COURSE	Name	: Software Defined Radio
	Code	: EE185537
	Credit(s)	: 2
	Semester	: (Elective Course)

Description of Course

This course discusses the principles and techniques of digital radio systems, software-defined radio (SDR), cognitive radio and software radio. To support the understanding of the problem and the SDR design, basic RF system design and receiver and transmitter architecture will be studied, followed by a discussion of various platforms for building SDR and radio software along with sampling rate design. Next, students will study various concepts and approaches to cognitive radio systems and architectures that have been proposed, followed by radio cognitive networks and dynamic spectrum access. Students will also simulate and implement a system learned on SDR software and platforms available in the laboratory, namely WARP and Ettus.

Learning Outcomes

Knowledge

(P01) Mastering the concepts and principles of science in a comprehensive manner, and to develop procedures and strategies needed for the analysis and design of systems related to the field of power systems, control systems, multimedia telecommunications, electronics, intelligent multimedia network, or telematics as a preparation for further education or professional career.

Specific Skill

(KK01) Being able to formulate engineering problems with new ideas for the development of technology in power systems, control systems, multimedia telecommunications, electronics, intelligent multimedia network, or telematics.

General Skill

(KU11) Being able to implement information and communication technology in the context of execution of his/her work.

Attitude

(S09) Demonstrating attitude of responsibility on work in his/her field of expertise independently.

Course Learning Outcomes

Knowledge

Mastering the concepts and principles of software defined radio both as transmitters and receivers as well as concepts and techniques on cognitive radio.

Specific Skill

Able to design transmitter and receiver systems with software defined radio and analyze its performance and able to design cognitive radio systems.

General Skill

Able to use software and tools to implement and simulate defined-radio and radio cognitive software with Matlab, WARP and Ettus.

Attitude

Demonstrating attitude of responsibility for work in his/her area of expertise independently.

Main Subjects

1. Introduction to software defined radio and cognitive radio
2. Fundamentals of RF design and wireless communication systems
3. Receiver architecture
4. Transmitter architecture
5. Digital radio system
6. Software-defined radio and radio software
7. Basics of cognitive radio
8. Spectrum sensing
9. Cognitive radio network
10. Dynamic spectrum access

Reference(s)

[1] Behzad Razavi, “RF Microelectronics,” 2nd ed., Prentice Hall, 2012.
[2] Tony J. Rouphael, “RF and Digital Signal Processing for Software-Defined Radio: A Multi-Standard Multi-Mode Approach,” Elsevier, 2009.
[3] Charles W. Bostian, Nicholas J. Kaminski & Almohanad S. Fayed, “Cognitive Radio Engineering,” Scitech, 2016.
[4] Ezio Biglieri et al., “Principles of Cognitive Radio,” Cambridge University Press, 2013.

Prerequisite(s)

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