



ARUN PRAKASH

RESEARCHER

5G WIRELESS AND DIGITAL SIGNAL PROCESSING

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India, 695306

Overview

3 yrs. research experience
3 years teaching Experience
Numerous paper publications
VHDL and VERILOG



WORK EXPERIENCE

National Institute of Technology, Calicut, India

Teaching faculty (2016-present)

- Taught Digital Signal Processing for Masters level students and Basic Electronics Engineering to first year undergraduate students
- Developed course plan for Digital Signal Processing by incorporating project based learning.
- Handled MATLAB based signal processing lab sessions for graduate students, communication and electronic circuits lab sessions for undergraduate students.
- Participated in and contributed to the development of proposals for consideration of support under the Scheme "Fund for Improvement of S&T Infrastructure (FIST)" of the Department of Science & Technology (DST), Government of India.
- Participated in the National Board of Accreditation (NBA) activities of the college.
- Evaluated and provided feedback on student performance throughout academic year

VIT University, Vellore, India

Researcher (2013- 2016)

- Developed 3 year research plan on signal processing for fifth generation wireless communication systems
- Published research findings in various academic journals
- Supervised undergraduate and graduate students on their academic projects in the areas related to wireless communication, digital signal processing and image processing.
- Worked as Project Associate in project related to radar signal processing sponsored by Aeronautical Development Agency (ADA) alongside Doctoral research.
- Developed project proposal titled "Study and analysis of airborne clutter modelling and elimination" - funded by ADA, Bangalore.

University College of Engineering, Karyavattom, India

Lecturer (2010-2011)

Guest Lecturer (2009-2010)

Department of Electronics and Communication

EDUCATION

VIT University, Vellore, India

Ph.D., Signal Processing for Wireless Communication, 2017

Dissertation: *“Prototype filter design techniques for FBMC systems under doubly dispersive channels”*

M.Tech, Communication Engineering, 2013

Thesis: *“Filter design methodologies for Filter bank multicarrier systems based on Ambiguity function”*

SCTCE, University of Kerala, India

B.Tech, Electronics and Communication, 2008

Project: *“Implementation of adaptive sampling technique, using MATLAB and PIC24HJ256GP206 in data acquisition system”*

References

Dr. G. Ramachandra Reddy - Academic Advisor

Senior Professor,

SENSE,

VIT University,

Vellore, Tamil Nadu.

Email: grreddy@vit.ac.in

Dr. S. M. Sameer – Department Head

Associate Professor and Head,

Dept. of Electronics and Communication,

National Institute Technology Calicut, Kozhikode, Kerala.

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PROJECTS

“Prototype filter design techniques for FBMC systems under doubly dispersive channels”

PhD Research, Advisor: Prof. G. Ramachandra Reddy

- Filter bank multicarrier (FBMC) systems - promising candidate for the physical layer of 5G systems.
- Flexible pulse shaping filters (localized in both time and frequency domain) reduces out-of-band emissions providing robustness in doubly dispersive channels (channels involving both time and frequency dispersions).
- Proposed four prototype filter design methods for FBMC systems in this thesis.
- Algorithms are implemented and the results are analyzed using MATLAB.

“Blind carrier frequency offset estimation methods for OFDM systems”

Research Project, Advisor: Prof. G. Ramachandra Reddy

- Orthogonal Frequency Division Multiplexing (OFDM) systems – Under time varying channel conditions, inter carrier interference (ICI) occurs due to the reception of transmitted data at a different frequency at the receiver.
- This carrier frequency offset (CFO) occurs due to the Doppler shift (caused due to the relative motion of the transmitter and receiver frequencies).
- Non-data aided CFO estimation methods are developed for OFDM systems in this project.
- The blind CFO estimation problem formulated as optimization problems (cost functions defined based on the magnitude and phase of the received symbols).
- Matrix formulation of the design problems are developed for efficient implementation and analysis using MATLAB.

“Adaptively varying modulus algorithm for non-data aided channel equalization”

Research Project, Advisor: Prof. G. Ramachandra Reddy

- Project developed a fractionally spaced blind channel equalization algorithm - a better alternative to data aided channel equalization.
- Non-blind channel equalization methods suffer from poor latency and spectral efficiency which are corrected using the proposed blind equalization techniques.
- The proposed conventional constant modulus algorithm based blind equalization improved by incorporating fractionally spaced equalization and using an adaptively varying modulus technique.
- The code for blind equalization is developed and the performance comparison is performed using MATLAB.

Research award for contribution to research through peer reviewed publications at the VIT University. Secured this achievement 3 consecutive years (2013 to 2015)

Best paper award at 3rd International Science and Engineering Technology (SET) Conference conducted by VIT University, for developing two novel algorithms 'Adaptively Varying Modulus Algorithm (AVMA)' and 'Modified Constant Modulus Algorithm (MCMA)' for Blind channel estimation

TRAININGS

Undergone a value added program on 'Roadmap to 5G' at VIT University, Vellore in April 2016.

Training in 'Multi-Sensor Data fusion – Estimation, Filtering and Tracking' at VIT University, Vellore in August 2014.

Attended a three day national workshop on 'Wavelet Theory and its Application in Signal & Image Processing' at VIT University, Vellore in November 2014.

Undergone Faculty Development Program on Digital Image Processing in VIT University, October 2013.

Undergone Faculty Development Programme, organized by Institute of Human Resource Development (IHRD) in Academic Staff College, University of Kerala, Karyavattom, Trivandrum.

PROJECTS

"Computationally efficient sparse spectrum estimation method for astronomical and radar signal processing"

Research Project, Advisor: Prof. G. Ramachandra Reddy

- In applications like wind speed detection, CFO estimation and astronomical signal processing- The spectrum is sparse in nature.
- A spectrum estimation algorithm that takes into account of the sparse nature of the spectrum would be preferred over the conventional parametric and non-parametric spectrum estimation methods like semi-parametric spectrum estimation (SPICE) algorithm.
- But, the algorithm has high computational complexity as it is iterative and involves operations using matrices of large dimensions.
- A method for reducing the computational complexity of SPICE algorithm at the same time achieving greater accuracy is developed in this project.
- The code is developed using MATLAB.

"Study and analysis of airborne clutter modelling and elimination"

Project funded by ADA, Bangalore. Principle Investigator: Prof. G. Ramachandra Reddy

- The unwanted echo signals returned from land or sea is referred to as clutter.
- The clutter obscures the radar returns from small targets which makes its detection a challenging task.
- The study involved development of new measures based on fractal dimensions, statistical parameters and semi parametric power spectrum for small target detection within ground and sea clutter.
- A modified fractal parameter estimation method was proposed and the modified results are obtained for actual sea clutter data using MATLAB.

"Implementation of adaptive sampling technique, using MATLAB and PIC24HJ256GP206 in data acquisition system"

Academic Project.

- The data redundancy in data acquisition systems due to high sampling rates is reduced using adaptive sampling technique based on sampling theorem in this project.
- The mathematical formulation of the problem is carried out and the algorithm is simulated using MATLAB.
- Process is implemented using the micro controller PIC24H256GP206.

"Implementation of electronic stethoscope with digital heart beat rate monitor"

Academic Project.

PUBLICATIONS

Refereed Journal Publications

1. Arunprakash Jayaprakash, G. Ramachandra Reddy: **Covariance Fitting based Blind Carrier Frequency Offset Estimation method for OFDM Systems**, *IEEE Transactions on Vehicular Technology*, vol. 65, no.12, pp. 10101-10105, Dec. 2016.
2. Arunprakash Jayaprakash, G. Ramachandra Reddy: **Robust Blind Carrier Frequency Offset Estimation algorithm for OFDM Systems**, *Wireless Personal Communications*, Sep. 2016, doi: 10.1007/s11277-016-3650-9.
3. Arunprakash Jayaprakash, G. Ramachandra Reddy: **Discrete Ambiguity Function Based Analysis of Filter Bank Multicarrier Systems**, *IETE Technical Review*, vol. 32, no. 5, pp. 1-17, Mar. 2015.
4. Arunprakash Jayaprakash, G. Ramachandra Reddy: **Novel Adaptive Filter Design for Filter Bank Multicarrier System for Doubly Dispersive Channels**, *accepted in IETE Journal of Research*, Apr. 2017.
5. K. Vinoth Babu, G. Ramachandra Reddy, and Arunprakash Jayaprakash: **Fractionally spaced equalizer based on dynamically varying modulus algorithm for spectrally efficient channel compensation in SC-FDMA based systems**, *Wireless Networks* vol. 20, no. 6, pp. 1387-1398, Aug. 2014.
6. Arunprakash Jayaprakash, G. Ramachandra Reddy, N.S.S.R.K. Prasad: **Small Target Detection within Sea Clutter Based on Fractal Analysis**, *Procedia Technology*, Vol. 24, pp. 988-995, 2016.
7. N.I. Eappen, Arunprakash Jayaprakash, G. Ramachandra Reddy: **Covariance-fitting based sparse spectrum estimation of non-uniformly sampled data in presence of noise**, *International Journal of Applied Engineering Research*, vol. 10, no.11, pp. 29963-29975, Jan. 2015.
8. Arunprakash Jayaprakash, G. Ramachandra Reddy: **Novel steganographic algorithms based on colour visual cryptography/exact histogram matching**, *International Journal of Applied Engineering Research*, vol. 8, no.19, pp. 2555-2558, Jan. 2013.

Book Chapter

S.Sankar Ganesh, K.Mohanaprasad, Arunprakash Jayaprakash and Sivanantham Sathasivam : **Optimized-Fuzzy-Logic-Based Bit Loading Algorithms**, *Handbook of Research on Fuzzy and Rough Set Theory in Organizational Decision Making*, IGI Global, pp. 305-315, Apr. 2017.

Conference Publications

1. Arunprakash Jayaprakash, G. Ramachandra Reddy: **Flexible Design Procedure for Prototype Filters of Filter Bank Multicarrier (FBMC) Systems**, 3rd IEEE International Conference on Electronics and Communication Systems, Coimbatore, India, Feb. 2016.
2. Divya Prakash, Sakuntala S. Pillai, Arunprakash Jayaprakash, G. Ramachandra Reddy: **A new blind carrier frequency offset estimation scheme for OFDM systems**, 2016 International Conference on Communication and Signal Processing (ICCSP) Apr. 2016.
3. Dillip Dash, Arunprakash Jayaprakash, Valarmathi J, G. Ramachandra Reddy: **Generalized OFDM-LFM waveform design and analysis for multistatic airborne radar**, 2015 IEEE Power, Communication and Information Technology Conference (PCITC), Oct. 2015.
4. Arunprakash Jayaprakash, G. Ramachandra Reddy: **Optimized generalized Gaussian pulse (OGGP) based prototype filter design for filter bank multi carrier (FBMC) systems**, IEEE First International Conference on Computational Systems and Communications (ICCSC), Trivandrum, India, Dec. 2014.
5. N.I. Eappen, Arunprakash Jayaprakash, G. Ramachandra Reddy: **Efficient multi user CFO estimation and correction techniques in uplink OFDMA systems**, IEEE First International Conference on Computational Systems and Communications (ICCSC), Trivandrum, India, Dec. 2014.
6. Arunprakash Jayaprakash, G. Ramachandra Reddy: **Efficient prototype filter design for Filter Bank Multicarrier (FBMC) System based on Ambiguity function analysis of Hermite polynomials**, IEEE International Multi-Conference on Automation, Computing, Communication, Control and Compressed Sensing (iMac4s), Kottayam, India, Mar. 2013.
7. K. Vinoth Babu, G. Ramachandra Reddy, Arunprakash Jayaprakash: **Effective frequency offset correction in OFDM systems with extended Kalman filtering technique**, First International Conference on Wireless Technologies for Humanitarian Relief, Kollam, Dec. 2011.
8. Arunprakash Jayaprakash, G. Ramachandra Reddy: **Blind Channel Estimation Using Fractionally Spaced Equalizers Based On Adaptively Varying Modulus Algorithm (AVMA)**, Third International Conference Of Science, Engineering and Technology, Vellore, India, 2011.