right angles compared to the seascape. I also need to react to the boat itself, tending to and fixing anything that is broken or weak.

I do have to plan my own route, though, and I make all the tactical and meteorological decisions myself. Major weather updates arrive at 5am and 5pm, so that's when I sit down to work on my computer, looking at strategy and weather forecasting.

How do you keep yourself motivated, sane and healthy?

I've already sailed around the world several times, and I've been mentally preparing for this for 3–4 years. Since it's my choice, the isolation I'm facing is different from that imposed on people by COVID-19.

In a race you have to push yourself so hard that you live in an extreme state of exhaustion, and it's essential to keep well- ›

rested, eat enough food and maintain good hygiene. That can be difficult on a moving boat with no bathroom, but I have to look after my body so I can handle the physical challenges of sailing the boat.

Structuring the day with mealtimes and breaks from sailing is equally important. I've got some playlists and electronic books on my smartphone, and my friends gave me a selection of television series to watch, including Game of Thrones. Mostly though the adrenaline of the race overcomes any boredom or frustration, and raising money to save children's lives boosts my morale.

How are you saving children?

I've been involved with *Initiatives Coeur* since 2015. The charity helps children from developing countries who were born with heart defects by flying them to France for life-changing surgery that isn't available in their country.

I volunteered for a week with one of the medical teams that are sent out pre-treatment to check that the children have the correct diagnosis if the local doctors aren't able to confirm this. Now I spend a lot of time with the kids when they come to France to stay with their host families, and I've even been in the operating theatre and watched the open-heart surgery.

It costs €12,000 to save one child's life, and I'm grateful to have three amazing sponsors who are donating whenever the charity's social media pages gain a follow or their posts are shared for the duration of my trip. Using notoriety to raise money and awareness for important charitable causes is the future for top-level sports, and I'm grateful that I can use my sport in this way.

Are you connected to the other contestants, your team and the world at large?

Yes, very! In my previous Vendée Globes the data was expensive and we had minimum communication outside the boat. But in 2020/21 satellite airtime is more affordable and we have WhatsApp, which I've been using to keep in touch with my sponsors, my shore team, my competitors, my family and my partner Romain, who has also been racing. It's great to be able to share the adventure with the world by sending videos, images and stories from on-board.

Can you compare this race to your previous ones?

Each Vendée Globe I've taken part in has been a unique and incredible adventure. The first time I competed I finished fourth, and I was only an hour and 20 minutes from being third place and on the podium. I was in an old but reliable boat, which was easy to sail, and there was no expectation or pressure on me. I remember it being such a fun race, and it's also the result I'm most proud of.

The second Vendée Globe was my saddest because I broke my mast and had to abandon the course. Getting my damaged boat back to France was a big adventure in itself, but it was disappointing not to have sailed beyond the North Atlantic.

Going into the 2020/21 race I wasn't

one of the favourites on paper to win, but until the Cape of Good Hope I was in the leading pack with a really good position and time. My boat isn't new but it is amazingly powerful, and I was racing intensely. Then sadly I hit something – I still don't know what it was – and there was so much damage to the boat that I had to haul it out of the water in Cape Town to fix it.

How bad was the collision?

I was sailing about 18–20 knots at night when the boat came to a standstill. It was like driving into a brick wall. The keel had collided with something in the water, and everything in the boat flew up and forwards, including me, my dinner and all the items that weren't secured inside the boat. Some structural areas around the keelbox were badly cracked, and I hit my ribs on a ringframe and broke them.

It's a situation you never want to be in, but when it happens your body goes into automatic. The fear comes afterwards when you realise what's happened. In the moment

> ***It was a big crash. I hurt myself. I was really scared, and I wanted to get back out there to get over what had happened***

I couldn't feel my broken ribs, and I acted instinctively on my training and experience. I was worried that my keel would fall out, so I slowed the boat and got my sails down to avoid the boat capsizing. Then I put the boat on the safest heading relative to the seascape, which was pretty huge. Finally I checked the boat and contacted my shore team to let them know what had happened and where I was, in case things got worse.

The keel remained attached and intact, thanks in part to reinforcements we'd made to the boat following feedback from Alex Thomson, whose keel fell out the bottom of his boat in 2019. And although I was very unlucky to hit something, I was lucky to be where I was – only a few hundred miles from Cape Town, with the wind in the right direction.

What motivated you to continue?

My whole shore team flew out to Cape Town, and many locals rallied together to help us. Once you've stopped and had outside assistance, the sport side of the ›

competition is over and you have to abandon the race. But I realised that it was possible to fix the boat quickly and that I would be able to resume the course and complete the lap around the planet.

We'd been preparing for the journey for over three years, and I wanted to honour this commitment, continue the adventure and raise more money. I also needed to overcome my fear. It was a big crash. I hurt myself. I was really scared, and I wanted to get back out there to get over what had happened.

> *The Southern Ocean is freezing, full of storms and very remote*

Does sailing the course feel different when you're not racing?

It's been a long month and a half since I left Cape Town. In the first few weeks, whenever I started going fast at night I kept thinking about the collision. The Southern Ocean is freezing, full of storms and very remote. You're lucky if there's a boat within a three-day radius, and you're not within helicopter or airplane reach. We'd fixed the boat as quickly as possible so I wouldn't be too far behind the last skippers in the race, but there was still an obvious gap, and I missed the safe feeling of having other competitors around me.

Being behind the fleet and out of the race, I also lacked the adrenaline and drive I'm used to. It's a lot harder mentally than being in the race, and I've learnt a lot about myself and what motivates me. There is a silver lining to being out of the competition, though: I can now choose to slow down, look at the view and enjoy the sailing more.

Are you intending to enter the next Vendée Globe?

Most people still on the boat (as I am now) say, 'No, I'm never going to do this ever again.' Then we land, and a few days later we're planning the next one. However, this has been my toughest race, and I scared myself so much that I really don't know at this stage whether I'll be able to do it again.

Where are you now?

I'm going to pass the equator today back into the northern hemisphere. The sailing conditions are wonderful – it's hot and there's a nice breeze – but I just want to get home. It was frustrating to see the leaders finish the race, knowing that I should have been there. Since then time has dragged.

My boat is also getting tired. There are some pretty tough conditions in the last stretch of the race – we still get storms in the North Atlantic in winter – and I'm worried about parts breaking. I'm therefore running a bit below 100% performance to look after the boat and myself.

What's the first thing you'll do when you land?

Spend time with my nine-year-old son Ruben and my partner Romain, who finished 14th in this Vendée Globe. I'm looking forward to celebrating Romain's race and my lap around the planet, and to finding out how many kids' lives I've saved in total. When I land I'll go see some of the children who are already in France having their treatment. It'll be a wonderful reward to see their smiling faces.

Sam finished the course on Friday 26 February 2021 and raised enough money to save 103 children. Watch Sam's video diaries from her boat on the Initiatives Coeur Facebook page (facebook.com/initiativescoeur) and listen to a snippet of Sam's interview, replete with atmospheric background beeping and clunking, on the digital Johnian magazine pages: johnian.joh.cam.ac.uk/issues/johnian-magazine-47/Sam-Davies

Feature

Communicating with computers

Dr Cameron Taylor (2009) read Linguistics and Italian at St John's, and he now works as an AI Interactions Architect at Boost AI, where he improves human-robot interactions using his language knowledge and research into how people communicate. Read on to discover what lessons robots can learn from humans and how advances in automation might affect our future.

My experiences studying and working in the US, Italy, the UK and Norway have taught me that there is a lot more that unites us than divides us. The years I spent at St John's were some of the most formative of my life, and I use the skills I learnt there daily in my job at Boost AI, a Norwegian conversational AI company that creates the most successful text- and voice-based virtual customer service agents in Scandinavia.

There are many lessons from human-human interactions that can apply to human-robot interactions. We often misunderstand each other in conversation (anyone in a relationship can relate), but there are universal repair-mechanisms found across languages for this. For example, we interject 'What?' or 'Huh?' in conversation when there is an ambiguity or when there is a mechanical failure, such as water blocking the eardrum or an ambulance driving by mid-sentence. When we think we caught only some of what was said, we'll often offer it as a suggestion: 'Did you say "skeleton"?' Or if we only half-remember what someone said, we'll ask them: 'Sorry, did you say liver or salad?'

These conversational techniques may seem obvious to us, but robots need to be taught them to avoid frustrating their human interlocuters with a repeated 'Sorry I didn't catch that'. Some programming developments, such as Automatic Semantic Understanding (ASU), reduce false positives by detecting different levels of uncertainty. The algorithm then responds with two best guesses, so if you are ordering a pizza and the bot didn't understand what you said, rather than saying 'Sorry I didn't catch that' it might say 'Sorry, did you say mushrooms or onions?'

Conversational AI can adapt its tone and personality depending on how the user speaks to it and the type of question asked, but this depends on the training that goes into it, what systems the software integrates with and what the purpose of the bot is. We built a bot for Helsinki University Hospital to help triage mental health patients, since the staff thought that young men suffering from depression and anxiety might be more willing to disclose their emotional problems to a bot than to a live nurse. Unsurprisingly, we programmed this to respond differently than a bot used to support insurance claims.

There are many lessons from human-human interactions that can apply to human-robot interactions

We have also developed the ability for bots to talk to each other and to transfer end users to the most relevant service. In Finland we deployed virtual agents for the Immigration Service, the Tax Administration, and the Patent and Company Registration Office. We noticed that the Immigration Service bot was receiving lots of questions that were more appropriate for these other government agencies. Now if a person asks the Tax Administration bot a question related to visas, it will ask them if they would like to be transferred to the Immigration Service bot.

Exciting advances are being made in neuromorphic hardware, which aims to mimic the human brain. These computer chips will allow bots to take in, understand and respond to much more nuanced data, such as odours in the room. Because this hardware also consumes less power, we would be able to more easily create embodied bots, eg talking chairs and tables.

While technological advances in making computers more humanlike are incredible, there is a danger that this hardware will increase faster than our ability to understand ourselves and how our minds work. Computers are not yet able to detect emotions with accuracy beyond 'calm' and 'excited' (either of which could indicate joy or anger), but once they are able to accurately assess how we feel, they may also be able to manipulate how we feel. Clear benefits and ethical challenges arise from this. Technology will continue to help us tremendously, but if it gains too much power over our lives then we might become hostage to the agenda of sophisticated marketing teams.

With the pandemic driving more traffic online, we have noticed an enormous spike in usage of chatbots, especially from public agencies. We run a virtual agent called Frida for the Norwegian Labour and Welfare Administration (NAV), the government agency which is responsible for administering many of Norway's key social benefit programmes (eg pensions, child support, unemployment benefits and employee sick leave). The director of NAV's contact centre told us that since the beginning of the lockdown in Norway, if Frida hadn't been there they would have needed an extra 220 full-time employees to handle all the enquiries.

One virtual agent can respond to thousands of people at once, and a well-trained, well-designed, high-quality virtual agent answers about 80% of enquiries, with the remaining 20% needing to be escalated to a human. At Boost AI we offer free training to anyone who wants to learn how to become an AI trainer, which is a person who builds and maintains a virtual agent. This creates new jobs, but it may not create equal opportunities to cover redundancies.

Automation will inevitably change the way we work, and we need to take the impact of automation on jobs seriously. Unless we want to drift into a future of greater economic inequality, this will require political engagement and fresh thinking around the relationship between income and work.

This year has been particularly tough. Like many others I have been unable to travel to visit family, and working from home has presented new opportunities and challenges. I have relied on a vipassana meditation practice, which reminds me that everything always changes. I have also gained a few kilos, which will require some discipline this summer to shed! But working in the technology industry has been fascinating because the pandemic has accelerated progress exponentially in a way that I don't think would have otherwise happened.

While studying at St John's, Cameron met a Tibetan monk and arranged for the Dalai Lama to visit Cambridge. This laid the groundwork for him setting up the Inspire Dialogue Foundation to facilitate intergenerational and interdisciplinary conversations on global issues. Learn more about these unconventional dialogues on our alumni blog: johnian.joh.cam.ac.uk/news/inspiring-dialogue

One to watch

Sophie Callis (née Catt, 2009)

Sophie qualified as a Clinical Psychologist three days before the first UK lockdown, and she has been working in a heart and lung hospital throughout the COVID-19 pandemic.

Last spring I was thrown in the deep end at a specialist cardiothoracic hospital, which is one of seven centres in the UK that perform lifesaving heart and lung transplants. When I started, many of the outpatient and elective services were still on hold while the hospital treated patients critically unwell with COVID-19. Over the summer and into autumn we were able to restart much of this work, but the winter spike in infections has brought COVID-19 to the forefront of our clinical services again.

A majority of the hospital's patients are considered 'clinically extremely vulnerable' and have been shielding for most of the past year. We have avoided bringing people into the hospital for appointments if it is not clinically necessary, and our hospital has made the incredibly difficult decision not to permit any visiting except under exceptional circumstances like end-of-life care. Being admitted to hospital is difficult at the best of times, but being unable to see loved ones has made it even more challenging.

We rapidly adapted to offering therapy appointments remotely via phone or video call, which has the added benefit of allowing patients living far from the hospital to access a service that they might have missed out on pre-pandemic. For inpatients, my face-to-face work has been impacted by the personal protective equipment (PPE) that all staff are wearing throughout the hospital. None of my patients have seen my face without a mask, which means I have to work harder to show empathy and active listening – important non-verbal factors in a therapeutic relationship. ›

None of my patients have seen my face without a mask, which means I have to work harder to show empathy and active listening

My clinical work with patients has had a huge emphasis on bringing the focus around to what they can control within a world that is so uncontrollable. My preferred therapeutic model is Acceptance and Commitment Therapy, where we accept what we cannot change and commit to acting in ways that are in-line with what is truly important to us. This lends itself well to the current global situation.

Many patients have told me how the vaccination feels like a glimmer of hope, but among the shielding population, and particularly among patients who have had transplants, there is a common theme of struggling with isolation. A donor heart or lungs can gift patients more time, but some feel that this past year has been a waste of those precious months.

Patients who have been admitted to intensive care (and particularly those who have been sedated and ventilated) often experience symptoms of anxiety, depression and post-traumatic stress even after their physical health has improved. However, surprisingly few COVID-19 patients out of those our hospital has followed-up on have needed a Clinical Psychology service. This leads me to wonder if the shared experience of COVID-19 elicits a sense of compassion that allows people to make a good psychological recovery.

Hospital employees have benefited from a strong sense of teamwork, and staff from all professions have readied themselves to be redeployed to roles where they can be most helpful. Our hospital had a break from COVID-19 patients for a few summer months while we acted as a hub for cardiac surgery across London – but this was not a break for staff, and many NHS workers are exasperated by people ignoring lockdown restrictions and even denying the reality of the virus.

The winter spike in infections over Christmas and January has been more exhausting than the first wave. Intensive care staff are experienced in caring for patients who are critically ill, but the ICU is busier than it has ever been before. Sadly, there are some patients who do not survive their illness, and it is heartrending for staff to break this news to families over the phone and to facilitate end-of-life visits in PPE.

I have found this year incredibly challenging, but I have tried to approach this with a sense of self-compassion instead of feeling guilty. The difficulties of the last year are much bigger and longer-lasting than anything most of us have ever had to face, so we shouldn't expect ourselves to 'bounce back' to normality in a short space of time. If you have been finding lockdowns and the ongoing threat of COVID-19 difficult, please know that you are far from alone! There are some fantastic sources of support out there, and your GP can advise you on what is available locally on the NHS.

I've taken care of myself by taking breaks – lunch times, annual leave and informal chats with colleagues – and by sharing with the team, especially when there are particularly stressful days or complex patients. I have also tried to maintain a life outside of work, even though that looks very different to pre-pandemic! I've stayed in touch with family and friends and spent time outdoors with my husband, and I've kept a sense of hope for the future by having something to look forward to. I'm expecting my first child in June, which has brought a huge sense of excitement (as well as inevitable anxiety)!

Long-term I definitely want to continue working in an acute physical health setting, and I am particularly interested in intensive care psychology. Working in a clinical setting is challenging at the best of times and has exceeded anyone's expectations during the pandemic, but this year has made me especially proud to be part of the NHS.

You can read more from Sophie in a short alumni blog from June 2020, featuring three Johnian healthcare workers: johnian.joh.cam.ac.uk/news/mounting-the-medical-defence-covid-19

Career Spotlight

Eric Ho (1994)

Founder of Bumblebee Wellbeing, Eric summarises his career journey from corporate lawyer to Leadership Health Coach.

During my degree I developed an enduring curiosity for solving difficult problems that helped me turn myself from head of legal for a large FTSE 100 company into a Leadership Health Coach.

Following graduation, a career in the law was a natural choice for me: I had read law at St John's, and I was influenced in part by the notion among first-generation Singaporean Chinese immigrants to the UK that traditional careers in law and medicine equalled success. I spent 10 years training as a corporate M&A lawyer at Linklaters, solving black-letter legal problems on transactions that grabbed the financial headlines.

I suffered burnout early on in my legal career. The excitement of success I'd felt when I started working was waning, and my poor health and wellbeing was a problem that I knew I needed to fix. But, as with all change, it was difficult.

In 2013 I signed up for ÖtillÖ, a swim-run race (65km running and 10km swimming) across the archipelago islands nestled in the Baltic Sea around Stockholm. As part of the preparation, I read *A Paleo Diet for Athletes* by Loren Cordain and Joe Friel. The diet was wildly out of line with the conventional advice concerning food and athletic performance, so I stuck with my original plans: carb-loading with pasta and carrying my glucose gel packs for the 11-hour race.

After the race, I experimented with my health. First I tried paleo, then I discovered Functional Medicine and ancestral health – or 'Functional Health'. This approach seeks to bring us into realignment with how we humans were designed to thrive, and to solve the root causes of disease rather than simply relieving symptoms. Just like the humble bee, our human ancestors knew instinctively what to do to survive and live a balanced life. But we humans have become out of sync with how we were designed to live.

At work I started solving a different kind of problem: how could I work in a job I loved but be healthier and feel better doing it? The demands of heading up a global legal team increased, but with my new focus on health my energy levels were high, my brain fog disappeared, I stopped succumbing to coughs and colds, and I was calm and focused. I also reversed my autoimmune condition (psoriasis) and eliminated my debilitating hayfever symptoms – all without a drug in sight.

I discovered that leadership can be effortless when health is the foundation for success. My accomplishments felt authentic and enjoyable again. Colleagues started asking about the changes they noticed in me, and I realised that helping others change was a new type of problem I enjoyed solving.

This led me to retrain as a Functional Health Coach, blending the psychology of coaching with the tenets of Functional Health. I then set up Bumblebee Wellbeing to help professionals treat wellbeing and work as equals.

'Be aware' is the best tip I can share for helping my fellow Johnians focus on their self-care. The specific method of checking-in with ourselves – whether that is a meditation practice, journaling in the morning or taking a walk outside in nature – is less important than the results. When we give ourselves the space to pause, notice and reflect, we can see the real problem that lies in front of us. And once we truly see the problem, we can then decide what to do with it.

Read more about how Eric overcame burnout and replaced it with effortless leadership, including his use of the four 'HERO' traits that help individuals navigate challenging situations, on our alumni blog: johnian.joh.cam.ac.uk/news/burnout-to-success

Generating Genius

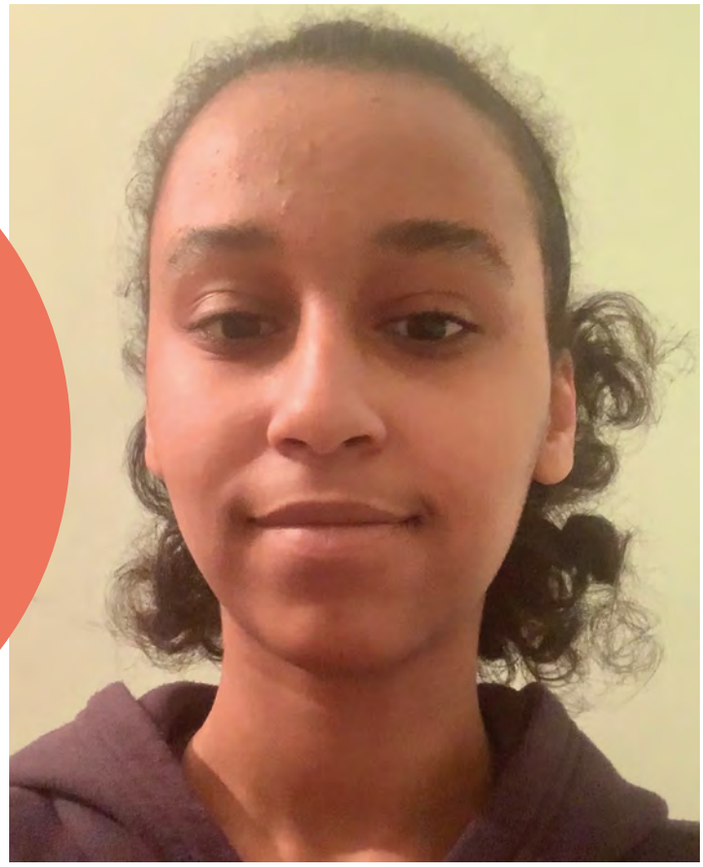
Thanks to a generous Johnian donation, this year marks the start of an exciting collaboration between St John's and Generating Genius. Head of Admissions Victoria Harvey introduces the scheme.

WORDS VICTORIA HARVEY

> *We both benefited from and enjoyed our time at Cambridge, so we were keen to support a programme that broadens access to the University and to St John's. There is an urgent need to support Black and BME students into STEM subjects and industries, and Generating Genius has a great track record in this area.*
> **Nick and Hilary Studer, donors**

> *I'm really excited to be a part of the STEM@Cambridge programme. It is an excellent opportunity for me to learn more about the degree choices that Cambridge University offers that are STEM related. The programme will also help me tailor my university applications and prepare for interviews.*
> **Nene Obiajuru**

> *STEM@Cambridge is a great chance to learn about how to get into one of my dream universities. I've been interested in Forensic Sciences and Chemistry, so I'm excited to hear about the different options available for someone like me who is trying to decide what I'd like to pursue.*
> **Phebe Efrem**



Generating Genius is a charity that works with Black African and Caribbean year 12 pupils who want to progress to STEM subjects at university. The charity's ethos speaks very much to our College's outreach strategy. We seek to offer high-performing groups multiple engagements at crucial moments to add academic value and application guidance.

Almost 70 pupils from state schools in London who achieved highly in their GCSEs attended the launch event in November, where I thoroughly enjoyed welcoming the pupils to the programme and encouraged them to ask as many questions as they could think of. This backfired slightly as I was only able to progress through about 10% of my presentation, but the atmosphere (even on Zoom) was exciting and filled with potential.

Since that welcome, the students have met with Gaia Lambert, our Schools Liaison and Access Officer, to learn how they can make competitive applications to universities and what to consider when selecting courses. Gaia runs various workshops including super curricular activities, independent study skills and information and guidance sessions for potential applicants.

Next in the series of events were the February workshops, which gave pupils a chance to explore their chosen fields through a mathematical or biological science route. Once split into the two streams, each group received two sessions from different subjects. All of the Mathematical Science students received a mathematics lesson from St John's Fellow Dr Matthias Doerrzapf, while the Biological Science students participated in a medicine lesson, followed by a session with one other subject area (Computer Science, Engineering and Physical or Biological Natural Sciences). The day also included discussions of how to explore their subjects outside of school and how to harness this for their university applications.

There are several aims to these sessions: we hope to give the students a real sense of what the subject is like at university level, we hope to teach them something they might not have covered in their current curriculums, and we offer them the opportunity to talk with the Director of Studies, who has some current students on the call to give them subject-specific information and guidance about Cambridge specifically.

Perhaps, however, the most important outcome of these sessions is to give a taste of subjects that are not currently being considered. We find that many students, and particularly those from more disadvantaged backgrounds, tend to apply to vocational subjects like Medicine, or to those with an obvious career outcome like Engineering. We need to raise awareness about the career opportunities that are manifestly open to graduates of Natural Sciences and other degrees. In future years I would like to include a session for parents and advisors in these programmes so that this message reaches home as well as the students.

In addition to these fundamentally important academic sessions, the pupils have the opportunity to talk with some of our current science students who can enthuse them further with first-hand insights about life at St John's.

It is sadly often the case that my advice in many areas has become rather irrelevant: when I suggest more reading, they talk YouTube; when I suggest Facebook, they talk Tik Tok; when I suggest preparatory reading they say rest! Current students are simply more relevant and in touch, and they better understand what is preoccupying school pupils. Their help is always forthcoming, so we can always rely on some good support at our workshops.

Find out more on the College news page: bit.ly/GenGenius

Paying it forward

Beaufort Society

Before leaving a legacy to St John's last year to help students in challenging circumstances, Walter Hayman (1943) was a child refugee, a Fellow of the Royal Society and a distinguished mathematician. His daughters Carolyn Hayman and Daphne Wassermann shed more light on Walter's achievements, as well as on the hardships he overcame.

"Walter would have been pleased to know that his legacy is benefiting refugees: young people who arrive at Cambridge, like he did, with little but their hopes and ambitions

Walter left Cologne in 1938 as a child refugee to attend Gordonstoun School, which was founded by Kurt Hahn, his mother's cousin. His way was paved with generosity, and family members paid his fees.

When all the other boys went home for Christmas, a friend of Hahn's, Mrs Edwards, kindly invited him to stay with her. Though still only twelve years old, Walter understood what was happening back in Germany, and in Easter 1939 he asked her to invite his parents for a visit. Another distant relative then supported them in Oxford throughout the war.

Walter enjoyed his time at St John's, making close friends with the other maths scholars and playing in the chess club. A fellow student introduced him to the Quaker meeting where he met his future wife, Margaret Crann, who was also a mathematician.

As a young man in a hurry, he was keen to marry, but his future parents in law imposed three conditions: he had to be 21, a British citizen and have a job. Hence Walter passed up the opportunity to stay on at St John's and pursue his research there, taking up a lectureship instead at Newcastle University.

At one time the youngest Fellow of the Royal Society, Walter enjoyed a distinguished career. He continued to do research in collaboration with others around the world until his death at nearly 94, and his last co-authored book was published a few days after he died.

Never forgetting his own good fortune, Walter remained committed to helping refugees, serving as a council member of the World University Service and on the Council for At Risk Academics, and supporting Bail for Immigration Detainees (BID). Through BID he met Zoumana Bagayogo, a refugee from Cote d'Ivoire, who remains a close friend of his family.

Eternally grateful for the help he received in Britain after he arrived in the 1930s, by his will Professor Hayman left a legacy to St John's that will be used to assist a student who is also a refugee or otherwise in straitened circumstances.

Read more about leaving a legacy to St John's: johnian.joh.cam.ac.uk/legacy-giving

Johnian playlist

A COMPUTER SCIENTIST'S CHOICES

PHOTOGRAPHY THE UNIVERSITY OF MANCHESTER AND CREATIVE COMMONS

ICL Professor of Computer Engineering at the University of Manchester Steve Furber (1971) summarises his career so far, from making his first computer models in the 1970s and developing the ARM microprocessor in the 1980s to his present research using neuromorphic models of neurons and synapses to better understand the brain. ›

I came up to St John's to read maths (this involved very little reading) in 1971, stuck around for Part III, and then took a PhD in aerodynamics. After those seven years at St John's I took up the Rolls Royce Research Fellowship at Emmanuel. During my PhD and Research Fellowship I got drawn into the Cambridge University Processor Group – a student society for folk who liked making computers for fun.

I made computers that were useful in my aerodynamics research and for writing my PhD thesis. This led to a peripheral involvement with the embryonic Acorn Computers company, which I joined full-time at the end of my Research Fellowship. Acorn was in the throes of developing the BBC Microcomputer, which was based on a design I had put together the previous year. Following the success of the BBC Micro, we developed the Acorn RISC Machine (ARM) – a microprocessor whose roughly 200 billion descendants now power pretty much all mobile phones and tablets, not to mention the world's most powerful supercomputer (the Japanese Fugaku machine) and the 'Apple Silicon' Mac laptop that I am typing this text into.

In 1990 I moved to the ICL chair at Manchester. The chair was endowed by the British mainframe computer company International Computers Limited (ICL), which emerged from a series of mergers over the first half century of the UK computer industry. ICL was bought by Fujitsu in 1998 and, so far as I am aware, all that remains of the ICL name is the chair and a pension fund.

For the last 20 years the focus of my research has been the SpiNNaker (Spiking Neural Network Architecture) machine that incorporates a million ARM processors and was designed to support real-time models of brain subsystems. We all critically depend upon the brain, but we understand very little about the organ's function as an information processing system. SpiNNaker was therefore designed to contribute to the scientific grand challenge of understanding the principles of how the brain operates.

My motivation for developing SpiNNaker derived from the 20 years I had spent designing conventional computers. The last models I worked on were a thousand times more powerful than those I started with in the late 1970s, but they still struggled to do things that we humans find easy from a very early age, such as recognising another human face. Brains and computers are both information processing systems, but their relative strengths and weaknesses are very different. I wanted to know what it is about brains that makes them so different. Could I, as a computer engineer, contribute to the quest to understand some of the brain's secrets?

In many ways what emerged from this thinking looks like a conventional computer, but

with one significant difference. Brains are very highly connected, with each basic brain cell – a neuron – connecting to many thousands of other neurons. This makes building models of brains on conventional computers difficult. SpiNNaker therefore has a bespoke communications infrastructure that enables it to support models of brain subsystems with realistic connectivity, making it particularly good at this one, rather specialised, task.

SpiNNaker is still basically a computer, so models of individual neurons and synapses (the connections between the neurons) are written in software. It is therefore relatively easy to change these models, for example to introduce new learning rules. There are several other so called 'neuromorphic' (brain-like) computing systems around the world, but they generally adopt a more hardware-based approach to modelling. There are pros and cons to the various approaches, but with SpiNNaker we have chosen in favour of the flexibility offered by software at the cost of reduced energy-efficiency compared with hardware-based systems.

Computer technology has advanced spectacularly over my lifetime, mainly as a result of finding ways to make the transistors from which computers are built ever smaller. But we are now approaching physical limits. The computer I am using to write this uses 5-nanometre technology, and there are about 20 silicon atoms in 5 nanometres. There are various reasons (such as the fact that the transistors are now built in three dimensions) why this is a slightly misleading perspective, but in any case the technology is approaching atomic scales, and the next half century cannot simply be a continuation of the last half century in the way that technological advances emerge.

As a result, the industry is actively looking for new approaches to computing, and brain-inspired computing is among the front runners, along with even more arcane developments such as quantum computing. SpiNNaker is well-positioned to contribute to advances in brain-inspired computing as well as in brain science, and it will be fascinating to see where this line of thinking might take us over the coming years.

STEVE'S CHOICES

The Moody Blues, *The Dream* (1969)

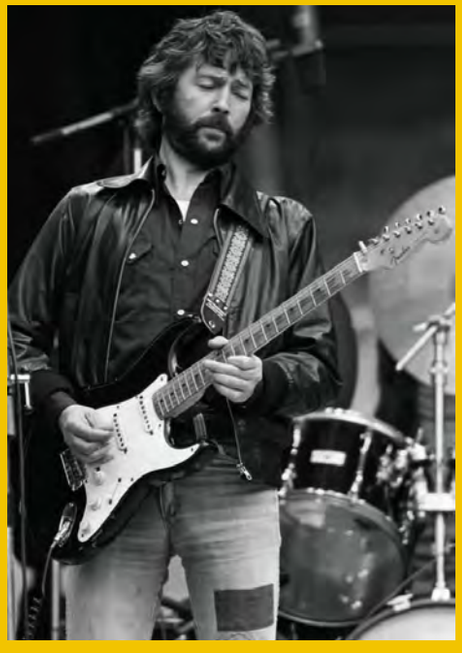
During my early teens I didn't really get caught up in the music revolution of the times until a friend exposed me to The Moody Blues, who have provided much of the theme music for the rest of my life. Their album *On the Threshold of a Dream* was some sort of revelation for me. As I was born on 21 March, which I still consider to be the first day of spring, 'spring's new hope' in *The Dream* always resonates with me (though my mother would not have thought the same about 'born of leaves decaying'!).

Flanders and Swan, *A Transport of Delight* (1960)

Although both of my parents sang in the Marple Congregational Church choir, and I was sent for (rather fruitless) piano lessons at an early age, my childhood was not filled with music. My parents had a record player but few records, most of which were not at all to my taste. However, there was one exception: Michael Flanders' and Donald Swann's *At the Drop of a Hat*, which I still love to this day.

20th Century, *Gethsemane* (1972)

I was awarded my place at St John's at the tender age of 16, but was advised not to take it up until a year later. I spent much of my 'gap year' (actually a gap 18-months, before gap years had been invented!) in Canada at McGill, Montreal and then at a YMCA day summer camp in Meadville, Pennsylvania, making use of my free time to learn to play guitar. This turned out to be a good use of that time as much of my social existence as an undergraduate was invested in the 20th Century Christian Music Group, a student society that played modern music in churches all around the country, including taking their album *A Folk Passion* on tour each Easter vacation.



Wishbone Ash, *Everybody Needs a Friend* (1973)

20th Century was, perhaps, a bit middling in terms of musicianship – there were some very good musicians there, though I wasn't one of them! – but it was outstanding as a matchmaking agency, and it was there that I met Valerie, my wife-to-be. I was in my 2nd year, in K4 Second Court, sharing with Pete Hobson, who became my best man and also did the behind-the-scenes work to rebury Richard III at Leicester Cathedral (see his book *How to Bury a King*). Pete came across Val in the Porters' Lodge, asking for 'Steve Furber's room' because I was then President of 20th Century and was holding a meeting for prospective new members. He came back excitedly reporting that there was 'a 5'3" blonde girl in the porters' lodge, and she's asking for you!'. A song that Val sang with the group, and on which I played lead guitar, was *Everybody Needs a Friend* by Wishbone Ash.

Eric Clapton, *River of Tears* (1998)

Val and I have continued our involvement with modern church music ever since our time at Cambridge. For the last 30 years (at least until the coronavirus lockdown) I have played electric bass, but as a former (if not very good) lead guitarist I still love the sound of that instrument, especially when played slowly and melodically by one of the greats. For guitarists of my era there is none greater than Eric Clapton, and to my mind no better example than *River of Tears*.

In a nutshell

Neil Lawrence (1998)

A keen cyclist and collector of old computers, Neil Lawrence was the first PhD student to work on machine learning at the Cambridge Computer Lab, and he is now the University's first DeepMind Professor of Machine Learning.

PHOTOGRAPHY
P. G. LAWRENCE

At school I did a psychometric test on an Acorn BBC computer, which recommended I work in something like fifteen different types of engineering. This reinforced my teenage career plans, and I completed my undergraduate degree in Mechanical Engineering at the University of Southampton.

I began my career on the oil rigs working for Schlumberger as a wireline logging engineer. I'd hoped to be sent on adventurous jobs in Colombia and Nigeria, but I ended up in Morecambe and Great Yarmouth. The job was lucrative, hard and hazardous. Field engineers operate radioactive tools and explosives in one of the most dangerous working environments, and I developed a great respect for people and the lives they lead.

Giving up a large salary to do my PhD at Cambridge was one of the best decisions I ever made. My career in machine learning has taken me to both Colombia and Nigeria – and teaching data science in those environments brings me closer to local communities than I would have been in one of Schlumberger's remote bases.

After a brief stint in industry, I took up a lectureship in Sheffield, where my wife was a postdoc in computational biology. I loved the people and the hills, and I would cycle and fell run in the Peak District. We lived and worked there for 16 years, but getting research funding for machine learning was hard, and by 2015 the team I'd built was starting to break up.

I founded a small company called Inferentia with Eric Bridgstock, who was the sort of engineer I'd always dreamed of being when I was young, and our company was bought by Amazon. When asked where we'd like to locate, I pushed for an office in Cambridge – it had been home before, and there are many great machine learning people here, including Zoubin Ghaharamani.

To relax I take long cycle rides. Academics can be far too cloistered, and I love the diverse cross-section of people that cycling attracts. I'm also fascinated by the history of technology. I had a collection of old computers, but when we moved to Cambridge my wife suggested I donate them to the city's Centre for Computing History, where I used to visit them regularly pre-pandemic.

I've been lucky to work alongside some of my historical heroes, or at least have dinner with them. The Centre for Computing History provided all the machines for the BBC drama *Micro Men*, which tells the story of Herman Hauser, Steve Furber (1971; see page 23) and Sophie Wilson at Acorn. I've worked alongside Steve, had dinner with Herman and am hoping to bump into Sophie now that I live in Cambridge.

At Amazon I learnt an enormous amount about leadership, decision-making and running a business. But my dream job became available as the DeepMind Professor of Machine Learning in the Computer Lab. It felt extraordinary to have gone from the first PhD student to work on machine learning there to the first endowed Professor of Machine Learning.

The opportunities to influence from academia are far greater than from industry. You're surrounded by world-leading researchers, and you constantly influence through teaching. My day job still relies on my technical expertise in machine learning, but much of my time is spent on executive education, AI policy, data governance and convening interdisciplinary groups.

I want to live in a world where we don't talk about machine learning and AI. In the same way we don't talk about computers today because they are integrated in our everyday lives, I look forward to when we expect machine learning technology to simply do its job.

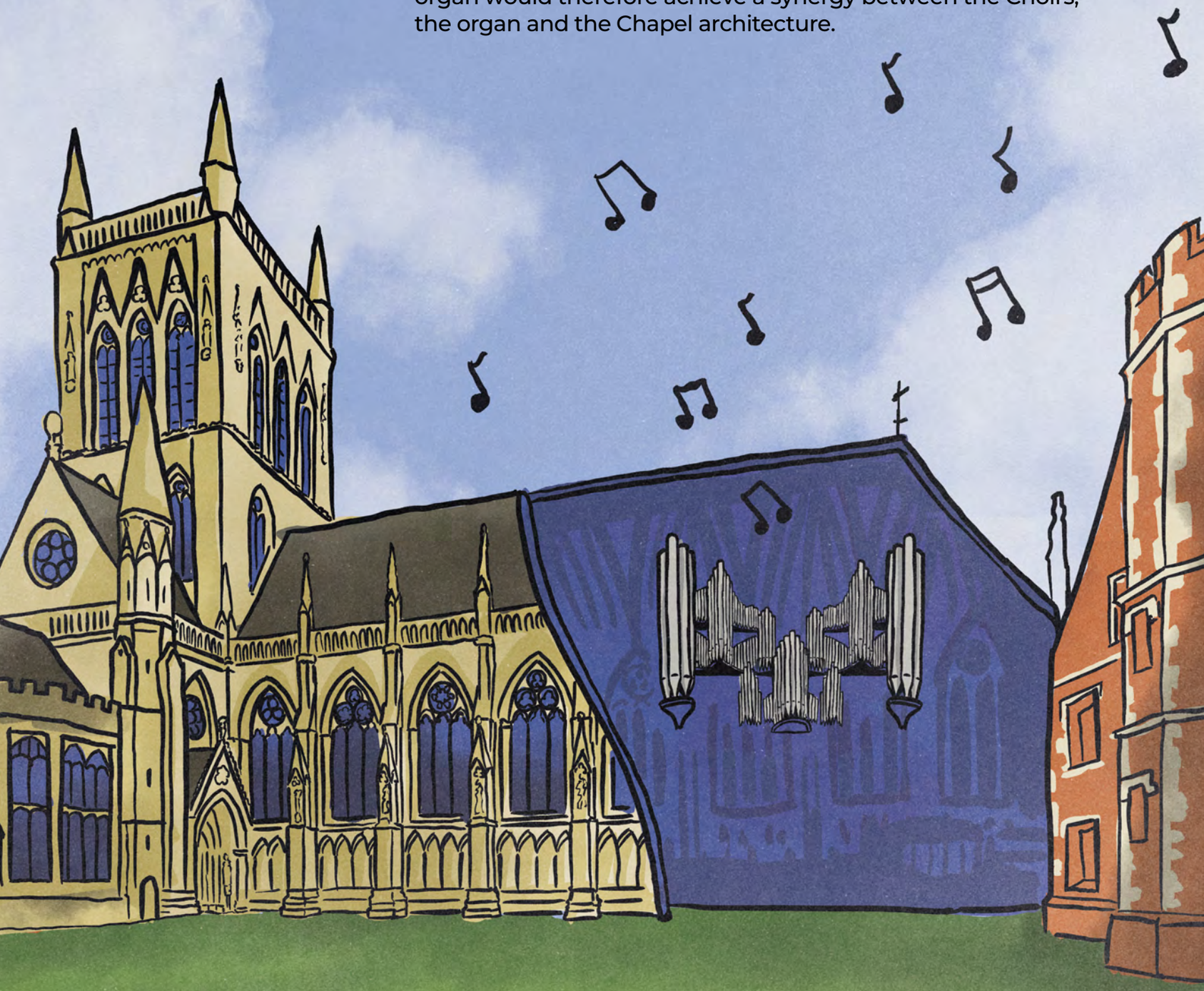
Read a longer interview with Neil in the digital *Johnian* magazine: johnian.joh.cam.ac.uk/issues/johnian-magazine-47/Neil-Lawrence

You can also find him in the University's CAM magazine: magazine.alumni.cam.ac.uk/hidden-in-plain-sight

Love music?

St John's has the extraordinary opportunity to obtain a Willis organ, renowned for its warmth, character and beauty of tone. The present Mander organ in Chapel is becoming unreliable, and there is a mismatch between the reputation of the College Choirs and the potential of the College organ. With support from Johnians, the College plans to change organs in 2024–5.

Henry Willis (1821–1901), commonly known as 'Father' Willis, was the greatest British organ builder of the late nineteenth century, the same period in which the College Chapel was built. A Willis organ would therefore achieve a synergy between the Choirs, the organ and the Chapel architecture.



If you enjoy the emotional power of music and would like to hear the Willis organ played in Chapel, please contact development@joh.cam.ac.uk