

PhD position available at University College Cork, Ireland

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PhD Position in "Modelling & Design of Injection-Locked Frequency Dividers (ILFD)"

A three year PhD position in Microelectronic Engineering is available at the University College Cork, starting in October 2006.

For this project we look for an outstanding PhD student able to undertake the challenge of an advanced mathematical modelling whose results will have straightforward implications in modern telecommunications.

PROJECT DESCRIPTION

Core elements of modern mobile communication devices are the frequency synthesizers, which set and control the communication frequency. Given the high frequencies at which modern wireless communication take place, they are also the critical component for the power budget of portable communications devices, determining, almost by themselves, the battery lifetime.

Nowadays, injection-locked frequency dividers (ILFD) offer great hope for lowering the power consumption of frequency synthesizers. However, due to an incomplete theory, ILFD are currently designed using a combination of heuristics and extensive simulations, preventing their widespread use. In particular, key problem for designers is to determine a priori the range of frequencies (locking range) over which the ILFD will operate.

In this project, the methodological design of ILFD will be addressed resorting to the nonlinear mathematical modelling of the basic circuitry, leading to better designs and ultimately longer battery lives for portable wireless systems.

Starting from simple models of the ILFD circuitry, the candidate will combine analytical and numerical nonlinear bifurcation analysis to investigate the externally induced singularities, which may a priori justify the frequency locking ranges.

Afterwards, by combining normal form theory and averaging techniques, the candidate will extrapolate a priori rules for

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predicting the structural stability limits of the circuit parameters (components values), i.e. the maximal parameter drift under which the behaviour of the circuitry remains compatible with the required one. Finally, in order to seriously ground the theoretical results in the experimental evidence, the candidate will address the design of an experimental setup in order to compare the theoretical predictions with the experimental results.

WE REQUIRE

The ideal candidate has an MSc in electrical and/or automatic control engineering, applied mathematics, or physics, with basic knowledge in nonlinear dynamics. Knowledge in computational methods for dynamical system analysis would be an asset.

We expect the candidate to work on the aforesaid project mostly independently, however under the regular supervision of a Lecturer.

WE OFFER

An excellent working environment, within an exciting team at the core of the best Irish University of the last three years.

To achieve the PhD title working on a challenging mathematical modelling problem, with real implications in modern telecommunications, and interacting with industry.

To be formed, among other things, in applied analysis of nonlinear dynamical systems, one of the hottest topics in mathematical engineering.

A competitive PhD fellowship of 16,000 ? p.a., tax and PhD registration fees exempt.

TO APPLY

Applications that are complete by June 1st, 2006, will be given full consideration, although the search will continue until the position is filled. Forecasted starting date: October 1, 2006.

The applicants should send a motivation letter, a CV, including the list of publications, and the contacts of 3 reference persons to Dr.

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