Notice for the PhD Viva-Voce Examination

Ms Rinu C Varghese (Registration Number: 1982603), PhD scholar at the School of Engineering and Technology, CHRIST (Deemed to be University), Bangalore will defend her PhD thesis at the public viva-voce examination on Friday, 23 August 2024 at 10.00 am in the CDI Conference Room, III Floor, Block V, Bangalore Kengeri Campus, Bengaluru 560074.

Title of the Thesis	:	**Design and Implementation of Low Complexity Multiplier-Less Reconfigurable Band Tuning Filter Structure with Sharp Sub-Bands**
Discipline	:	**Electronics and Communication Engineering**
External Examiner (Outside Karnataka)	:	**Dr Rajib Kar** Associate Professor Department of ECE National Institute of Technology Durgapur, MG Road West Bengal - 713269
External Examiner (Within Karnataka)	:	**Dr N Shekar V Shet** Professor Department of ECE National Institute of Technology Surathkal, Mangalore Karnataka - 575025
Supervisor	:	**Dr Inbanila K** Associate Professor Department of Electronics and Communication Engineering School of Engineering and Technology CHRIST (Deemed to be University) Bengaluru - 560074 Karnataka

The members of the Research Advisory Committee of the Scholar, the faculty members of the Department and the School, interested experts and research scholars of all the branches of research are cordially invited to attend this open viva-voce examination.

Registrar

Place: Bengaluru
Date: 12 August 2024

ABSTRACT

Digital filter banks are extensively used in communication purpose for channelization. Multi-band channelizer system must choose a specific channel from a broad bandwidth signal. Reconfigurable non-uniform multi-channels with sharp transition widths are necessary for channelization in digital channelizer and spectrum sensing in wireless communication networks. The aim of this research work is to design a reconfigurable filter structure featuring a low computational complexity. With help of the proposed reconfigurable filter structures, non-uniform and sharp transition width channels are designed with reduced number of filter coefficients. The four different filter structures are proposed in this research for achieving low complexity reconfigurable structure for the design of multiple non-uniform sharp transition width arbitrary bandwidth channels.

A novel filter structures are designed with the help of interpolated finite impulse response (IFIR), cosine modulation technique (CMT), complex exponential modulation technique (CEMT) and frequency response masking (FRM) techniques. The examples are employed to illustrate the efficient operation of the proposed designs. The results point to that the proposed designs have less multiplier complexity than existing cutting-edge techniques. When the proposed reconfigurable filter structures are successfully implemented, power consumption and hardware complexity are decreased. This work incorporates optimization approaches to even more decreases the complexity of the proposed structures. The FIR filters employed in these structures are rendered multiplier-free with the support of canonical signed digit (CSD), multi-objective artificial bee colony (MOABC), shift inclusive differential coefficients (SIDC), and common sub-expression elimination (CSE) optimization.

Keywords: FIR filters, Interpolated finite impulse response (IFIR), Cosine modulation technique (CMT), Frequency response masking (FRM), Reconfigurable non-uniform sub-bands.

Publications:
1. **Varghese, Rinu C., and A. Amir (2024),** "A Multiplier-less FRM based Reconfigurable Regulated Bank of Filter for Spectrum Hole detection in IoT," IETE Journal of Research, pp. 1-14.
2. **Rinu C. Varghese, Inbanila K., and Amir A (2023),** "Design of Reconfigurable Multiplier-less Filter Structure based on IFIR for Digital Channelizer," AEU-International Journal of Electronics and Communications, 154904.
3. **Varghese, Rinu C., and A. Amir (2023),** "A Low-Complexity Multiplier-Less Filter Bank Based on Modified IFIR for the SDR Channelizer," IETE Journal of Research, pp. 1-13.
4. **Varghese, Rinu C., and K. Inbanila (2023),** "Reconfigurable Non-uniform Band-generating Filter Bank for Channelizer," International Journal of Electronics Letters.
5. **Varghese, Rinu C., and A. Amir (2022),** "Design of computationally efficient ifir based filter structure for digital channelizer," in 2022 IEEE International Conference on Signal Processing, Informatics, Communication and Energy Systems (SPICES), vol. 1, pp. 99–104.
6. **R. C. Varghese and A. Amir (2022),** "Design of computationally efficient frm based reconfigurable filter structure for spectrum sensing in cognitive radio for iot networks," in 2022 IEEE 10th Region 10 Humanitarian Technology Conference (R10-HTC), pp. 281–287.