

MAN FOUND DEAD ON A BENCH IN WEST LONDON COMMON

My super summer school: enrol at NASA, save the world

Instead of heading to the Med this summer, London scientist Cosima Gretton was handpicked to join a group of brainiacs on a ten-week programme in a NASA hothouse. The aim? To create a startup that will save billions of lives



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Ed Boyden is expected to win the Nobel Prize in October. He is a pioneer in a new field called optogenetics. He can restore sight, steady trembles and soothe epilepsy. He uses a tiny virus to infect brain cells in mice with a molecule that makes the cells respond to light. When he shines a red light through the skull, he can change the cells' activity. In the future he might be able to turn off brain cells that are overactive (as in epilepsy). Boyden, a researcher at MIT, is just one of many world-changing lecturers appearing this summer on Singularity University's ten-week Graduate Studies Program, aimed at the world's brightest young sparks.

This institute for megabrain is tucked away on the NASA Research Center in Mountain View, California. It draws on the innovation in Silicon Valley to solve some of humanity's biggest problems. Ray Kurzweil, artificial intelligence pioneer and director of engineering at Google, and serial entrepreneur Peter Diamandis founded the organisation in 2008, aided by Google co-founder Larry Page. Now it draws the best minds from the Valley and Ivy League universities to create social change using cutting-edge technology. Every summer it runs the Graduate Studies Program with the goal of creating a tech startup that can positively impact the lives of a billion people. It's a hothouse for ideas and innovation — some companies that have emerged

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in previous years include Matternet, which uses drones to deliver medical aid in remote places, and BlueOak, which recycles the tons of electronic waste we produce every year. Eighty top entrepreneurs, scientists and techies from around the world are selected after a lengthy and competitive application process and I am lucky enough to be one of them.



Singularity University campus

I'm a Londoner, my background is in medicine and entrepreneurship, but to end up here at NASA, I took a large sideways step in my career. I studied psychology at Oxford and then medicine at King's College London. I was on track to become a

psychiatrist. Shortly before my fourth-year exams, only a year away from graduating, I decided to take a year out. I threw myself into London's burgeoning health-tech startup scene. There I found a world of hackers and startup gurus poised to break into the sacred grounds of medicine. I liked the frisson: doctors were either unaware of the coming disruption or intensely opposed to it. And the tech world didn't care.

I won the internship by pitching a startup that improves the care of chronic wounds, the kind that occur in advanced diabetes. I proposed using image processing to monitor changes in smartphone photos of wounds. The idea was developed with a skin-cancer startup called Skin Analytics. The software would help manage chronic wounds at home, without the need to travel to a specialist clinic.

The first five weeks at Singularity University involved lectures and workshops. Then we formed teams and started a business. Every day leading figures came to teach us about humanitarian challenges across the world, or futuristic technologies they had made a reality. We've even had two very serious lectures on terraforming Mars — NASA's moonshot plan to turn Mars into a habitable place.

Most days I wake at 7am and do two hours' work on things back home. My science communication company AXNS Collective is curating an augmented reality exhibition at King's College in September. Most students are also running companies back home, in South America, Israel or Sudan. To begin with we had lectures until lunch. Now, in the team-project phase, we work in groups in an office space across from the classroom. We talk with the lecturers or brainstorm around the day's topics, which range from artificial intelligence to human trafficking in India. In the afternoon there are more classes or visits to a company in Silicon Valley, to hear about new technologies we could use for our projects.

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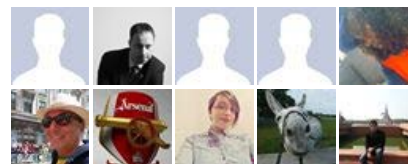
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Before dinner I go for a 45-minute run. The break is sorely needed — the days can be exhausting, emotionally and intellectually. There is usually an evening speaker, maybe longevity expert Aubrey de Grey, or Anousheh Ansari, the first female space tourist. Afterwards we talk, work and brainstorm until 2am or 3am. There is an innovation lab kitted out with 3D printers, drones and an Oculus Rift, a pair of virtual reality glasses. There you can work all night, putting ideas into action, or learning how to 3D-print prosthetic limbs.



Cosima Gretton

At Singularity University, the students are the highlight: 80 dynamic, passionate, international entrepreneurs of all ages. There are researchers in molecular and synthetic biology, space entrepreneurs and artificial intelligence experts. Ernesto from Mexico builds robotic prosthetic limbs controlled by brainwaves. Pablo runs Red Innova, South America's largest entrepreneurship and innovation conference. There are Google employees and Oxford academics. Ju-Chun's lab in Japan is creating a futuristic version of Skype using telepresence robots. You sit in a special suit on the other side of the world and you can see, hear and even feel the environment the robot is in — and you can control its movements.

Being at NASA means we have access to some of its wilder projects. Davide Venturelli, a Singularity University graduate from 2012, took us on a tour to the D-Wave, one of three quantum computers in the US. Quantum computers are a kind of supercomputer and could potentially hack any encryption system in the world. NASA research centre director Pete Worden has spoken to us about the space agency's resurgence of interest in warp drives. Essentially they are trying to find a way to travel faster than light. But although people like Worden push the boundaries, the real innovation is happening in the private sector. Elon Musk and SpaceX are creating reusable rockets. Planetary Resources, founded by Peter Diamandis, aims to open up the asteroid mining industry. And they are making progress: this summer the Asteroid Mining Bill of 2014 was introduced to Congress.

Right opposite our classroom is a former McDonald's. It has been taken over by a group who are digitising 1960s analogue photos of the Moon. Scattered around the disused kitchen, which still smells of chip oil, are enormous old computers. They are the only ones capable of processing the magnetic film.



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A medical brainstorming session

The computing revolution of the past two decades has changed our world radically. But here in Silicon Valley you can feel the threads of a new future. Throughout the Bay Area biotech startups are thriving. Companies such as Cambrian Genomics are literally printing

DNA: you can upload a digital file of the gene and it is printed out by a machine attached to big brown bottles containing the building blocks of DNA. These can then be inserted into bacteria, or used to make new (non-harmful) viruses — a field called synthetic biology. Software companies such as Autodesk make synthetic viruses and 3D-printed organs. At Berkeley, scientists have proposed a way of connecting a computer directly with your brain, using thousands of microscopic chips.

The pace of technological change is rapid. We are developing ever more powerful technology, but our brains, our own computational power, our legal systems and our governments do not evolve at the same rate. Singularity University aims to put this technology to work in positive ways and also prepare us for what is ahead.

Cosima Gretton is co-director of AXNS Collective (axnscollective.org)

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