



The Dream Machine

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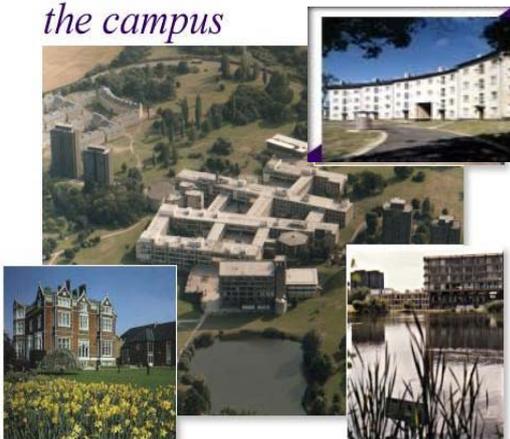
Presented at Creative Science 2013,
29th November 2013, King's College London

About Me

- ▶ Professor of Computer Science at Essex University
- ▶ Member of Intelligent Environments Group and Digital Lifestyles Centre
- ▶ Worked in avionics (aircraft) before joining university system
- ▶ Specialist in robotics and artificial intelligence (founded Robotics at Essex in late 80's, IE in late 90's)
- ▶ Current research focused on Embedded-Agents, End-User Programming, Affective Computing & Mixed Reality.
- ▶ Part of organizational team for numerous conferences, workshops, journals



the campus



<http://victor.callaghan.info>

- Parkland of 200 acres
- Royal Charter in 1965
- 12,240 students
- 27% post graduates
- 40% overseas (130 countries)
- Ranked 9th in UK for research
- Ranked 2nd for student satisfaction



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Overview of Talk

“Hypothesizes that dreams may be akin to a ‘natural immersive education system’, having an important role in learning (whether they are a primary mechanism or secondary artefact is deliberately obscure, as are roles of dreams in our current lives)” ; in this world we are, effectively, “Dream Machines” .

- ▶ Section 1 – about inspiration
- ▶ Section 2 – about the science
- ▶ Section 3 – about the story
- ▶ Section 4 – reflections



The Inspiration

- ▶ The Singularity *the moment machine intelligence exceeds human intelligence* (around 2050 according to Kurzweil)



... a fascinating futurescape!

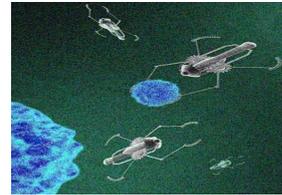
About the Science



Blended Reality – mixing real and virtual activities

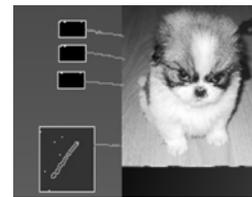


Plug & Learn – creating appliances by plugging together functions



Nanobots – in-body nano size robots for medical work.

- **Blended Reality** - “xReality interactions within an immersive blended reality learning space”, Immersive Education 2013, London, 28-29 November 2013
- **Plug & Learn** - “Bespoke Appliances for the Digital Home”, Intelligent Environments 2008, Seattle, 21-22 July 2008
- **Nanobots** - “A Collaborating Team of Spiking Neural Network Based Robotic Agents for Inaccessible Fluidic Environments”, Proc IEEE Int'l Conf on Systems, Man and Cybernetics, Taipei, Taiwan, October 2006
- **iSkin** - “Using an amorphous computer for visual display applications in intelligent environments”, Intelligent Environments 2008, Seattle, 21-22 July 2008



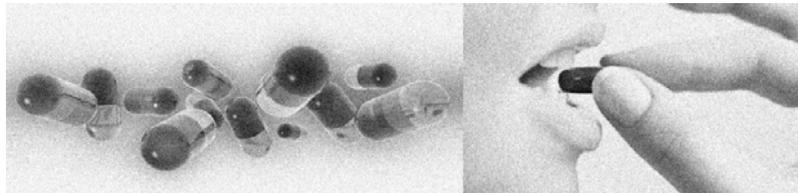
iSkin – spray-on surface based nano-computer systems

About The SFP

- ▶ “based in a post-singularity world (2046+) and speculates on how technological developments, in the form of transhumanism, might change the nature of future education”.
- ▶ At its root, it imagines:
 - The *technological singularity* has been reached, and machine intelligence and bioelectronics has equaled or surpassed the capabilities of people.
 - *Dreams* are regarded as a ‘*natural immersive education system*’ and this SFP explores their relationship to learning.
 - Imagines brains can be augmented or ‘adjusted’ via plug-ins, uploads and nanobot surgery!
- ▶ Imagines these approaches can deliver ‘*learning-free education*’ for a variety of scenarios.



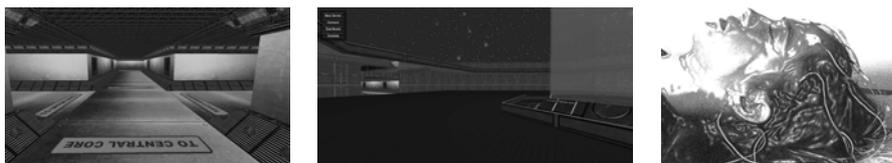
About The Stories - "The Education Pill"



- ▶ Group of Mexican scientists (in company called '*Addictive Technology*') invent an "*education pill*" (*ePill*)
- ▶ Each *ePill* contains millions of programmed nanobots that can restructure the brain's neuron connections and weights.
- ▶ Taken overnight, the *ePill* gives people new knowledge & skills (programmed into nanobots) providing "*learning-free, education*" (with dreams being artefacts of brain restructuring)
- ▶ Used in a futuristic integrated job & training agency; *JOBS+* which provide a "*skills on demand job service*".
- ▶ Story has humorous twist where *JOBS+* employee tries to use *ePill* to get himself a girlfriend (which goes wrong!).
- ▶ Explores an *in-body type of immersive educational experience*



About the Stories - "Plug & Learn"



- ▶ The HEX University - a new (& somewhat controversial) type of university where people attend for brain-augmentation (implants, uploads, upgrades etc); as part of a new "*learning-free, education*" offering.
- ▶ University is a converted Spacestation; a quiet environment where students have induced sleep, experiencing spurious images fleeting their minds, so-called '*electric dreams*'.
- ▶ an altered reality is generated from within the mind (an *in-body immersive reality experience*).
- ▶ This SFP takes the form of written notes from a press conference where VC explains and defends this controversial type of education.

Reflections

- ▶ I remember as a young student being fascinated by how a 'pile of electronic components' could be connected one way to make an amplifier (say), and another way to make a synthesizer (say); the same heap of bits, just a different connections!
- ▶ There was no explicit program or knowledge, just connections; the same way as the brain is mostly connections – a "hardware & software duality". Can education be reduced to being equivalent to changing physical structure; a type of "educational entropy"?
- ▶ Dreams are seen in this SFP as being somewhat similar to immersive reality; could they be induced to produce similar experiences to the benefit of education.
- ▶ Is there a prospect of 'learning-free, education'?
- ▶ What kind of changes will the *singularity* bring to education; super intelligent artificial tutors at one extreme, super intelligent augmented people at another?
- ▶ Will autonomous technological developments sweep us into some accidental future, or can we orchestrate our own future; and how?



Kevin Warwick implants chips into his own arm
<http://content.time.com/time/magazine/article/0,9171,2050030,00.html>

Upcoming Creative Science Events

www.creative-science.org



21st Century Robot - A 'Maker' Event

<http://intenv.org/?q=conferences/ie14/robot>



Maker activities (crowd sourced) aim at moving people away from being just consumers of technology, to creators of technology & include activities such as 3D printing, virtual appliances & customisation are often seen as the forerunners of these processes.



Intel Labs Pittsburgh 



 CREATIVE SCIENCE
FOUNDATION
www.creative-science.org

- Two workshops:
- Creative-Science 2014
 - Imagine 2014



The Singularity Hypothesis: A Pragmatic Approach.

Springer edited volume in The Frontiers Collection.
The Singularity – Point where AI transcends the limitations of peoples brains

References in this Presentation

- ▶ Hagaras H, Pounds-Cornish A, Colley M, Callaghan V, DeSouza G, "A Collaborating Team of Spiking Neural Network Based Robotic Agents for Inaccessible Fluidic Environments" Proceedings of the IEEE International Conference on Systems, Man and Cybernetics, Taipei, Taiwan, October 2006
- ▶ Johnson B, Callaghan V, Gardner G "Bespoke Appliances for the Digital Home", IET International Conference on Intelligent Environments 2008, Seattle, 21-22 July 2008.
- ▶ King, A.M.; Callaghan, V.; Clarke, G, "Using an amorphous computer for visual display applications in intelligent environments", IET International Conference on Intelligent Environments 2008, Seattle, 21-22 July 2008nt Environments 2008, Seattle, 21-22 July 2008.rt Environments, IOS Press, Netherlands, 2009.
- ▶ Anasol PEÑA-RIOS, Vic CALLAGHAN, Michael GARDNER· Mohammed J. ALHADDAD "xReality interactions within an immersive blended reality learning space", Immersive Education 2013 (IED'13), King's College London, 28-29 November 2013



University of Essex



That's it!



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