



**University of Pavia**

**Ph.D. School of Electrical and Electronics Engineering and Computer Science  
Ph.D. School in Microelectronics**

## **SEMINAR**

### **A 2-16 GHz Stepped Frequency Integrated Radar for Breast Cancer Diagnostic Imaging in 65nm CMOS**

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Aula Seminari piano D, ex Dip. Elettronica

**Abstract:** Over the last few years, a significant growth of the research involving the use of microwaves to image the human body has been taking place. Among the many examples of ongoing research, the use of microwaves for breast cancer diagnostic imaging has seen an increasing interest. Breast cancer is one of the most incident tumors among the female population, but 95% cure rates are possible if it is detected in its early stages. Thus, early diagnosis is a key factor in delivering long-term survival of breast cancer patients. Microwave radar imaging can effectively complement conventional diagnostic techniques, e.g. X-ray, MRI, ultrasound, yielding higher sensibility and specificity, lower cost, and smaller size, hence emerging as an enabling technology for mass screening programs. In this talk, the design of an integrated microwave imaging radar transceiver for the diagnostic screening of breasts cancer is presented. A custom integrated circuit was implemented in a 65-nm CMOS technology. The radar operates on the broad frequency range from 2 to 16GHz with a dynamic range of 107dB. Imaging experiments carried out on a realistic breast phantom show that the system is capable of detecting tumor targets with a resolution of 3mm. The talk presents innovative circuit solutions addressing the challenges set by the ultra wideband frequency range of operation of the transceiver. Due to their broadband operation, such design techniques may find application in other wideband systems.

**Bio:** Andrea Bevilacqua received the Laurea, and Ph.D. degrees in electronics engineering from the University of Padova, Padova, Italy, in 2000, and 2004, respectively. Currently, he is an Assistant Professor with the Department of Information Engineering, University of Padova. His current research interests include the design of RF/microwave integrated circuits and the analysis of wireless communication and radar systems. Dr. Bevilacqua has been serving as a member of the TPC of IEEE ESSCIRC since 2007, and was TPC Co-Chair of IEEE ESSCIRC 2014. He was a member of the TPC of IEEE ICUWB from 2008 to 2010. He was an Associate Editor of IEEE TCAS-II from 2011 to 2013 and was nominated “Best Associate Editor” for TCAS-II for 2012 to 2013. He is author or coauthor of about 60 papers, published in international journals and conference proceedings, and he holds 2 patents.

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