



How to be an inventor and entrepreneur

ANTHONY CAMU

26-year-old **Anthony Camu** has been awarded the Innovate UK's Young Innovators Award for **Theia**, a handheld orientation and mobility device for blind and partially sighted people. He talks us through his entrepreneurial journey, from the conception and development of the device at Loughborough University to founding his start-up Theia Robotics.

Why did you study industrial design and technology at Loughborough University?

I chose to study industrial design because it has elements of art and creativity, whilst also focusing on mechanics, electronics, software, manufacturing, economics and management. Designers, in my opinion, are generalists; we work with engineers, scientists and marketers to integrate technology into useful and desirable products. I've always been a creative and engineering-minded person.

I chose Loughborough because it is a top design and engineering university in the UK. Its facilities are amazing, which include advanced 3D printing technologies and fabrication labs, not to mention the great lecturers and technical staff.

Throughout your degree, you worked for various companies. Why was this important to you?

I worked as a Junior Mechanical Engineer at Mornflake, a cereal production company in Cheshire. Most of my peers at Loughborough went to work for design consultancies, but I was veering towards the engineering side of design and I wanted to explore this further by trying an engineering-heavy job. I spent a year designing specialised components for cereal production machines and configuring assembly lines. It may sound boring to some, but I was inspired by the TV programmes *Inside the Factory* and *How it's made*, both of which feature tours of factories and cover how everyday items are manufactured on massive scales.



Theia, a portable and concealable handheld device that guides users through outdoor environments with little user input. © Anthony Camu

I worked on lots of interesting projects – much of the cereal you find on supermarket shelves have come from the machines I worked on. The role was important to me as it was a real-world engineering experience.

How did you come up with the idea for a handheld navigation device for blind and partially sighted people?

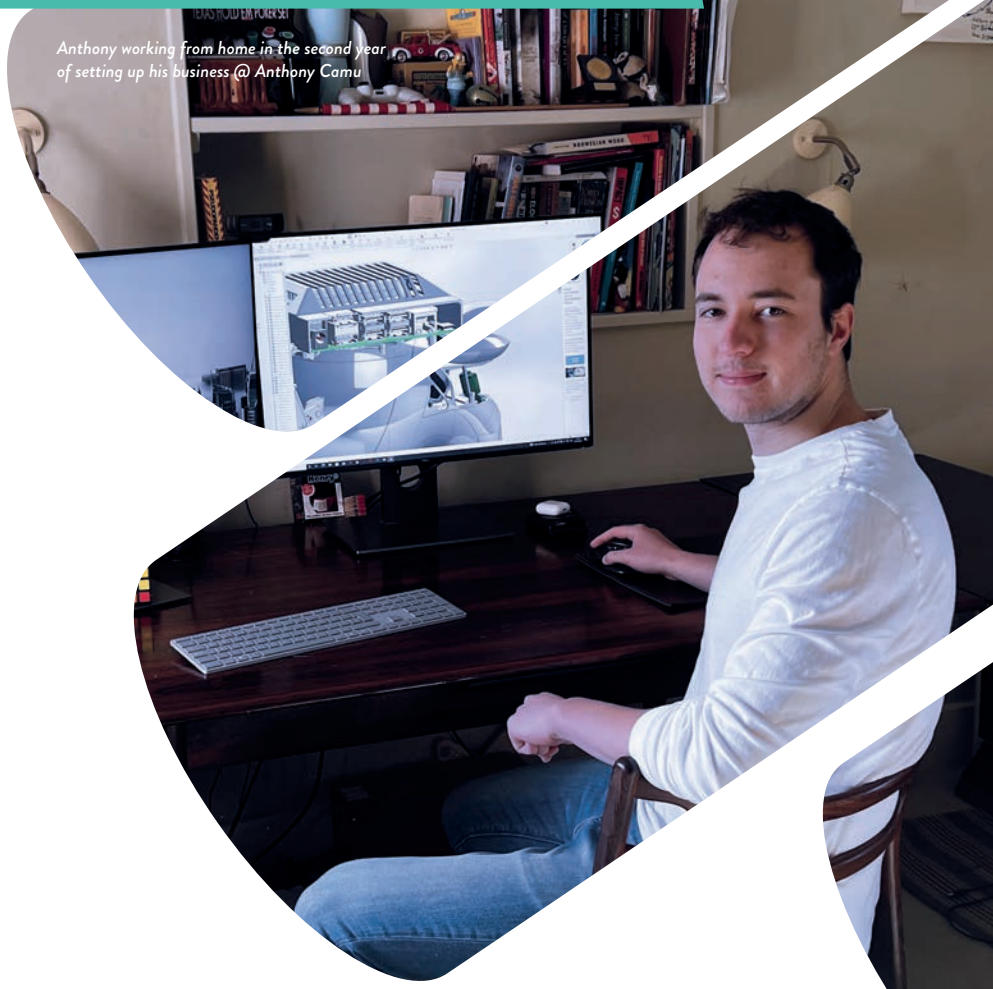
I'm not visually impaired nor did I know many visually impaired people before I started this project, but the inspiration behind Theia came from observing everyday life. I was doing an ethnographic study for a completely different project at London Waterloo Station, and I noticed a blind person who was walking with a white cane

and was supported by a member of station staff. They were walking straight through the bustling station concourse, parting the crowd of people, with the blind person tightly holding on to the staff member's elbow. The cane was suspended above the ground by a couple centimetres and, contrary to how I presumed canes were used, was not being scanned from side to side. I drew so many questions from observing this; for example, why was the cane still required if the blind person was being guided by a sighted person?

Why is a cane still required?

The cane is there to prevent the user from tripping over an obstacle, but what's less discernible is the bottleneck of information

Anthony working from home in the second year of setting up his business @ Anthony Camu



transfer between the staff member, the environment and the blind person. Take for example, tiny cracks or lips in pavements, which are everywhere and can trip a partially sighted and blind person up. The person (or guide dog) guiding the visually impaired person may automatically avoid these minute obstacles and not communicate that they're doing so, hence the fear of tripping and/or the blind person's lack of full trust in their guide. A cane provides a physical connection with the ground, allowing users to 'feel' the pavement they're about to walk on. This is probably why canes have hardly changed over thousands of years and are still used today. It's our mission to change that.

Why did you call your device Theia?

Theia is the Greek goddess of sight and light. Theia is also the name of an ancient planet in the solar system that collided with Earth, forming the Moon.

How does Theia work?

Inspired by autonomous vehicles, Theia aims to translate that sense of effortless driving into a system of effortless walking, helping users make complex manoeuvres without needing to see nor think too hard about what they are doing.

Theia is a handheld device which users hold in front of them, similar in size to a TV remote or supermarket scanner. Much like a self-driving car, Theia will programme routes to reach destinations and helps users avoid accidents along the way. Users input where they want to go by voice command, and powerful on-board processors will then determine the best path for them to take and separate routes into individual commands – for example, bear left at 1.4 m/s.

The challenge is communicating this information to the visually impaired person, and Theia tackles this by physically 'leading' users. Using a special mechanism we developed, users are guided with a unique form of force-feedback. This provides a 'leading' sensation that can be compared to a guide dog's brace, i.e. users holding Theia are able to feel all the subtleties of speed and direction, and the feel of being 'pulled' along.

What research have you conducted for Theia?

We investigated which of the seven human senses are the most useful for walking. Our findings revealed that sight is not the most important sense, neither is hearing nor touch. Proprioception (body position) is more important, followed by the vestibular sense (movement), then sight, hearing, touch, smell and taste. Proprioception tells us →

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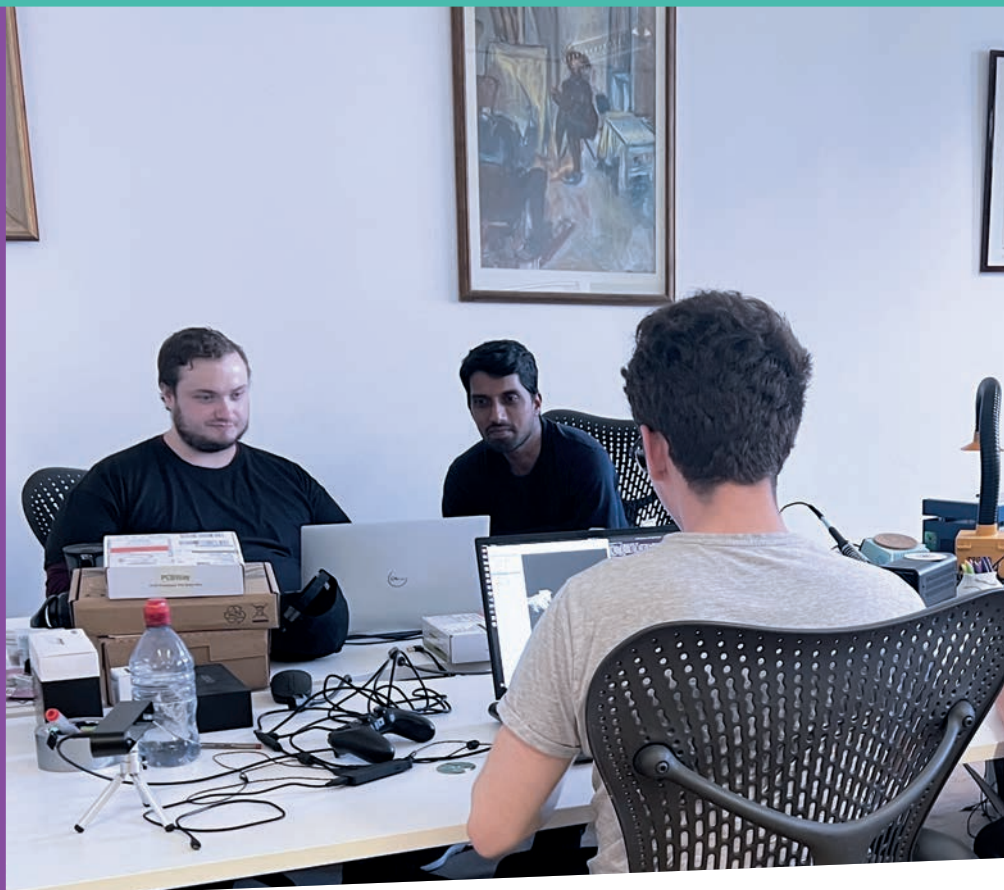
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WHEN YOU START A BUSINESS, YOU HAVE TO GET YOUR HANDS DIRTY AND EXPECT TO BURN THE MIDNIGHT OIL A LOT OF THE TIME!
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where our limbs are in space and how to control them without looking at them, and the vestibular sense, also known as the balance sense, helps us move smoothly.

Horse riders, for example, can accurately control the speed and direction of their horses by pulling reins and moving their legs, etc. I've heard that it's possible for horse riders to ride blind horses once there's enough confidence and trust instilled in the horse. It's a very similar situation with visually impaired people. A person or dog can intuitively guide a blind person by manipulating their proprioceptive and vestibular senses simply by 'pulling' them along a path. The first steps in Theia's creation were focused on developing a new branch of research focused on haptic interfaces, alongside human and robot cooperation. Haptics

are about creating an experience of touch for the user by applying forces, vibrations or motions.

What technical challenges did you have to overcome?

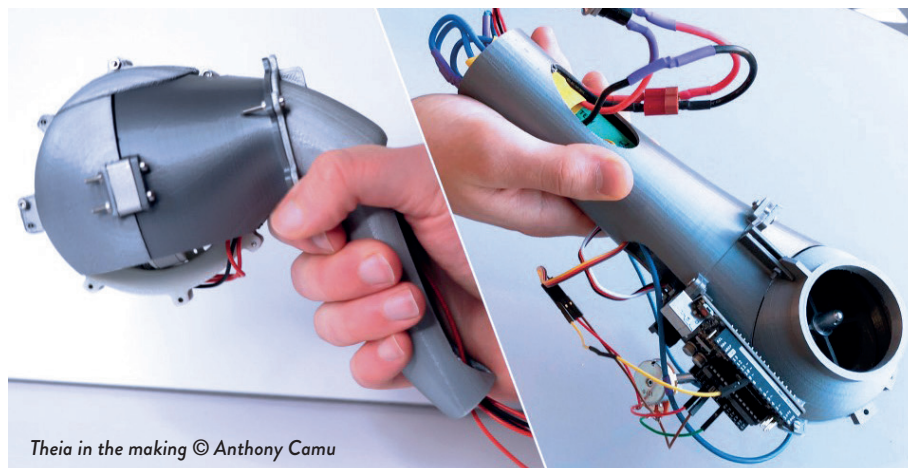
Creating a lightweight, handheld device that provides users with safe, autonomous navigation on pavements is undoubtedly complicated. For example, self-driving cars have briefcase-sized computers, draw a lot of power and are still in the research stage. We've spent a lot of time developing a pedestrian-centred and miniaturised autonomous system, which users can rely on.

At what stage is this device?

We've tested our prototypes with visually impaired participants, both guide dog users and cane users, and we're about one year away from selling our first



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Theia in the making © Anthony Camu

product. It's important to mention that there is a distinction between guide dog users and cane users, not least between each visually impaired individual. Each person's environment, experiences, and orientation and mobility skills vary.

What have been some of your findings during this testing phase?

By working directly with mobility instructors and blind people, we discovered a fascinating partnership between guide dogs and their owners. In fact, their interdependence has been the driving force behind Theia's features. This may also be why guide dog users found Theia, at least initially, more intuitive than cane users. Nonetheless, it was clear we had invented something that requires new skills. That said, within about 20 minutes of using the



Anthony with his current team © Anthony Camu

device, test participants became proficient enough to walk at nearly double the pace of traditional cane users, which is very exciting!

What is Theia's unique selling point?

While improvements in the walking pace are great, it's more about cost and functionality. Many more visually impaired people will be able to get the support and enhanced mobility that would ordinarily come with guide dogs but without the long waiting lists and high costs.

What led to you founding Theia Robotics?

Theia Robotics started out as a university project. Loughborough University's public relations department and I wrote a press release about Theia which piqued the interest of PA media, a

news agency. The next morning, I was on BBC Breakfast (a daily morning TV programme in the UK) talking about Theia to 7.7 million people! I then appeared on *The Gadget Show*, followed by J-Wave, Tokyo's largest radio station. I was also featured in UK newspapers, such as the *Daily Mail* and the *i Newspaper*. This unexpected media attention led to hundreds of visually impaired people reaching out to me wanting to buy a Theia, although, at the time, the project was still in its infancy. So, I decided to dedicate the next few years towards making Theia a reality by starting a company and building a team. From a very young age, I'd wanted to found a company.

How challenging is it to set up your own company?

I started Theia Robotics fresh out of university, and it's fair to say I didn't have a clue how to start a business! In the first year, I joined programmes such as Loughborough University's incubator, LU Inc., to learn about entrepreneurship and business operations. As a sole founder, I wear many hats, including designer, engineer, manager, accountant, administrator, employer, salesman and cleaner, etc. When you start a business, you have to get your hands dirty and expect to burn the midnight oil a lot of the time!

I made quite a few mistakes when I started out, but I had the support of advisors and, eventually, investors whom I met by growing my network, for example on LinkedIn, and from the programmes I had joined. A great programme was Innovate UK's Young Innovators programme. It provides tailored business support, as well as advisors and an initial injection of capital (money). After three years of running a start-up, I can say the biggest challenge for any company is cash flow. If you start a business, it's important to know about budgeting and forecasting – Excel is a good friend!

What is your proudest moment to date?

My proudest moment was when I was standing on a train platform in Wolverhampton last year, and I received an email from Innovate UK notifying me that my company had been awarded a SMART grant. It's a very competitive grant which provided



LOUGHBOROUGH UNIVERSITY'S PR DEPARTMENT AND I WROTE A PRESS RELEASE ABOUT THEIA, WHICH PIQUED THE INTEREST OF PA MEDIA. THE NEXT MORNING, I WAS ON BBC BREAKFAST TALKING ABOUT THEIA TO 7.7 MILLION PEOPLE! I THEN APPEARED ON THE GADGET SHOW, FOLLOWED BY J-WAVE, TOKYO'S LARGEST RADIO STATION.



the funds I needed to hire my first staff members and move into an office in London. Before receiving the grant, I was working from a shed in my parent's garden for two years.

What is your philosophy in life that helps drive you forward?

Persistence is key! I have also always wanted to be doing something that widens the skills I'm passionate about. I never stop learning.

What is one piece of advice you wish someone had given you at the beginning of your career?

As a young entrepreneur, my career path has been a bit unconventional. When you start a business, you're the boss, and you work things out as you go along. Ideally, I would have liked to have had a few more years' experience working for someone else before starting a company. That said, I felt it was important to start a company straight away because of the media interest and the need to get a patent. Although I'm very happy where I am, if I could go back, I would probably study a part-time engineering master's degree at the same time as starting my business. Also, if I were to work for someone else, I would work for a start-up with less than 50 employees in an industry I'd want to work in. But hindsight is a beautiful thing!



A close-up of Theia © Anthony Camu

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