OpenInterface: SIMILAR platform
openinterface@similar.cc

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Outline

• OpenInterface platform
  – Brief description
  – Software architecture of a system

• Links between the OpenInterface platform and the eNERFACE projects
  – Reusable Components
  – Example: Project 4
OpenInterface Platform

• Software Platform
  – A software platform that includes heterogenous software components dedicated to multimodal interaction (HCI) and multimodal data fusion (Signal Processing)
OpenInterface Platform

• Characteristics
  – Component-based approach
  – Heterogeneous native components
  – Easy integration of components
  – Connection between components to develop multimodal applications
Step 1: Adding components

Each component is registered into the OpenInterface Platform using the Component Interface Description Language (CIDL) and described in XML.
Step 2: Developing a system

The registered components properties are retrieved by the Graphic Editor (Java)
OpenInterface components

MouseDriver_Emul.h  MouseDriver_Emul.XML
SpeechRec.java  SpeechRec.xml
ImageViewer.java  ImageViewer.xml
Assembling OpenInterface components

Ex: Image coregistration

ITK

Feature extractor

Img1

Mlab

Interpolator

Img2

Java

Image Navigator

FeatureExtractor.cpp

FeatureExtractor.xml

Interpolator.m

Interpolator.xml

ImageViewer.java

mageViewer.xml
Assembling OpenInterface components
Ex: Military aircraft

- French military project: University of Grenoble
Assembling OpenInterface components

Ex: Military aircraft

**Task:**
Mark a position on ground

- **Fusion component**
  - Location and Orientation of the pilot
  - Location and Orientation of the plane
  - HOTAS commands
  - Speech commands

- **Languages components**
  - HOTAS
  - Microphone

- **Devices components**
  - Location and Orientation of the pilot
  - Location and Orientation of the plane

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Assembling components: Software architecture of a system

• ARCH architectural model

• A software architecture is an organisation of computational elements + the description of the interactions between these elements
Assembling components: Software architecture of a system

- ARCH architectural model

Diagram:
- Dialog Controller
  - Functional Core Adapter
  - Functional Core
  - Logical Interaction
  - Physical Interaction

User

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eNTERFACE 2005
Assembling components: Software architecture of a system

- ARCH architectural model

Diagram:

- Dialog Controller
  - Logical Interaction
    - Physical Interaction
      - User
  - Multimodal Interaction
    - Multimodal Data components
      - Functional Core Adapter
        - Functional Core
          - Multimodal Data components
Assembling components: Software architecture of a system

Task:
Mark a position on ground

Fusion

Location and Orientation of the pilot
Location and Orientation of the plane
HOTAS commands
Speech commands

Dialog Controller

Functional Core Adapter

Logical Interaction

Physical Interaction

Location and Orientation of the plane
HOTAS
Microphone

Speech commands

HOTAS
OpenInterface Platform and eNTERFACE projects

- Develop reusable components
- XML description of the component

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OpenInterface Platform and eNTERFACE projects

• For each eNTERFACE project:
  1. Design the software architecture
  2. Identify reusable components
  3. Develop the components
  4. Manually assemble the components for developing the complete system

=> Later we will create the OpenInterface components (XML description)
OpenInterface Platform and the eNTERFACE project 4

- Example Project 4
- Multimodal Focus Attention Detection in an Augmented Driver Simulator

Diagram:
- Driving simulator
- Set of captors
- Driver
- Dialog Controller
  - Functional Core Adapter
  - Functional Core
  - Logical Interaction
  - Physical Interaction
- (1) Detect hypovigilence
- (2) Present alarms
Result: Hypovigilence state

Fusion (Redundancy / Equivalence)

- EEG (electroencephalogram)
- ECG (electrocardiogram)
- Eye Blinking detector
- Head motion detector
- Mouth motion detector
- Camera

Physiological sensors

EEG interpreter
ECG interpreter

Head inclination?
Yawn?

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Alarm (presentation task)

- Fission (Redundancy / Equivalence)
  - Graphical representation
    - Screen
  - Sonic representation
    - Loudspeakers
OpenInterface Platform and the eINTERFACE project 4

Dialog Controller

Functional Core Adapter

Driving simulator

Logical Interaction

Physical Interaction

Present alarm

Graphical representation

Sonic representation

Screen

Loudspeakers

Fission (Redundancy / Equivalence)

driver

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EEG: electroencephalogram
ECG: electrocardiogram
OpenInterface Platform and eENTERFACE projects

• Conclusion

• For each project
  – Design the software architecture (ARCH model)
  – Identify reusable components
  – Develop the components
  – Later we will create the corresponding OpenInterface components (XML description) and register them into the platform

• Tutorial by Lionel Lawson
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