

# Curriculum Vitae

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Université Lille1  
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French  
Birthdate : 08 November 1973, married, 1 child.

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## Professional Experience

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**since 2003** : Associate Professor, University Lille1 59655 Villeneuve d'Ascq  
Member of the Laboratory of Electrical Engineering and Power Electronic,  
Member of the INRIA Mint project (<http://www.lifl.fr/mint/People/People>),  
Member of the IRCICA Stimtac Project (<http://www.ircica.univ-lille1.fr/>).

**2002–2003** : Assistant Professor – Polytech-Lille

**1999–2002** : PhD Student, University Lille1

**1997–1999** : Professor of Electrical engineering, Beirut, Lebanon.

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## Education

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**1999-2002** : PhD Student University Lille1,  
*Modelling and Control of Travelling Wave Ultrasonic Motors.*

**1996-1997** : Master in Electrical Engineering, speciality « Electrical systems » ENSEEIHT - INPT  
Toulouse (France).

**1996** : French Agrégation in Electrical Engineering. Rank 2nd.

**1993-1996** : École Normale Supérieure de Cachan  
: Département EEA.

1995 : Master Electrical Engineering and control – Paris XI Orsay (France)

1994 : Licence in Electrical Engineering – Paris XI Orsay (France)

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## Appraisal

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**PhD Thesis** : Valentin Bolborici, "Modeling of the Stator of Piezoelectric Traveling Wave Rotary Ultrasonic Motors", University Toronto (CA –2009)  
Clément Nadal, "Contribution à la modélisation et la conception de transformateurs piézoélectriques dédiés à la génération de plasma", INP Toulouse (FR – 2011)

**Reviewing** : Reviewer of the french ANR COSINUS PProgram  
Reviewer of several journal among which : IEEE TUFFC, ISA Transactions, ...

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## Graduate Student Supervision

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**PhD Students** : 6 Students co supervised with Pr Betty lemaire-Semail from 2001 to 2011  
**Master Students** : 5 students supervised from 2005 to 2011.

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## Scientific Activities

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**Modeling and control of piezoelectric motors** : This activity is dedicated to the control of piezoelectric motors. The methodology is based on original causal modelling of the electromechanical conversion process, which gives rise to original control algorithm. Our research helped to reach accurate and robust behaviour of the motor. This methodology has been described in a book chapter (editor : hermes science publication, to be published), and we also proposed a tutorial on "modelling and control of traveling wave ultrasonic motors" to the EPE2011 attendees (conference in power electronic). We apply results from this work on mecatronic applications, to improve stability and accuracy of position or speed controls using piezoelectric motors. This research has been funded by to research contract with french companies : Thales(2002) and Sagem Defense and security (2004-2007). We also try to use piezoelectric motors in force-feedback applications, and we participate to the ANR *Reactive* which aims at using force-feedback devices to help stroke patients to recover (<http://reactive.berck-handicap.com/>).

**Tactile Stimulators** : In 2004, University Lille1 started a project around the tactile stimulators. We organized a conference on the touch interactions, which launched this activity in Lille. Today, we propose our own tactile stimulator, named StimTac, which is like a Laptop Touchpad, but which can simulate the touch of programmable grooved surfaces. Two patents are pending on that device. This research is funded by INRIA through the Mint Project, and the IRCICA through the Stimtac Project. It is also funded by contract with ST-Crolles through the 3D-Touch Project (<http://www.generation-nt.com/stmicroelectronics-stouch-concept-ecran-tactile-actualite-1215501.html>)

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## Miscellaneous and awards

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Member of the organizing committee of International conferences : EPE2013(<http://www.epe2013.com/>), IEEE VPPC 2011 (<http://vppc2010.univ-lille1.fr/>).

Member of the organizing committee of International Workshop and summer schools on *Modeling and control using Energetic Macroscopic Representation*.

Scientific Coordinator of the Work Package "Specific interfaces" of the ANR TECSAN *Reactive*

Best demo award at the 2011 UIST Conference [16] and honorable paper award at the 2011 CHI conference [25].

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## Scientific publication (alphabetical order)

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## International Journals

- [1] Mélisande BIET, Frédéric GIRAUD et Betty LEMAIRE-SEMAIL : Squeeze film effect for the design of an ultrasonic tactile plate. *IEEE Transactions on Ultrasonic, Ferroelectric and Frequency Control*, 54(12):2678 – 2688, dec 2007.
- [2] Mélisande BIET, Frédéric GIRAUD et Betty LEMAIRE-SEMAIL : Implementation of tactile feedback by modifying the perceived friction. *The European Physical Journal - Applied Physics*, 43(1):123–135, jul 2008.
- [3] Zheng DAÏ, Frédéric GIRAUD et Betty LEMAIRE-SEMAIL : Modélisation globale de l’interface mécanique d’un actionneur piézoélectrique à onde progressive. *European Journal of Electrical Engineering*, 13(3):261–282, june 2010.
- [4] Frédéric GIRAUD, Michel AMBERG, Romuald VANBELLEGHEM et Betty LEMAIRE-SEMAIL : Power consumption reduction of a controlled friction tactile plate. In Astrid KAPPERS, Jan van ERP, Wouter BERGMANN TIEST et Frans van der HELM, éditeurs : *Haptics : Generating and Perceiving Tangible Sensations*, volume 6192 de *Lecture Notes in Computer Science*, pages 44–49. Springer Berlin / Heidelberg, 2010.
- [5] Frédéric GIRAUD et Betty LEMAIRE-SEMAIL : Causal modeling and identification of a travelling wave ultrasonic motor. *The European Physical Journal - Applied Physics*, 21(2):151–159, feb 2003.
- [6] Frédéric GIRAUD et Betty LEMAIRE-SEMAIL : A torque estimator for a travelling wave ultrasonic motor – application to an active claw. *IEEE Transactions on Ultrasonic, Ferroelectric and Frequency Control*, 53(8):1468–1477, aug 2006.
- [7] Frédéric GIRAUD, Betty LEMAIRE-SEMAIL, Julien ARAGONES, Jacques ROBINEAU et Jean-Thierry AUDREN : Precise position control of a travelling wave ultrasonic motor. *IEEE Transactions on Industry Applications*, 43(4):934–941, jul 2007.
- [8] Frédéric GIRAUD, Betty LEMAIRE-SEMAIL, Julien ARAGONES, Jacques ROBINEAU et Jean-Thierry AUDREN : Stability analysis of an ultrasonic motor for a new wave amplitude control. *IEEE Transactions on Industry Applications*, 45(4):1343–1350, aug 2009.
- [9] Frédéric GIRAUD, Betty LEMAIRE-SEMAIL et Jean-Thierry AUDREN : Analysis and phase control of a piezoelectric traveling-wave ultrasonic motor for haptic stick application. *IEEE Transactions on Industry Applications*, 40(6):1541–1549, nov 2004.
- [10] Frederic GIRAUD, Paul SANDULESCU, Michel AMBERG, Betty LEMAIRE-SEMAIL et Florin IONESCU : Modeling and compensation of the internal friction torque of a travelling wave ultrasonic motor. *Haptics, IEEE Transactions on*, 4(4):327 –331, july-aug. 2011.
- [11] Betty LEMAIRE-SEMAIL et Frédéric GIRAUD : *Sciences et Technologies pour le Handicap*, volume 2, chapitre Dispositifs à frottement variable pour le retour tactile, pages 115–129. Hermès, 2009.
- [12] François PIGACHE, Frédéric GIRAUD et Betty LEMAIRE-SEMAIL : Modèle mécanique linéaire et causal d’un actionneur piézoélectrique plan. *Revue Internationale de Génie Electrique*, 8(4):453–481, jan 2005.
- [13] François PIGACHE, Frédéric GIRAUD et Betty LEMAIRE-SEMAIL : Modelling and identification of a planar standing wave ultrasonic motor. *The European Physical Journal - Applied Physics*, 34(1):55–65, jan 2006.
- [14] Peter SERGEANT, Frédéric GIRAUD et Betty LEMAIRE-SEMAIL : Geometrical optimization of an ultrasonic tactile plate for surface texture rendering. *Sensors and Actuators : A Physical*, 191(1–2):91–100, june 2010.

- [15] Tao ZENG, Frédéric GIRAUD, Betty LEMAIRE-SEMAIL et Michel AMBERG : Analysis of a new haptic display coupling tactile and kinesthetic feedback to render texture and shape. In Astrid KAPPERS, Jan van ERP, Wouter BERGMANN TIEST et Frans van der HELM, éditeurs : *Haptics : Generating and Perceiving Tangible Sensations*, volume 6192 de *Lecture Notes in Computer Science*, pages 87–93. Springer Berlin / Heidelberg, 2010.

### International Conference

- [16] Michel AMBERG, Frédéric GIRAUD, Betty LEMAIRE-SEMAIL, P. OLIVO, Géry CASIEZ et Nicolas ROUSSEL : Stimtac, a tactile input device with programmable friction. In *Extended proceedings of UIST'11, the 24th ACM Symposium on User Interface Software and Technology*, 2011. Best Demo Award (second place).
- [17] Pierre-Jean BARRE, Alain BOUSCAYROL, Philippe DELARUE, Eric DUMETZ, Frédéric GIRAUD, Jean-Paul HAUTIER, Xavier KESTELYN, Betty LEMAIRE-SEMAIL et Eric SEMAIL : Inversion-based control of electromechanical systems using causal graphical descriptions. In *IEEE 32nd Annual Conference on Industrial Electronics, IECON 2006*, pages 970–975, Paris, nov 2006.
- [18] Melisande BIET, Loïc BOULON, François MARTINOT, Frédéric GIRAUD et Betty LEMAIRE-SEMAIL : Using an ultrasonic transducer : Evidence for an anisotropic deprivation of frictional cues in microtexture perception. In *WorldHaptics, The Second Joint Eurohaptics Conference and Symposium on Haptic Interfaces for Virtual Environment and Teleoperator Systems*, pages 385–390, mar 2007.
- [19] Melisande BIET, Géry CASIEZ, Frédéric GIRAUD et Betty LEMAIRE-SEMAIL : Discrimination of virtual square gratings by dynamic touch on friction based tactile displays. In *Haptic Interfaces for Virtual Environment and Teleoperator Systems (part of IEEE-VR)*, pages 41–48, Reno (USA), mar 2008.
- [20] Melisande BIET, Frédéric GIRAUD, François MARTINOT et Betty LEMAIRE-SEMAIL : A piezoelectric tactile display using travelling lamb wave. In *EUROHAPTICS 2006*, pages 567–570, jul 2006.
- [21] Mélisande BIET, Frédéric GIRAUD et Betty LEMAIRE-SEMAIL : New tactile devices using piezoelectric actuators. In *10th international conference on new actuators (ACTUATOR'06)*, Brème, jul 2006.
- [22] Alain BOUSCAYROL, Antoine BRUYÈRE, Philippe DELARUE, Betty LEMAIRE-SEMAIL, Frédéric GIRAUD, Yvonick LE-MENACH, Walter LHOMME et Fabrice Locment F : Teaching drive control using energetic macroscopic representation - initiation level. In *EPE Conference 2007*, Aalborg, sep 2007.
- [23] Marc BUDINGER, Frédéric GIRAUD, Bertrand NOGARÈDE, Jean-François ROUCHON et Betty LEMAIRE-SEMAIL : Feeding and control electronic of a piezoelectric actuator. In *9th international conference on new actuators (ACTUATOR'02)*, jun 2002.
- [24] Géry CASIEZ, Nicolas ROUSSEL, Romuald Van BELLEGHEM et Frédéric GIRAUD : Efficacité et robustesse aux distracteurs d'un retour tactile pour faciliter le pointage. In ACM PRESS, éditeur : *22ième conférence sur l'interaction Homme-Machine (IHM 2010)*, pages 25–32, sep 2010.
- [25] Géry CASIEZ, Nicolas ROUSSEL, Romuald VANBELLEGHEM et Frédéric GIRAUD : Surfpad : riding towards targets on a squeeze film effect. In *CHI 2011 - ACM Human Factors in computing systems*, 2011. Honorable Mention Paper Award.
- [26] Zheng DAÏ, Frédéric GIRAUD et Betty LEMAIRE-SEMAIL : Force feedback operations with a traveling wave ultrasonic motor. In *10th international conference on new actuators (ACTUATOR'06)*, Brème, jul 2006.

- [27] Zheng DAI, Frédéric GIRAUD, Betty LEMAIRE-SEMAIL et François MARTINOT : A force feedback device actuated by piezo-electric travelling wave ultrasonic motors. *In 10th international conference on new actuators (ACTUATOR'06)*, Brême, jul 2006.
- [28] Frédéric GIRAUD : Practical considerations in ultrasonic motor selection. *In EPE-PEMC*, Ohrid, sep 2010.
- [29] Frédéric GIRAUD, Michel AMBERG et Betty LEMAIRE-SEMAIL : Control of a haptic interface actuated by ultrasonic motors. *In EPE-PEMC*, Ohrid, sep 2010.
- [30] Frédéric GIRAUD, Mélisande BIET et Betty LEMAIRE-SEMAIL : Advances in the development of a new force-feedback tactile device. *In 11th international conference on new actuators (ACTUATOR'08)*, jun 2008.
- [31] Frédéric GIRAUD et Betty LEMAIRE-SEMAIL : Position control of a small travelling wave ultrasonic motor. *In 9th international conference on new actuators (ACTUATOR'04)*, jun 2004.
- [32] Frédéric GIRAUD, Betty LEMAIRE-SEMAIL, Julien ARAGONES, Jacques ROBINEAU et Jean-Thierry AUDREN : Precise position control of a travelling wave ultrasonic motor. *In IEEE Transactions on Industry Applications*, volume 3, pages 1548–1554, oct 2005.
- [33] Frédéric GIRAUD, Betty LEMAIRE-SEMAIL, Julien ARAGONES, Jacques ROBINEAU et Jean-Thierry AUDREN : Stability analysis of an ultrasonic motor for a new wave amplitude control. *In IAS'42 Annual Meeting*, sep 2007.
- [34] Frédéric GIRAUD, Betty LEMAIRE-SEMAIL et Jean-Thierry AUDREN : Analysis and control of a piezo-electric travelling wave ultrasonic motor for haptic stick application. *In Conference Record of the 38th IAS Annual Meeting*, volume 1, pages 380–386, oct 2003.
- [35] Frédéric GIRAUD, Betty LEMAIRE-SEMAIL et Alain BOUSCAYROL : Modelling and control of an ultrasonic motor : Application to a mechanical claw drive. *In IEEE 32nd Annual Conference on Industrial Electronics, IECON 2006*, pages 970–975, Paris, nov 2006.
- [36] Frédéric GIRAUD, Betty LEMAIRE-SEMAIL et Zheng DAI : Modelling and control of a twum using causal ordering graph. *In Electrimacs 2008*, june 2008.
- [37] C. GIRAUD-AUDINE et F. GIRAUD : Preliminary feasibility study of a speed estimator for piezoelectric actuators used in forging processes. *In Power Electronics and Applications (EPE 2011), Proceedings of the 2011-14th European Conference on*, pages 1–10, 30 2011-sept. 1 2011.
- [38] Betty LEMAIRE-SEMAIL, Zheng DAI et Frédéric GIRAUD : Piezo-actuators for force feedback in human-computer interfaces : advantages and drawbacks with regard to electromagnetic actuation. *In EPE Conference 2007*, sep 2007.
- [39] Gaston M'BOUNGUI, Betty LEMAIRE-SEMAIL et Frédéric GIRAUD : Friction control with a piezoelectric actuator. *In EPE Conference*, Barcelone, sep 2009.
- [40] Gaston M'BOUNGUI, Betty LEMAIRE-SEMAIL et Frédéric GIRAUD : Piezoelectric actuator for a force-feedback application : preliminary evaluation. *In Symposium on Haptic Interfaces for Virtual Environment and Teleoperator Systems*, pages 85–90, Salt Lake City, mar 2009.
- [41] François PIGACHE, Betty LEMAIRE-SEMAIL, Frédéric GIRAUD et Alain BOUSCAYROL : Control of a piezo-electric actuator for adjustable brake in haptic devices. *In EPE 2005*, 2005.

## Patent

- [42] Michel AMBERG, Frédéric GIRAUD et Betty LEMAIRE-SEMAIL : Interface tactile vibrante transparente. European Patent pending, may 2011.

- [43] Mélisande BIET, Frédéric GIRAUD et Betty LEMAIRE-SEMAIL : Interface tactile vibrante. European Patent N EP1956466 (A1), aug 2008.