



SEVENTH FRAMEWORK  
PROGRAMME



Laugh when  
you're winning

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for the  
ILHAIRE Consortium

# Overview

- ILHAIRE
- Laughter databases
- Laugh when you're winning project
  - Concept & Design
  - Architecture
- Multimodal analysis
- Audiovisual synthesis



# Laughter?

- Ubiquitous
- Frequent
  - In normal conversation ~ 1 laugh/minute
- Conveys various emotions
- Vital nonverbal social tool
- Multimodal - produces lots of signals
- Barely used in Human-Computer Interaction

# Incorporating Laughter into Human-Avatar Interactions: Research and Evaluation

- 9 partners, for 3 years from September 2011



- Range of expertise and approaches
  - Psychology of laughter & humour
  - Natural behaviour databases
  - Multimodal signal analysis
  - Machine learning
  - Dialog management
  - Visual and auditory synthesis

# Natural behaviour databases

- Essential for understanding laughter
- ILHAIRE laughter database:  
<http://www.qub.ac.uk/ilhairelaughter/>



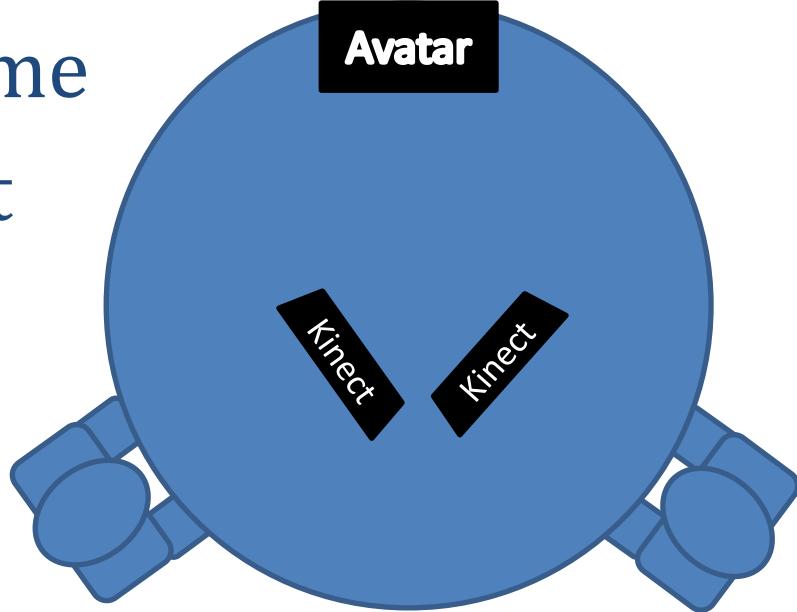
# Laugh when you're winning: Concept

- Games are a good way of making people laugh!
- Avatars as game companions
- Games are complex social situations and laughter could be important in ensuring that they flow smoothly
- Games require a face-to-face interaction



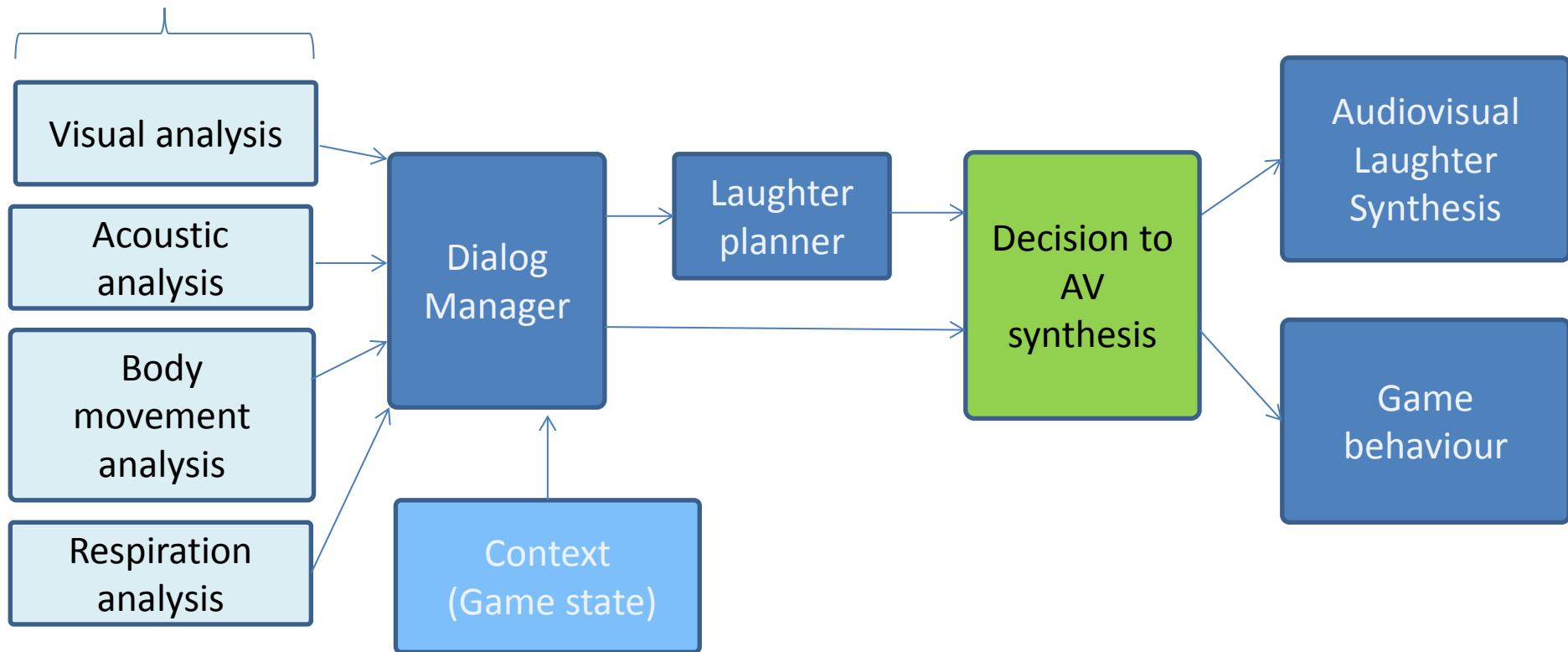
# Laugh when you're winning: Design

- One or two users
- Simple social games
- Avatar:
  - plays active part in game
  - is a socially competent (laughing) game companion



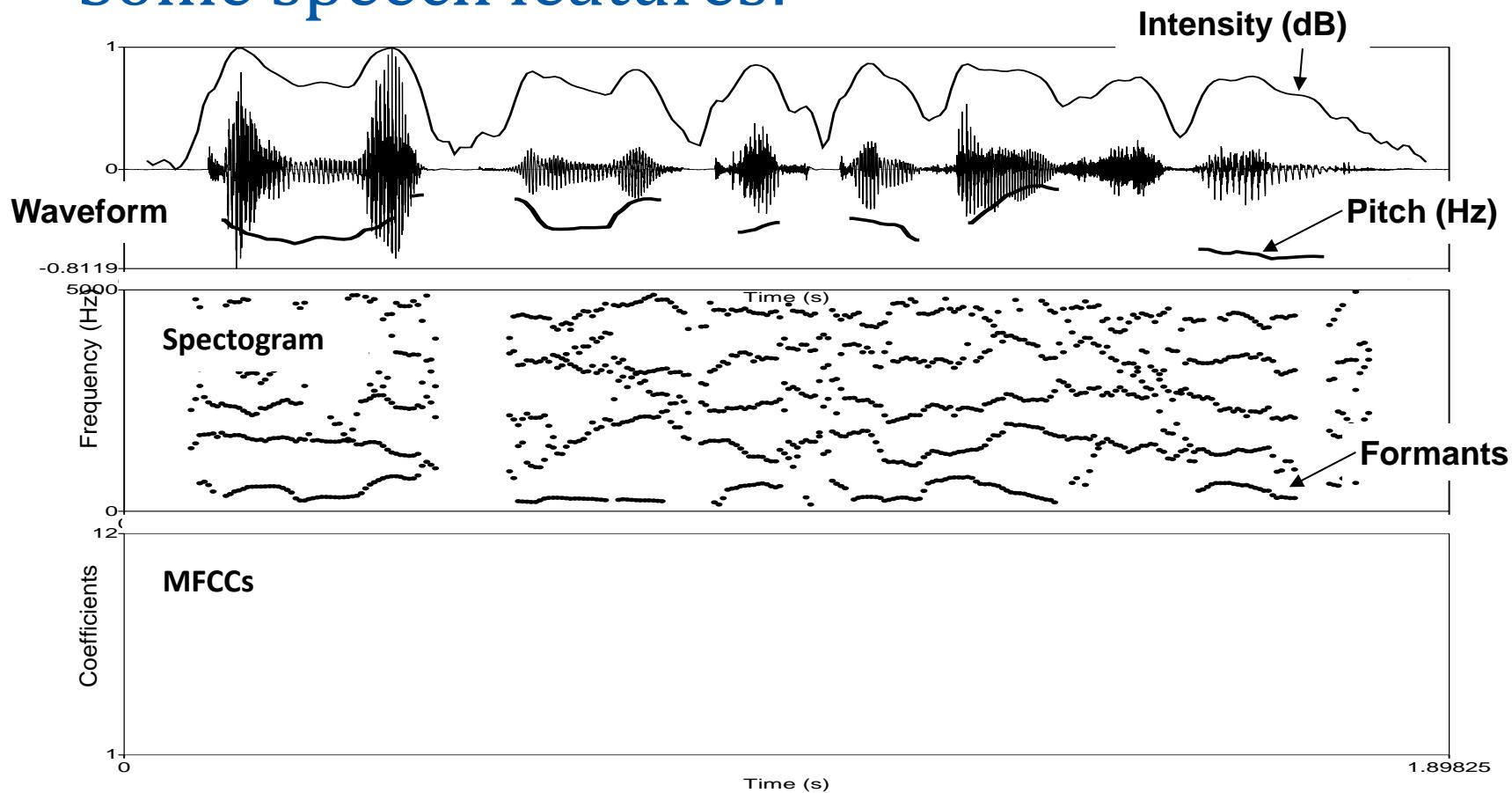
# System architecture

Laughter detection & intensity estimation



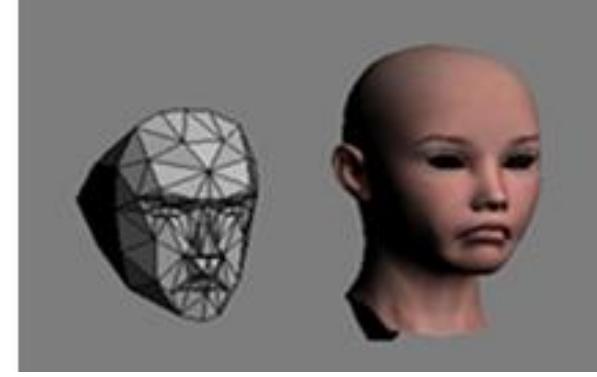
# Laughter Detection (Voice)

- Some speech features:



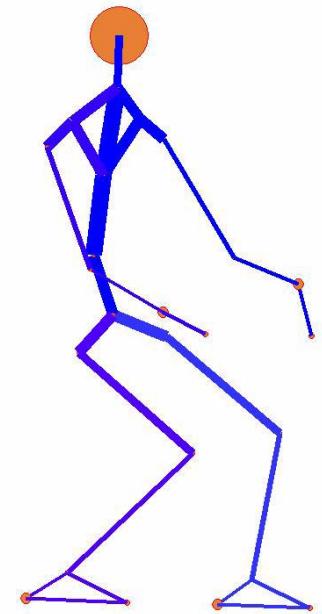
# Smile Detection (Face)

- Features: Action units from Microsoft Kinect



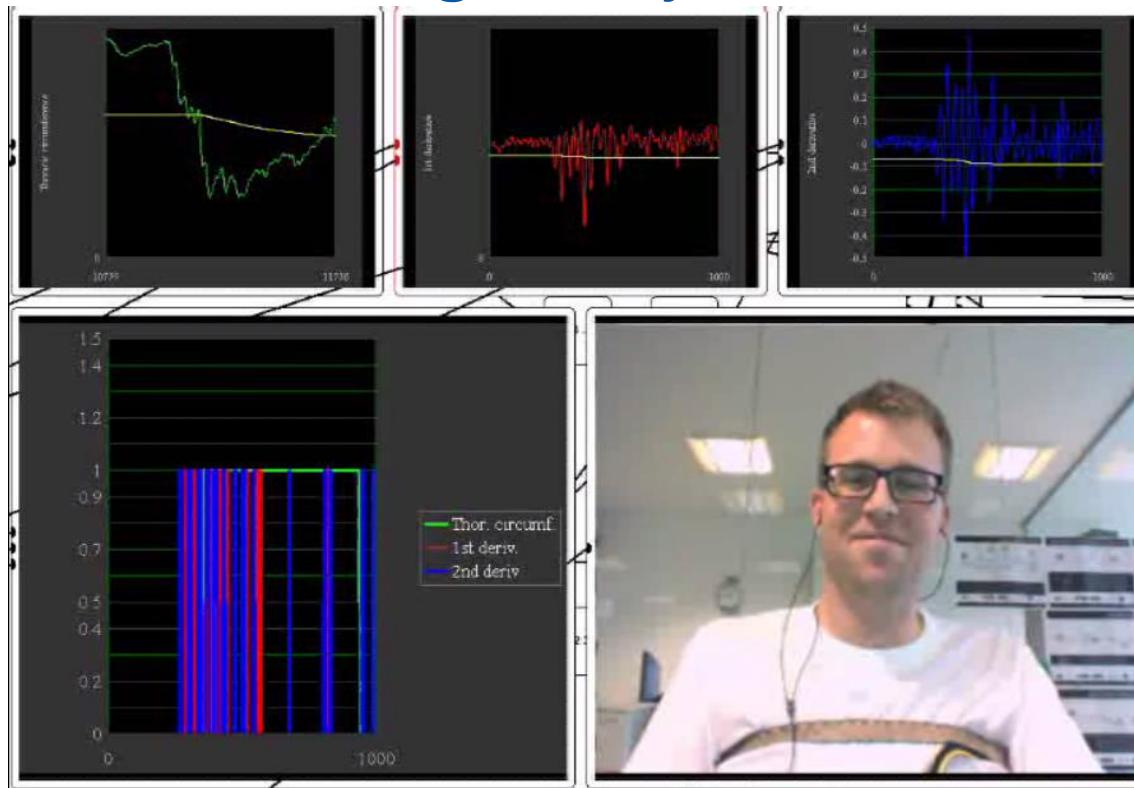
# Laughter movements (Body)

- Kinect depth mapping for more general measures  
e.g., contraction index
- Computer vision for extraction of key movements  
e.g., shoulder movement frequency and amplitude
- Motion capture with modified suit



# Laughter respiration (Torso)

- Laughter-related respiratory actions generate characteristic non-rigid body movements



# Acoustic Laughter synthesis

- Little past work
- Lack of naturalness
- UMONS: HMM-based synthesis with HTS
- No generation of laughter sequence for the moment: we play existing laughter phonetic transcriptions



# Visual Laughter synthesis

- Generation of common BML scripts
- 2 different interpretations  
(Greta and Living Actor)

- Living Actor conversion

selection of predefined  
animations + combination  
of morphing data  
matching BML parameters



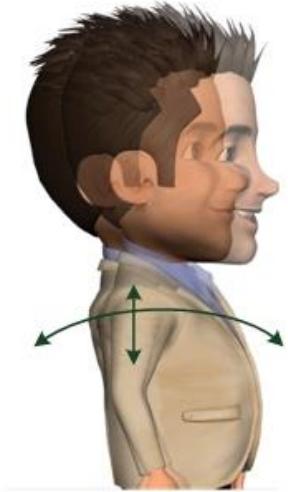
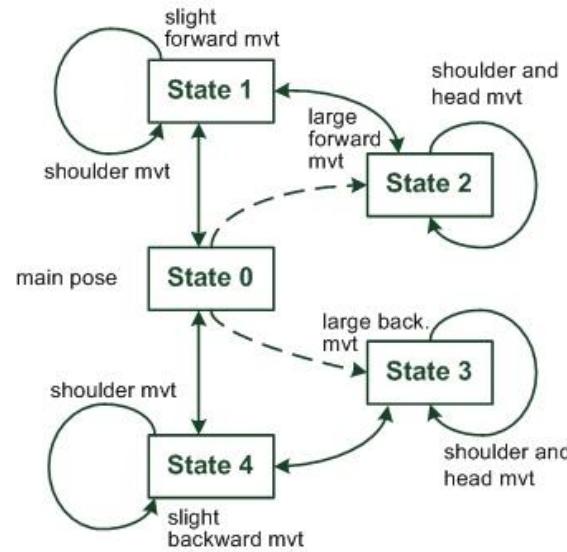
Active MQ  
(Message-oriented Middleware  
used in SEMAINE project)

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<bml>
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  <end>0.9</end>
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  <descriptionlevel>1</descriptionlevel>
  <type>xml</type>
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  <reference><affection>surprise</affection></reference>
  <intensity>12</intensity>
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  <OAC.value>0.90</OAC.value>
  <PWR.value>0.40</PWR.value>
  <REP.value>0.85</REP.value>
  <SPC.value>0.55</SPC.value>
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  <preference.value>0.50</preference.value>
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</face>
<gestureid>emotion_0</gestureid>
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<type>gretahml</type>
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<REP.value>0.70</REP.value>
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</description>
</gesture>
</bml>
```

# Visual Laughter synthesis

## Living Actor Avatar

- A graph of animations corresponding to different types of laughter movements and different intensities
- Pseudo-phonemes associated with facial expressions and lips movements
- Combination of head, torso, and shoulder animations



# Thank you

