DIGITAL MEDIA DOCTORAL SYMPOSIUM

futureplaces

Porto, 21st October 2011

UT Austin | Portugal

INTERNATIONAL COLLABORATORY FOR EMERGING TECHNOLOGIES, COLAB

Real-Time Video Interactive Systems for Sustainability

Mónica Mendes

FBAUL and CIEBA, Universidade de Lisboa

THESIS ADVISORS » Nuno Correia [FCTUNL] | Sílvia Chicó [FBAUL]

PhD in Digital Media [FCTUNL] | UT Austin-Portugal Program

As citizens doing research and art practices, we can also play a role for effective change in people's behavior regarding forests protection:
What are the possibilities of proposing constructive approaches to the destructive dynamics of fire that aggravate climate change?
Can digital art foster awareness and respect for nature?

This research proposes to investigate innovative concepts and design methods using real-time video as raw material for artistic exploration on environmental causes. *RTiVISS* [Real-Time Video Interactive Systems for Sustainability] is the acronym for this exploratory project and research agenda.

OBJECTIVES

» Create digital contexts of aesthetic contemplation of nature by exploring the beauty and danger of trees and forest fires

» Raise awareness on the natural environment by establishing a bond between people and forests, using technology in artistic contexts

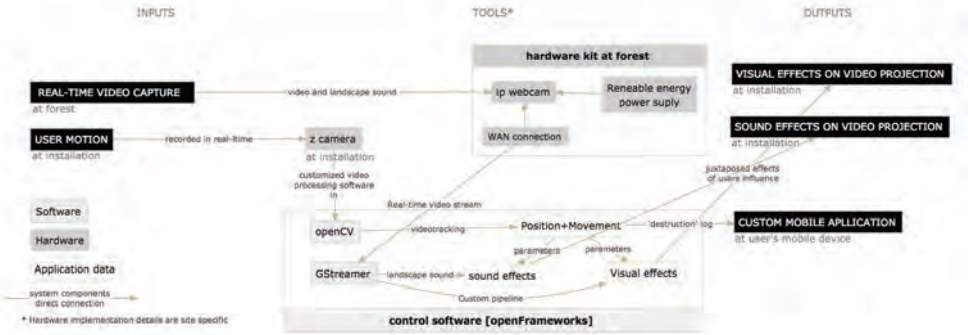
» Help prevent forest fires by extending surveillance systems to online communities through "the emotion of real-time".

Combining physical and digital worlds, this practice based research lives at the intersection of Art, Science and Technology. The outcomes include an online platform, interactive installations and the design of a surveillance kit prototype. *Treeellucinations, B-wind!, Hug@ree, Play with Fire, Enchanted Forest* and *Maicro* are the first series of installations to develop within the scope of RTiVISS. *With this combination of artistic explorations and functional purposes, can we conceive a project that is both artistic and functional?*

All together, we foresee that these interactions provide the experiences of contact with nature contributing to a feeling of belonging, strengthening the relationship with the forest, and also leading to local communities growth and empowerment.

+ info » **monicamendes.info/rtiviss** | **www.rtiviss.com**

RTiVISS online platform » web & mobile design proptotypes.



B-Wind! » Interaction in the installation and fans at the forest.

Play with Fire » System architecture for the interactive installation and sketches for the user interaction and mobile application.

Hug@ree » Screenshots from presentations in diverse venues: Popup (Lisbon), AZ Hackmeet (Porto), TEI (Madeira), Sci|Art (Los Angeles), Artropocode (Santiago), and Summer (Maçal do Chão).

ACKNOWLEDGEMENTS FBAUL and CIEBA for the support regarding participation in conferences and exhibitions; to Victoria Vesna, for the research term at UCLA Art|Sci center+lab. We also thank Valentina Nisi for the collaboration in *Play with Fire* and AZ Labs and its members for the development support, especially to Pedro Ângelo, who has been the programming the interactive installations implemented | This research is done in the framework of the PhD in Digital Media of the UT Austin-Portugal Program funded by FCT – Foundation for Science and Technology (ref. SFRH/BD/42555/2007).

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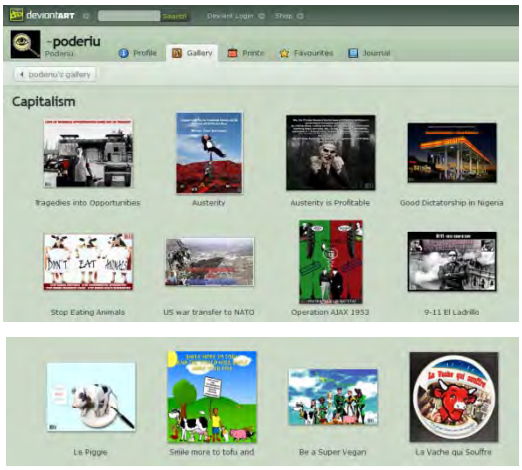
Conscious-raising: Activism in Digital Art

Ana Margarida Barata

Advisors: Prof. Dr. Patrícia Gouveia | Prof. Dr. Carlos Vaz de Carvalho



Examples of two activists/artists' work on the web (in: http://poderiu.deviantart.com/ ; http://artintifada.wordpress.com).

This research is focused on the artistic digital work of activists that are not considered in the art system. These artists/activists use the web to develop and publish their work as well as to reach the publics, using personal websites, blogs and online art platforms like *deviantArt.com*. Denouncing current situations involving injustice, war, prejudice, their work intends to raise people's consciousness towards those worldwide issues, many times distorted and neglected by the media and the governmental power.

Therefore, this project intends to reflect on the relevance of those marginal artistic practices considering their themes and morphology, on their critical aspects and alternatives they present. We also intend to discuss their intervening character, and pertinence (or not) of integrating this kind of work in the contemporary art field.

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UT Austin | Portugal
International Collaboratory for Emerging Technologies, CoLab

DESIGN OF PARTICIPATORY AUDIOVISUAL ACTIONS

Presentation of a Case Study
in the Historical Center of Porto

UT Austin | Portugal
International Collaboratory for Emerging Technologies, CoLab

Faculty of Engineering of the University of Porto | **PhD in Digital Media**
Researcher: Daniel Brandão | **Advisor:** Heitor Alvelos

KEYWORDS
Participatory Media | Cultural Audiences |
Institutional Identity and Narrative | Case Study

CENTRAL ISSUE

In this interconnected world we live in, where the media are increasingly global, social, and ubiquitous, where each individual no longer depends on the organizations in order to structure their participation or to communicate with others, where consumers become producers, where the amateur's recognition is increasingly intersecting the professional's reputation, what is the role of institutions? How can traditional organizations take advantage of the communication flow that occurs directly between the network members? How can participatory audiovisual tools contribute to culturaly revitalize the Historical Center of Porto?

In this presentation we will show the methodologies and preliminary conclusions of the first phase of the work of construction of audiovisual narratives related to the project **"Manobras no Porto"**, which will serve as a case study for the research project entitled: **"The Museum of All: Institutional Communication Practices in a Participatory Networked World"**.

This PhD research project addresses the topic of **participatory media** and sustains that cultural institutions face, today, with an inevitable revision of its traditional one-way communication strategies, given the increasing availability of tools for production and distribution of audiovisual content, the diversity of networked communication contexts and the consequent **repositioning of the user and audience** figures in relation to the institutional universe. These began to take a participatory role in the content they consume.

The main objective of this research project is to understand how the use of collective and participated creation of identities and narratives can contribute to get audiences engaged with cultural institutions and events. We intend to identify the effects and measure the dynamics of participation of audiences in the construction of audiovisual objects, and understand how these may influence the reconfiguration of the missions of the institutions and cultural projects in the development of societies. We will also look for readings on the consequences of the implementation of more open, flexible and permeable communication strategies, which will explore the unpredictability of participation and the creative capacities of the audiences, by conducting a series of audiovisual exercises aiming to test contexts of cooperation and community involvement in the institutional practices.

The cultural program of collective boosting of the Historical Center of the City of Porto called "Manobras no Porto", will serve as a case study for the implementation of the first exercises of participatory nature. With the help of participatory observation techniques and exploratory interviews, in this first phase, the aim is to map the position of the partners of the project in study and identify their cultural boosting actions, to collect information about social, economic and cultural problems of the project intervention zone and to listen to the participating people on the priorities they have in their daily life and experiences. After that, we will begin a proposition process, with the aim of analyzing the context of community cooperation, participation and involvement in the collective creation of new messages and narratives, by implementing a set of audiovisual participatory exercises. The aim is to search the parameters that can characterize the participation of citizens in creative processes.

Finally, we will present preliminary conclusions regarding the results that taken from this first work phase and expectations for the remaining research phases, whose final product can probably include a set of recommendations that may be presented to Portuguese and international institutions in order to call the attention of those responsible for the communication and social media evolution and for the participatory media and contemporary trend issues, which are dominated mainly by the interactive factor.

The project presented in this communication is being developed as part of the Ph.D. in Digital Media, of the Universidade do Porto and the Universidade Nova de Lisboa, with the support of UT Austin-Portugal program and supervised by Prof. Heitor Alvelos.

MUSICAL MORPHOLOGIES: A FRAMEWORK FOR CREATIVE EXPLORATION OF CONCATENATIVE SOUND SYNTHESIS

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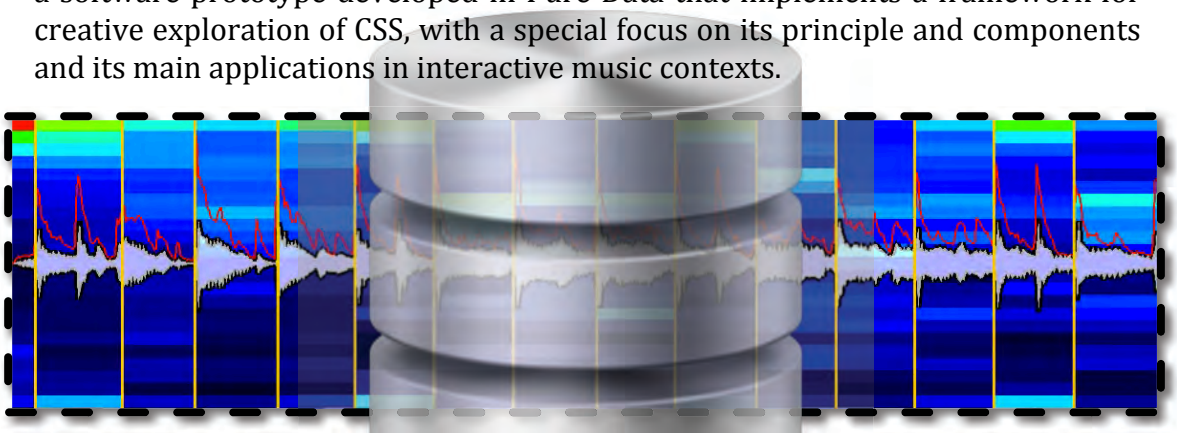
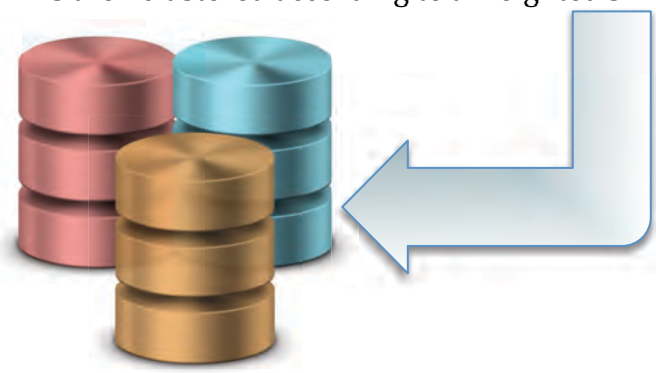
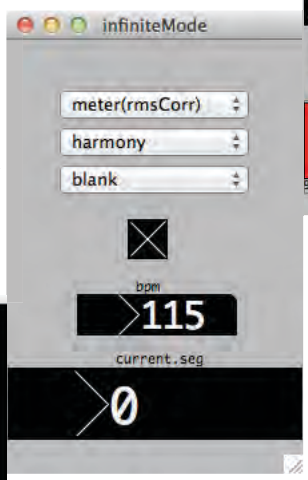
Concatenative sound synthesis (CSS) is a novel and promising method for sound synthesis with a solid body of work and publications. It uses a large database (*corpus*) of sound snippets (*units*) to assemble a given target phrase. *earGram* is a software prototype developed in Pure Data that implements a framework for creative exploration of CSS, with a special focus on its principle and components and its main applications in interactive music contexts.

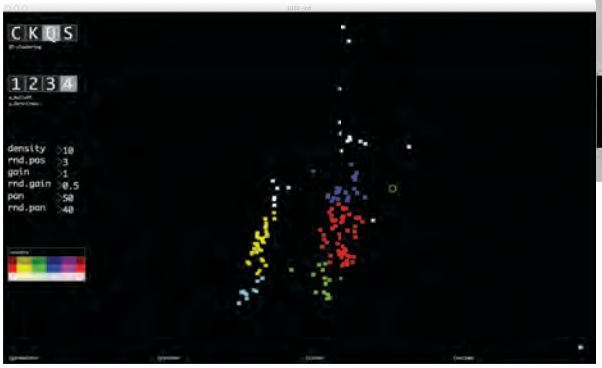


earGram selects initially the best segmentation strategy to slice either a collection of audio files or a live signal input. Subsequently, all the segments are reduced to their most relevant characteristics and stored into a database (*corpus*). The *corpus* is then clustered according to a weighted similarity function.



Playing modes:
- Timbre-based granular synthesis;
- Composition by navigation;
- Re-arranging the unit's temporal organization by either assembling a given target or extending the sound source according to its own morphology;
- Corpus-based orchestration.





Future Work:
- Incorporate both live audio and audio files in a single *corpus*;
- Interaction with a live sound source;
- Improve search speed by mining the database;
- Design interactive models between different *corpuses.*

A Facial Rigging Standard

Pedro Bastos Xenxo Alvarez Veronica Orvalho

Problem

Animating the face of a 3D character for films and videogames is hard because a complex facial control structure [1] has to be built to support its behaviors. This process, called facial rigging, is laborious and time-consuming for the digital artist and slow and expensive for the entertainment industry. Our overall goal is to study, analyze and deploy a standard for rigging a character's face and bridge the gap between facial modeling and animation.

Contribution

The contribution is scientific due to the rigging standard being based in the research of artistic pre-requisites. It is professional due to providing a facial rigging framework for artists to use in the entertainment industry. It is technological due to deploying prototypes for facial rigging.

Method

To define the facial rigging standard a collection of requirements and specifications is used. The variations of morphologies and behaviors of the face are the requirements. The resulting facial rig designs for the different facial regions are the specifications.

The Anthropomorphic Face

The starting point is the anthropomorphic face. To get to the rigging variations in the other facial styles a 3-stage process is used: (a) realize morphology variations [2] for each facial region (b) know the behaviors [3] for each of the morphology variations (c) identify the facial rig design for each possible morphology and behavior variation. The resulting data encloses the combinations to support the characteristics of both the highly stylized and hyper-realistic character styles (also known as cartoons and creatures).

Creatures and Cartoons

Characters with highly stylized or hyper-realistic characteristics show a complex variation of the basic human face proportions and behaviors, thus requiring different rig design approaches.

State of the Art

Studying the evolution of the process of rigging a character's face in the entertainment industry is the goal of the State of the Art. The specification of the facial rigging process is obtained by studying scientific and artistic references. This involves collecting and analyzing literature from the most renowned researchers and artists to realize existing tools, be aware of techniques and realize the interaction paradigms in facial rigging. This allows providing a detailed insight on how the science and art of rigging a character's face has evolved.

Acknowledgments

This research is funded by FCT – Fundação para a Ciência e a Tecnologia and IT – Instituto de Telecomunicações. The images are copyright of FaceInMotion. We published in BlenderArt [4], ComputerArts [5], and Interact2011 [6].

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Generation and control of automatic rhythmic performances in Max/MSP

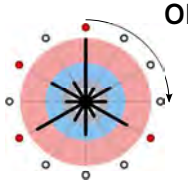
We developed two algorithms and the corresponding software applications for automatically generate music rhythms and rhythmic variation. They can be used to substitute static loops with constantly varying rhythms which are intuitively managed and controlled in real time. The first, the kin.rhythmicator, generates rhythms characteristic of a certain rhythm and that do not belong to a specific musical style. The second, the kin.recombinator, recombines in real time a batch of MIDI drum loops in order to get non-excessively repetitive combinations of loops during a performance. The algorithm's power lies in a novel analysis of the drum loops which sorts them in increasing order of complexity prior to utilizing them in the recombination algorithm.

kin.rhythmicator

1.Chose a Time Signature

A metrical template is constructed, characteristic of the meter specified by the user. The template consists of weights that represent the importance of each pulse in the meter.

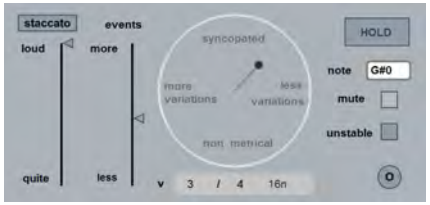
2. Generate a Rhythmic Performance based on a Metrical Template



A stochastic performance is generated by cycling through the pulses in the meter and stochastically triggering events according to the weights in the template.

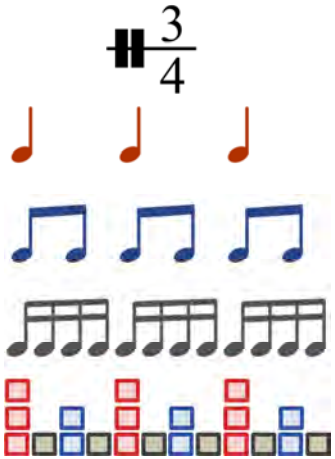
3. Effectively Control the Performance through Descriptive and Intuitive Parameters

The generative algorithm has been parametrized in such a way that the user can control all aspects of the performancemeter—density of generated events, amount of variation, amount of syncopation, and the meter itself—in real time through a musically meaningful interface.



Construction of a Metrical Template

Stratification of the meter into metrical levels



A metrical template defines a metrical hierarchy, such as the one described by F. Lerdahl and R. Jackendoff in "*A Generative Theory of Tonal Music*" (Cambridge, The MIT Press, 1996).

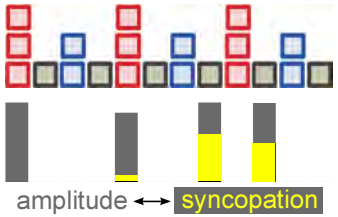
The metrical template is further refined according to the indispensability formula of Clarence Barlow ["*Two essays on Theory*" (Computer Music Journal, 1987)].

kin.recombinator

1. Chose a Bunch of MIDI Files

Metrical templates are constructed according to the time signatures found in the MIDI files.

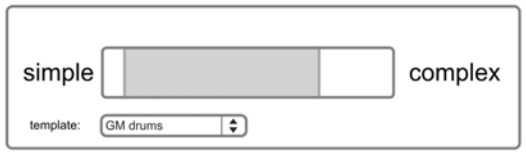
2. Sort the MIDI Files from Simple to Complex by Comparing them to the corresponding Metrical Template



Each rhythmic pattern found in the MIDI files is compared to a Metrical Template characteristic of its Time Signature. The files are assigned a complexity score according to the amount of syncopation and density of events.

3. Generate a performance by recombining the MIDI files

The complexity of the generated rhythms is controlled in real time by restricting the range of files (from the simplest to the most complex) that take part in the recombination process



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George Sioros and Carlos Guedes. Recombining MIDI Drum Loops in MAX/MSP: The KIN.RECOMBINATOR Application. Proceedings of the 12th International Society for Music Information Retrieval Conference (ISMIR 2011)

VIRTUAL MARIONETTE
DIGITAL PUPPETRY

Luís Leite
FEUP Faculty of Engineering of the University of Porto | PIC Porto Interactive Center

Introduction

Virtual Marionette is a research on digital puppetry, an interdisciplinary approach that brings the art of puppetry into the world of digital animation. Inspired in the old mechanic technology of marionettes our intention is to study novel interfaces as an interaction platform for creating artistic contents based on computer animated puppets.

Aim

The overall goal of this thesis is to research and deploy techniques and methods for the manipulation of articulated puppets in real-time with low-cost interfaces to establish an abstact interaction model for digital puppetry.

Findings

Study on marionettes, animation, interaction design, interfaces to find out differences between:
- Key-frame animation vs real-time animation;
- Analog controls vs digital interfaces;
- Animation vs Digital Puppetry;
- Animator vs puppeteer

Methods

Several experiments will be made for comparison purposes using several interfaces as puppet controllers, like:
WIImote; Playstation Move; Microsoft Kinect; Joysticks; Sensors;

Adapting different types of marionettes with different interfaces:
- Glove puppets
- Rod puppets
- String puppets

Background

The most common approaches to create animations using digital puppetry include: strings to control the puppet with a digital glove [1]; computer vision for tracking color marks in a object that controls the marionette movements [2]; using a multi-touch surface for direct manipulation of bi-dimensional shape puppets [3]; hand gesture recognition to use fingers to move the marionette simulating a string controller [4] a multi-modal interface to simulate different marionette techniques [5]; a motion capture system for performance-driven with gesture recognition to trigger behavior animation for virtual theater, using an extra joystick for expanding the movement area [6].

Low-Cost Interfaces

Overview

Several proof of concept experiments were develop during the research to study manipulation techniques and targets.

CBS - Cartoon Broadcast System
A simple proof of concept of live cartoon animation system for television;
Features: lip-sync; Trigged animations; Trigged cameras.

Animatic
Virtual puppet show for real-time animation
Multi-model 3D system simulating different marionette manipulation tecnhics with different interfaces;
Features: collision detection; animated lights and cameras; lip-sync;
Interfaces: WIImote, microphone; gamepad; mouse; keyboard.

Virtual Silhouette
Low-cost mark-less motion capture solution for 2D puppets. Real-time 2D puppet animation using the Microsoft Kinect.
Easy to use interface, capture the motion of the body to assign to a silhouette.
Software workflow: OpenNI + OSC + ANIMATA

reActor
Low-cost mark-less motion capture solution for 3D puppets. Real-time 3D puppet animation using depth cameras. Capture the motion of the body to assign to a 3D Puppet.
Software workflow: OpenNI + OSC + UNITY

Act or Interact
An experiment with 54 participants to evaluate low-cost motion capture system in real-time animation comparing Virtual Silhouette (2D) with reActor (3D);
The participants were invited to guess what sports other participants were doing just by observing the animations.

Kine-Puppet Show
3D Puppet Show demonstration using body motion as a controller for the puppet animation. Performance animation with digital puppetry technique using the Microsoft Kinect device with OpenNI Framework and Unity Game Engine with Wrapper for OpenNI.
Software workflow: OpenNI + Wrapper + Unity

Acknowledgments

Luís Silva silhouete figure; **Veronica Orvalho** Supervisor

Further information

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FUTUREPLACES
DIGITAL MEDIA AND LOCAL CULTURES

Digital Media Doctoral Symposium

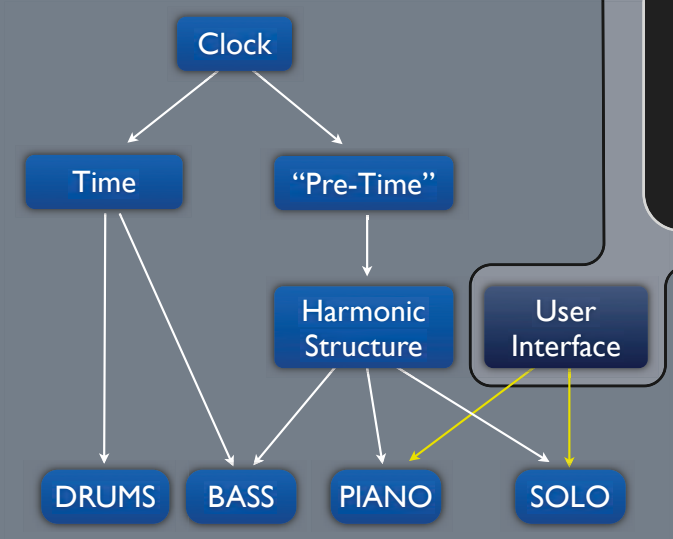
Porto, October 2011

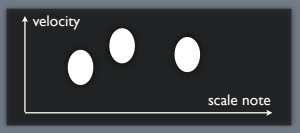
Reasearch on Automatic Music Generation
Automatic Generation of Jazz Music Accompaniments
Rui Dias - Kinetic Project, INESC-Porto

Gimme 'da Blues

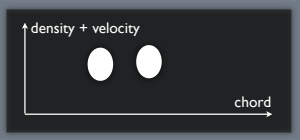
A Jazz / Blues Player and Automatic Comping Generator for iOS devices

The user can play a solo instrument and/or a keyboard, while the Bass and Drums are generated automatically





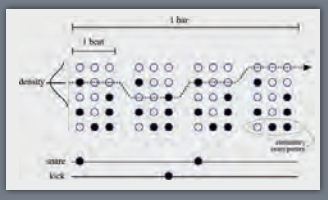
Solo



Keyboard

The bass and drums generation algorithms follow the user activity, continuously adapting it's density

The drums are generated by probabilistically recombining small phrase segments.



Carlos Guedes, Rui Dias, George Sioros, Telmo Marques

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Universidade do Porto FEUP Faculdade de Engenharia
THE UNIVERSITY OF TEXAS AT AUSTIN
FCT Fundação para a Ciência e a Tecnologia MINISTÉRIO DA CIÊNCIA, TECNOLOGIA E ENSINO SUPERIOR

Facial Skin Shading Parameterization Methodology for Rendering Emotions

Instituto de Telecomunicações | Faculdade de Engenharia da Universidade do Porto

PhD Student: Teresa de Jesus Baptista Vieira - viteresa@gmail.com | Supervisor: Verónica Costa Orvalho - veronica.orvalho@gmail.com

October, 2011

Introduction

What if we would like to portray the skin color of a 2D or 3D character according to his emotions?

We would have to hand paint empirically, without guidelines, each skin texture and then animate them frame by frame. Resulting expressions look more artificial since they do not follow the dynamic changes of blood under the skin, which makes us blush or turn pale, like anger or fear.

Accurate lifelike texture portrayal is:

1) time consuming ("*it can take an estimated time of 30 hours to create texture maps for 3D animation of each one of the six basic facial expressions, as defined by Ekman*" [1]);

2) computationally expensive (high definition textures slow down real time rendering), thus being avoided.

Goal

We propose to study and define skin color variation of facial emotions for accurate animation of expressions.

Our methodology is supported by scientific and artistic data, such as hemoglobin and melanin maps empirical analysis and comparison with photos and painted portraits, which reflect gaze's perception. Accurate and standard guidelines will help digital artists to animate increased lifelike emotions.

Methods

Our study will empirically analyze and compare several data, in four different phases, namely: 1) hemoglobin SIAscope maps for definition of areas and intensity of major blood perfusion (Fig. 1b); 2) melanin SIAscope maps for definition of skin basic color (Fig. 1c); 3) photos of actors depicting the six basic emotions (as defined by Ekman [2]) for color and expression comparison (Fig. 2); and 4) artists painted portraits for color comparison (Fig. 3).

A comparative table of expressions and its skin color change was proposed by Jung and Wagner [3], which also helped us define facial skin color variation for the preliminary results (Fig. 4).

Results

A 3D model was textured with our study and a preliminary facial animation was done, for the six basic expressions defined by Ekman, whose results can be seen in (Fig. 4). For instance, we can see that the anger expression is the most blushed. These preliminary results (Fig. 4) will be compared with photos of actors deploying the same emotions and with facial expressions portraits, painted by recognized artists, because they represent the gaze's perception.

Conclusions

Defining the skin color variation of facial expressions comparing physical and artistic data provides accurate guidelines for standard portrait of emotions. Our methodology guidelines can also open new implementation opportunities, such as helping programmers to build applications for rendering skin shading expressions. As a result, the film and videogame industries will gain more expressive and lifelike characters, because their skin is represented as a live organ, reflecting blood perfusion patterns.

Acknowledgements

This research is partially supported by the European Union FP7 Integrated Project VERE (No. 257695) and FCT - Fundação para a Ciência e Tecnologia.

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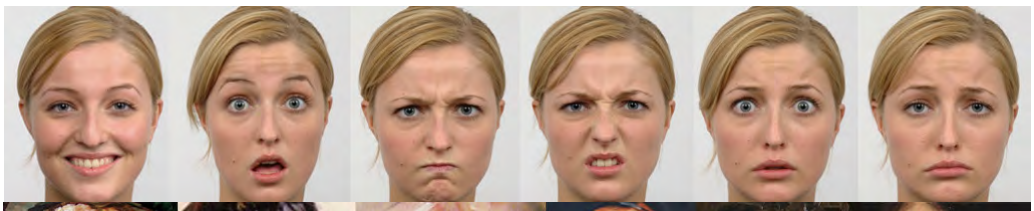
Figure 1: SIAscope chromophore maps (female, 35 years) *in* Matts, P J. New Insights into Skin Appearance and Measurement. *Journal of Investigative Dermatology Symposium Proceedings*, 2008, 13, 6-9.

Figure 2: Langner, O., Dotsch, R., Bijlstra, G., Wigboldus, D.H.J., Hawk, S.T., & van Knippenberg, A. Presentation and validation of the Radboud Faces Database. *Cognition & Emotion*, (2010) 24(8), 1377-1388.

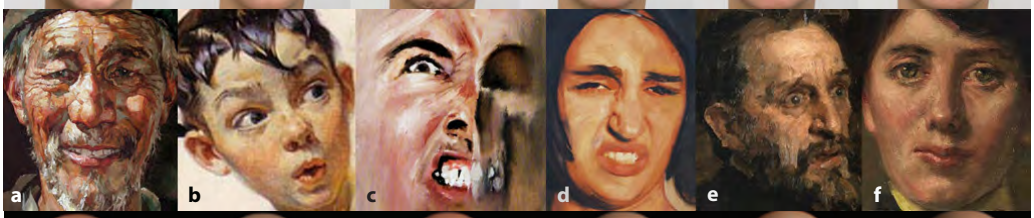
Figure 3: a) Christopher Zhang, Man with smile *in* www.copleysociety.org; b) Norman Rockwell, No Swimming, 1921, *in* www.saturdayeveningpost.com/; c) John Michael Taylor, Halfs *in* www.paintingsilove.com/; d) Pamela Kivelson, Disgust *in* www.pamdk.com/; e) Ilya Repin, Study for Ivan the terrible and his son Ivan, 1983 *in* www.artsunlight.com/; f) Alice Barney, Agnes, 1903 *in* www.museumsyndicate.com/.

1 SIAscope chromophore maps

2 Actress portraying the six basic emotions (joy, surprise, rage, disgust, fear and sadness - in order of appearance).



3 Painted Portraits of the six basic emotions (joy, surprise, rage, disgust, fear and sadness)



4 Preliminary results of a 3D model textured with the six basic emotions (joy, surprise, rage, disgust, fear and sadness)

how to create a virtual avatar in 30 minutes

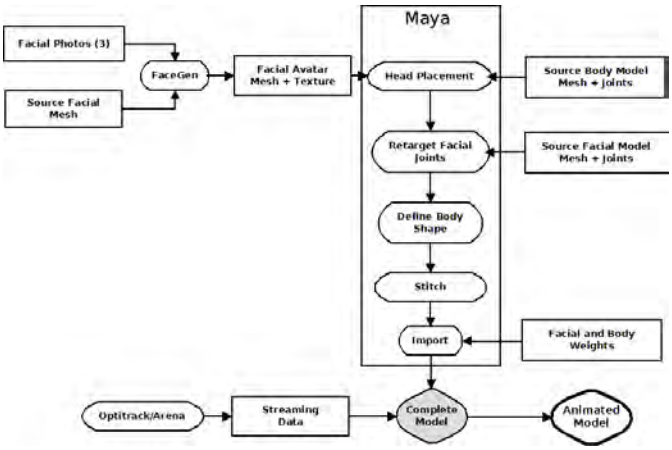
Virtual environments, offer the opportunity to immerse one or more individuals in a completely different virtual world with which they can interact, and an all-new of experience is open to participants today, when compared to the inception of virtual reality.

a human participant (right) and the generated avatar (left)

Nonetheless, one of the main drawbacks of a full immersion sensation is visual likeness. Although possible to achieve with today's technology, the process to produce a look-a-like character is tedious, laborious, requires an expert in the field of virtual characters creation and it takes, approximately, 4 weeks of work.

To be able to provide to any participant an enriching experience in a virtual environment, there is the need to develop tools that can create in a short period of time a look-a-like character of a particular human, which can be used by anyone, not necessarily an expert in the field.

With this in mind, we developed a proof-of-concept that can produce a completely animatable character, which looks like a given human, in less than 30 minutes. Taking advantages of well-known software and facial and body meshes rigged by default, we devised a pipeline that takes as input a couple of photos, and produces a animatable avatar that can be used in a virtual environment and mimics the likeness of the participant. We also developed a set of tools that allows any user to create the avatar without the need of understanding the details of the avatar's creation process.



the complete pipeline

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Porto Interactive Center

LearnIng Facial Expressions usIng Serious GAMEs

http://www.portointeractivecenter.org/lifeisgame
Project Principal Investigator: Verónica Orvalho
Email: veronica.orvalho@gmail.com
Project Leader: Tiago Fernandes

Introduction:

The ability of socially and emotionally impaired individuals to recognize and respond to emotions conveyed by the face is critical to improve their communication skills. The LIFEisGAME project attempts to show how it is possible to apply a pioneer serious game approach to teach people with Autism Spectrum Disorder (ASD) to recognize facial emotions, using real time synthesis and automatic facial expression analysis. This is a joint project between Portugal and UT Austin.

The LIFEisGAME project is part of a broader research effort, focusing on an open question of scientific and clinical importance, of whether the use of virtual characters in interactive training programs can provide a basis for ASD rehabilitation. But first, we need to develop the technology. LIFEisGAME overall objective is to deploy a low cost real time facial animation system embedded in an experimental game, which will allow to further study the symptomatic problems of facial emotion recognition.

LIFEisGAME advances the synthesis of realistic virtual characters and markerless motion capture technology, and creates a non-stressful game to help individuals recognize facial emotions in an interactive way.

Partners:

Instituto de Telecomunicações, Universidade do Porto, University Texas Austin, Microsoft Portugal, Instituto Politécnico do Porto.

Team:

Verónica Orvalho (PI FCUP/IT): Computer Graphics, HCI, Character Animation
Cristina Queirós (Co-PI FPCEUP): Psychology, Emotion Recognition
António Marques (Co-PI IPP): Psychology, Emotion Recognition
Miguel Sales Dias (Co-PI M): MLDC Director
Jake Aggarwal (Co-PI UTA): Computer Vision, Signal Processing
Yan Zhang (Co-PI UTA): User Needs Assessment
Tiago Fernandes: Project Leader
Xenxo Alvarez Blanco: Technical Director
Researchers: José Miranda, Samanta Alves, Pedro Rodrigues, José Serra, Gustavo Augusto , Birgi Tamersoy, Changbo Hu, Bretagne Abirached, Stacy Crain, Pedro Bastos, Bruno Oliveira.

Filipe Cunha Monteiro Lopes
PhD in Digital Media - Faculty of Engineering of Porto

Immersive Resonances, Rhythm and Room Feedback

This work continues to promote a dedicated research on sound and space, based on artistic work and scientific research, supporting new trends in this investigation area. The last few years, the domain of architecture and the solid and quick development of acoustics, has been more and more prominent in the research conferences on computer music, highlighting a growing interest within researchers and artists.

Music is an art linked with time. This makes rhythm one of the most important aspects when dealing with development, structure and musical experiences. Rhythm creates formal relationships between past, present and future. This project will focus on creating ways in which physical properties of sound/music and spaces can be bounded into one while having rhythm mediating this symbiosis.

"The acoustics of a grand cathedral can create an exalted mood; those of a chapel can enhance the privacy of quiet contemplation; those of an elevator can produce the feeling of encapsulation and, in the extreme, claustrophobia."
(Blesser&Salter, 2007)

"The perceptible and unmistakable sensation of nearby walls is created by elevated low-frequency sounds, and by the presence of strong resonances."
(Blesser&Salter, 2007)

My first question was how to musically approach space beyond reverb…? What is there besides reverb in music performance? What is the rhythm of a space? These basic questions seeded my investigation and quickly diverge in other questions such as: Is music and space able to immerse audiences in a symbiotic relationship? What are the elements for that fusion? How to blend sound and space and what's the role of sound on that relationship? In the search for a more profound physical relationship for audiences to experience music and space, the idea of resonances appear has a possible path to explore. Vibrations and resonances are the natural response of rooms to sounds, which in turn gives it his sonic fingerprint. The use of established techniques such as impulse-response measurements will be used, extended and rethought to be used as compositional and immersive tools.

" The perceptible and unmistakable sensation of nearby walls is created by elevated low-frequency sounds, and by the presence of strong resonances."
(Blesser&Salter, 2007)

ImTV

On-Demand Immersive-TV *for* Communities of Media Producers and Consumers

Television has progressively shifted away from a broadcast, linear and passive type of viewing experience:

Gradually, it is leaving the traditional one way communication system to become a two way, active and participatory, communication platform.

The traditional TV is "being developed towards a networked social medium which can be used while chatting with friends online and browsing the Internet."

Bruno Nobre UNL-FCT
bruno.nascimentonobre@gmail.com

Today's TV role in social interaction cannot be diminished. Users are more receptive to new types of interaction (e.g. Wii, Kinetic, iPhone, iPad.), probably through a gaming experience undertaken in this medium, breaking mental models and habits in how home entertainment is processed. Further, the living room is now the stage for playing golf, sing karaoke, follow a personal trainer demands, or other group activities, where the family or a group of users is called to interact.

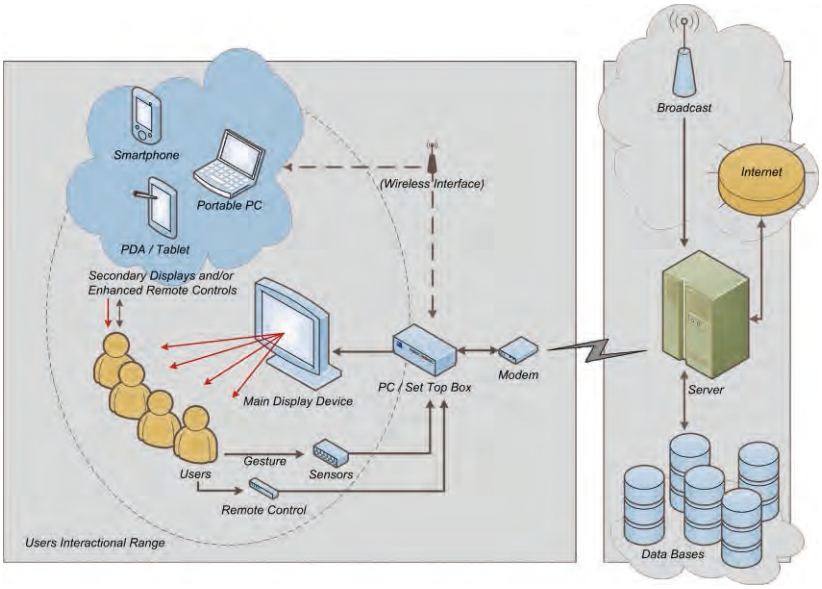
Users are more active. The interactional TV paradigm is no longer just the leanback "couch potato" interactional paradigm (although sometimes still is, and a lazy interaction thus requires a simpler interface, involving minimal consumer effort. Some users simply just want to watch a movie on TV).

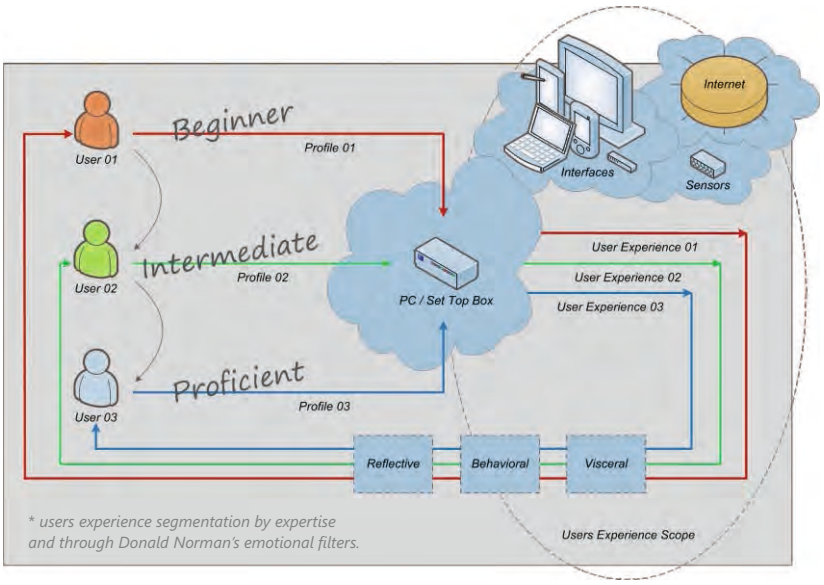
New on-line social activities are also emerging from the web, such as the growing on-line social communities, and they are enabling the burst of new communicational paradigms on our society. These new communicational paradigms are pushing more and more the user needs in a way that traditional television could not keep up. Hence user needs are also pushing the interactional paradigms more and more to a new and challenging level of user experience – booth aesthetical, functional and social. These communities are creating, in fact, new viewing habits. Not just for entertainment purposes but also becoming gradually part of a new collective everyday experience,

In that order, interfaces should consistently adapt as the interactional paradigm changes. Interfaces must change along, adapting and evolving, becoming more and more aware of the user - or users - expectations for a particular interactional occurrence. The system should be predictive and attend to a specific situation and also attend to a specific user.

It's recognized that there is a lack of comprehensive studies in how the user *feels* an iTV interface, particulary with all these new and recent capabilities. How the interface facilitates the interaction and how it should adapt to a specific scenario. Defining and explore these new interactional mental models and evaluating the user experience under those is urgent in order to establish design guidelines for future sustained research that aim to provide a effective immersiveness state in iTV users.

This research aims to develop and apply new work methodologies in the creation and development of multimedia products with this specific characteristics, achieving a more participative, motivating and satisfying interactive experience in new types of interactive and immersive digital television. It will also focus on a User Experience Design (UxD) approach with the purpose of develop and approve design guidelines that can be translated not only in greater effectiveness and efficiency of use, but also in increased user satisfaction in an immersive interactive television environment.





Achievements:

> Design an effective immersive user interface for a personalized combination of Mainstream TV and On-line User-Generated Content.

> Develop specific methodologies in the creation and development of a digital media product with this characteristics.

Further research:

> Enhanced Remote Controls

> Gesture Interface

> Facial Recognition and User Awareness

> Voice to Command

> Interaction over Content

> Virtual Channel Metaphor

UT Austin | Portugal
International Collaboratory for Emerging Technologies, CoLab

This study is being pursued in the context of the ImTV research project coordinated by the Research Center for Informatics and Information Technologies *(Centro de Investigação em Informática e Tecnologias da Informação - CITI)* of the New University of Lisbon Science and Technology Faculty.

UT Austin | Portugal
International Collaboratory for Emerging Technologies, CoLab

Haptic Art: The Exaltation of a Sense

Doctoral Program in Digital Media
Faculdade de Engenharia da Universidade do Porto (FEUP)

Researcher: Sandra Coelho
Supervisor: Miguel Velhote Correia

The 'future is haptic' is what we have been heard from technologists and visionary theorists. Yet, haptic is not a technological feature, but a biological function. Haptic is almost an unknown term outside the research discourses and engineering labs. When asked, the majority of people ignore the relation between haptic and touch. What is generally unknown is that haptic is part of our multifunctional sense of touch.
Proposing to rediscover the haptic through crossroads of art and design, this research aims to introduce a concept of a biomimetic dynamic surface as an awareness project inspired by the sensorial behavior of living beings. Intended to construct the knowledge of the self through the sense of touch.

Through a design creation and engaging the inherent inquisitive characteristic of art, this research aims to develop considerations based on crossing scientific findings related to the sense of touch, intervening and raising awareness for this sense that we so often neglect. Usually people know very little about touch, often restricts it to the sensations felt on the skin. They only know the surface of this sense. The sense of touch is critically vital, from controlling the body to perceiving, learning from, and interacting with others and the environment.
The biomimetic dynamic surface is a visual and tactile metaphor created to show how our actions influence the behaviors of others. How our immediate reactive instinct predicts our consequent behaviors. Concerning the instinctive action to an unexpected touch, or the first reaction to the embodied experience of feeling something in our skin. The first moment we experience something new is the alluring of an instant that will determine our future behaviors to similar experiences.

A lasting involvement depends on the quality of the first impression. We are moved by sensations, constantly looking for unforgettable ones. Commonly, beyond our survival instincts, it is our desire to enhance our experiences when dealing with the most disparate things, from the everyday simplest actions to interactions that challenge our knowledge. Those improvements are related to how we use our senses when experiencing those things. When forming first impressions, it is what we see, hear, smell, taste, and touch that influence our assessments and future behaviors. The Reactant is a design surface concept that goes through a physical change during a reaction. This sensitive surface changes its physical nature, as it may grow or shrink when we press a finger on it.

For more information look in http://utaustinportugal.org/people/sandra_coelho
or contact sandra.coelho@fe.up.pt

The Fundação para a Ciência e a Tecnologia (FCT) funds this research (SFRH/BD/33952/2009) through the UT Austin | Portugal program for the joint Doctoral Program in Digital Media by UP and UNL.

Urticina Crassicornis, discovered by Mueller, 1776. Specimens from Kamchatka, NW Pacific. Photo of Nadya Sanamyan, Russia. http://www.actiniaria.com/urticina_crassicornis.php

The cnidarians are very simple life forms constituted only by muscle and nervous system. Because they don't have eyes, they use touch to be able to feed and to protect themselves from threats. Deprived of other senses, the possibility of existence is only achieved through the sense of touch. As Aristotle described "some classes of animals have all the senses, some only certain of them, others only one, the most indispensable, touch."

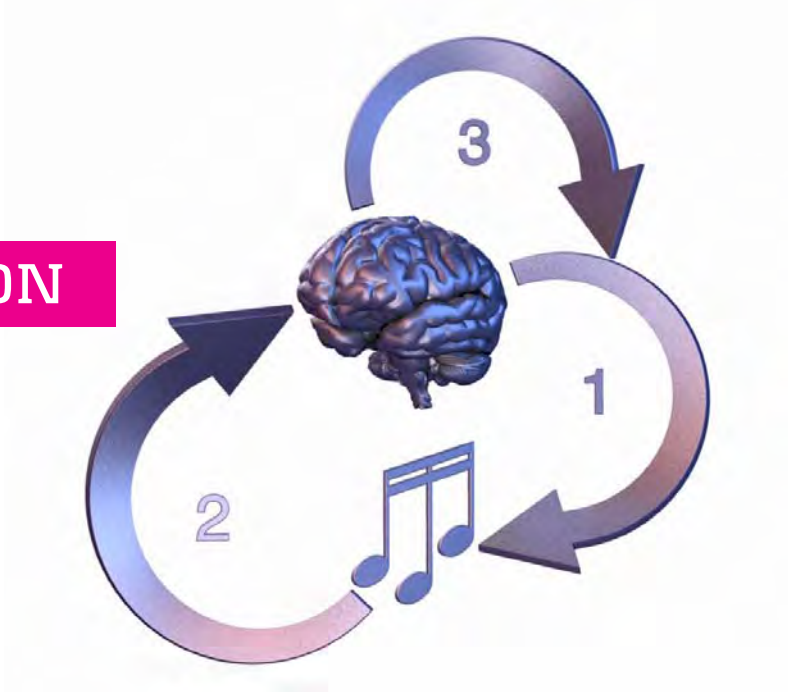
Aristotle (1907 (350 BC)). De Anima. Translated by Hicks, R.D. Cambridge University Press.

Digital Media Doctoral Symposium, October 21, 2011
@ FUTUREPLACES 2011, Porto, Portugal

Horácio Tomé Marques, PhD Research Student
PDMD - Doctoral Program in Digital Media
FEUP | UPorto : UTAustin | Portugal

REASON and/or EMOTION

Understanding and exploring throught BCI (Brain Computer Interface) the duality/unity of determinant constituents of human behavior and condition—or the brain potentials generated by the dynamics between aware cognitive commands and unaware emotional reactions.



Abstract

The practice of music is based on an orchestrated dynamic rational, motor, visual and emotional behavior where various mechanisms interact in multiple and complex decision-making in real-time, to adequately control the muscular, auditory, visual systems. It also triggers emotional signals—generated simultaneously in the deepest interior of the brain—that often function as spontaneous feedback energy, complementary to the aware cognitive system. A factor that may influence our own rational decisions and affect the practice of music itself—seen, as an example, in the modulation of interpretation.

Background and state of the art (short summary)

The practice of music is a human activity that can activate nearly every known areas of the brain, whether at the cognitive or the emotional level. But we also activate the systems of generators and the deepest emotions in the primitive reptilian areas (amygdala and vermis), the core of emotional processing that is part of a network that deals with pleasure, arousal, opioids transmission and production of dopamine, a neurotransmitter associated with emotions.

A musician is thus a psycho-dynamic engine, a generator of electromagnetic brain signals at various levels.

Investigation throughout the last century led to the creation of a system known as encephalograph, which reads and records the oscillations of the electric potential of the brain. Based on these systems brain-to-computer interfaces (BCI) have been created—BCIs can establish links between humans and computers. The majority of the practice based research on BCI and its potential uses has been oriented by and towards low level design and programming—brain neurophysiology, applied technologies. In Arts they have been used as systems to control and generate sequences or rhythms like musical textures triggered by a non discriminant design from EEG wavepaterns.

Focus

There are have been studies on brain electric potentials not only focused on the cognitive aware potentials side but also on the emotional signals one. However there is a research gap to be fulfilled. That opportunity resides on the exploration and comprehension of the eventual relationship between reason and emotion namely on its a) dynamic, b) dialetic, d) tension, e) relevancy, f) hierarchy, g) prevalence.

We are focusing our research towards the uses and consequences of known potentials—the cognitive conscious, aware, thoughts and the emotional spontaneous unconscious, unaware, responses—but exploring an unknown terrain which resides inbetween reason and emotion, in contexts of contemporary performative arts practice (music, dance, audiovisual interactive installations, generative visuals) that is, based and focused on a digital experimental arts conceptualization field.

Objectives

a) better understand the characteristics of the potentials and signals generated by conscious cognitive aware brain commands and emotional spontaneous inner brain generation in context of instrumental music practice;

b) use of rational and emotional brain potentials, simultaneously, in real-time, with proper differentiation, through low cost BCI, to control and control and modulate or recharacterize (certain aspects of) digital narratives and entities;

c) use the system to interactively alter content and form, leading as such to the modification of the conceptual and aesthetic meaning of the performance constituents;

d) understand the produced potentials and the consequent impact through forward feed-back feeding on the intellectual and emotional behaviour of the performer and of the audiences.

e) to pursue a framing of the usefulness of the research to consequently apply it as a possible therapeutic tool to people with physical and/or neurological disabilities—at least in context of clinical art therapy.

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UT Austin | Portugal

INTERNATIONAL COLLABORATORY FOR EMERGING TECHNOLOGIES, COLAB

Dynamic Animation of Surfaces using Chemical Approaches

Objectives:

The aim of my research work is to explore and develop innovative low cost dynamic display surfaces through the use of the concepts behind printable electronics and electrochromism.

It will focus on how these displays can be implemented in products and used to exhibit dynamic programmed animations, while employing minimal hardware resources and computational power (e.g. by implementing Cellular Automata).

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Supervisor:

Prof. António Câmara *(FCT/UNL)*

Keywords:

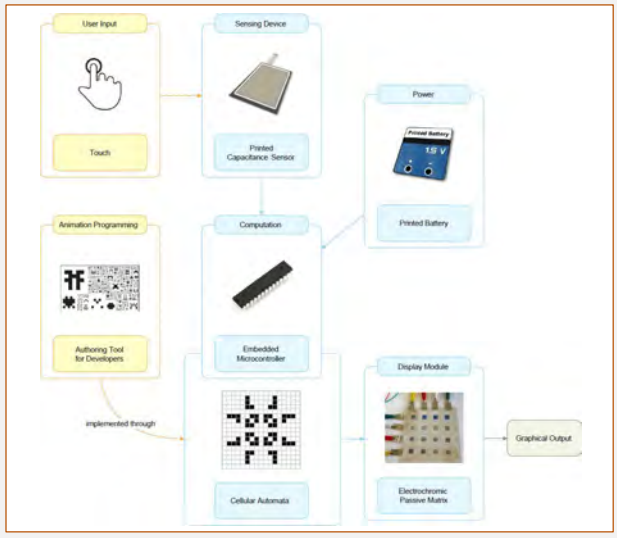
Ubiquitous Computing, Printable Electronics, Invisible Displays, Cellular Automata.

Design Principles:

- **Simplicity:** The complexity of the device is that of the task, not the tool. The technology is invisible.
- **Versatility:** Devices are designed to allow and encourage novel, creative interaction.
- **Pleasurability:** Devices should be pleasurable, fun and enjoyable.

Adapted from:
Donald A. Norman, "The Invisible Computer" (1998)

Device Scheme:



Applications:

Consumer Electronics

- Integration in simple computational devices such as music players, digital watches, and calculators.

Advertising

- Magazines, newspapers, signage, billboards, posters, or any other paper surface featuring animations or user-activated content.

Smart Cards

- Simple displays to access information on payphone cards, frequent flyer cards, public transportation cards, or any oher type of smart card.

Smart Packaging

- Improved information on packages / packages that react to the environment;
- Electronic shelf labels and pricing tags for dynamic information signs.

Other

- Intelligent furniture and walls;
- Interactive clothing.

FACULDADE DE CIÊNCIAS E TECNOLOGIA UNIVERSIDADE NOVA DE LISBOA

With the support of:

FCT Fundação para a Ciência e a Tecnologia

MINISTÉRIO DA CIÊNCIA, TECNOLOGIA E ENSINO SUPERIOR

Winning the game is gain skills? An assessment of Serious Games in Education

Ricardo Baptista, PhD. Student of Digital Media – FEUP

António Coelho, Assistant Professor – FEUP

INTRODUTION

Learning is an extremely complex process. It depends on the individual characteristics of the learner, on the learning context, on the proposed activities, on the tutor, etc. It also depends upon actions such as experimenting, interpreting, visualizing, abstracting and showing, by means of which the learner succeeds in constructing his own knowledge. The educational environment has been undergoing considerable changes due to the use of the Information and Communication technology tools. However, there are social and individual skills (like being autonomous, responsible or dealing with teamwork) that learners acquire by the social relation with their peers, teachers and other individuals.

We live in a society that is constantly demanding creativity, globalization, responsibility, autonomy and the ability to deal with virtuality and the new technologies (Baptista, 2008, p. vi), and the use of technology has a strong influence on human cognitive functions (Tobaldini & Brancher, 2006).

The definition of computer game combines the concept of "game" with the use of computers. The "game" concept represents a structured or semi-structured activity with goals that players try to achieve by following a set of rules. The associated concept of "play" relates to the interaction with the game itself. A game can be instantiated for learning, entertainment or recreation as it involves mental stimulation and development of practical skills – games forces - to decide, to choose and to define priorities.

Games are now part of modern culture (Oblinguer, 2006). Rewards are a major part of their universe, whether they are translated in game entities (get more life power, access to new levels, acquire new capacities or equipment, etc.) or even as a neurological impulses for satisfaction or happiness. Comparatively, in real life, humans do not achieve so easily the rewards obtained in the complex world of games. Games assume differents forms and, as in real life, "games present problems that must be solve and overcome by taking action.

However, games depart from reality in the consequences of success or failure and in the clarity of outcomes." (Bergeron, 2006, p. xvi)

Serious games "are games insofar as they have rules, simulate behaviours, accept input from the player, and provide feedback within the context of the rules and behaviours." (Michael & Chen, 2006, p. 43) This type of games is defined as "an interactive computer application, with or without a significant hardware component, that: has a challenging goal; is fun to play and/or engaging; incorporates some concept of scoring; imparts to the user skill, knowledge or attitude that can be applied in the real world." (Bergeron, 2006, p. xvii) Mike Zyda describes Serious Games as "a mental contest, played with a computer in accordance with specific rules, that uses entertainment to further government or corporate training, education, health, public policy, and strategic communication objectives" (Zyda, 2005, pp. 22-35).

A premise of this type of games is "if the player learns to beat the game but can't usefully apply what he's learned in the real world, then the serious game has failed in its mission" (Michael & Chen, 2006, p. 42). The player becomes motivated to learn on their own when they can relate to what's being taught. So many areas can be explored with some success because they may be the most effective means of learning skills and attitudes and that serious game play may support longer-lasting learning than traditional methods.

These games aren't only entertaining, but intentionally deliver an underlying message. Their value results on change of emotional state of player, and understanding the user experience is central to quantifying the effectiveness of serious videos games as educational tools. The goal for the design of Serious Games is the successful integration of learning objectives with the elements of entertainment, play and fun. (Rankin, McNeal, Shute, & Gooch, 2008, pp. 43-49)

Other important aspect of design is involved pedagogical concepts to become a successful mediator of knowledge, as like Zyda called as "collateral learning" - the learning that happens by mechanisms other than formal teaching (Zyda, 2005). But designers, developers and teachers need to make sure their serious games are adaptable to a variety of classroom and training situations as well as being easy to use.

Fortunately, game design and development can now be made in a much more economic way because there are already game engines that allow for rapid prototyping and production. These engines can result in highly competitive and engaging environments, not at the top commercial level, of course, but to the extent required for this research.

THE PROBLEM

The serious games have implied the acquisition of knowledge / skills after completion. One of the issues relevant to research in the serious games is the assessment of learning that has to be certified.

In order to help clarify this issue, I propose the construction of a methodology for evaluating the serious games in education, where learning objectives are listed at the beginning of the game design and validated at the end of the game.

A POSSIBLE WAY TO RESEARCH

As the starting point of the questioning on the implementation and evaluation of the use of Serious Games, aims to focus on learning environments with specific historical, cultural and social.

These contexts may be of different natures, but the choice rests on the realization of various scenarios representing 600 years of discovery of the island of Madeira. With the diversity of learning elements shows that this context, I propose the construction and evaluation of a serious game as a vehicle for learning focused on specific targets, and other intrinsic aspects of the games, such as motivation and fun. The evaluation will be based on the use of a methodology for validation of knowledge and social and personal skills, which are related to the contexts in which they live.

a. General objectives

- Find and discuss the design methodologies and evaluation related to serious games in education surveyed for the state of the art;
- To study, discuss, propose and implement a methodology for designing scenarios for serious games in education;
- To systematize a methodology for evaluating the serious games for education.

b. Specific objectives

- Analysis of case-studies of online platforms to implement methodologies for the design and implementation of serious games;
- To systematize a methodology for evaluation of the paradigm of serious games, which gives competence validation process by the action taken in the game.
- Implement a prototype to test the application of the methodology through a platform / game in an online multi-player where to apply the methods of study design / design scenarios, related to the theme of 600 years of Madeira, with a strong on social, economic, cultural and military during this period.
- Assess the impact of such a game, serious games, a first target group, students from primary and secondary education, in learning the game of factors and circumstances of the common history, validation of gained competences according to the methodology of evaluation.
- Assess the impact of serious games in the second target group, the children of Madeira's emigrants in the Diaspora, which would have much interest in knowing the history of the homeland of the ancestors, allowing validating other skills such as citizenship and multicultural integration.

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Performance-Driven Facial Animation with HALCA and XVR

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Fundação para a ciência e a Tecnologia

Introduction

Being the dominant mean of human communication, facial expressions and motion are regarded as one of the fundamental topics in computer animation. Applications are among interactive games, using live real motion to control a character's face; virtual reality and animation. In a performance-driven animation system, usually the workflow is separated in three main components: Motion data acquisition with *Motion Capture* (MoCap), design of a *Facial Rig* to control the animation, and *Mapping/Retargeting* to the defined rig.

Towards the goal of finding a standard method to relate facial motion data to rig parameters, in order to be able to perform retargeting to different kinds of faces' topologies, we have currently implemented a marker-based first approach to synthesize facial expressions in real time. By using the Optitrack ARENA software [2], the animation library HALCA [3], and the XVR development framework [4], we are able to synthesize in real time local facial deformations on an a priori modeled and rigged 3D face model.

Methods

Our system is composed of 3 different components: The ARENA expression, a Client Application and an XVR Project. The ARENA software allowed us to administrate facial motion capture using facial markers. We used a previously fully calibrated standard set of six Optitrack cameras to define our volume of capture; and 24 facial markers (including head tracking) to define a facial template to track, which depended upon the definition of the facial rig for the 3D model to animate.

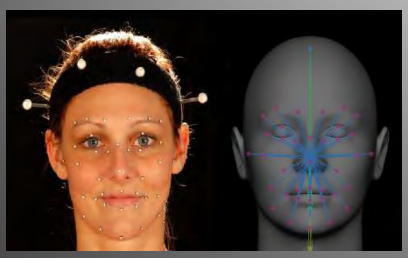

Figure 1. *Markers distribution example and its corresponding rig based on hierarchical joints*

For performance-driven animation in real-time, we used the streaming capabilities of ARENA in conjunction with its C++ NatNet SDK by implementing a compatible client application. This last was developed to retrieve in real time the facial template information created previously in ARENA, along with 3D markers positions for each of the frames, scaling of the data, correct orientation and head tracking. This data is finally sent via UDP to an XVR application, which in turn implemented the HALCA library to load all animations functions and controls over the avatar mesh and rig.

In our procedures we used a joint based facial rig and a direct mapping between joints and facial markers (Figure 1).

Mapping Process

Let $R = \{J^t_i\}$ be the facial rig of our model, defined as a set of n facial joint positions at time t. Let $M = \{M^t_i\}$ be the set of corresponding n markers positions also at time t, without counting the four head tracking markers. Suppose that at $t=0$, J^0_i stores the neutral expression joint positions, and similarly M^0_i stores the neutral user expression markers positions. In a direct mapping procedure, it is natural to relate displacements of the joints to displacement of the markers. Therefore a linear model can be constructed by the equation

$$J^t_i = J^0_i + K_i(M^0_i - M^t_i)\ ,\ i=1,..,n;\ \ for\ all\ t$$

Which allow us to get joints positions for all time (frames) t. The constant factors K_i could be modeled to influence more certain parts of the face than others that we know are more stable along time. The range of motion calibration can be attached to the 3D model rig definition procedure, simulated with predefined values for these factors by regions. This mapping method however could not be applied to joints whose motion is due to rotation rather than translation, e.g., the Jaw joint. For this, we used a cosine law to solve for rotation angles in joints from displacements in markers, in a very similar fashion to the aforementioned linear method. The head rigid motion is extracted from four headband markers from Optitrack.

Results - Work in Progress

We performed two MoCap sessions to test our mapping and animations in real-time. In general the range of motion factors K_i needed to be adapted for each of the participants, in a range value from 0.25 to 1. The assumption of linearity between joints and markers displacements synthesized facial expressions in real time accordingly to live performance but losing subtleness of a particular actor. Artifacts however were caused mainly by markers tracking instability, and bad weighting of the joints.

In order to get the subtleness within the expressions of each user, a different mapping needs to be developed, including the design of another rig. Current development points to address: Optimal number of markers that are needed to capture subtleness of facial expressions. Optimal facial rig and skinning accordingly to the number of markers: Shape-Aware joint weighting as an alternative to the traditional manual painting; and finally to replace reflective markers for feature tracking in a vision based method such as Active Appearance Models (AAM).

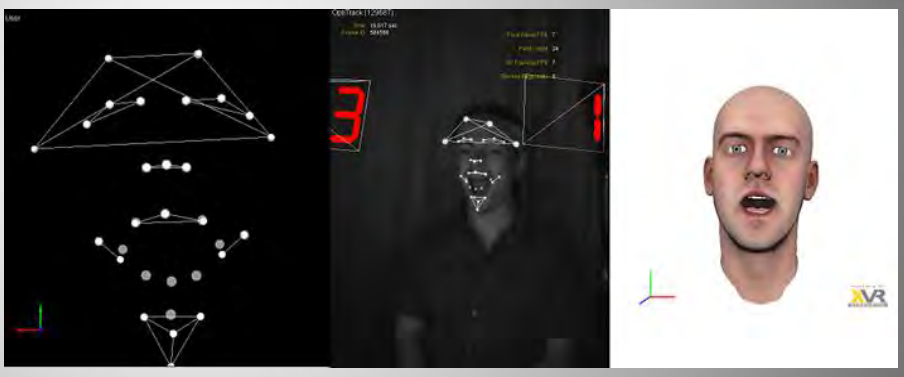

Figure 2. *Performance-driven Animation: Facial Template(Left), marker based mocap (Middle), and animation (Right)*

Acknowledgements

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[2]http://www.naturalpoint.com/optitrack
[3]http://www.lsi.upc.edu/~bspanlang/animation/avatarslib/doc/
[4]http://wiki.vrmedia.it/index.php?title=Main_Page

Collaborative Environment Integrating Augmented Reality and Augmented Virtuality

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Introduction

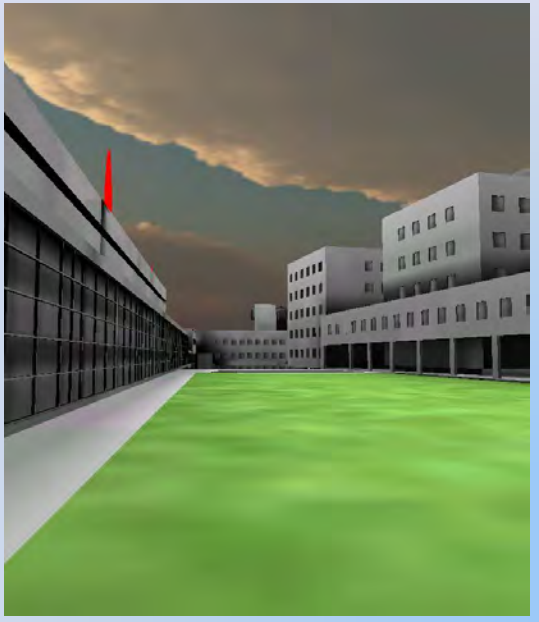
Collaborative Virtual Environments provide a way for people to develop team work from any part of the world. Besides from a common virtual ground, a CVE provides tools to improve collaboration. The use of a virtual world that replicates the real world, combined with augmented reality, allows for the interaction of desktop based users with team members on the field.

COVEN - Collaborative 3D Spreadsheet

Objectives

The exploration of the virtuality continuum metaphor intends to provide group awareness to spatially distributed teams in the execution of a common activity. Team members that are far away can interact on a virtual world that replicates familiar buildings, roads and landmarks. Since this virtual world is a reproduction of reality, avatars can interact with each other but also with the embodiments of real people whose location, direction and speed is known from location and direction sensors in their mobile devices.

These devices gather and exchange information and also act as an interface to the virtual world making use of augmented reality. This approach allows all users to visualize other participants – whether on a computer or on the field – and share relevant information. The main objective of this dissertation is to study forms of interaction that may bring together the before mentioned users, whether they are "real" or "virtual" and permit information sharing on a CVE that brings people together, on the field, at home or in an office. Since a mobile device will be used as a "window" through which information can be visualized, an alternative data entry system shall be studied in order to replace or complement menus and buttons, providing a more natural interface.



First Person view of FEUP with geo-referencing points for the virtual side of the CVE

Research Questions

The main research questions are focused on communication, interaction and visualization for optimizing collaborative work. The benefits of AR will be lost if the user has to use menus or read small text. Both AR and VR users must be aware of other users and the environment.

Four mains questions should be answered with the present study:

- In what ways can collaborative work benefit from a combined VR /AR approach?
- How to achieve optimal group awareness for both "real" and "virtual" users?
- What forms of communication can be used to improve group dynamics and collaboration?
- How should users, objectives, objects or other relevant information be visualized, explored and handled for better collaboration in performing group activities?

Methodology

- **Analysis of real life requirements** – Interviews with fire department and the army should provide real time scenarios, allowing research questions to be tested for situations based on real life.
- **Development of an AR / VR solution for collaborative work** – Specifications for an AR / VR solution for collaboration based on parameters defined from the analysis of requirements.
- **Working prototype** – Development of an AR / VR prototype for collaborative work that implements established considerations.
- **Mixed reality interaction** – Hypothesis testing with the use of proposed mixed reality solution.

First Person view of FEUP with geo-referencing points for the virtual side of the CVE

For further information

More information on this project can be found by contacting Hugo Miguel Machado da Silva at pdd09012@fe.up.pt or hugodasilva@hotmail.com.

UT Austin | Portugal

INTERNATIONAL COLLABORATORY FOR EMERGING TECHNOLOGIES, COLAB

FCT Fundação para a Ciência e a Tecnologia
MINISTÉRIO DA CIÊNCIA, TECNOLOGIA E ENSINO SUPERIOR

FCSH FACULDADE DE CIÊNCIAS SOCIAIS E HUMANAS

Instrumental Fado : A Generative Interactive System

Tiago Videira
Digital Media PhD Student – FCSH/UNL – UT Austin Portugal

Fado in Literature

The history of Fado as seen through literature. How the practice evolved in society, analysis of definitions, schemes, histories, and musical transcriptions.

«A section of eight 2/4 measures, divided in two equal and symmetric parts, with two melodic contours each; preferably in the minor mode, although many times it goes into the major with the same melody or another; harmony built on an arpeggio in sixteenth-notes using only tonic and dominant chords, alternating within two measures.»

(Ernesto Vieira, 1904)

«Fado is a way to launch your voice.»

(António Victorino d'Almeida, 2010)

General Reference:

Nery, Rui Vieira. 2004. *Para uma história do Fado*. Público.

Musical Informatics

Studying the history and evolution of Musical Informatics. Finding suitable models for future implementation.

Analyses of several rule-based versus Intelligent systems in style imitation:

Markov models, Grammars, Chaos and Fractals, Cellular automata, Evolutionary Systems, Artificial Neural Networks...

David Cope's successful *Experiments in Musical Intelligence* and *Emily Howell* programs as a source of reference and inspiration.

Gerenal reference:

Nierhaus, Gerhard. 2008. *Algorithmic composition.* Springer

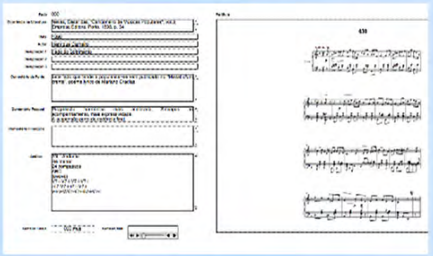
Abstract

Fado is commonly thought as being a traditional Portuguese musical genre that evolved and became the most important style of music in Portugal, regularly identified with the people and culture of the nation itself. Its study, performance and preservation is of great relevance in the present time. Currently, Fado is claiming its place in the world applying for the classification of immaterial humanity patrimony by UNESCO.

Our goal is to understand what Fado is and to create an automatic system that successfully generates new instrumental music based on it. The generative process also aims to be interactive, i.e. responsive to user constraints, considering musical and aesthetical parameters, such as tempo, rhythm, or general mood of the Fado.

Systematization

A database is being built using the occurrences of musical transcriptions classified as Fado in literature.



The database contains references, comments, structural and formal analyses, musical scores and MIDI files of each Fado.

Pattern analysis and statistic evaluation is being made to capture essential signatures and characteristics.

General Reference:

Margulis, E.H. «A model of melodic expectation». Music Perception 22, n. 4 (2005): 663–714.

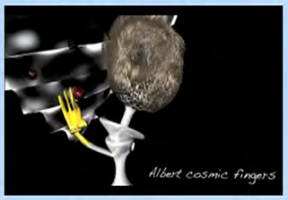
Interactive Music and Digital controllers

Sonata for unprepared player

An interactive work for 2 wii motes presented in Artech 2010.

Videira, Tiago. 2010. Sonata for Unprepared player. in *Proceedings of the 5th International Conference on Digital Arts*, 165-167. Guimarães.

Alberto Cosmic Fingers



A digital instrument based on a glove with sensors.

http://atomicdesigners.yolasite.com/experiments.php