DEPARTMENT OF
ELECTRONICS AND COMMUNICATION ENGINEERING

Faculty of Engineering and Technology, SRM

DESIGN PROJECT PROPOSAL FORM

Project Title : **Wideband spectrum sensing using subnyquist techniques for Cognitive Radio Networks**

Supervisor/Guide : **Mr. M.Aravindan**
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Background/Literature Review:

This paper presents the design proposal for detecting the unoccupied band in a wideband RF spectrum using the compressive sensing with subnyquist techniques for cognitive radio networks.

References:

1. Advances on Spectrum Sensing for Cognitive Radio Networks: Theory and Applications Abdelmohsen Ali, Student Member, IEEE, and Walaa Hamouda, Senior Member, IEEE

2. Tianyi Xiong, Student Member, IEEE, Hongbin Li, Senior Member, IEEE, Peihan Qi, and Zan Li, Senior Member, IEEE- "Pre-Decision for Wideband Spectrum Sensing with Sub-Nyquist Sampling"

Objective:

To determine the unoccupied RF band by using wideband sensing and to use them in wireless communication to prevent spectral wastage.

Requirements:

1) Matlab R2017a

Technical Requirements:

Engineering standards and realistic constraints in these areas:

Area	Codes & Standards / Realistic Constraints
Economic	Targeted to reduce Spectral Wastage and hence helps in economic sustainability.
Environmental	This project is not expected to entail any particular environmental consequences.
Social	This project aims for making wireless communications more efficient , hence leads to the betterment of the society.
Ethical	This project is not expected to entail ethical constraints.
Health and Safety	This project is not expected to entail health and safety constraints except in the use of lead-bearing solder in its assembly .
Manufacturability	This project must be easily replicated. This requires *complete* schematics, *complete and documented* code listings, and use of the MATLAB (R2017a) software available in the networking Lab.
Sustainability	The Project uses only code listings in MATLAB and hence the software can be reused.

Realistic Constraints:

1)Sparsity levels may change . A primary user can occupy a band at any time. So unwanted changes in the signal level can occur.
2)If Channel State Information (CSI) is not known, then the presence of Primary Users cannot be detected.

Deliverables:

1)Wideband spectrum sensing will be executed and the result whether the primary user is presented or not in the spectrum will be shown in MATLAB

Standards Referred/used:

1)GSM (IEEE 802.21)
GSM (Global System for Mobile communication) is a digital mobile telephony system that is widely used in Europe and other parts of the world. GSM uses a variation of time division multiple access (TDMA) and is the most widely used of the three digital wireless telephony technologies (TDMA, GSM, and CDMA)

2)WiMAX (IEEE 802.16e)
4G is the fourth generation of broadband cellular network technology, succeeding 3G. A 4G system must provide capabilities defined by ITU in IMT Advanced. Potential and current applications include amended mobile web access, IP telephony, gaming services, high-definition mobile TV, video conferencing, and 3D television.

Abstract:

Cognitive radio(CR) communications have recently emerged as a reliable and effective solution due to underutilization problem in the given radio spectrum. Nowadays Cognitive radio networks are extensively used because of their ability to produce reliable and efficient service. Spectrum sensing provides the essential information to enable this interweave communications in which primary and secondary users are not allowed to access the medium concurrently. In this project, we will be implementing a model that can be used to sense the unused RF bands by measuring their energy levels using power spectral density techniques.We will be using wideband sensing techniques that uses sub nyquist frequencies (frequencies that are below the Nyquist frequency). In this way we can detect the unused spectrum and hence reduce spectral wastage and improve spectral efficiency by accommodating the licensed secondary users.

Additional Requirements:

(Multidisciplinary tasks –Mechanical, instrumentation, electrical, Computational /IT involved)

This project involves software works in Matlab R2017a version.

Other Department	Utilised for	Remarks
Basic Sciences		
Mechanical Engineering		
Instrumentation and Control Engineering		
Electrical and Electronics Engineering		
Computational/IT	Matlab R2017a	
Biomedical Engineering		
Purchase Section		
Maintenance Department		
Desktop publications	Report	

ABET Design Project Summary

Project Title	Objective of the Project	Realistic constraints imposed	Standards to be referred/followed	Multidisciplinary tasks involved
Wideband spectrum sensing using sub Nyquist techniques for cognitive radio networks	To determine the unoccupied band by using wideband sensing and cognitive radio and to use them in wireless communication to prevent spectral wastage.	1)Sparsity levels may change . A primary user can occupy a band at any time. So unwanted changes in the signal level can occur. 2) Channel State Information should be known	1)GSM (IEEE 802.21) 2)WiMAX (IEEE 802.16e)	1)Computational and IT field for MATLAB 2)Desktop publication for report.