NOVEL ARCHITECTURE FOR MULTIMEDIA HARDWARE ACCELERATION

Universidad de Vigo

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THESIS ADVISOR: FELIPE GIL CASTIÑEIRA
ENRIQUE COSTA MONTENEGRO

AtlantTIC

PhD Programme on Information and Communications Technology (Doc_TIC)

- **The technology of telecommunication networks has been evolving in the last years.**

- **Multimedia communication usage is growing so rapidly.**

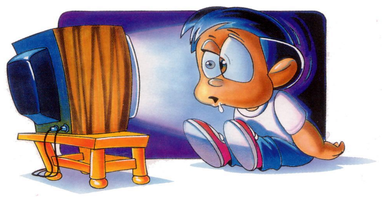
Video Conferencing

Telemedicine

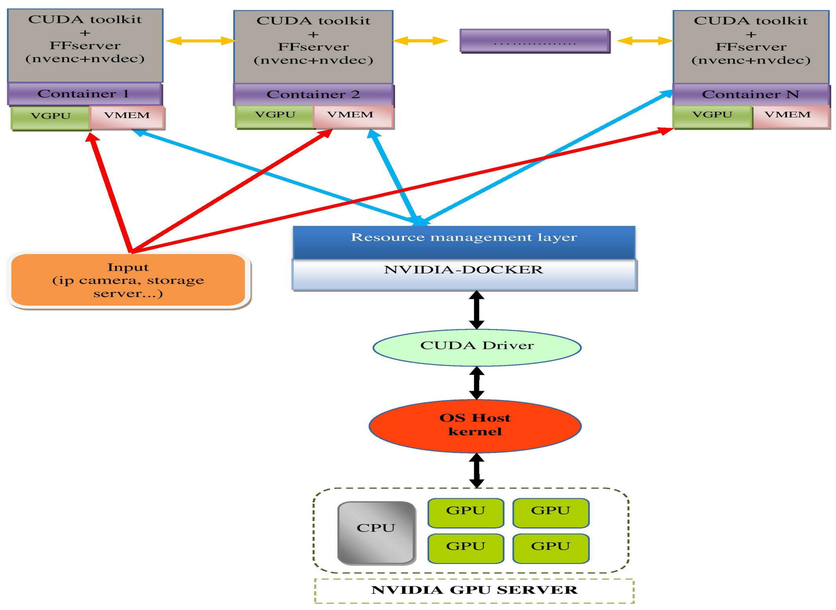
Video streaming

The mechanism of multimedia communication has to be developed:

- **Provide new services for 4G and 5G networks**
- **Guarantee the quality of experience for users.**



- **Design a "Virtualized Media Server" architecture.**
- **Design a new architecture of hardware accelerated mechanisms to manipulate video.**



Workshop on Monitoring PhD Student Progress, June 22-23, 2017, Vigo, Spain

Laboratorio de VISION Universidad de Vigo

Fast vision algorithms for advanced driver assistance systems

PhD: Francisco Parada Loira
Advisor: JOSE LUIS ALBA CASTRO

2017 WORKSHOP ON MONITORING PhD STUDENT PROGRESS

Multimedia Technology Group (GTM)

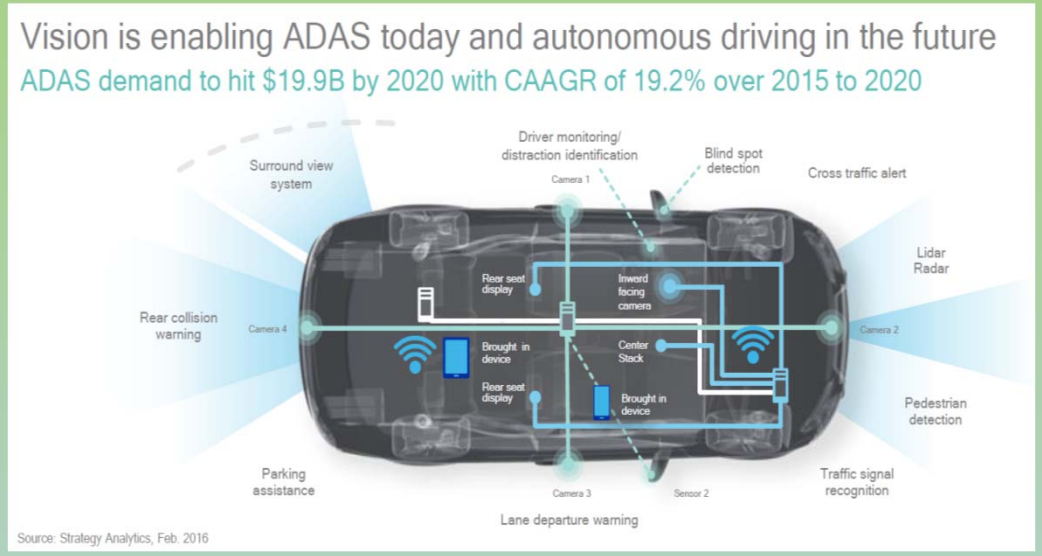
Motivation of the work

ADAS:

- Safety
- Easy Driving
- Autonomous driving

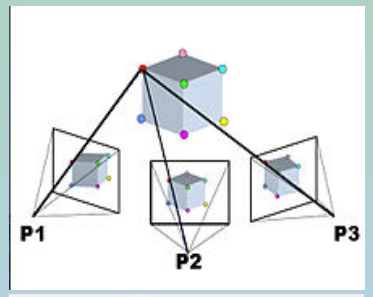
Cameras-Computer Vision

- Cost: Tesla autopilot2 uses 8 cameras, Uber is Testing 10-13
- Perfomance
- Avalaibility
- More features (recognize diferent objects by their appearance



Thesis Objetives

- Adapt state of the art algorithms for ADAS to work in real time
- Develop new algorithms for ADAS, mustwork in real time
- Compare the performance with other ADAS non based on computer vision



Results & Discussions

- Start the implementation of a SFM system.
- Study of real time traffic sign recognizer. Implementing SVM cascades to recognize signals in real time
- Work in the development of a new LIDAR system.

CONTRIBUTION TO THE VIRTUALIZATION TECHNIQUES FOR 5G NETWORKS

Abel Fernández Nandín, supervised by Felipe Gil-Castiñeira

Information Technology Group (GTI)

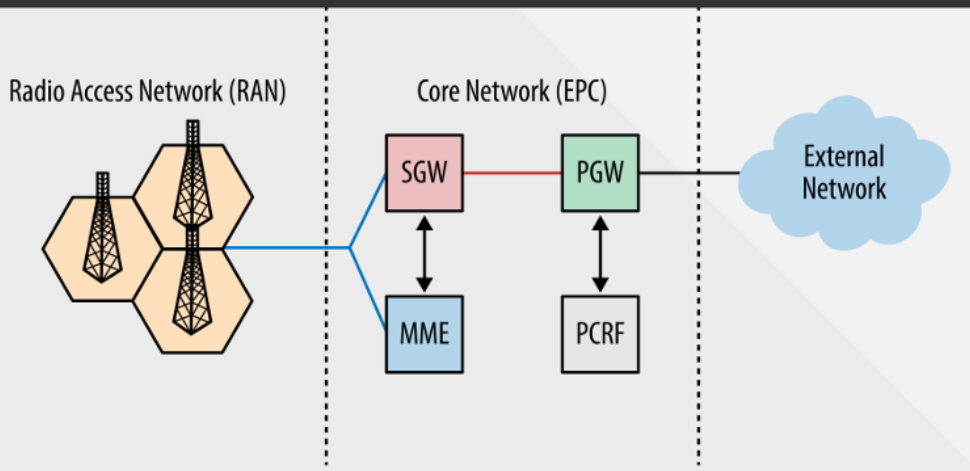
Universidade Vigo

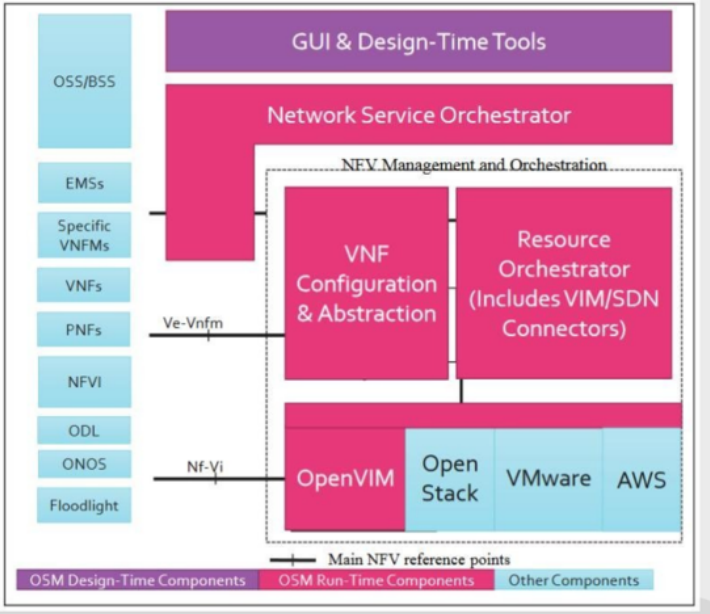
DocTIC

AtlantTIC

Major Goals

- Evaluation of the possibilities in the creation of virtual 5G networks
- Automation of the virtualization of 5G networks
- Analysis of the most common scenarios of communication
- Design new network architectures
- Comparison between new and traditional network architectures
- Parametrization and optimization of the new network architectures
- Evaluation of emerging technologies for the virtualization of networks
- Creation of testbeds where the various tests will take place

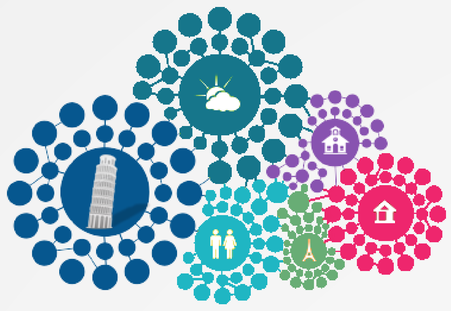




CONTRIBUTIONS TO SEMANTICS-BASED RECOMMENDATIONS AND VISUALIZATION TECHNOLOGIES TO DEVELOP AND CURATE CULTURAL HERITAGE EXPERIENCES

ABDULLAH RADY DAIF, MARTÍN LÓPEZ-NORES

Motivation of the Work



Semantic web and Linked data technologies can spur a change in the way citizens appraise history, by automating the discovery of associations among historical events, locations, pieces of cultural heritage and viewpoints

Thesis Objectives

Sort collections of semantic paths linking concepts of interest as per their relevance with regard to the reflective topics

Create MCQs tailored to users with different levels of historical knowledge

A web-based tool to load/edit/save experiences involving sets of reflective topics, connections, questions and multimedia content

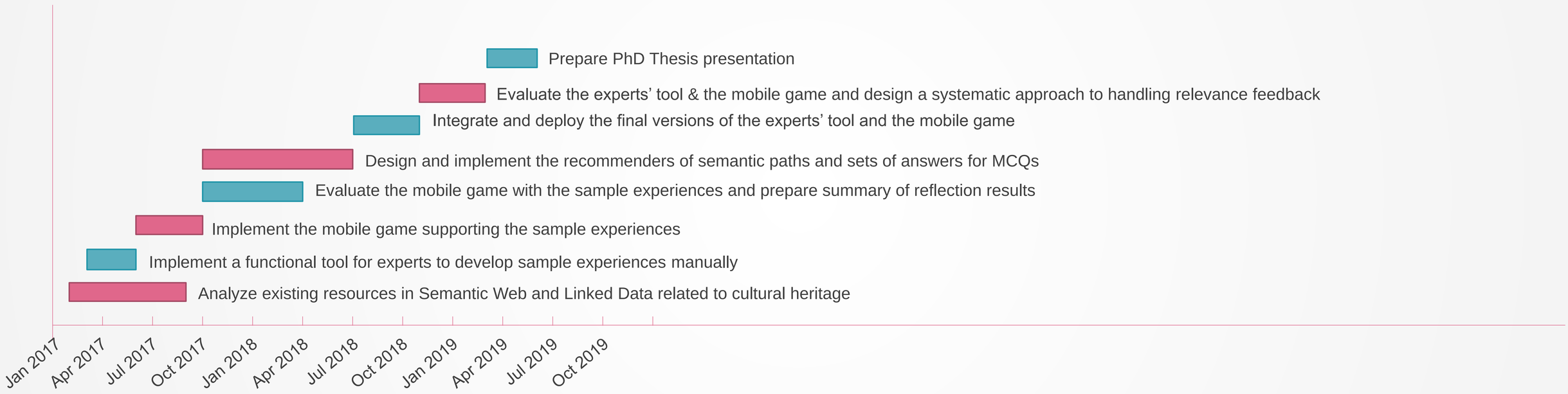
Evaluation of the perceived value of the tool by humanities experts from the H2020 project CROSSCULT (www.crosscult.eu)

A mobile game for museum visitors to reflect on the associations and provide new links of their own

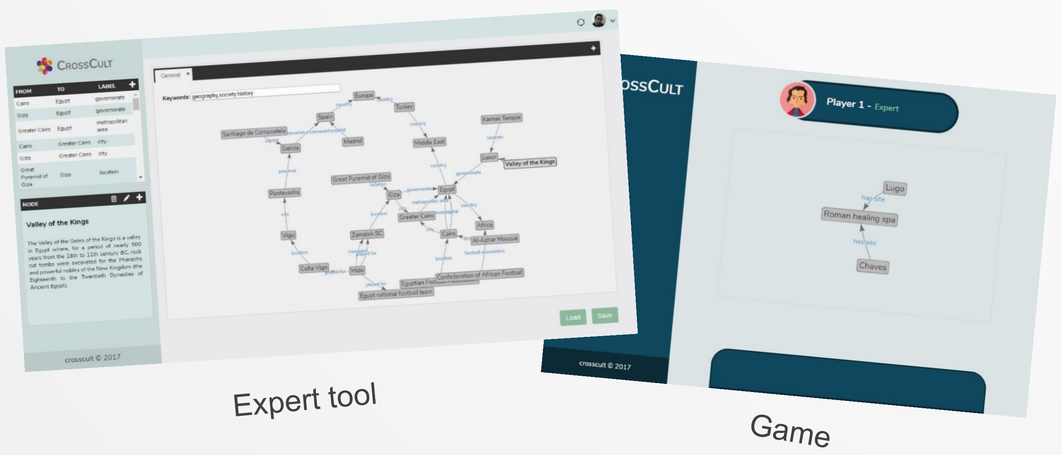
Evaluation of the reflection outcomes attained in experiments held on at least 4 venues around Europe, chosen from among the associated partners of CROSSCULT

Visualization artifacts suited to tactile screens

Research Plan



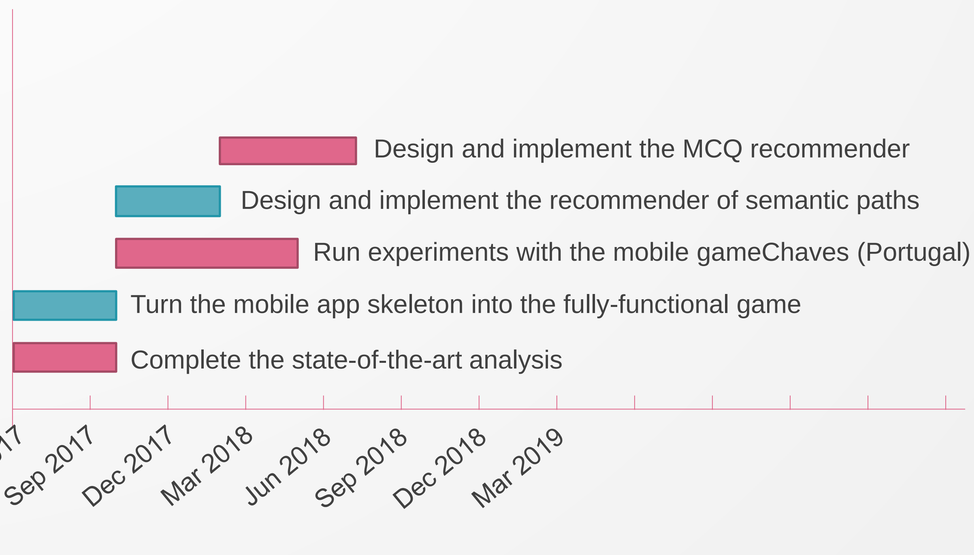
Results and Discussions



Expert tool

Game

Next Year Planning



References

01 O.G. Bravo-Quezada, M. López-Nores, I. García-Nogueiras, D. Perdiz-Gradín, Y. Blanco-Fernández, J.J. Pazos-Arias, A. Gil-Solla, and M. Ramos-Cabrer. 2016. A Semantics-Based Exploratory Game to Enrich School Classes with Relevant Historical Facts. In Proceedings of 11th International Workshop on Semantic and Social Media Adaptation and Personalization (SMAP). Thessaloniki, Greece, 128–132

02 C.E. Jones, A. Vlachidis, A. Bikakis, and I. Lykourentzou etal. 2016. Pilot speci cations. CROSSCULT Deliverable 2.1, http://www.crosscult.eu/en/resources/deliverables/. (2016)

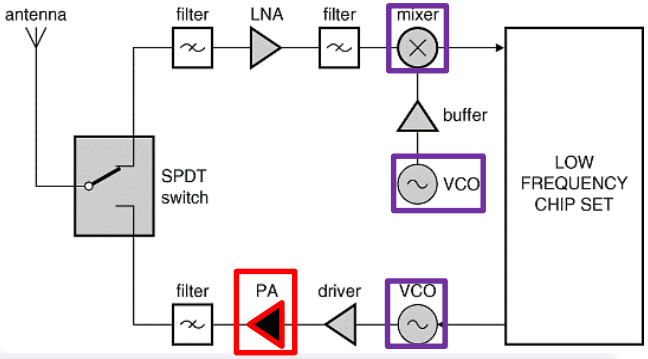
03 D. Myers, A. Dalgity, and I. Avramides. 2016. The Arches heritage inventory and management system: a platform for the heritage eld. Journal of Cultural Heritage Management and Sustainable Development 6, 2 (2016), 213–224

04 C. Vassilakis, L. Deladiennee, M. López-Nores, and R. GiménezMolina. 2017. Programmer's guide for data management and service invocation - First version. CROSSCULT Deliverable 4.3, http://www.crosscult.eu/en/resources/deliverables/. (2017)

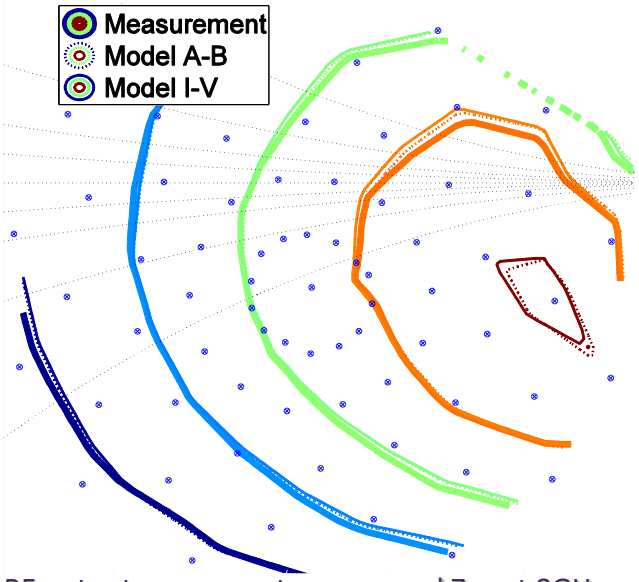
05 A. Vlachidis, A. Bikakis, M. Terras, Y. Naudet, L. Deladiennee, D. Kyriaki-Manessi, E. Vasilakaki, J. Pad eld, and K. Kontiza. 2017. Upper-level Cultural Heritage Ontology. CROSSCULT Deliverable 2.3, http://www.crosscult.eu/en/resources/deliverables/. (2017)

Behavioural Modelling of Microwave Transistors for Wideband High Efficiency Power Amplifier Design

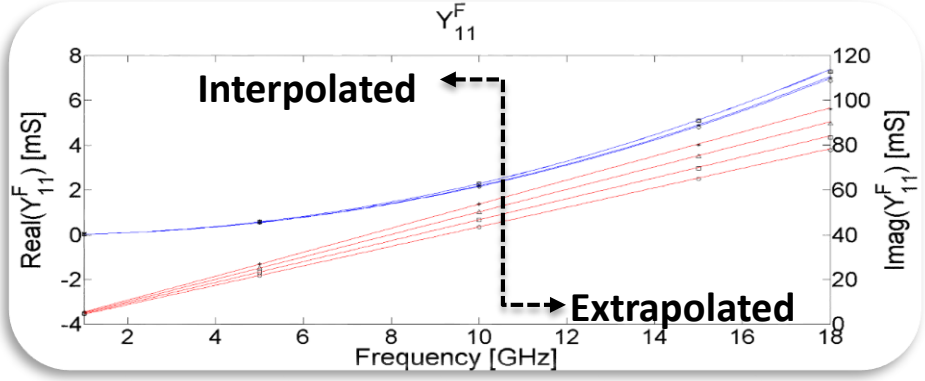
➢ **Motivation:** Behavioural modelling for CAD of efficient broadband PAs in C-band



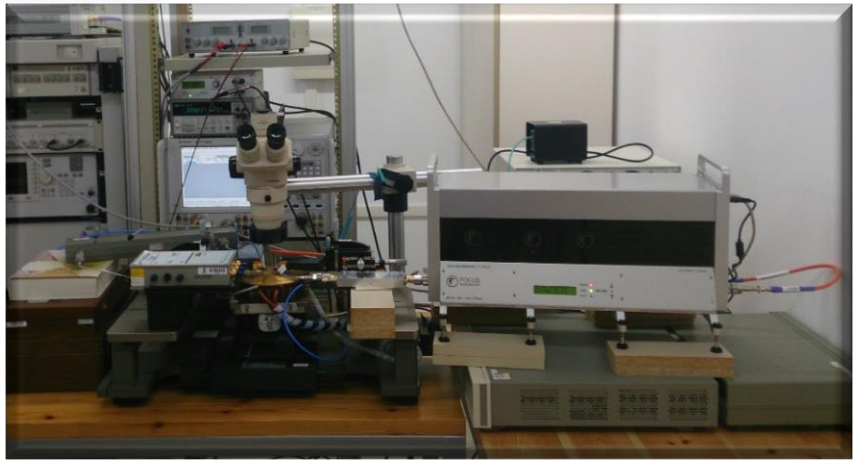
> **Objectives:**
- **Bandwith** improvement of non-linear behavioural models
- Application design of effic. broadband **PAs in C-band**



RF output power contours around Z_{opt} at 8GHz. GaN-HEMT Wg=100um.



Y-parameters behavioural model



PNA-X based meas. system set-up with a multi-harmonic tuner

Author: Mª del Rocío Moure Fernández
Advisor: Mónica Fernández Barciela

Universidad de Vigo

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PHD PROGRAM ON INFORMATION AND COMMUNICATIONS TECHNOLOGY OF THE UNIVERSITY OF VIGO

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GDAF

INTEREST-BASED SYSTEM FOR INFRASTRUCTURE-LESS DENSE- COMMUNICATION SCENARIOS

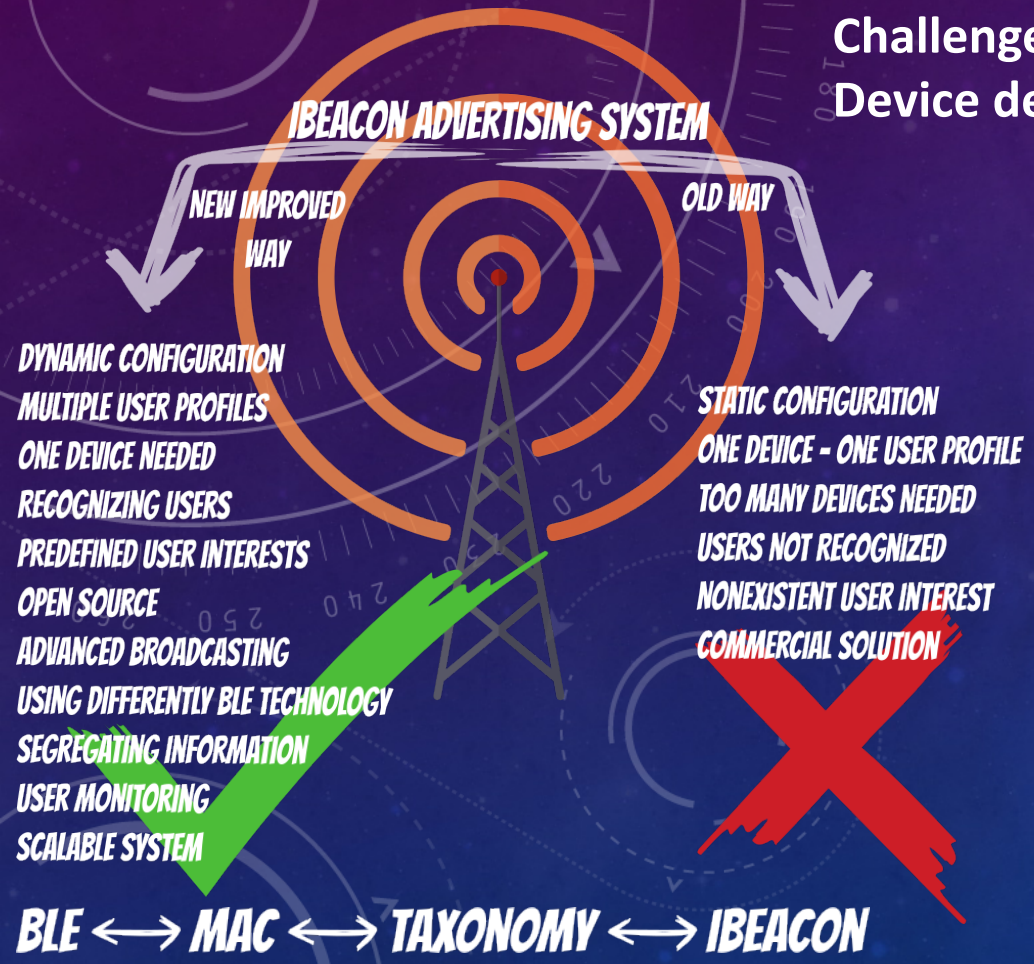
MIRAN BORIĆ

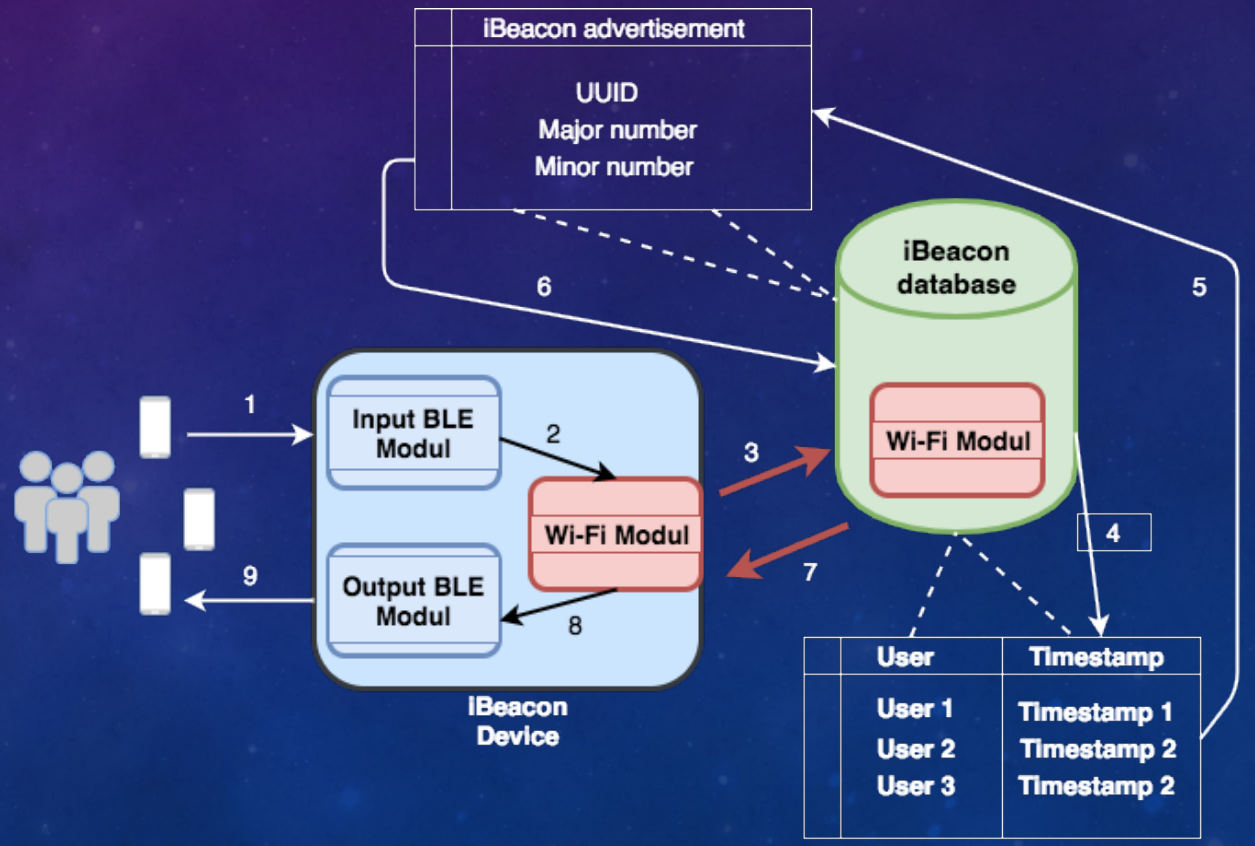
Wireless technologies - > important part of “Internet of Things” concept.

Smart environment -> Huge amount of sensors sharing different data.

Challenge -> segregating and classifying big amount of data in a proper way.

Device density -> How many nodes are optimal for effective data transfer?



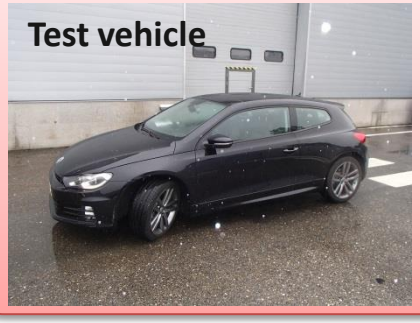


Synthesis of multiaxis non-Gaussian shaped random vibration

Damián González (*CTAG*) / Advisor: Roberto López (*Universidade de Vigo*)

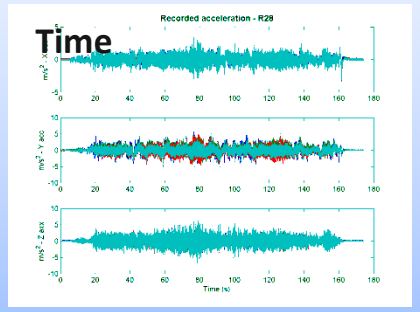
Field measurement

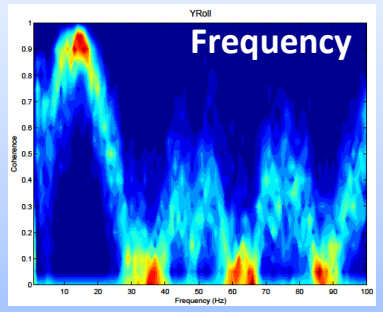
$A(t)$

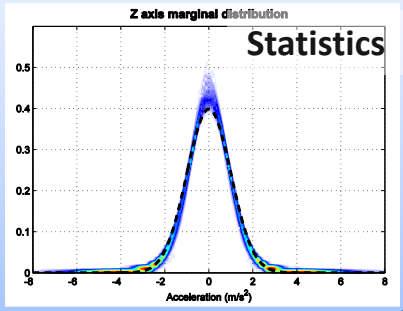


Model generation

$\Phi = \{\phi_i\}$







Laboratory synthesis

$X(t) = f(\phi_1, \dots, \phi_N\}$

Single axis vibration

Multiaxis vibration

Applications

Ride comfort	Squeak & Rattle	Mechanical reliability	Others

Contribution to development of telematic services for data analysis in technology area. Application to eHealth field.

Author: Mateo Ramos Merino **Thesis Advisors:** Juan M. Santos Gago, Luis M. Álvarez Sabucedo
Department of Telematic Engineering , University of Vigo

Universidad de Vigo

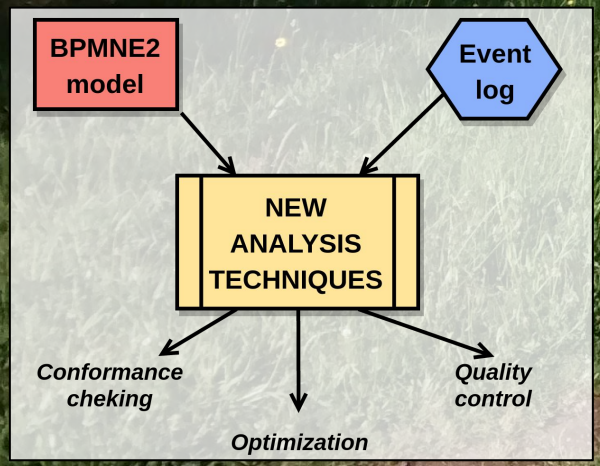
AtlantTIC

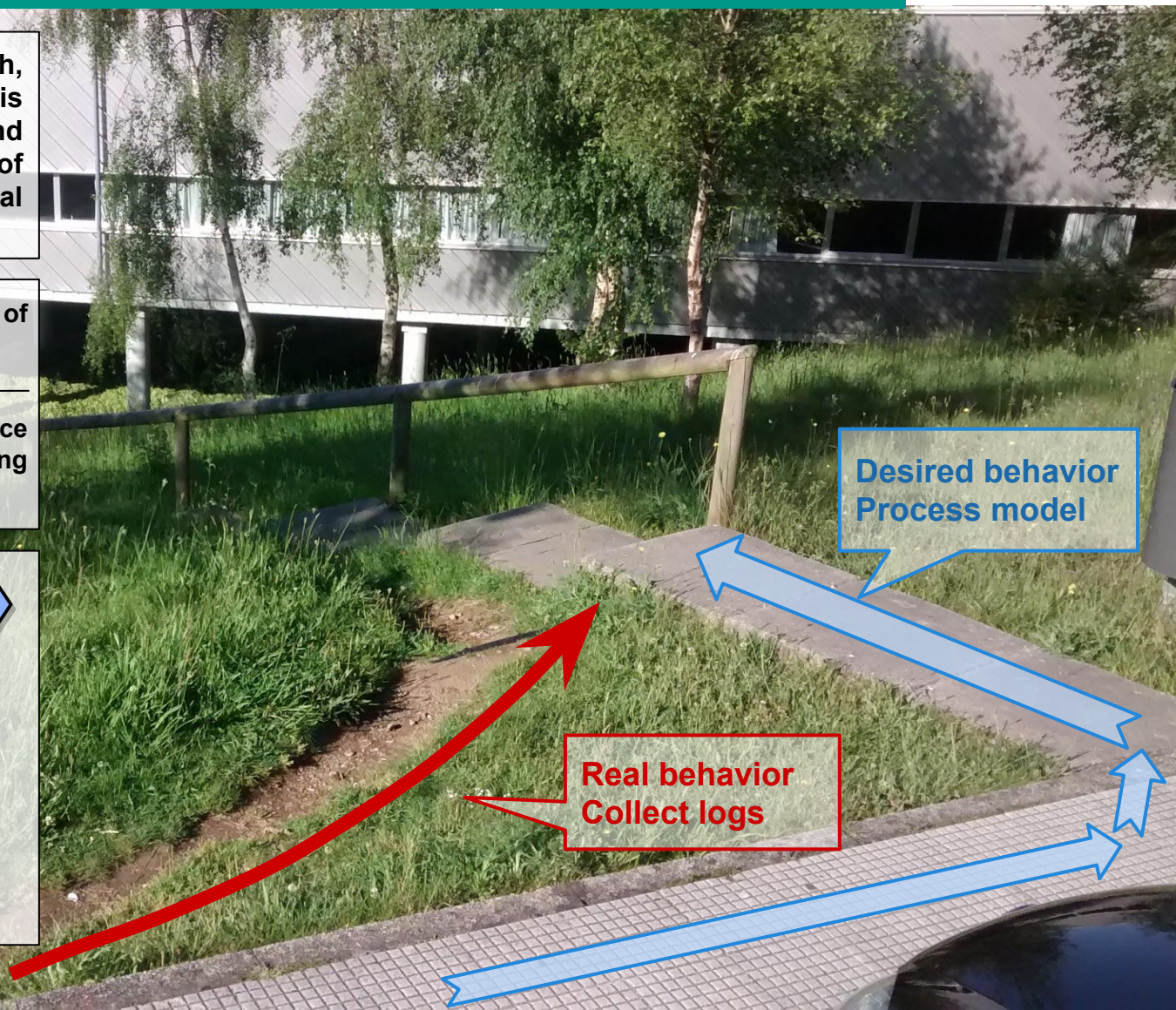
In some domains, such as eHealth, process monitoring is crucial. It is mandatory to control, check and verify the implementation of workflows as designed in actual scenarios.

OBJECTIVES

Improve expressiveness of current modeling languages.

Enhance results of conformance checking techniques using semantic information.





DESIGN OF ANTENNAS FOR BREAKTHROUGH RADIO SYSTEMS

by David Álvarez Outerelo , Ana Vázquez Alejos and Fran Díaz Otero

2017 WORKSHOP PhD STUDENT PROGRESS

THESIS OBJECTIVES:

Novel antenna designs with unforeseen features for three different frequency bands:

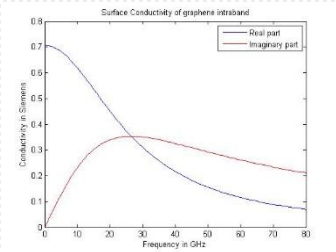
- **Millimeter** wave frequency band antennas (60GHz): 5G wireless systems require of large bitrate and massive density of devices. Miniaturized antennas of large gain jointly to a low side-lobe level (**SLL**) are required to equip devices with MIMO capability.
- **THz** frequency antennas: THz radio link must be doted of a high gain and minimum SLL to compensate the path losses of the high frequency channel.
- **Microwave** frequency band: the above experience is aimed to be combined to a quantum transmitter to improve the performance of this emerging radar technology for the 18GHz frequency band.

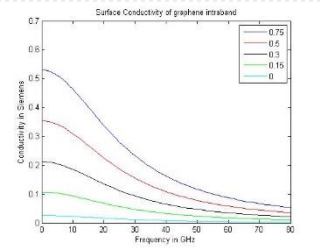
Analysis and characterization of the Graphene for its use in the design of millimeter and THz band antennas

$$\sigma(\omega,\mu_c,\gamma,T) = \sigma_{intra}(\omega,\mu_c,\gamma,T) + \sigma_{inter}(\omega,\mu_c,\gamma)$$

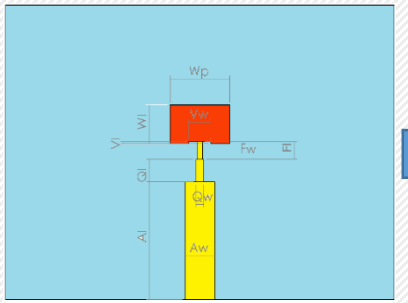
$$\sigma_{intra}(\omega,\mu_c,\gamma,T) = \frac{je_c^2 K_B T}{\pi\hbar^2(\omega - j2\gamma)}\left(\frac{\mu_c}{K_B T} + 2\ln\left(e^{\left(-\frac{\mu_c}{K_b T}\right)} + 1\right)\right)$$

$$\sigma_{inter}(\omega,\mu_c,\gamma) = \frac{-je_c^2}{4\pi\hbar}\ln\left(\frac{2|\mu_c| - (\omega - j2\gamma)\hbar}{2|\mu_c| + (\omega - j2\gamma)\hbar}\right)$$

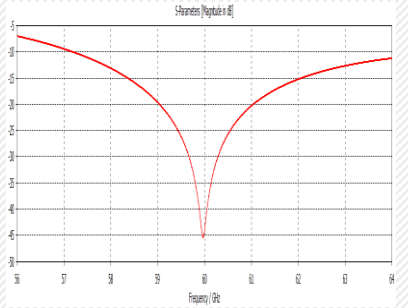


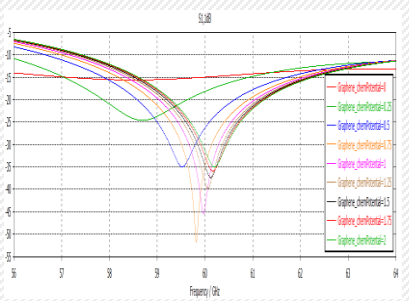


Simulation of an antenna design with Graphene for 5G band

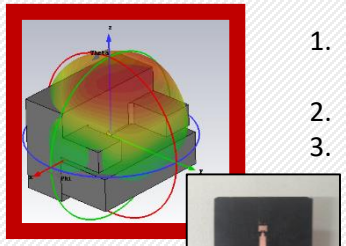


reconfiguration of the patch resonant frequency using a bias potential →





Analysis and characterization of the effects due to the material substrate and manufacturing process in the coplanar microstrip design of millimeter and THz band antennas.



1. Inaccurate value of relative dielectric permittivity ε_r:
2. Connector - feed line soldering:
3. Fabrication mechanical inaccuracies and errors.

Simulation of an antenna design for millimeter band using coupled microstrip line feeding