

CREATIVE SCIENCE

INJECTING INNOVATION INTO THE IT INDUSTRY

Product innovation can be both an opportunity and a concern for IT companies. Those driving innovation can gain unprecedented market openings, while those trailing can risk disaster. Victor Callaghan, Professor of Computer Science at Essex University, explains.

Companies such as Kodak and Nokia clearly show how disruptive innovations can threaten even the largest technological giants. Hence, companies both small and large have a keen interest in methods with the potential of improving their product innovation capability. In this article, I will describe a new product innovation tool called Science-Fiction Prototyping (SFP) which, perhaps surprisingly, seeks to encourage scientists and engineers to write fictional stories about their work.

The story of SFP began with Brian Johnson, Intel's Futurist. Intel is the dominant company in the manufacture of integrated circuits (chips) for computers. Companies producing integrated circuits face a particularly difficult challenge as it can take 7+ years from the conception of a new chip to its delivery to customers which, in terms of current product and market dynamics, is a very long time.

For example, new versions of mobile phones, pads and desktops appear as frequently as every 18 months meaning that chip designers need to think up to 4 generations ahead, a daunting challenge. Compounding the difficulties, traditional engineering education doesn't always prepare engineers well for tasks that need creative skills.

Step in Brian David Johnson, Intel's futurist who had the idea that, if engineers were asked to write fiction rather than fact about extrapolating their technologies forward, it might help them escape the shackles of worrying about whether the technology would work, and allow them to make imaginative leaps that, in turn, could serve as motivational visions for their R&D programmes. The fictions he advocated were based on science, but extrapolated into the future and acting as prototypes to evaluate new ideas ... Science-Fiction Prototyping (SFP) was born!

The deliberately detailed analogy to real-life was an important feature which allowed SFP to function as a prototype (a narrative simulation of a future reality) whereby different stakeholders could assess the idea's feasibility and usefulness, which differentiated it from

earlier scenario or design-fiction-based approaches.

In parallel, Essex University were faced with the need to make a presentation to a non-technical audience at the 2004 United Nations Habitat Forum, explaining the risks that pervasive computing technologies presented to individual privacy. For that event we adopted a series of fictional vignettes to provide a conversation bridge between ourselves and the largely non-technical audience.

The final piece of the jigsaw was a chance meeting with Brian Johnson at IE'07 in Ulm which brought together these two facets of science-fiction, prototyping and communications, giving birth to the Creative Science Foundation (CSf) with

'Mixed-reality, nano-technology and artificial intelligence might combine to create new kinds of education experiences.'

a mission to facilitate conversations between professionals and society at large, connecting companies/researchers to their customers and thereby facilitating conversations about the kind of futures and innovations we all want. In the remainder of this article some current SFP activities will be described.

The Education Desk

The first Creative Science Foundation workshop took place in Kuala Lumpur in 2010 and contained an SFP entitled 'Tales from a Pod', which explored how mixed-reality, nano-technology and AI might combine to create new kinds of education experiences. At the heart of the story was a product innovation called an ePod (educational pod). A short extract from the SFP is as follows:

'ePods were effectively small cocoons; something like a comfortable armchair enclosed within a sound-proof egg-like structure packed with sophisticated but largely invisible technology that included immersive mixed reality and sophisticated AI. The immersive reality technology aimed to make the participant feel as though they were truly part of a fictional physical world.'

This SFP might have remained fiction if it hadn't been for a meeting with David J Aldridge the CEO of a small Essex based SME, Immersive Displays, that produce virtual-reality environments such as flight simulators, planetariums and exhibition systems. Talking with them revealed they could build some aspects of the ePod now, albeit in a somewhat different form, as a student desk; the eDesk.

In the final eDesk product, the desk and spherical screen (ImmersaVU) were constructed by Immersive Displays, the mixed-reality education-ware by Fortito (a small Mexican SME) with the mixed-reality, vision and AI software created by the University of Essex and King Abdulaziz University.

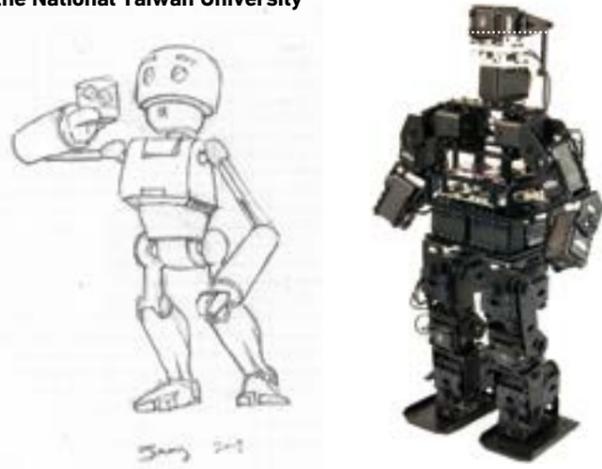
The resultant system was tested successfully in a trial that interconnected students in the UK, USA, China, Korea, Malaysia, UEA, KSA and Mexico into a unified mixed-reality laboratory session where the students collaborated to build smart home systems using a mix of hard and soft components which functioned as a collective whole despite the large geographical separations. A YouTube video shows this system in action; see: <http://youtu.be/ZjnnBCMkrmc>.

The 21st Century Robot Project

This is a crowd-sourced enterprise enabling society at large to participate in a Maker activity which aims to explore the possibilities for creating future domestic robots. The project is based around the skeleton of a humanoid robot which participants are invited to customise by adding their own 3D-printed skins and software functionalities (via App modules).

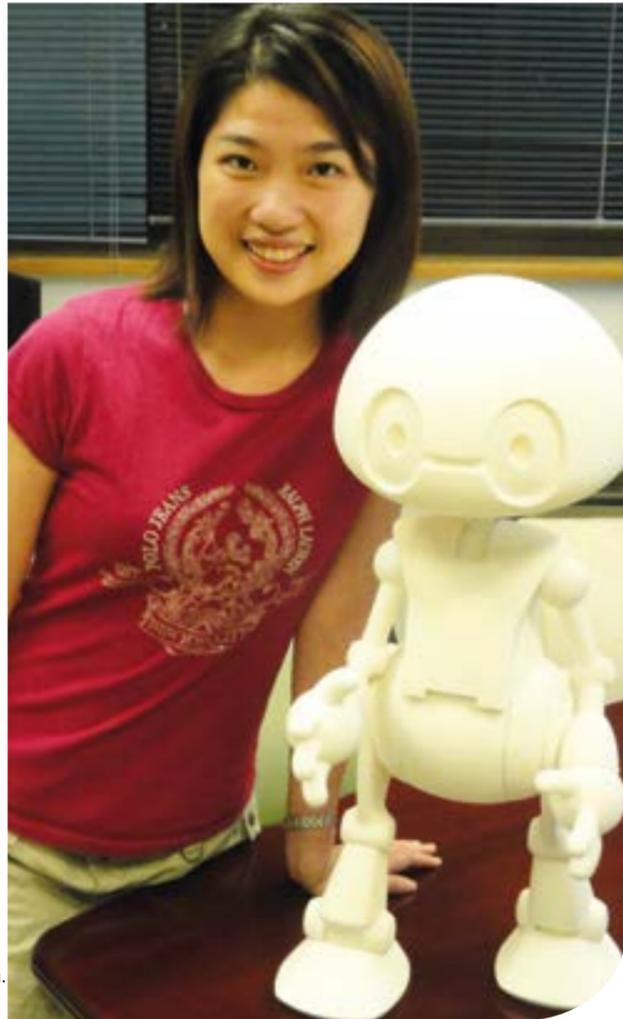
The main participants in the 21st Century Robot project are Intel (makers of the Edison embedded-processor), Trossen Robotics (makers of the exoskeleton) and O'Reilly (organisers of the supporting Maker Fayres and publishers of the related

(From left to right) the original concept sketch; the production exoskeleton version; and a version with a skin (Jimmy) that mirrors the associated Maker book alongside Hsuan-Yi Wu of the National Taiwan University



book). The concept arose from a SFP series called, 'Nebulous Mechanisms', written by Brian Johnson about a robot called Jimmy, and the issues that arose through mimicking the irrational aspects of humans in robots (one of the directions AI could explore as it moves towards the technological singularity). This project is

exploring many issues of importance to 21st Century industry such as the consequences of moving from a centralised to a more distributed mode of manufacturing plus the possibilities for rebalancing customer-company relationships through ideas such as SFP and open innovation.



Further reading

- www.creative-science.org
- <http://www.morganclaypool.com/doi/abs/10.2200/S00336ED1V01Y201102CSL003>
- [http://victor.callaghan.info/publications/2010_CS10\(TalesFromAPod\).pdf](http://victor.callaghan.info/publications/2010_CS10(TalesFromAPod).pdf)
- www.immersivedisplay.co.uk/
- <http://fortito.mx/>
- www.essex.ac.uk/
- http://www.kau.edu.sa/home_ENGLISH.aspx
- www.21stcenturyrobot.com/
- www.intel.com
- www.trossenrobotics.com
- www.oreilly.com/

Other activities

Beyond company-based innovation, the Creative Science Foundation is working towards supporting the introduction of creative approaches to science, engineering and business education. Examples include a computer security course in Washington University (USA), entrepreneurship at Canterbury Christ Church University (UK), Computer English in Shijiazhuang University (China) and motivating pre-University students towards STEM choices via schemes such as Essex University's (UK) 'New Creatives'. It's interesting to note that, in China, every university computer science student is required to undertake a 'Computer English' course. SFP is perfect for exercising language and in cooperation with Tsinghua University Press and the Creative Science Foundation is writing a standard textbook to integrate learning language, creative thinking and computer science, which will be available to all Chinese students; a potentially significant development for Chinese IT education.

And finally...

Creative thinking is important for the success of any organisation and much has been written about this over the years. In this spirit the Creative Science Foundation seeks to pick up that baton for those of us who were inspired into IT careers by science fiction and the possibilities of applying the power of IT to transform our world for the better.

For more information about CSF, or how to become involved, see www.creative-science.org or <http://linkd.in/1xUMdJD>

Fake sales brochure from 'Tales from a pod' SFP

In this increasingly competitive world, where knowledge determines success, your child deserves the very best tuition, learn at least an order of magnitude better than grouped students. If you want to give your child the best one-to-one education in the world, give them an **Addictive Technology's ePod-4**

Pioneering research by Benjamin S. Bloom in the 1980s (and supported by all work since) proved that students who receive one-on-one tuition learn at least an order of magnitude better than grouped students. If you want to give your child the best one-to-one education in the world, give them an **Addictive Technology's ePod-4**.

Education - Product Specifications

- Super-Intelligent Artificial Teachers
- Personalised one-to-one tuition (the gold standard)
- Teacher's avatar has visualisation powers that don't exist in physical space
- Available 24 hours a day, 365 days a year
- Learning environment (avatar, surroundings, lessons) can be tailored for each student
- Unwavering attention and happy disposition
- Compelling content combined with contextual delivery
- Teachers available in different cultures, ages, sexes and form

Technology - Product Specifications

- Free-Will 3 © - Quantum processor (upgradable)
- My-Mind 1.2 © - Evolving Persona Engine (customizable)
- Flame 5 © - EmotionWare
- Get Real 8.2 © - Mixed Reality Cocoon
- Real-Touch © iSkin & Haptics
- Ghost 4.1 © - 3D Imaging & Audio
- SentiNet © - Knowledge Engine

Addictive Technology **ePod-4** 

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