

the future of gaming? brain computer interfaces and biofeedback games



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summary

what are brain-computer interfaces?

current sgi projects

current sgi research with brain-computer interfaces

aims of the day

conclusions







selected research and development projects

visualisation and modelling:

- rome reborn project (funded under erasmus)
- meducator project (funded by eu)

multimodal interface integration:

- mary rose museum exhibits (funded under ktp)
- living stories (funded by idm)

neuropsychological and educational research approaches to game-based learning :

- e-vita project (funded by eu)
- serious games - engaging training solutions project (funded by tsb, selex and blitz games)
- sexual health game for parents (funded by warwickshire pct)
- childhood obesity game (warwick university)
- modes project (funded by eu)
- floodsim game evaluation
- code of everand evaluation (department for transport)

artificial intelligence and artificial life techniques

- roma nova project

aims of the day

to begin a debate about the future of gaming

to facilitate collaborations between participants and partners

to develop a strategic road map for future developments in this area

conclusions

so are applications of games technologies really changing our approaches to learning, social interactions and how we consider experiences?

providing new tools for flow, feedback, visual and actual realism leading to higher levels of immersion

great potential for the medium for supporting immersive education through increased motivation and engagement

potential changes to how we conceptualise spaces

future developments for gbl include intelligent tutoring environments integrating multimodal interfaces and scaffolding learning with intelligent agents



links:

info for second wednesday events, at: the
serious games institute web site, see:

www.seriousgames.org.uk

games for health in london 12th may 2010

any questions contact: prof. sara de freitas

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recent references

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BCIs – Technology and Research Challenges

Dr. Ian Dunwell

Serious Games Institute

NeuroSky MindSet

Single electrode
Anode rests on forehead,
cathode in earphone (v2)

Dry contact

Onboard signal
processing chip



EmotivSet

16 electrodes in a
10-20 variant

Wet-contact

Bluetooth

Onboard
processing chip &
software

processing


Coventry
University
Enterprises Limited
(Engine)



EEG waves

Alpha – 8-12Hz – relaxed, eyes closed

Beta – 12-30Hz – alert/active thinking

Theta – 4-7Hz – drowsy, idle

Delta – <4Hz - asleep

Gamma – >30Hz – motor function

Composites

BCIs typically combine wave activities into linear or quantised variables

Alpha, beta, theta, and delta can give some insight 'attentive', 'excited', 'bored' or 'relaxed' a learner is

These terms are used by NeuroSky and Emotiv to describe composites

Demonstration

SGI
Serious Games Institute

SW 
Second Wednesday

Experiment

Users (degree students, n=40) self-report attention levels pre- and post-using a questionnaire adapted from ADHD research, based on the DSV-IV criteria

Also wear a NeuroSky MindSet

Interact with a virtual character in Second Life to solve ten problems

Results

	N	Min	Max	Mean	Std. Dev.
Student's attention levels	34	14.99	88.00	53.40	16.69
Student's self reported attention	34	3.0	5.0	4.27	.44548

The results of a Pearson correlation between the two variables indicated a significant, positive correlation (Pearson's $r = -.391$, $p = .022$).

However, 6 data sets discarded as NeuroSky did not collect data

Usability

Comfort

The results showed that for 5% (N=2) the MB was uncomfortable, for 10% (N=4) somewhat uncomfortable, for 35% (N=14) neither comfortable nor uncomfortable, for 25% (N=10) somewhat comfortable and for 25% (N=10) comfortable.

Ease of Use

The results showed 15% (N=6) students found the MB difficult to wear, 12.5% (N=5) found it somewhat difficult to wear, 37.5% (N=15) thought it was neither easy nor difficult to wear, 12.5% (N=5) found it somewhat easy to wear and 22.5% (N=9) thought it was easy to wear.

Degree of Frustration

The answers showed 2.5% (N=1) found the experience frustrating, 2.5% (N=1) thought it was somewhat frustrating, 22.5% (N=9) found the experiment neither frustrating nor satisfactory, 25% (N=10) thought it was somewhat satisfactory and 47.5% (N=19) had a satisfactory experience using the MB.