Exploring Sensors & Actuators for Immersive Learning Scenarios

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Immersive Learning: characteristics & motives

Solving problems through Authentic Tasks

Active and interactive participation

Develop conceptual understanding (practicing: models-simulations)

Ability to perform scientific inquiry

Develop understanding about inquiry (reflection + natural feedback)

Experiencing emotions and reasoning in authentic environments

All about: Authenticity - suspension of disbelief - motivation
Authentic Tasks

= realistic problem situations, where learners participate as actor and constantly are being confronted with the consequences of their actions when applying knowledge and skills in finding solutions.
Authentic tasks - characteristics

(Herrington, Oliver, Reeves, 2002)

- real-world relevance
- ill-defined (learners define subtasks themselves)
- complex tasks (time consuming)
- different perspectives (variety of resources)
- opportunity to collaborate
- opportunity to reflect
- integrated & different subject areas, beyond domain-specific outcomes
- real-world assessment
- competing solutions, diversity of outcomes
- polished products
Sensors & Actuators

Affordances of Sensors

• Continuous non-disruptive data gathering of user (behavior, biodata)
• Continuous data gathering of environment of user

Affordances of Actuators

• Can influence environment

Goals

• Enhance learner support
• Sustain ‘Flow’
Categories of Sensors

- **Physiological sensors** for biodata (heartbeat, EEG, skin resistance)
- **Physiological sensors** for affection detection (face & voice emotion)
- **Motion sensors** (physical movement, eye-tracker)
- **Orientation sensors** (physical orientation)
- **Location sensors** (geographic location)
- Scanning sensors (barcode, RFID)
- Electrical sensors (electrical systems)
- Environmental sensors (surroundings, weather a.s.o.)
- Light sensors (light characteristics)
- Mechanical sensors (mechanical devices, instruments)
- ...........
Tasks - ongoing

• Define conceptual & technical framework
• Technical setup software and equipment
• Demonstrator (sensor room)
• Refine conceptual & technical framework
• Define pilots (link with PhD proposal(s))
• Scouting for additional equipment and software
• ............
Pipelines – face & voice emotion recognition

Pipeline - Emotion classification from voice features

Voice recognition → Voice detection

Reference databases (training-tuning)

Processing /buffering

Pipeline - Emotion classification from facial features

Face recognition → Face detection

Reference databases (training-tuning)

Processing /buffering

Camera (webcam)

user (learner)

Post-processing

ILS (8 ILS-rules)
Pipelines – face & voice emotion recognition

- PhD- Soft skills training
  (awareness of behavior)
  (training (a)‘non-verbal’
  & (b) intonation)

- Stress & Learning:
  Emotional state (ES)

- Others sensors for ES
  (posture, ...........

- Combine ES & Cognitive State
Discussion & Questions
Thank you for your attention …

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