IITB-Monash Research Academy

An Indian-Australian research partnership

Indian Institute of Technology Bombay | MONASH University

Project Title:	**Antennas for TV White Space Band For High Speed WiFi**	
Project Number	**IMURA0738**	
Monash Main Supervisor (Name, Email Id, Phone)	Dr. Nemai Chandra Karmakar (Associate Professor) nemai.karmakar@monash.edu	*Full name, Email*
Monash Co-supervisor(s) (Name, Email Id, Phone)		
Monash Head of Dept/Centre (Name,Email)	Tom Drummond tom.drummond@monash.edu	*Full name, email*
Monash Department:	Department of Electrical and Computer Systems Engineering	
Monash ADRT (Name,Email)	Emanuelle Viterbo	*Full name, email*
IITB Main Supervisor (Name, Email Id, Phone)	Prof. Girish Kumar, Electrical Engg. Dept., IIT Bombay. Email – gkumar@ee.iitb.ac.in,	*Full name, Email*
IITB Co-supervisor(s) (Name, Email Id, Phone)		*Full name, Email*
IITB Head of Dept (Name, Email, Phone)	Prof. B.G. Fernandes, Electrical Engg. Dept., IIT Bombay. Email – head.ee@ iitb.ac.in,	*Full name, email*
IITB Department:	Electrical Engg. Dept., IIT Bombay.	

Research Clusters: Research Themes:

Highlight which of the Academy's CLUSTERS this project will address? *(Please nominate JUST **one.** For more information, see www.iitbmonash.org)*		**Highlight which of the Academy's Theme(s) this project will address?** *(Feel free to nominate more than one. For more information, see www.iitbmonash.org)*	
1	*Material Science/Engineering (including Nano, Metallurgy)*	***1***	*Advanced computational engineering, simulation and manufacture*
2	*Energy, Green Chem, Chemistry, Catalysis, Reaction Eng*	2	*Infrastructure Engineering*
3	*Math, CFD, Modelling, Manufacturing*	3	*Clean Energy*
4	*CSE, IT, Optimisation, Data, Sensors, Systems, Signal Processing, Control*	4	*Water*
5	*Earth Sciences and Civil Engineering (Geo, Water, Climate)*	5	*Nanotechnology*
6	*Bio, Stem Cells, Bio Chem, Pharma, Food*	6	*Biotechnology and Stem Cell Research*
7	*Semi-Conductors, Optics, Photonics, Networks, Telecomm, Power Eng*	7	*Humanities and social sciences*
8	*HSS, Design, Management*	8	Design

The research problem

a) Motivation :

Unutilised or under- utilised UHF licensed television spectrum band is known as Television White Space (TVWS). The unutilised band spectrum can be used for the purpose of creating a super hi-speed Wi-Fi, which can provide high data rates. TVWS can provide a smart solution to telecom infrastructure and services, in area-based development to make better connectivity by using unutilised resources and providing cheaper services. The deployment of such system/technology would lead to city improvement (retrofitting) and city renewal (redevelopment) with minimum additional cost. The idea can also be extended to Internet of Things (IoT) in Smart Cities.

b) Approach:

Design and development of the antenna for communication in TV white space frequency band (470-698 MHz) for base station as well as user terminal.

c) Novelty:

- This spectrum is underutilised and can be utilised for the purpose of creating a super hi-speed Wi-Fi network.
- It can cover a range of over 10 km (subject to path interference). This is several times the range of normal Wi-Fi for same transmitted power.
- It has larger wavelength and greater depth of penetration, so it can penetrate the obstacles and the walls of the buildings.
- Low hardware cost as it operates at low frequency.

Project aims

- Reduction in the size of the antenna
- Enhancement in the gain of the antenna for long range coverage.
- Low cost and robust design of the antennas.

Expected outcomes

- Development of the antennas to create the super Wi-Fi region.
- Low cost and fast internet facility.
- Utilization of underutilised resources.

How will the project address the Goals of the above Themes?

The project is intended to develop a novel antenna working in the frequency band (470-698 MHz), which will include design and computation of antenna in ideal condition using advanced engineering software such as IE3D, CST and HFSS. After achieving the required bandwidth and gain, antenna will be fabricated and tested in real world scenario.This entire procedure involves Advanced computational engineering, designing, simulation and manufacturing.

Capabilities and Degrees Required

- Student Should have a Masters degree in Electrical Engineering / Communication Engineering.
- Knowledge of subjects like Electromagnetics , Microwave and Antenna is a pre-requisite.
- Additional working experience with software such as CST , HFSS , IE3D is preferable .

Potential Collaborators

Please visit the IITB website www.iitb.ac.in OR Monash Website www.monash.edu to highlight some potential collaborators that would be best suited for the area of research you are intending to float.

Select up to **(4)** keywords from the Academy's approved keyword list **(available at http://www.iitbmonash.org/becoming-a-research-supervisor/)** relating to this project to make it easier for the students to apply.

Antenna Design, TV White Space.