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## Professors Kinget, Kymissis and Wright Receive NSF Grant to Research Scanning and Filtering Technologies for Future Cognitive Radios



Prof. [Peter Kinget](#) ([/peter-kinget](#)), Prof. [John Kymissis](#) ([/ioannis-john-kymissis](#)) and Prof. [John Wright](#) ([/john-wright](#)) have received a \$750,000 grant from the National Science Foundation (NSF) "Enhancing Access to the Radio Spectrum" (EARS) Program for their research project entitled "Low-Power, Multi-Tiered, Shared-Spectrum Access Terminals using Compressive Scanning and On-Top-of-CMOS BAW Filter Banks." The project is in collaboration with Dr. Ariela Zeira from InterDigital Communications.

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As wireless systems continue to proliferate and the demand for instantaneous, over-the-air access to large volumes of content continues to grow, radio spectrum (especially in the 500MHz–6GHz range) is an increasingly scarce resource. Most of the useful spectrum has been licensed. A few license-free bands are crowded to capacity, while many licensed bands are underutilized. Cognitive radios propose to scan and opportunistically share spectrum. They have the potential for expanding the available spectrum through opportunistic use, if conflict can be sensed and avoided by continuously monitoring higher priority traffic. This requires agile, low-power solutions for spectrum scanning and bandwidth aggregation receivers.

This project studies these challenges in the context of a multi-tiered shared-spectrum access communication system. It focuses on tier-3 cognitive radio terminals that scan and dynamically use radio spectrum that is underutilized by higher tier users. It proposes novel bandpass compressed spectrum scanner architectures and recovery algorithms, that promise to substantially reduce power consumption and scan time compared to existing solutions. To enable interference-robust, reconfigurable receiver architectures with noncontiguous bandwidth aggregation, reconfigurable arrays of bulk acoustic wave devices fabricated on top of CMOS will be investigated.

The industrial partnership with InterDigital Communications provides system and application knowledge, as well as system integration expertise to test and evaluate the innovations. The cross-disciplinary research questions are important for broadband RF systems in general, and the proposed solutions will have impact beyond multi-tiered cognitive radio systems.

Details on the research grant are available [here](http://www.nsf.gov/awardsearch/showAward?AWD_ID=1343282&HistoricalAwards=false) ([http://www.nsf.gov/awardsearch/showAward?AWD\\_ID=1343282&HistoricalAwards=false](http://www.nsf.gov/awardsearch/showAward?AWD_ID=1343282&HistoricalAwards=false)). The collaborative research will be conducted in the [Analog and RF IC Design Research Group](http://www.cisl.columbia.edu/kinget_group) ([http://www.cisl.columbia.edu/kinget\\_group](http://www.cisl.columbia.edu/kinget_group)) (Prof. Kinget), the [Columbia Laboratory for Unconventional Electronics](http://www.kymissis.columbia.edu) (<http://www.kymissis.columbia.edu>) (Prof. Kymissis), the [Research Group](http://www.columbia.edu/~jw2966/) (<http://www.columbia.edu/~jw2966/>) of Prof. John Wright, and [InterDigital Corp](http://www.interdigital.com) (<http://www.interdigital.com>).

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