# Darukeesan Pakiyarajah

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## Research Interests

My research interests lie in the general area of Signal Processing and Machine Learning, particularly in Graph Signal Processing and Machine Learning on Graphs. I am equally interested in Multi-Dimensional Signal Processing as well.

## Education

**B.Sc. Engineering (Hons) in Electronic and Telecommunication Engineering** Dec 2015 – Jan 2020
*University of Moratuwa, Sri Lanka*

- **GPA:** 4.03/4.2 [3.94 out of 4.0]
- **Ranked 2nd** out of 101 in specialization

**G.C.E. Advanced Level Examination** Aug 2014
*Jaffna Hindu College, Sri Lanka*

- Distinctions in Combined Mathematics, Physics, Chemistry and General English
- **Ranked 1st** in national level out of about 100,000 students

## Research Experience

**Design of FIR and ARMA Graph Filters Using Convex Programming**
*University of Jaffna, University of Moratuwa* Ongoing

- Supervisor: Dr. Chamira U. S. Edussooriya
- This research primarily focuses on adopting convex programming techniques for designing graph filters optimal in least-square and minimax sense.

**Design of 2-D IIR Filters with Arbitrary Frequency Response using Iterative Second-Order Cone Programming**
*University of Moratuwa* 2021

- Supervisor: Dr. Chamira U. S. Edussooriya
- Collaborators: Dr. Chamith Wijenayake (University of Queensland), and Dr. Arjuna Madanayake (Florida International University)
- A weighted least-square (WLS) design method is proposed for the design of 2-D IIR filters having arbitrary frequency response and stable in the practical BIBO sense. Proposed method considers transfer functions with nonseparable numerators and denominators having complex- and real-valued coefficients, respectively.

**Design of M-D Complex-Coefficient FIR Filters with Low Group Delay using Second-Order Cone Programming**
*University of Moratuwa* 2020

- Supervisor: Dr. Chamira U. S. Edussooriya
- Collaborators: Dr. Chamith Wijenayake (University of Queensland), and Dr. Arjuna Madanayake (Florida International University)
- A WLS design method is proposed for the design of multi-dimensional (M- D) complex-coefficient FIR filters with arbitrary frequency responses and low group delays.

### Design of M-D Sparse FIR Filters with Arbitrary Frequency Response using Second-Order Cone Programming

*University of Moratuwa* 2021

- Supervisors: Dr. Chamira U. S. Edussooriya
- A minimax design method for M-D FIR filters having sparse coefficients is proposed. The design of M-D FIR filters with arbitrary frequency responses and low group delays of which the coefficients are complex valued is considered.

### A Low-Complexity 2-D FIR Parallelogram Filter for Broadband Beamforming with Sparse Linear Arrays | Undergraduate Research Project

*University of Moratuwa* 2019 – 2020

- Supervisor: Dr. Chamira U. S. Edussooriya
- A low-complexity 2-D FIR filter having a parallelogram-shaped passband is proposed for broadband beam-forming. The filter design is formulated as a parallel combination of two 2-D filters. The filters are designed in a minimax sense with linear phase responses using linear programming.

### Intelligent Camera | Final Year Project

*University of Moratuwa* 2019 – 2020

- Supervisors: Dr. Ajith Pasqual, and Dr. Jayathu Samarawickrama
- The primary objective of this project is to make a camera development platform that can capture a video, process the video, perform video encoding, and send the data over the network. The video capturing and processing is demonstrated using ZedBoard (Xilinx Zynq®-7000 SoC) and the entire hardware design of the intelligent camera is submitted.
- This is a R&D collaboration project with Paraqum Technologies.

***Remark:*** More details about the projects and relevant publications are available in the personal website.

## Teaching Experience

**University of Jaffna, Sri Lanka** | Department of Electrical and Electronic Engineering

**Lecturer (Probationary)** Sept 2021 – Present

- Conducting lectures for classes ranging in size from $35 - 70$.
- Modules: EC8010 – Design Proficiency (Fall 2021), and EC6090 – Robotics and Automation (Fall 2021).
- Supporting faculty with administrative tasks.

**Assistant Lecturer** Jan 2021 – Sept 2021

- Conducted several lectures for the module EC7090 – Communication Network Design (Spring 2021) for a class of 35 students.
- Conducted laboratory sessions for the following modules: EC5011 – Digital Signal Processing (Spring 2021), and EC7090 – Communication Network Design (Spring 2021).
- Supported faculty with administrative tasks.

**Academic Instructor** Aug 2020 – Dec 2020

- Facilitated and supervised the laboratory sessions for the students, and graded lab reports, quizzes, and assignments.
- Modules: EC4040 – Signals and Systems (Fall 2020), EC6090 – Robotics and Automation (Fall 2020), and EC6100 – Wireless and Mobile Communication (Fall 2020)

## Industrial Experience

**Zone 24×7 (Private) Limited, Sri Lanka**

**Trainee Associate Electronics Engineer** June 2018 – Dec 2018

- Worked in the embedded systems division, mainly on Android OS customization and driver integration for an embedded device. Involved in several data analysis and signal processing tasks as well. In addition, worked with Raspberry Pi and STM32 Family micro-controllers.

## Publications

**Published Works**

- **D. Pakiyarajah** , S. S. Jayaweera, C. U. S. Edussooriya, C. Wijenayake and A. Madanayake, "WLS Design of M-D Complex-Coefficient FIR Filters with Low Group Delay Using Second-Order Cone Programming," *2021 IEEE International Symposium on Circuits and Systems (ISCAS)*, 2021, pp. 1-5.

**In Review**

- **D. Pakiyarajah** and C. U. S. Edussooriya, "WLS Design of ARMA Graph Filters using Iterative Second-Order Cone Programming," *2022 IEEE International Conference on Acoustics, Speech, Signal Processing (ICASSP)*, under review.
- *A paper on minimax design of M-D sparse FIR filters with arbitrary frequency response using second-order cone programming is submitted to ISCAS 2022 and under review.
- *A paper on WLS design of 2-D IIR filters with arbitrary frequency response using iterative second-order cone programming is submitted to ISCAS 2022 and under review.

* The title and authors are not presented due to the double blind review process.

## Honors and Awards

**Dean's Honors List** 2015 – 2020
*Seven semesters*

**Mahapola Higher Education Merit Scholarship** 2015 – 2020
*Merit based grant for outstanding performance in G.C.E A/L Examination*

**First Runner Up in ESTADISTICA Quiz competition** 2018
*Inter university Statistics quiz competition organized by University of Sri Jayewardenepura, Sri Lanka*

**First Runner Up in hackStat** 2018
*Data Science hackathon organized by University of Colombo*

**First Runner Up in MED-HACK** 2017
*Medical hackathon organized by Mobitel*

**Dialog Merit Scholarship** 2017
*Scholarship for ranking 1st in national level in G.C.E A/L Examination*

**President's Award** 2015
*For ranking 1st in national level in G.C.E A/L Examination*

**Best Performer in G.C.E A/L Examination** 2015
*Awarded at Jaffna Hindu College for outstanding performance in G.C.E A/L Examination*

**Silver Medalist in Physics Olympiad** 2014
*National level Physics quiz competition organized by Institute of Physics*

## Skills

**Languages**: English (full professional proficiency, TOEFL iBT score: 105/120), Tamil (native proficiency)
**Programming**: Python, MATLAB, C, Verilog