SCIENCE FICTION IS CHANGING THE WORLD

Innovators are using science fiction to design the future – and you can use it to create your own personalised robot. By **BROOKE LEWIS**

Within most of our lifetimes, personal robots will become as commonplace as mobile phones, according to science fiction author and Intel futurist, Brian David Johnson.

It sounds like science fiction but it's already starting to happen – people are downloading robots found on the Internet and printing off a 3D version of it at home. As of September, people are now able to build and customise their own robots using a handy step-by-step guide in the form of Johnson's new book, 21st Century Robot: the Dr. Simon Egerton Stories.

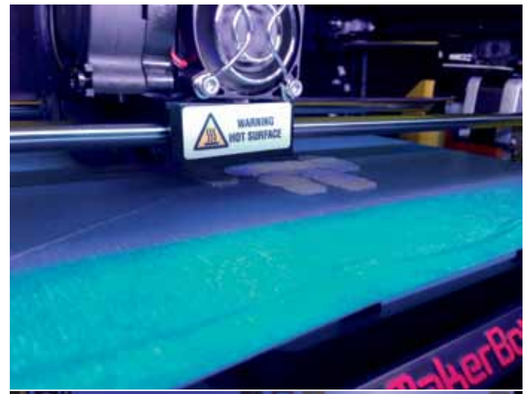
Dispersed between its 'how to' sections, the book contains four stories starring a robot called Jimmy. But far from simply providing some entertainment and light relief from the more instructional parts of the book, the stories are actually science fiction prototypes, written with the intention of exploring how the very robots that the book is teaching us to build might impact our lives.

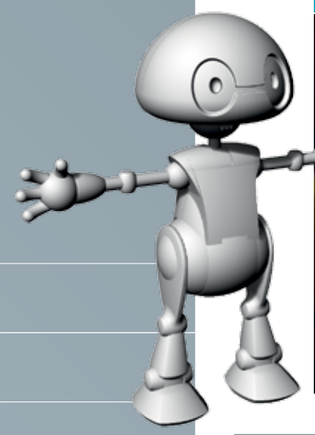
"The difference between science fiction prototyping and scenario planning and regular science fiction, is that science fiction prototyping takes science fiction based on science fact and uses it for the specific intent to create something new," Johnson says. "It could be the intent to create a new chip or specific piece of science, often ... with the intent of imagining possible futures. But it's that intent that does it."

He notes that while some science fiction writers have used their novels as a way of campaigning for or against something happening in the future, it is still distinct from science fiction prototyping because these authors weren't feeding their writing directly back into the development of new technologies.

"They had intent but they were using entertainment to get across their point, whereas science fiction prototyping very much prompts us to use science fiction based on science fact to build a better future," Johnson says.

Science fiction prototyping – which is now taught in science and engineering classes in more than 50 universities





worldwide and is increasingly being embraced by a number of other industries including design, security and business – was something that Johnson began doing intuitively as a child.

Johnson, who grew up with technologically savvy parents and describes himself as being "pretty much born a geek", has worked with computers since his very first job at a college computer lab at the age of 10, when he taught economics students "how to use this brand new thing called the PC, the personal computer". He has also written science fiction stories since the age of nine and worked in product development since leaving school. So, for Johnson, exploring the new technologies he was most excited about through science fiction and then using those explorations to inform his work seemed like a natural thing to do.

"About 10 years ago I was working with some professors who were fans of my work

SCIENCE FICTION PROTOTYPING SOMETIMES ALLOWS YOU TO GO TO THE DARKER PLACES IN SCIENCE

and who had read some of the work I had done in things like [science fiction book] Fake Plastic Love, which is about robots, and they saw that what I was doing was really playing out the realities of science in fiction and asking the question of 'what if? What would that really be like?' And they wanted to start teaching it and they wanted something to put in front of their students," Johnson says.

"Which is really what lead me to come up with a textbook and actually start to document what I was doing and always had been doing. I think, like with most things that you've always done, it hadn't really occurred to me that other people weren't doing it that way."

Johnson says that, along with being a fun way to free up the imagination, science fiction prototyping provides a focused way of exploring the human implications of new technologies – including any potential negative impacts they could have.

"Even a science fiction story based on science fiction fact is still about people. And it gives people the freedom to go and explore things they haven't been able to explore before. And that's sometimes positive but also sometimes very negative," he says. "I think science fiction prototyping sometimes allows you to go to the darker places in science and technology and business that you wouldn't normally do in say the corporate world or an academic setting. When people do corporate documents or scenarios, people don't die. But in science fiction stories, people die all the time. We need to go to those dark places because we need to think about 'what's the worst that can happen?' so that we can understand it and make sure that it doesn't happen."

And it was this element of science fiction prototyping that drew Johnson to collaborate with Egerton and a collection of other scientists on the project that brought about 21st Century Robot: the Dr. Simon Egerton Stories.

DIY SCIENCE FICTION PROTOTYPING

- Pick your science/technology and build your world
- Introduce your chosen technology to the world you have created
- Explore the ramifications of the science on your characters
- Describe how your characters adapt to any positive or negative impacts of the technology
- Reflect on any lessons learned from steps 2-4
- More detailed instructions can be found in the book "Science Fiction Prototyping: Designing the Future with Science Fiction" by Brian David Johnson.

THE RISE OF 3D PRINTERS

US inventor Chuck Hall created the first 3D printer in the mid 1980s (it was patented in 1986) but desktop versions designed for home usage have only become available in the past five years. They are becoming increasingly accessible with prices now starting from around AU$1,200.

"As most really good stories start, it started in a bar," Johnson says of the book, which grew out of a discussion with Egerton. "I was having a pint with the good doctor and we were talking about what I was working on at the time and then he said he was working on irrational robots. And I said 'excuse me?!' And he said he was working on artificial intelligence systems that allowed these robots to make both good decisions and bad decisions."

The rationale was that the human ability to make both good and bad decisions enables us to successfully adapt to complex environments – and this same ability would help robots interact with people.

"So when you have a roboticist telling you he wants to make robots that are irrational, I was in, I was hooked, I was fascinated," Johnson says. "And I told him about science fiction prototyping and how we could use it to imagine 'what would that be like?'. Because if you say you're going to be living with an irrational robot, most people imagine very bad things."

The fictional parts of 21st Century Robot play out what some of these very bad things might look like, which could be helpful for people customising their own robots – something that Johnson says will be possible very soon.

"Because of the increase in computational power – what we do in my day job at Intel, making the chips smaller and more efficient and faster – that's allowing us to have real artificial intelligence right now on a very small device with the ability to put it into a very small robot at a very cost affective price," Johnson says. "3D printing is allowing people to customise the robots for themselves and print the majority of the robot. And the materials such as the servers and batteries are almost there – we're just getting there."

Because it is making use of such new technology and because of the interactive nature of the project, the book is being released in instalments. Two of the book's 'how to' sections were released in September along with all of the fiction sections. Another two 'how to' chapters have been outlined but deliberately left undone so that they can incorporate feedback and new innovations before being released over the next year or so.

"[T]he 'how to' chapters are still being refined because part of the idea behind 21st Century Robot is that it's all open source – so all of the design files are all open source, all of the AI is open source. Even the production of the robots themselves, which is very 21st century, is open source," Johnson says. "So we're not going to go and say 'here's this one Jimmy robot and now you can buy this Jimmy robot' or 'here's this Jimmy chip and you can go and build your own Jimmy', we're actually open sourcing and we're going to work with makers and roboticists and students to actually have them make lots of different Jimmys and lots of different Pauls. So, in that way, it is by design a work in progress."

But that progress is happening more and more rapidly.

"It's becoming real that we're going to be having people all over the world building these types of robots very soon," Johnson says. "I think you'll see the experimentation happening over the next few years and it won't be uncommon to see people playing around with them at universities and also having kids playing around with them."

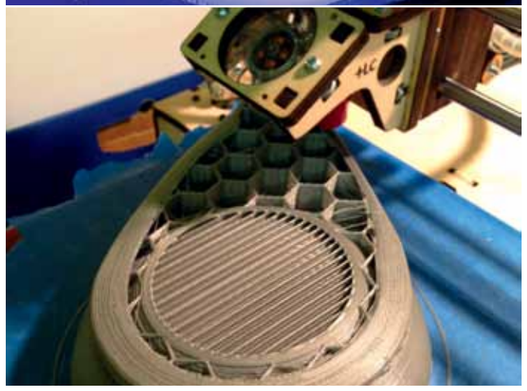
After that, he says, the shift toward personal robots becoming as mainstream as mobile phones is more a matter of human adjustment than of technological advances.

"[A]s those kids grow up and there are more and more robots and people are just as comfortable with a little robot as they are with their smart phone, I think that's when we'll start to see it. It's actually not a technology thing at that point, it's a human adaptation. Humans will adapt – just as we have adapted to spending most of our working hours working on a computer screen, which is quite new – we all think that's very normal but that isn't very normal and I actually remember a time before the internet existed."

And, even way back then, in the primal dark ages before the Internet existed, before smart phones and all the other amazing innovations that have happened within our lifetimes that we've already come to take for granted, Johnson was already writing science fiction stories and imagining how robots might one day be brought to life. Yet even he sounds amazed that it is finally actually happening.

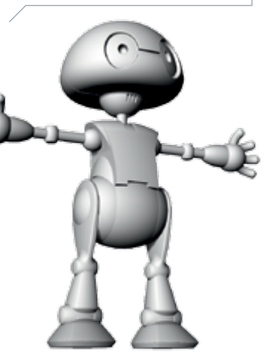
"I've paired with an illustrator who I've worked with ever since the beginning so we have all of these drawings and sketches of all of the different robots – and all of those robots are being turned into 3D robots that are being printed right now. I can guarantee you that right at this moment, somewhere in the United States of America, someone's printing Jimmy," he says.

"Go back to that 10-year-old kid, the nerd who was in the science lab teaching those computer classes – if somebody had come up to me and told me that every morning I would wake up and in my inbox there would be pictures of people all over the United States, 3D printing the robots from my science fiction stories, I would not have believed it."



SHOULD WE BE AFRAID OF ROBOTS?

So far there hasn't been any evidence of Skynet-style robot vengeance but there have been numerous accidental workplace deaths. The first was in 1979 when Robert Williams, who worked on the production line of a Ford Motor Company plant in the US, was killed instantly upon being struck in the head by the arm of a 1-tonne robot.



LEONARDO'S ROBOT

Leonardo da Vicini is thought to have designed – and possibly built – the world's first humanoid automaton around 1495. Detailed design notes rediscovered in the 1950s depict an armour clad automaton, often referred to as "the robotic knight", that is able to independently manoeuvre its arms, sit, stand, and open and close its visor.