Tales From the Pod
Aka: Education 2050

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Overview of Talk

"*Speculative look at how artificial intelligence and virtual environments might change the nature of future education in 2050*".

‣ Section 1 – about the inspiration

‣ Section 2 – about the science

‣ Section 3 – about the story

‣ Section 4 – about the interplay

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The Inspiration

▸ "The future has arrived ……… in Shanghai"

Joint BT/NNSFC Workshop on E-Learning and Emerging Technologies, held at Shanghai Jaiotong University, June 14th to 17th, 2005
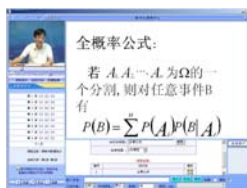
An extraordinary futurescape

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About the Science – SJTU eLearning Lab & Smart Classroom

Smart Board
Supporting Multiple Lecture Notes (Word, PPT, Handwriting, etc.)

Lecture Notes Screen
Supporting Multiple Lecture Notes

Feedback Screen
Supporting the *Real Time Interactive System* (Teachers may 'fine tune' their teaching based on students' short messages.

Monitor Camera
Supporting the *Student Attention System* (Capture absqatulaters in the classroom)

Localizer Camera
Supporting the *Teacher Tracking System* (Auto-track according to the teacher's locomotion

E-Pen
Supporting the *Laser Track System* (Infrared Sender)

Auto-track According to the Input from the Micro-Array
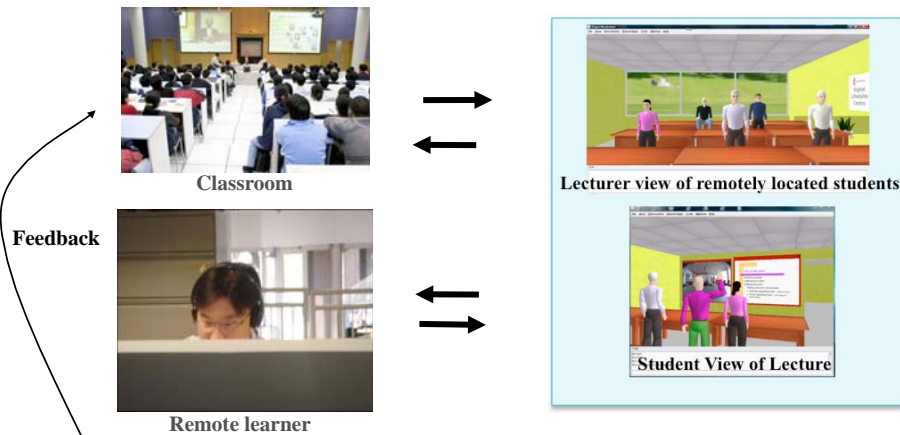Driver
Micro-Array

V. Callaghan, L Shen, M. Gardner, R. Shen, M. Wang, "*A Mixed Reality Approach to Hybrid Learning in Mixed Culture Environments*" in Handbook of Research on Hybrid Learning Models: Advanced Tools, Technologies, and Applications, Pages: 260-283 pp, IGI Global, 2010

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About the Science – Mixed Reality Teaching & Learning Environment (MiRTLE)

Classroom

Feedback

Remote learner

Lecturer view of remotely located students

Student View of Lecture

Reality - Augmented Reality - Augmented Virtuality - Virtual Reality

Milgram's Reality–Virtuality Continuum

Michael Gardner, Adela Gánem-gutiérrez, John Scott, Bernard Horan, **Vic Callaghan** "*Immersive Education Spaces Using Open Wonderland: From Pedagogy Through To Practice*", In book "Multi-User Virtual Environments for the Classroom: Practical Approaches to Teaching in Virtual Worlds" IGI Global, *Hershey PA , USA* , 2010.
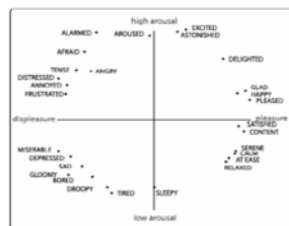
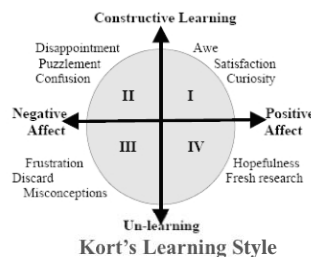School of Computer Science & Electronic Engineering
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About The Science – Affective eLearning

Russell's Circumplex Model of Affect

Kort's Learning Style

> Shen L, Leon E**, Callaghan V**, Shen R "Exploratory Research on an Affective eLearning Model", International Workshop on Blended Learning 2007 (WBL 07) 15-17 August 2007, University of Edinburgh, Scotland

> Shen L, **Callaghan V**, Shen R, "Affective e-Learning in Residential and Pervasive Computing Environments", *Journal of Information Systems Frontiers (special issue on "Adoption and Use of Information & Communication Technologies in the Residential/ Household Context")*, (Vol 10 No. 3, October 2008), Springer Netherlands, ISSN 1387-3326 (2008)

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About The Science –Essex/EA Collaboration

Sims Simulation Engine

- ➤ Simulation & Mixed Reality
  - ➤ real and simulated worlds can co-exist (eg developing working in isolation can share a common space)
  - ➤ Technology can be tested quicker and cheaper with virtual people (and recorded, and replayed/ repeated)
  - ➤ good for 'what-if' & dangerous scenarios

Davies M, **Callaghan V**, Shen L "Modelling Pervasive Environments Using Bespoke & Commercial Game-Based Simulators" 2nd International Conference on Life System Modelling and Simulation (LSMS'07) Shanghai, China, September 14-17 2007
Davies M, **Callaghan V**, Gardner M, "*Towards A Mixed Reality Intelligent Campus*" IET International Conference on Intelligent Environments 2008, Seattle, 21-22 July 2008

About The Science – Intelligent Environments

Robots to water the plants and sweep the floor | **Robot serving tea** | **iSpace**

- ‣ **V. Callaghan**, Clark G, M. Colley, H. Hagras, J. Chin, F. Doctor, "Inhabited intelligent environments". In BT Technology Journal – Kluwer, Vol. 22, No.3, 2004.
- ‣ **V. Callaghan**, M. Colley, G. Clarke, H. Hagras, "A Soft-Computing based Distributed Artificial Intelligence Architecture for Intelligent Buildings", In "Studies in Fuzziness and Soft Computing", (Eds: V. Loia, S.Sessa), Springer Verlag, Volume 75, pp. 117-145, 2002.
- ‣ M. Colley, G. Clarke, H. Hagras, **V. Callaghan**, "Integrated Intelligent Environments: Cooperative Robotics & Buildings", Proceedings of the 32nd International Symposium on Robotics and Automation, pp. 745–750, Seoul, Korea, April 2001
- ‣ Egerton S, **Callaghan V** "I Spatially Integrate Therefore I am … Lost? ; A Benchmark Measuring Environment Modelling Performance", 5th IFAC Symposium on Intelligent Autonomous Vehicles (IAV 2004), Lisbon, 5 to 7 July 2004
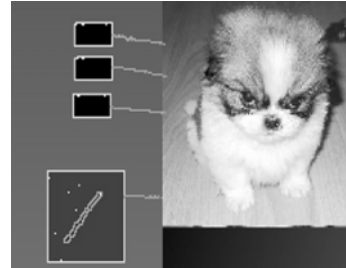
About The Science – End-User Programming & iSkins

End-User programming via physical interaction

Chin J, Callaghan V and Clarke G "*End-user Customisation of Intelligent Environments, Handbook of Ambient Intelligence and Smart Environments*" Nakashima, Hideyuki; Aghajan, Hamid; Augusto, Juan Carlos (Eds.), Hardcover, ISBN: 978-0-387-93807-3, 200

Screenshot of the iSurface simulator. The three black boxes are buttons, the grey panel detects gestures, and the picture of the dog is a video display

A.M.King, V.Callaghan, G.Clarke "*Using An Amorphous Computer For Visual Display Applications In Intelligent Environments*". Intelligent Environments 2008, Seattle, USA

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About The Story

▶ Speculative look at how artificial intelligence and virtual environments might change the nature of future education in 2050.

▶ At its root, it imagines a future time when
  ◦ Interactive computer games have merged with the world of cinema to provide "*immersive movies*" (audience were no longer passive observers – unless they wished to be), offering highly personalised experiences in the form of isolated high-tech-environments called '*interactive pods*', called iPods (a deliberate irony).
  ◦ the *technological singularity* has been reached, and machine intelligence and interaction is equal or surpasses that of people.

▶ Imagines this intelligence is used to create a intelligent teacher avatar.

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About The Story – The ePod-4

iPods 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 interactive 3D sensory/effector systems (sound, vision and haptics). When participating in a movie (the industry had long dropped the word "watching" which describing these new immersive movies) the 3D technology aimed to make the participant feel as though they were truly part of a fictional physical world.

ADDICTIVE TECHNOLOGY ePod-4

In this increasingly competitive world, where knowledge determines success, your child deserves the very best education available and that is 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:
- 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
- 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, Zizhu Science Park, No. 880 Zi Xing Road, Minhang, Shanghai 200241, China

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About the Story – The Vignettes (part technical, part social issues)

- **Identity** – describes the ePod technology from "*immersive movies*" through to "*social interactors*". From a human viewpoint it explores the potential for confusion between real and simulated existence and ends with the thought that, like cigarettes today, such future technology might carry a warning label, *ePods can damage your mental health!*"

- **Dreams** – describes nano computing paint and virtual appliances. Also explores the paradoxes that could arise if there were realistic simulations of living people (akin to the cloning issue with people)

- **Aberrations** – discusses the level of fidelity required to produce future immersive reality environments. As part of this it raises questions about the nature of our own reality, ending with the line "*was Hong's movements slightly unnatural or was it she that she was sinking into madness!*"

- **Who Made Me?** – discusses whether current AI architectures can ever become truly intelligent (or possess free will!). Includes a parody on a creator **including a line** "*evolving quantum processors "Grover Omni-Processor Devices," so you could say I was made by GOD !*"

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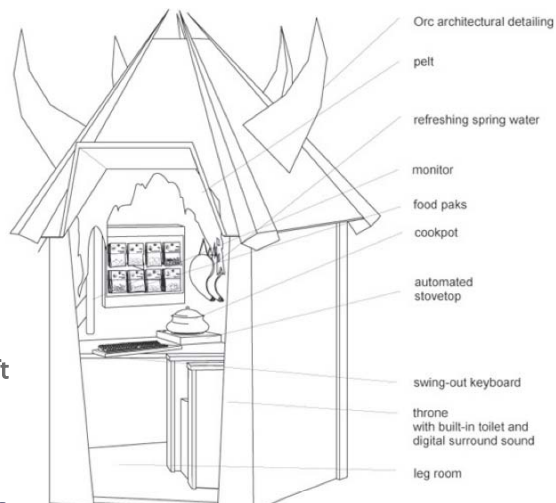Electronic Engineering
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The Interplay

- More our recently have become fascinated with the role of (apparent) irrationality in people (eg love, intuition etc) and wondering whether:
  - Whether it would be beneficial to artificial agents whether, and in what circumstances it would provide superior performance
  - How it might be implemented
- Lead to:
  - Work on games character personas
    - Davies M, **Callaghan V**, Shen L "Modelling Pervasive Environments Using Bespoke & Commercial Game-Based Simulators" 2nd International Conference on Life System Modelling and Simulation (LSMS'07) Shanghai, China, September 14-17 2007
  - Work on computational models of irrationality
    - S.Egerton, V.Zamudio, **V.Callaghan**, V; G.Clarke, "Instability and Irrationality: Destructive and Constructive Services within Intelligent Environments", 5th International Conference on Intelligent Systems, July 19th – 21st, 2009, Barcelona, Spain
    - S.J.Egerton, **V.Callaghan**, G.Clarke "*Using Multiple Personas in Service Robots to Improve Exploration Strategies When Mapping New Environments*", 4th International Conference on Intelligent Environments, 21-22 July, 2008, Washington, USA
  - Exploratory work on quantum controllers (see this conference)
    - A Bannikov, S Egerton, **V Callaghan**, B Johnson, M Shaukat "Quantum Computing: Non-deterministic controllers for Artificial Intelligent Agents", AITAml'06, 18 July 2010, , Kuala Lumpur, Malaysia

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The Interplay – Other people's ideas

Sleep Pods

The **WoW POD**, a physically immersive Chinese box, that encapsulate a virtual immersive environment for **World of Warcraft** (designed by Cati Vaucelle from MIT and artists Shada/Jahn).
www.makersofuniverses.com

Game Pods

Orc architectural detailing
pelt
refreshing spring water
monitor
food paks
cookpot
automated stovetop
swing-out keyboard
throne with built-in toilet and digital surround sound
leg room

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The Interplay – Other people's ideas

- ▸ **iCocoon**: gaming and virtual reality pod
- ▸ http://www.i-cocoon.com/
- ▸ Design & Concept: Tino Schaedler with NAU

Game Pods

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That's it!

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