Centre de linguistique appliquée
UNIVERSITÉ DE FRANCHE-COMTÉ

Presenting Research Papers in English at a Colloquium

A Simulation at the CLA (Centre for Applied Linguistics)

Université de Franche-Comté

Lecture Hall Quemada

Monday 20th March and Monday 27th March 2017

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Monday 20th March – Programme

Each presentation will be followed by questions from the audience

5.25 pm *Doors open*

5.40 pm *Welcome and introduction*

5.45 – 6.10 pm *Quentin CUENOT, PhD student, Aquatic Ecology, Chrono-Environment Laboratory, UFR Sciences et Techniques, UBFC*

The Impact of Land Use on the Functions of Wetlands in Contrasting Fluvial Contexts

Rivers are the biggest source of fresh water for most humans and their activities. However, the development of these activities, like the intensification of agriculture, urbanization or industrial expansion, lead to serious alterations of the water quality. These alterations cause several environmental disorders which endanger biological diversity, limit access to safe water and cause risks to public health. Fluvial wetlands are a particular ecosystem which stand in the floodplain at the border of the main channel and terrestrial lands. Their fundamental ecological importance, which lies in the large diversity of habitats for species, is threatened by the deterioration of the water quality. This is especially worrying because it is essential that wetlands function well in order to ensure the stability of river dynamics and natural remediation. It's therefore important to understand why the processes in alluvial wetlands are critical to decrease the effects of pollution in rivers and how their functioning can improve environmental remediation and the efficiency of conservation practices.

6.15 – 6.40 pm *Thomas Schlinquer, PhD Student, Automatics, FEMTO-ST Institute, UBFC*

A New Power Source Idea for Animal Tracking

The mechanical structure optimization of a mechanical energy harvester is devoted to supplying embedded animal tracking devices. The harvester mechanical structure is composed of two elements: a piezoelectric layer and a plastic layer (i.e, an active and a passive one). The aim of this presentation is to present the process used to find the optimal ratio between their two thicknesses in order to maximize the yield of the structure. For that, we use a model linking the external mechanical excitation to the output electrical charge, and a gradient-based optimization is carried out. A comparison will be made with a widely used existing mechanical piezoelectric harvester which clearly demonstrates that the proposed structure allows a gain up to five times higher in terms of the yield for a lower overall thickness.

6.45 – 7.10 pm *Shinji Ozaki, PhD student, Ecology, Chrono-Environment Laboratory (UMR 6249), UBFC*

Functional Roles of Diet Diversity on Trace Metal Exposure in Mammals: The Case of a Generalist Rodent, the Wood Mouse.

Trace metals (TMs) are environmental pollutants for both humans and wildlife. In metal contaminated ecosystems, terrestrial vertebrates like mammals pick up the substances mainly from contaminated resources through eat-eaten relationships. Trophic levels along food chains have been considered as one of the key factors for determining TM contamination of given organisms. It is important to take into consideration the fact that the wildlife community structure is not straightforward. One trophic level is composed of several organisms whose responses to pollution are varied. However, the importance of community diversity within a given trophic level on the transfer of pollutant is still an on-going question. This presentation focuses on the relationship between exposures to TMs in wild rodents, in particular wood mice, and the diversity of their resources consumed as a biological model of the issues, which leads to new insights into the role of biodiversity played on metal pollution in territorial ecosystems.

7.10 pm *Break: Complimentary Refreshments*

7.25 – 7.50 pm *Mengjia Wang, PhD Student, Nano-optics, FEMTO-ST Institute, UBFC*

Subtle Control on Hierarchical Reflow for the Simple and Massive Fabrication of Biomimetic Compound Eye Arrays in Polymers

Unlike mankind, some insects have compound eyes which endow them with a remarkably large field of view as well as an amazing capability to track fast moving objects. By mimicking a natural compound eye, a biomimetic compound eye (BCE) is usually a convex lens with many micro-lenses regularly resting on its curved surface. In this study, a hierarchical reflow method is proposed to produce BCEs with a sub-millimeter size. This method smartly combines the established thermal reflow and chemical reflow techniques, offering great flexibility in tuning the geometries of both the curved base and upper ommatidia. The optical tests show a near-diffraction-limited optical performance of the produced BCEs, indicating their prospective applications in highly compact endoscopic or surveillance devices,as well as in wide-angle illuminating systems.

7.55 – 8.15 pm *Elizaveta Korzhova, PhD Student, Chemistry, UTINAM Institute, UBFC*

Membrane Modification by an Electrospray Deposition Method

A synthetic membrane is a synthetically created membrane which is intended for separation processes in laboratories or in industry. Since the middle of the 20th century, synthetic membranes have been successfully used for small and large-scale industrial processes. They can be produced from organic materials such as polymers and liquids, as well as inorganic materials. Most of the commercially used synthetic membranes in separation processes are made of polymeric structures. Moreover, membranes are modified by a lot of polymers for changing or improving different chemical properties. Expanding the range of modifiers has led to searching for new methods of modification. Therefore, as a result of this study, a new method for modifying membranes has been developed and tested. Electro-spray deposition involves coating the membrane surface with a hydrophobic polymer under the influence of an electric current.

8.15 – 8.30 pm *Closing Exchanges and Remarks*

Monday 27th March – Programme

Each presentation will be followed by questions from the audience

5.25 pm *Doors open*

5.40 pm *Welcome and introduction*

5.40 – 6.00 pm *Coralie Joucla, PhD student, Neuroscience, CIC-IT 1431, Inserm, CHRU Besançon, UBFC*

Neural Signature of Musical Preference during Auditory Imagery

Although one of the greatest motivations for listening to music is the pleasure elicited by this activity, little is known about the neural mechanisms that elicit our liking for a song. The ability to make predictions about the continuation of a song while listening to it is an important determinant of musical appreciation but is difficult to explore because the neural processing of ongoing music occurs at the same time as prediction processes are generated. To avoid this limitation, a possibility is to explore prediction processes not during the perception but during the imagination of music. We explored the neural mechanisms of musical appreciation in twenty healthy volunteers. As a first step, they were asked to listen to five unknown songs for two weeks. Subsequently, the songs judged to be the two most liked and the two least liked were selected. Neural correlates of musical preference were measured by electroencephalography whilst listening to these songs in which gaps of silence had been inserted. Several neuronal mechanisms related to the evaluation were highlighted. This study shows how our knowledge of the incoming stimulus forms the basis of a preference judgment.

6.05 – 6.25 pm *Thomas Piotrowski, PhD student, Computer Science, IRTES-SeT Laboratory, UBFC*

Geolocation via iBeacons

Today, geolocation of people and goods is crucial to ensure the best performance and quality of business processes, but the techniques employed are still inefficient indoors. In 2013, Apple introduced its iBeacon protocol, which consists of a Bluetooth Low Energy (BLE) device broadcasting a unique identifier, in order to provide the receiver with information about its position in the physical world. Typical usage of iBeacons includes delivering detailed information about a Point Of Interest in a specific location on a customer's smartphone. Since iBeacons have fixed positions in space and the power level of the signal emitted from the iBeacons is known, we can triangulate the position of the smartphone. This is why this study aims to test the use of these devices in order to provide indoor geolocation services to customers.

6.30 – 6.50 pm *Marion Lestienne, Phd student, Paleoecology, UMR6249, Chrono-Environment Lab, UBFC*

Variability of Wood Charcoal Assemblages of Boreal Soils in Relation to Forest Stands

Fire is the strongest perturbation factor in boreal forests and charcoal is a good indicator of fire events. The identification and analysis of this charcoal allows for the reconstruction of vegetation, climate, fire events and past human-environment interactions. The aim of this study is to quantify and qualify variations in the production of charcoal and to understand causes of these variations. This presentation focuses on two areas in western Quebec (Abitibi): a pine forest dominated by Jack Pine (Pinus banksiana) and Ericaceae, and a spruce forest dominated by Black Spruce (Picea mariana) and where sphagnum moss is abundant. Quantification and identification of wood charcoal samples showed spatial variation of charcoal production during forest fires. This study shows that anthracomass at the humus / mineral soil interface is significantly higher in the spruce forest than in the pine forest. Moreover, the majority of the identified charcoal fragments from the pine forest are angiosperms, whereas spruce charcoal dominates the spruce forest assemblage. No significant difference was found with regards to the abundance and composition of charcoal retrieved from the mineral soil. These results will be useful to predict the evolution of the boreal forest, to assist in making decisions about more sustainable forestry, and to better predict the consequences of fires on the carbon stock in terms of wood charcoal in soil.

7.10 pm *Break: Complimentary Refreshments*

7.05 – 7.25 pm *Tianxiang Gou, PhD student, Mathematics, Mathematics Laboratory (LMB), UBFC.*

The Existence and Orbital Stability of a Normalized Solution to the Coupled-Nonlinear Schrödinger System.

Various physical phenomena, such as the occurrence of phase separation in Bose-Einstein condensation with multiple states, or the propagation of a mutual incoherent wave pocket in nonlinear optics, are described as a coupled nonlinear Schrödinger system (Schrödinger system). A fundamental understanding of the Schrödinger system is acquired through the study of standing waves. Since the mass of the solution to the Schrödinger system can be conserved over time, it eventually leads us to investigate the existence and orbital stability of a normalized solution to a stationary Schrödinger system. A great deal of literature is devoted to considering the existence of normalized solution to the Schrödinger system in a lower dimension with the help of the Liouville Theorem. However, the Liouville Theorem does not hold anymore in a higher dimension, which gives rise to the notion that handling the existence of normalized solutions to the Schrödinger system in a higher dimension becomes more delicate.

7.30 – 7.50 pm *Marianne Sagnard, PhD student, Science for Engineering, FEMTO-ST Institute, UBFC*

Viscoelasticity and Dielectric Losses

For the past few decades, numerical simulation tools have been improved to enable more efficient designs of SAW devices. Therefore, many phenomena are now taken into account to more closely evaluate the behavior of such components in their actual environment. In keeping with previous studies, this paper raises the question of how current approximations -such as considering a piezoelectric material as a perfect dielectric- can lead to imprecisions in the computations. As a consequence, this study uses a physical model (Kelvin-Voigt internal damping) to take into account the internal behavior of the material under stress or strain. Furthermore, losses related to the polarization of the material and to residual conductivity in the piezoelectric material are no longer neglected. Following the implementation of software taking these phenomena into account, numerical simulations have been conducted and calculation/test correlations have been carried out. The comparison between a theoretical and an experimental Q factor of a quartz device has shown promising results.

7.55 – 8.15 pm *Rania Mezzi, PhD student, Automatics, FEMTO ST, UBFC*

Operating Conditions Optimization in Order to Extend the Fuel Cell Lifetime

Today, the usage of PEM Fuel Cells is on the increase both for stationary and transportation applications. This device provides high efficiency, fast start and good power density with zero CO2 emissions. However, durability, cost and reliability still remain technical barriers that delay the large scale commercialization of PEMFC. To tackle the durability issue, optimization of the operating conditions has been developed in order to extend the lifetime of the PEMFC. The reversible degradations are avoided and the ageing rate of components is reduced by the proposed technique which maintains the voltage close to an optimal reference range.

8.15 – 8.30 pm *Closing Exchanges and Remarks*

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