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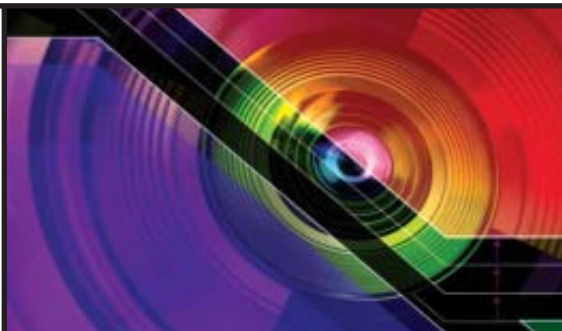
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ABOUT THIS ISSUE

Simultaneous advances in computer vision, image sensors, embedded computing, and sensor networks have led to the emergence of smart camera networks. The six feature articles in this issue—presenting research in video analysis, system design, sensing, and sensor networks—demonstrate both tremendous opportunities and challenges for these networks.

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related to the features in this issue.

A New Doorway into Time

Brian David Johnson, *Intel*

Just as editor Sam Moskowitz chronicled the accomplishments of John W. Campbell's new approach to science fiction in *Doorway into Time,* we're capturing the accomplishments of Vic Callaghan and his fellow practitioners in their crusade to explore and expand science fiction prototyping.

"Modern science fiction, among the insiders in the field, is a phrase that refers to a readily identifiable change in the format of the science fiction story, which began in 1938 and was readily apparent by the middle of 1939. The revolutionary was John W. Campbell, who not only forcibly moved this branch of fiction in the direction in which he wanted it to go but under the name of Don A. Stuart had previously written prototypes of the kind of stories he had in mind," wrote Sam Moskowitz in his introduction to the 1966 science fiction collection, *Doorway into Time.* Moskowitz, a 20th-century science fiction superfan and chronicler of the movement, painstakingly documented what he calls "modern" science fiction in that volume's lengthy opening survey.

I have a weakness for these kinds of books. I love nothing more than reading an old paperback about science and science fiction from over 50 years ago. I'm also a sucker for the covers and the descriptions of what you'll find inside. The back of the paperback version of *Doorway into Time* tantalizes you with, "Look into the future … a wonderful, terrifying world in which all wishes are granted; all man's work is done for him. Machines can solve any problem, even the psychological ones of fear, ambition and frustrated love. Look into the future … and learn that one problem solved brings on a thousand new dilemmas man never faced before. Look into the future … if you dare!"

Who wouldn't love that?

But as I read Moskowitz's introduction, it struck me that Campbell could have been an early science fiction prototyping (SFP) pioneer. Moskowitz explains Campbell's approach to modern science fiction by quoting from Campbell's own preface to an earlier science fiction anthology: "the modern science-fiction writer doesn't merely say, 'In about ten years we will have atomic weapons.' [Remember, this was Campbell writing in 1946.] He goes further; his primary interest is in what these weapons will do to political, economic and cultural structures of human society."

This sounds strikingly like the aim of science fiction prototypes; moreover, Campbell's very specific strain of future visions helped shape how the entire genre or perhaps the entire world envisions our own tomorrow. He was able to do this because he was a very powerful editor who worked closely with emerging writers, such as a young man from New York named Isaac Asimov. Together, Campbell and Asimov developed a whole new way of thinking about robots. The pair also brought logic to science fiction stories. This introduction of a logical architecture to a fictional story is at the bedrock of the SFP process. Asimov and Campbell's "Three Laws of Robotics" still influences both science and fiction today.

As I was exploring Campbell's deliberate influence on science

fiction and its relationship to SFP, I couldn't help but draw the connection to a similar figure who's taking SFP into new areas today. Perhaps Vic Callaghan is our 21st century John W. Campbell.

BUT FIRST, THE ROAD SO FAR

Over the years, SFP has been used in a wide variety of ways. At the University of Washington, Tadayoshi Kohno, an associate professor in the Department of Computer Science and Engineering as well as an adjunct associate professor in the Information School, used the SFP process to explore the fringes of security. What would it be like to hack a pacemaker? How could a person take control of multiple toy robots and use them to break into a house? Can we really hack into the antilock brakes of a car and, if so, what does that mean for the future of transportation? I worked with him to write a paper about it, "Science Fiction Prototyping and Security Education: Cultivating Contextual and Societal Thinking in Computer Security Education and Beyond" (https://homes. cs.washington.edu/~yoshi/papers/ SIGCSE/csefp118-kohno.pdf).

Sumi Helal, a professor in the Computer and Information Science and Engineering Department and director of the Mobile and Pervasive Computing Laboratory at the University of Florida, is known for his work in pervasive computing and used SPFs to investigate what tomorrow might look like when our houses can care for us. Working with a group of researchers, he explored how a "home of the future" combined with healthcare robots might take care of the elderly, the young, diabetics, the obese, and the addicted. He explains his work in "Exploring Science Fiction Prototypes in Persuasive TeleHealth" (www.bibsonomy.org/ bibtex/ab00fd3c4a0030523d36cff 065ded959).

Ari Popper of SciFutures has used SFP to help businesses explore new directions and innovative approaches. Valuable intellectual property, much of the work he and his team create will never see the light of day publicly.

But of all the innovators and trailblazers who have taken SFP and ventured into uncharted territory, none can match the Creative Science Foundation and Vic Callaghan.

REVOLUTIONARIES: FROM CAMPBELL TO CALLAGHAN

As a founder of the Creative Science Foundation and my longtime collaborator, Callaghan makes regular appearances in this column. He and I, along with other foundation members, continue to develop various uses of science fiction prototypes all over the world. But Callaghan is someone special.

A few years ago, I got an email from him. (Because he's based at the University of Essex in Colchester, England, we talk every now and then, but mostly we communicate through email.) This particular message explained how, along with Anita Greenhill from Manchester Business School and Gary Graham at Leeds University Business School, Callaghan was using science fiction prototypes with business students to explore the future of commerce and industry.

A special issue of the journal *Futures* lays out their intentions: "This special issue … explores the use of creative fictional prototyping to motivate and direct research into new high-tech products, environments and lifestyles. Fictional prototyping combines storytelling with science fact to explore a wide variety of possible futures. We define what a prototype is, then outline the design challenges. Commentaries are presented on each fictional prototype. Finally we highlight the significance of this SI by making reference to similar studies published in *Futures*" (June 2013, pp. 1–108).

I was a bit worried. Using science fiction prototypes to explore the human, cultural, legal, and ethical aspects of technology was one thing, but using them to build actual businesses … this concerned me. This was real money.

"If you think about it," said Callaghan, "what's a business plan if not a work of science fiction? These students are writing their own possible futures. They use these plans to explore the future they want and the futures they want to avoid. What better tool to use than science fiction prototyping!"

THE NEW CREATIVES

Last week, Callaghan sent me a press release about his new experimentation with SFP: "On the 18th March, the Creative Science Foundation (www.creative-science.org) piloted a new kind of event aimed at stimulating pre-university interest in studying STEM subjects. The event, called 'The New Creatives,' was designed to challenge gifted and talented K-12 students by giving them the opportunity to explore the creative aspects of science and engineering courses. In this pilot, conducted in partnership with the University of Essex in the UK, 15- to 16-year-old students from two Essex schools (Thurstable and Colne) took part in the day-long sci-fi-prototyping workshop event."

The press release went on to chronicle the event:

The day began with a presentation from Katie Walker, a professional visual artist who won a Wellcome Trust Arts Award and has worked on numerous films such as *Invisible Woman*, *John Carter*, *Harry Potter & the Deathly Hallows* (Part 1 & 2), *Harry Potter & the Order of the Phoenix*, *Paul*, *Scott Pilgrim*, *Australia*, *Blood Diamond*, *The Ruins*, and *Charlotte's Web*. Her presentation focused on creative science by describing *Small Wonders*, a film she made from recordings in conversation with a microbiologist and

his image archive, including a 16-mm film of a cutting-edge experiment shot through a microscope in 1972 that takes on a novel dynamic art form (see www.katiegoodwin.com/Small Wonders.html).

The sci-fi-prototyping workshops were presented by Victor Callaghan and Anasol Pena-Rios from the Creative Science Foundation and Essex University, respectively, based around a creative science methodology called "micro science fiction prototypes" where students were invited to write short Twitter-sized stories (140 characters or 25 words) conveying their views about the possibilities for future technologies. Thirty-four such microfictions were written, which you can view at www.creative-science.org/activities/microsfp/. To motivate the students, they were shown a novel mixed-reality student desk, which was inspired by an earlier prototype written in 2010 and a video made by Intel's Tomorrow project team (www.youtube.com/watch?v=GPhs1A32ywY).

You can read more about the Twitter activities at www.creative-science.org/activities/microsfp.

YOUNG MINDS EXPLORE THE FUTURE

As the press release described, Callaghan's experiment was a pilot trial at Essex University to explore the potential of micro science fiction prototypes as a way to get students interested in science, technology, engineering, and math. The group of 15- and 16-year-olds from the Thurstable School and the Colne School attended three workshops, each lasting 80 minutes (50 minutes of intro to SFP and methodology, and 30 minutes to write the prototype). Callaghan and his team showed the students an example of a successful prototype-to-commercial product, the ImmeraVU.

The ImmeraVU is an immersive desk that surrounds a person with an egg-shaped screen that sits on top of the desk and stretches into the viewer's peripheral vision, giving the impression that the person is immersed in the digital content. The idea for the ImmeraVU started as a science fiction prototype and is now commercially available.

"What did the students think?" I asked Callaghan about the New Creatives event.

"They loved it," he replied. "They came up with 34 micro science fiction prototypes in under 30 minutes. The teachers had to drag them away!"

"Did you learning anything new?" I asked. "With such young minds and the new approach, did you take away something that you hadn't expected?"

"Children have so much imagination," he answered. "They didn't need any prompting. They were overflowing with ideas about the kind of products and future they would like. What struck me is that they were better at imagining the future than most of my colleagues! A surprise to me, as I always think my colleagues are very innovative thinkers. But it begs the question as to whether imagination is a function of nature (a young brain) or nurture (that we educate people out of being imaginative)."

"I think there may be a message there for science educators who want to produce more creative scientists," he continued. "The bigger question is whether SFP can be a valuable tool in attracting more students into STEM areas, which all Western countries need to do. This pilot study was too small to answer that, but the initial signs are promising."

As science fiction prototypes make their way around the world and into people's imagination, it seems that there are so many more things we can do and accomplish. I take great inspiration from Vic Callaghan; he continually tries to find new ways to apply the approach and keeps coming up with unexpected and amazing results. If you're curious about his micro science fiction prototype project, follow the Creative Science Foundation on Twitter @CSciFoundation and add your ideas to the pilot.

Just as editor Sam Moskowitz chronicled the accomplishments of John W. Campbell's new approach to science fiction in *Doorway into Time*, I believe we're capturing the accomplishments of Vic Callaghan and his fellow practitioners in their crusade to explore and expand SFP. I end this column as Moskowitz ended his introduction, that "this collection forms a basic reference of a literary phenomenon of our time." ⬛

Brian David Johnson, Science Fiction Prototyping column editor, is Intel's first futurist. He is the author of Humanity in the Machine: What Comes After Greed? *(York House, 2013) and* Vintage Tomorrows: A Historian and a Futurist Journey through Steampunk and into the Future of Technology *(Make, 2013). Contact him at brian.david.johnson@intel.com or follow him on Twitter @IntelFuturist.*