

# Electrical/Computer Engineering Design Project Proposal

**Title:** *Spectrum Sensing and Awareness for Emerging Cognitive Radio Systems*

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## **Description**

Cognitive Radio (CR) is an emerging concept designed to enable dynamic access to the frequency spectrum and the reuse of licensed frequencies under specific conditions that no harmful interference be caused to the incumbent licensed users of the spectrum.

An important characteristic of the CR systems is the efficient and reliable sensing of the electromagnetic environment, including estimation of the spectrum which can be used by alternative radio systems that operate at the same time and in the same frequency bands. CR is an environment-aware radio, which acquires information on the spectrum occupancy, user profiles, etc., in order to adapt to it. As such, spectrum awareness also represents a unique characteristic and challenge of the CRs, and encompasses signal classification and parameter estimation among others.

The objective of this project is to design and test the spectrum sensing and awareness CR functionality. The performance will be verified through both software and hardware experiments. For the hardware experiments, Keithley vector signal generators and analyzers available through IRIF and CFI funding, will be employed.

## **Roles**

The project is suitable for three or four students, which can be either Computer or Electrical Engineering students with interest in the area of (wireless) communications. The Term 4 and 7 courses on Signals and Systems and Term 6 course on Principles of Communications are required. Term 6 Communications Networks course and Term 8 Digital Communications and Wireless Communications courses would be preferred.

Each student will have a specific role in the project, related to the transmitter and receiver design (for both software and hardware experiments).