**Dr. Vinod Achutavarrier Prasad**

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# Brief Biography

**Vinod A Prasad** received his B. Tech. degree in Instrumentation & Control Engg. from University of Calicut, India in 1993 (Second rank in University) and the Master of Engineering (by Research) and Ph.D. degrees from School of Computer Engineering, Nanyang Technological University (NTU), Singapore in 2000 and 2004 respectively. Vinod has a professional experience of 26 years (full-time), which includes 21 years full-time teaching experience and 5 years industry experience. He has spent the first 5 years of his career in industry as an automation engineer at Kirloskar, Bangalore, India, Tata Honeywell, Pune, India, and Shell Singapore. From September 2000 to September 2002, he was a Lecturer in the School of Electrical and Electronic Engineering at Singapore Polytechnic, Singapore. He joined as a Lecturer in the School of Computer Engineering, NTU, Singapore in September 2002, became Assistant Professor in December 2004 and Associate Professor (tenured) in August 2010 where he continued till September 2017. In October 2017, Vinod joined Indian Institute of Technology (IIT) Palakkad, India, as a Professor in Electrical Engineering Department. He was also the first Dean (Industry Collaboration & Sponsored Research) in IIT Palakkad during April 2018 – October 2020. In December 2020, Vinod joined The Hong Kong University of Science and Technology as a Professor of Engineering Practice. He also served as a Visiting Associate Professor in Electrical & Computer Engg. Dept., University of British Columbia, Canada, during June-July 2013.

Vinod has won the *Nanyang Award for Excellence in Teaching 2009*, the highest recognition conferred by NTU Singapore to individual faculty for teaching. He has won the Best Lecturer Award of School of Computer Engineering four years consecutively – 2007, 2008, 2009 and 2010. He was also a nominee of *Nanyang Award for Excellence in Teaching 2008.*

Vinod's research interests include digital signal processing, low power, reconfigurable circuits & systems for wireless communications, Brain-Computer Interface and its applications in neurofeedback, neurorehabilitation, neuroprosthetics and assistive technology devices. He has on-going and completed external research grants from various funding agencies (public and private sectors) - Ministry of Education, Singapore, Ministry of Defence, Singapore, DSO National Laboratories, Singapore, European Aeronautic Defence & Space Company (EADS), Singapore Millennium Foundation, Civil Aviation Authority of Singapore (CAAS), Airbus Group Innovations, Department of Science and Technology (Govt. of India), UVJ Technologies Pvt Ltd., India, and GadgEon Smart Systems Pvt Ltd., India, amounting over S\$3.5 million as principal investigator. He has published 276 papers in refereed international journals and international conferences which include 94 journal papers. He has supervised and graduated 18 Ph.D. students in NTU Singapore and 1 Master of Engineering (By Research) student. He has been conferred Research Outstanding and Recognition Award, Office of Research, NTU, twice – in 2005 and 2006. Currently, he is an Associate Editor of five journals - IEEE Transactions on Human-Machine

Systems, IEEE Transactions on Neural Systems and Rehabilitation Engineering, IEEE Transactions on Cognitive and Developmental Systems, IEEE Systems Man & Cybernetics Magazine and Circuits, Systems & Signal Processing (Springer), and also a Senior Member of IEEE. He was the Technical Co-Chair (Brain-Machine Interface Systems) of IEEE Systems, Man & Cybernetics Society during 2014 - 2018. Vinod has won the 'Award for the Most Active Technical Committee Award in Human-Machine Systems' (as the Technical Co-Chair of Brain Machine Interface Committee) of IEEE Systems, Man and Cybernetics Society in three consecutive years – 2016, 2017 and 2018.

In NTU Singapore, Vinod was the Assistant Chair (Students) in School of Computer Science & Engineering during 2015 – 2017, Member of NTU Teaching Council, Member of NTU Research Council, Leader of Hardware & Embedded Systems Research Group, Embedded Systems Track Lead of Curriculum Management Committee, and the Chairman of Faculty Search Committee of the School of Computer Engineering, NTU. Formerly, he has served as the Chair of NTU School's Undergraduate Outreach Committee for 6 years (2007 – 2013), Team Leader of NTU's Ph.D. Outreach (India) during 2012 - 2016 and Graduate Students' Liaison Faculty-in-Charge of the School in NTU for 2 years and Member of Undergraduate Outreach of College of Engineering, NTU for 4 years.

## 1. EDUCATION

**Ph.D., 2004**
School of Computer Engineering, Nanyang Technological University, Singapore
Dissertation topic: Design Techniques for Low-Complexity Implementation of Software Defined Radio Channelizers (Advisor: Professor Edmund M-K. Lai)

**Master of Engineering - M.Eng. (By research), 2001**
School of Computer Engineering, Nanyang Technological University, Singapore
Dissertation topic: A Novel Approach to the Design and Realization of Quadrature Mirror Filters

**Bachelor of Technology - B.Tech.,** Instrumentation and Control Engg., **1993** (Second topper in the University), University of Calicut, Kerala State, India

**Certificate in Teaching (Higher Education), 2002**
Accredited with the University of Sheffield, United Kingdom

## 2. PROFESSIONAL MEMBERSHIP
- Senior Member-IEEE (From June 2007)
- Technical Co-Chair, IEEE Systems, Man & Cybernetics Society (2014-2018)

## 3. SUMMARY OF WORKING EXPERIENCE:

**Total Work Experience – 26 years (Teaching: 21 years, Industry: 5 years)**

**9 December 2020 – Present:** Professor of Engineering Practice, Electronic and Computer Engineering Department, The Hong Kong University of Science and Technology, Hong Kong

**25 October 2017 – 7 December 2020:** Professor, Electrical Engineering Department, Indian Institute of Technology Palakkad, India

**1 Aug. 2010 – 26 September 2017:** Associate Professor (Tenured), School of Computer Science and Engineering, Nanyang Technological University (NTU), Singapore

**1 December 2004 – 31 Jul. 2010:** Assistant Professor, School of Computer Engineering, NTU

**September 2002-November 2004:** Lecturer, School of Computer Engineering, NTU

**September 2000-September 2002:** Lecturer, School of Electrical and Electronic Engineering Singapore Polytechnic, Singapore

**June 1997 – September 1998:** Instrumentation Engineer**,** Radiant Instrument and Electrical Engineering, Singapore (C/o Shell Chemicals Singapore)

**June 1996-March 1997:** Project Engineer, Kirloskar AAF Ltd., Bangalore, India

**Nov. 1995-May 1996:** Project Engineer (Industrial Automation)**,** Tata Honeywell, India

**October 1993-November 1995:** Instrumentation Engineer, Kirloskar Snydergeneral Ltd., Bangalore, India

### 4. TEACHING

#### *A. Teaching Awards:*

- Winner of **Nanyang Technological University's *Nanyang Award for Excellence in Teaching*, 2009** (*University's Teacher of the Year Award* - The highest recognition conferred by NTU to individual faculty for teaching excellence).
- Nominee of University's Nanyang Educator Award (College of Engineering level), 2016.
- Nominee of University's Nanyang Educator Award (Department level), 2016.
- **Most Popular Year-2 Lecturer** in School of Computer Engineering (SCE), NTU Singapore, 2010 (Voted by students).
- **Most Popular Year-2 Lecturer** in SCE, NTU, 2009 (Voted by students).
- **Nominee, University's (NTU) *Nanyang Award for Excellence in Teaching*, 2008.**
- **Most Popular Year-2 Lecturer** in SCE, NTU, 2008 (Voted by students).
- **Best Year-2 Lecturer in SCE**, NTU, 2007 (Voted by students).

#### *B. Achievements of PhD Students and Undergraduate Final Year Project Students*

- **Ph.D. Student, Abhishek Ambede, won the 2nd Prize for Best Student Paper Award** in 2016 Integrated Communications, Navigation, and Surveillance (ICNS) Conference, Herndon, Virginia, USA, April 19-21, 2016. http://i-cns.org/ Paper: Abhishek Ambede, A. P. Vinod and A S Madhukumar, "Design of a low complexity channel filter satisfying LDACS1 spectral mask specifications for air-to-ground communications".
- **Ph.D. Student, Vikram Shenoy, won the Best Student Paper Award** in 2014 IEEE International Conference on Systems, Man, and Cybernetics, San Diego, USA, October

2014 – flagship conference of IEEE SMC Society (IEEE SMC 2014). Paper: Vikram Shenoy and A. P. Vinod, "An Iterative Optimization Technique for Robust Channel Selection in Motor Imagery based Brain Computer Interface".

- **Ph.D. Student, Sumedh Somanath Dhabu, <u>won the Young Scientist Award</u>** in the the 31st General Assembly of the International Union of Radio Science (URSI General Assembly), Beijing, China, August 16-23, 2014.
- **Ph.D, Student, Abhishek Ambede, <u>won the Best Speaker Award in IEEE Circuits and Systems Society Graduate Students Workshop</u>** held on 10 December 2015 in Singapore.
- **Ph.D. Student, Neethu Robinson, <u>won the bronze medal in the best speaker competition: My research in 3 minutes"</u>** organized by James Cook University Singapore Campus, 2014.
- **Final Year Project Student, Alvin Khong, <u>won the International Undergraduate Award</u>** (Highly commended in the category of Computer Sciences & Information Technology) for his Final Year Project on Brain-Computer Interface based Game for Enhancing Cognition, in 2014. The Undergraduate Awards is the world's largest academic awards programme. The Award is sponsored by Higher Education Authority of Ireland, Department for Employment & Learning (UK), Google and Digicel.

## *C. Supervision of Post-Doctoral Research Fellows (Sole Supervisor):*

**Post-Doctoral Research Fellow Supervision (Completed Projects):**

| No. | Name | Duration | Project Title and grant amount | Funding Organization |
|---|---|---|---|---|
| 1 | Dr. Mahesh R. | Sep. 2008 – Oct. 2009 | Development of a Real Time Spectral Analysis and Filtering System Based on Lyrtech Small Form Factor Software Radio, $64,000 | DSO National Labs, Ministry of Defence, Singapore |
| | | Nov. 2009 - Sep. 2010 | Low Complexity Dynamically Reconfigurable Signal Processing for Cognitive Radios, $687,520 | Ministry of Education, Singapore, Academic Research Fund (AcRF Tier 2) |
| 2 | Dr. Smitha K. G. | Nov. 2009 – Dec. 2011 | Low Complexity Dynamically Reconfigurable Signal Processing for Cognitive Radios, $687,520 | Ministry of Education, Singapore, Academic Research Fund (AcRF Tier 2) |
| 3 | Dr. Smitha K. G. | Jan. 2012 - April 2013 | CAPESR: Development of an Assistive Device for Autistic Children Impaired Recognition of Facial Emotion, $99,000 | Ministry of Education, Singapore, Academic Research Fund (AcRF Tier 1) |
| 4 | Dr. Kavitha Thomas | Nov. 2011- Oct. 2014 | Brain Wave Driven Computer Game: A Pedagogical Tool for Attention-Deficit Children, $175,000 | Singapore Millennium Foundation (SMF) |
| 5 | Dr. Rajendra Prasad | Jan. 2014- Jan. 2017 | Dynamic Spectrum Access Enabled Cognitive Radio based Sustainable Air-to-Ground Communication System, $564,000 | Civil Aviation Authority of Singapore (CAAS) |

| 6 | Dr. Abhishek Ambede | Jan. 2014- Jan. 2017 | Dynamic Spectrum Access Enabled Cognitive Radio based Sustainable Air-to-Ground Communication System, $564,000 | Civil Aviation Authority of Singapore (CAAS) |
|---|---|---|---|---|
| 7 | Dr. Kavitha P. Thomas | March 2015 – Feb 2017 | Electroencephalogram-based Hybrid Brain-Computer Interface System for Biometric Identification ($100,000) | Ministry of Education, Singapore (AcRF Tier 1) |
| 8 | Dr. Shreejith Shanker | March 2014 – Feb 2017 | Enabling the Internet of Things Through New Hybrid Radio Architectures | Ministry of Education, Singapore (AcRF Tier 1) |
| 9 | Dr. Kavitha Thomas | Aug 2016 – July 2019 | Decoding of Imagined Hand Movement Kinematics using Brain-Computer Interface ($576,545) | Ministry of Education, Singapore (AcRF Tier 2) |
| 10 | Dr. Neethu Robinson | Aug 2016 – Aug 2018 | Decoding of Imagined Hand Movement Kinematics using Brain-Computer Interface ($576,545) | Ministry of Education, Singapore (AcRF Tier 2) |
| 11 | Dr. Benzy V. K. | September 2018 – 14 August 2021 | A Multimodal Brain-Machine Interface-based Neuro-enhancement System for Retarding the decline of Cognitive and Motor functions in the early-stages of Dementia, Stroke and Parkinson's Disease patients (INR 70,00000) | Department of Science and Technology, Govt of India |
| 12 | Dr. Sandra K. R. | July 2020 - Present | A Multimodal Brain-Machine Interface-based Neuro-enhancement System for Retarding the decline of Cognitive and Motor functions in the early-stages of Dementia, Stroke and Parkinson's Disease patients (INR 70,00000) | Department of Science and Technology, Govt of India |

**Post-Doctoral Research Fellow Supervision (On-going Projects):**

| No. | Name | Duration | Project Title and Grant Amount (S$) | Funding Organization |
|---|---|---|---|---|
| 1 | Jijomon C. M. | 1 January 2022 - Present | A Multimodal Brain-Machine Interface-based Neuro-enhancement System for Retarding the decline of Cognitive and Motor functions in the early-stages of Dementia, Stroke and Parkinson's Disease patients (INR 70,00000) | Department of Science and Technology, Govt of India |

## *D. Graduate Research Student Supervision:*

**Number of Graduated Ph.D. Students: 18**

| No. | Name | Year of graduation | Thesis Title | Current Employment | Role |
|---|---|---|---|---|---|
| 1 | Jijomon C. M. | 2022 | EEG-based Biometric Identification | Research Associate, IIT Palakkad | Sole Supervisor |
| 2 | Mane Ravikiran | 2020 | Brain Computer Interface for Post-Stroke Motor Rehabilitation | Research Scientist, | Main Supervisor |

| | | | | BioMind Singapore | |
|---|---|---|---|---|---|
| 3 | Libin Mathew | 2020 | Spectrum Sensing for Air-to-ground Communications | Scientist, Institute for Infocomm Research, A*STAR, Singapore | Main Supervisor |
| 4 | Tushar Chouhan | 2020 | Networks based Brain Computer Interfaces for Decoding Neurophysiological Dynamics | Research Fellow, NTU, Singapore | Sole Supervisor |
| 5 | Syed Naveen Altaf Ahmed | 2018 | Hardware Efficient Algorithms and Architectures for Burst Communications in Cognitive Radios | Principal Research Engineer, Institute for Infocomm Research, Singapore | | Sole Supervisor |
| 6 | Vikram Shenoy | 2017 | Neural Signal Processing for Brain Computer Interfaces | Research Scientist, Kessler Foundation, New Jersey, USA | Main Supervisor |
| 7 | Abhishek Ambede | 2016 | Design of Low Complexity Variable Digital Filters and Filter Banks for Software Defined Radio Receivers | Research Engineer, Ericsson, Stockholm, Sweden | Sole Supervisor |
| 8 | Sumedh Dhabu | 2016 | Design and Implementation of Digital Filters with Very High Frequency Response Flexibility for Multi-Standard Wireless Communication Receivers | Research Engineer, Ericsson, Stockholm, Sweden | Sole Supervisor |
| 9 | Neethu Robinson | 2015 | Signal Processing Techniques for Motor Control Brain Computer Interface Systems | Senior Research Fellow, NTU | Main Supervisor |
| 10 | Narendar Madhavan | 2014 | Physical layer Algorithms and Architectures for Accurate Detection and Classification in Cognitive Radios | Senior Research Engineer, Ericsson, Stockholm, Sweden | Main Supervisor |
| 11 | Sumit Darak Jagdish | 2013 | Design of Low Complexity Variable Digital Filters and Reconfigurable Filter Banks for Multi-standard Wireless Communication Receivers | Associate Professor, Indian Institute of Information Technology (IIIT), Delhi | Sole Supervisor |
| 12 | Lin Mengda | 2012 | Design and Implementation of a Low Power Wireless Communication Channelizer and Signal Detector | Research Fellow, Singapore Institute of Manufacturing Technology, A*STAR | Sole Supervisor |
| 13 | Navin Michael | 2011 | Design of a Low Power, Reconfigurable Digital | Research Scientist, Singapore Institute | Sole Supervisor |

| No. | Name | Year of graduation | Thesis Title | Current Employment | Role |
|---|---|---|---|---|---|
| | | | Front-end for a Multi-mode Software Defined Radio Handset | of Clinical Sciences, Singapore | |
| 14 | Kavitha P. Thomas | 2011 | Efficient EEG Frequency Band Selection Techniques for a Robust Motor Imagery based Brain-Computer Interface | Senior Research Fellow, NTU, Singapore | Main Supervisor |
| 15 | Jijajia Chen | | New Design Methodologies for Low-complexity FIR Filters | Senior Lecturer, Singapore University of Technology and Design | Co-Supervisor |
| 16 | Smitha K.G. | 2010 | Low Power and High Speed Digital Filters for Wireless Communication Receivers | Senior Lecturer, NTU, Singapore | Sole Supervisor |
| 17 | Mahesh R. | 2009 | Reconfigurable Low Complexity Digital Filter banks for Software Radio Receivers | Associate Professor, Indian Institute of Technology Palakkad, India | Sole Supervisor |
| 18 | Huang Beilei | 2008 | Sampling Theory for Non-Bandlimited Signals and Its Applications | Senior Research Fellow, Red Rock Consulting, Wellington, New Zealand | Co-Supervisor |

## Graduated Master of Engineering (By Research) Student: 1

| No. | Name | Year of graduation | Thesis Title | Current Employment | Role |
|---|---|---|---|---|---|
| 1 | Prashob R. | 2012 | A Fast Algorithm for Spectrum Sensing in Cognitive Radios | Senior Research Engineer, Toshiba, Tokyo, Japan | Sole Supervisor |

## Ph.D. Students Presently Supervising: 2

| No. | Name | Year of Commencement | Thesis Title | Current Status |
|---|---|---|---|---|
| 1 | Praveen Kumar | January 2018 | Detection of Error-related Potential in Brain Computer Interface Systems. | Thesis writing in progress |
| 2 | Sagila Gangadharan | August 2020 | Decoding Motor Imagery Hand Movement Kinematics using Brain-Computer Interface | Progressing (IIT Palakkad, India) |

## *E. Courses Currently Teaching (in Hong Kong University of Science and Technology)*

- Electro-Robot Design (First Year B. Engg)
- Introduction to Embedded Systems (Third Year B. Engg)

## *F. Courses Taught in Past Years*

**IIT, India:**
- Digital Signal Processing
- Biomedical Instrumentation and Signal Processing
- Digital Systems

**NTU, Singapore:**
- Electronics I (Basic Electrical & Electronics), Tutorial, Laboratory
- Digital Signal Processing: Lecture, Tutorial, Laboratory
- Electronics II (Analog Electronics): Lecture, Tutorial, Laboratory
- Digital Signal Processing (Lecture, Tutorial and Laboratory)
- Introduction to Computing (Computing Minor): Lecture, Tutorial, Laboratory
- Sensors, Interfacing and Control: Lecture (class size 150), Tutorial, Laboratory, Course Coordinator.
- Circuits and Signal Analysis: Lecture, Tutorial and Laboratory
- Digital Logic: Tutorial and Laboratory

## *G. New Courses Developed:*

- Biomedical Instrumentation and Signal Processing (Technical Elective Course in IIT Palakkad)
- Sensors, Interfacing and Control: Developed Lecture notes, Tutorials and Lab Manual, a new third year course introduced in 2012/2013 according to the revised B.Eng. (Computer Eng.) curriculum.
- Instrumentation & Data Acquisition: Developed Lecture notes, Tutorials and Lab Manual of CPE 208, a new second year course introduced in 2004/2005 according to the revised B.Eng. (Computer Eng.) curriculum. The course materials have been revised thrice subsequently.
- Electronics-II: Developed Lecture notes and Tutorials of SC106, a revised first year course in 2003/2004 according to the revised B.Eng. (Computer Eng.) curriculum.

## *H. Teaching Feedback Score by Students*

| Year | Lecture | Tutorial |
|---|---|---|
| **IIT Palakkad, India (Overall rating out of 10)** | | |
| 2019/2020 | 8.74 | |
| 2018/2019 | 9.1 | |
| 2017/2018 | 9.0 | |
| **NTU Singapore (Overall rating out of 100)** | | |
| 2015/2016 | 90.40 (School Mean: 79.80) | **94.80** (School Mean: 80.00) |
| 2014/2015 | **93.60** (School Mean: 80.21) | **94.80** (School Mean: 82.90) |
| 2013/2014 | **96.66** (School Mean: 80.67) | **98.00** (School Mean: 83.96) |
| 2012/2013 | **92.37** (School Mean: 80.42) | **92.34** (School Mean: 82.85) |
| 2011 | **95.43** (School Mean: 80.35) | **94.29** (School Mean: 83.66) |
| 2010 | **95.69** (School mean: 82.41) | **93.80** (School Mean: 84.49) |
| 2009 | **95.06** (School Mean: 83.48) | **97.80** (School Mean: 83.78) |

## 5. RESEARCH

### A. Research Interests:

- Digital Signal Processing, Embedded Signal Processing (DSP) for Wireless Communications
- Brain-Machine Interface / Human-Machine Systems and its applications in Neurofeedback, Neurorehabilitation, Assistive Technology, Biometric Identification, Brain Fingerprinting, Advanced Driver Assistance Systems, Mental Workload & Stress evaluation, Cognitive Performance Training.
- Biomedical Signal Processing and Machine Learning

### B. Publications: Please refer **Pages 16-31** for detailed list of publications.

- Published **276 papers** in international refereed journals and international conferences.
- **Number of Journal Papers**: **94, Number of International Conference Papers**: **182**

### C. Research Grants:

**On-going (Active) Research Grants:**

| No. | Amount (INR) | Title | Funding Organization | Duration | Role |
|---|---|---|---|---|---|
| 1 | 35,00000 | Technology Development for Combating Covid-19 | Federal Bank Limited, India | April 2020-March 2021 | **PI** |
| 2 | 70,00000 | A Multimodal Brain Machine Interface-based Neuroenhancement System for Retarding the Decline of Cognitive and Motor Functions in the Early Stages of Dementia, Stroke and Parkinson's Disease Patients | Department of Science & Technology, Govt. of India | Jan 2019 – Dec 2022 | **PI** |
| 3 | 13,80,000 | Brain Machine Interface based Assistive and Rehabilitation Technology | GadgEon Smart Systems Pvt Ltd., Kochi, India | Nov 2019 – Oct 2021 | **PI** |
| 4 | 12,00000 | EEG-based Driver Drowsiness Detection | UVJ Technologies Pvt Ltd., Kochi, India | Jan 2019 – Feb 2021 | **PI** |

**Past (Completed) Research Grants as PI:**

| No. | Amount (S$) | Title | Funding Organization | Duration | Role |
|---|---|---|---|---|---|
| 1 | 576,545 | Decoding of Imagined Hand Movement Kinematics using Brain-Computer Interface | Ministry of Education, Singapore | Aug. 2016 – July 2019 | **PI** |
| 2 | 100,000 | Electroencephalogram-based Hybrid Brain-Computer Interface | Ministry of Education, Singapore | 1 March 2015 – 28 Feb 2017 | **PI** |

| | | System for Biometric Identification | | | |
|---|---|---|---|---|---|
| 3 | 564,000 | Dynamic Spectrum Access Enabled Cognitive Radio based Sustainable Air-to-Ground Communication System | Civil Aviation Authority of Singapore (CAAS) | Jan. 2014 - Jan. 2017 | **PI** |
| 4 | 183,295 | Enabling the Internet of Things Through New Hybrid Radio Architectures | Ministry of Education, Singapore | March 2014 – February 2017 | **PI** |
| 5 | 175,000 | Brain Wave Driven Computer Game: A Pedagogical Tool for Attention-Deficit Children | Singapore Millennium Foundation (SMF) | Nov. 2011 – Oct. 2014 | **PI** |
| 6 | 99,000 | CAPESR: Development of an Assistive Device for Autistic Children Impaired Recognition of Facial Emotion | Ministry of Education, Singapore, Academic Research Fund, AcRF Tier 1 | Mar. 2011- Mar. 2013 | **PI** |
| 7 | 687,520 | Low Complexity Dynamically Reconfigurable Signal Processing for Cognitive Radios | Ministry of Education, Singapore, Academic Research Fund, AcRF Tier 2 | Nov. 2008 - Aug. 2012 | **PI** |
| 8 | 182,748 | Advanced Baseband Algorithms and Low Power Implementations for Wireless Communications | European Aeronautic Defence & Space Company (EADS) Singapore Pte. Ltd. | Aug. 2008 - Aug. 2012 | **PI** |
| 9 | 24,000 | Low Power Adaptive Spectrum Detection Technique for Cognitive Radio Applications | European Aeronautic Defence & Space (EADS) Singapore Pte. Ltd. | Jan. 2010 - Dec. 2011 | **PI** |
| 10 | 33,000 | Design Methodology for Reconfigurable Low Power Software Defined Radio Handset | Merlion PhD Grant, Dossier No.: 9.03.07, France-Singapore Cooperation Platform in Science & Technology | July 2007- June 2011 | **PI** |
| 11 | 50,000 | Design and Implementation of a low power wireless communication channelizer | Ministry of Defence, Singapore | Jan. 2008 – Dec. 2010 | **PI** |
| 12 | 64,000 | Development of a Real Time Spectral Analysis and Filtering System Based on Lyrtech Small Form Factor Software Radio | DSO National Labs, Ministry of Defence, Singapore | Sep. 2008 - Oct. 2009 | **PI** |
| 13 | 30,000 | An Architectural Framework for Dynamically Reconfigurable Low Power Software Defined Radio Handset | Merlion Project Grant, Dossier No.: 9.03.07, France-Singapore Cooperation Platform in Science & Technology | July 2007- June 2009 | **PI** |
| 14 | 64,514 | Low Power Reconfigurable Receiver Architectures for Migrating Software Defined | Ministry of Education, Singapore, Academic Research Fund, AcRF Tier 1 | Nov.2005 - Aug. 2008 | **PI** |

| | | Radio Technology from Base Stations to Handsets | | | |
|---|---|---|---|---|---|
| 15 | 46,000 | EEG Signal Processing for Brain-Computer Interface | University Start-up Grant | March 2006 - Feb. 2008 | **PI** |
| 16 | 5000 | Residue Number System-Based Reconfigurable Mesh for High-Performance Fault Tolerant Grid Computing | British High Commission Singapore, Federation of Commonwealth Offices (Travel grant) | 2006 | **PI** |

**Past (Completed) Research Grants as Co-Investigator:**

| No. | Amount (S$) | Title | Funding Organization | Duration | Role |
|---|---|---|---|---|---|
| 1 | 548,828 | **Interference Management for Emerging Satellite Communication Networks** | Astrium Innova | Feb. 2016 – Feb. 2018 | **Co-PI** |
| 2 | 147,000 | Algorithms for scalable cooperative communication of multi-hop relay network in a distributed environment | Ministry of Education, Singapore, Academic Research Fund, AcRF Tier 1 | Mar. 2009 – Jul. 2012 | Co-investigator |
| 3 | 54,194 | VLSI-Efficient Algorithms and Architectures for Real-Time Face Recognition in Biometric-Based Security Systems | Ministry of Education, Singapore, Academic Research Fund, AcRF Tier 1 | Oct. 2006 - Aug.2009. | Co-investigator |

## D. Research Awards:

1. Award for the Most Active Technical Committee Award in Human-Machine Systems' of IEEE Systems, Man and Cybernetics Society in 2016.
2. Tan Chin Tuan Fellowship in Engineering, Singapore, Awarded for **Visiting Associate Professorship in University of British Columbia, Canada (June-July 2013).**
3. Research Outstanding and Recognition (ROAR) Award, 1 PhD Scholarship ($150,000), Office of Research, NTU, 2006.
4. ROAR Award, 1 PhD Scholarship ($150,000), Office of Research, NTU, 2005.

## 6. SERVICE

### A. Service to the University (Administrative Appointments):

**Dean (Industry Collaboration & Sponsored Research), Indian Institute of Technology Palakkad, India (April 2018 – October 2020)**

**Head, Electrical Engineering Department, Indian Institute of Technology Palakkad, India (November 2017 – November 2020)**

**Senate Member, Indian Institute of Technology Palakkad, India (October 2017 – Nov 2020)**

**Board of Research Member, Indian Institute of Technology Palakkad, India (July 2018 – October 2020)**

**Assistant Chair (Students), School of Computer Science and Engg., NTU Singapore, May 2016 – May 2018**

**University Senate Member, NTU Singapore, June 016 – May 2018**

**University Team Leader, India Outreach (PhD), NTU Singapore, June 2012-31 May 2016**

**University Teaching Council Member, NTU Singapore, November 2012 – October 2016**

**University Research Council Member, NTU Singapore, June 2012 – May 2017**

**Faculty Search Committee Chair (Digital Systems & Cyber physical Systems), SCE, NTU Singapore, June 2013 - May 2017**

**Research Coordinator - Hardware and Embedded Systems Group, SCE, NTU, Jan. 2013 – Present**

**Subject Area Group Leader, Embedded Systems, NTU Singapore**

**School Curriculum Management Committee, NTU Singapore**

**Chairman, Student Outreach Committee (Undergraduate), SCE, NTU Singapore, July 2007 – June 2013**
- Planning and Coordination of SCE student outreach activities.
- Deliver Career Talks at Open Houses
- Deliver Technical Talks at Polytechnics and Junior Colleges.
- Represent the School/University in Open Houses.
- Active participation in Outreach Meeting organized by Associate Dean (College of Engineering), giving suggestions and feedbacks on outreach activities.
- Proactive in formulating new initiatives to enhance linkage with Polytechnics and Junior Colleges.

**Member, Research Performance Benchmarking Committee, SCE, NTU Singapore, 2008-2009**

**Graduate Student Liaison faculty-in-Charge, School of Computer Engineering, NTU Singapore, June 2005 – Jan. 2007**

## *B*. Editorial Board Memberships and Guest Editorships:

- **Associate Editor,** *IEEE Transactions on Human-Machine Systems,* October 2014 – Present
- **Associate Editor,** *IEEE Transactions on Neural Systems & Rehabilitation Engineering,* January 2020 – Present
- **Associate Editor,** *IEEE Transactions on Cognitive and Developmental Systems,* January 2021 – Present
- **Associate Editor,** *IEEE Systems Man & Cybernetics Magazine,* September 2019 - Present

- **Associate Editor,** *Circuits, Systems & Signal Processing Journal (Springer)*, January 2013 – Present
- **Associate Editor,** *Frontiers in Neurorobotics,* January 2021 – Present
- **Guest Editor,** Special Issue on Electronic System Design, *Journal of Circuits, Systems and Signal Processing, Springer,* Publication: October 2013
- **Lead Guest Editor,** Special Issue on Embedded Signal Processing Circuits and Systems for Cognitive Radio, *Journal of Circuits, Systems and Signal Processing, Springer,* Publication: December 2010.
- **Lead Guest Editor,** Special Issue on Signal Processing for Software Defined Radio, *Journal of Signal Processing Systems (*Formerly, *Journal of VLSI Signal Processing), Springer,* Published in November 2009.

## *C. Invited Keynote Talks and Tutorials Delivered in Flagship IEEE International Conferences:*

- Keynote Talk (Inaugural), 10th IEEE International Conference on Awareness Science & Technology (iCAST 2019), October 23, 2019, Morioka, Japan, http://www.chishiki.soft.iwate-pu.ac.jp/icast2019/plenary_speakers.html

- Keynote Talk (Inaugural), IEEE Region 10 Conference (IEEE TENCON 2019), October 18, 2019, Kochi, India, https://www.tencon2019.org/speakers.html

- Keynote Talk (Inaugural), IEEE INDICON 2018, December 2018, Amrita University, Coimbatore, India, http://117.240.224.8/indicon2018/Assets/keynote.pdf

- Invited talk on Brain-Computer Interface Systems Research in 'Sensing: From Minds to Machines Conference' organized by Israel Science Foundation and Ben-Gurion University of the Negev, Israel, May 29-June 1, 2016,

- "Brain-computer interface systems – Overview, design challenges and applications", IEEE International Conference on Systems, Man and Cybernetics (SMC 2015), Oct. 2015, Hong Kong, http://www.smc2015.org/tutorials

- "Brain-Machine Interaction: From neural decoding to real world applications", IEEE International Conference on Systems, Man and Cybernetics (SMC 2014), Oct. 2014, San Diego, USA, http://smc2014.org/node/68

## *D. Service to Professional Bodies:*

- **Technical Co-Chair, Brain-Machine Interface Systems, IEEE Systems, Man & Cybernetics Society, 2014 - 2018:** http://www.ieeesmc.org/technical-activities/human-machine-systems/brain-machine-interface-systems
- **Workshop Organizer,** Brain-Machine Interface Systems, IEEE International Conference on Systems, Man and Cybernetics (SMC 2016), Oct. 2016, Budapest, Hungary, https://documents.epfl.ch/users/c/ch/chavarri/www/IEEESMC2016_BMI/files/IEEE_SMC2016_CFP_BMI_Workshop.pdf
- **Workshop Organizer,** Brain-Machine Interface Systems, IEEE International Conference on Systems, Man and Cybernetics (SMC 2015), Oct. 2015, Hong Kong, http://www.smc2015.org/workshops

- **Workshop Organizer,** Brain-Machine Interface Systems, IEEE International Conference on Systems, Man and Cybernetics (SMC 2014), Oct. 2014, San Diego, USA, http://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=6973872
- **General Chair,** *International Symposium of Electronic System Design, ISED 2013,* 12-14 December 2013, Singapore.
- **General Chair,** The third IEEE International Conference on Advances in Computing and Communications (ACC-2013), Aug. 2013, Kochi, India
- **General Chair,** The second International Conference on Advances in Computing and Communications (ACC-2012)**,** Aug. 2012, Kochi, India
- **Program Chair,** *International Symposium of Electronic System Design, ISED 2011,* 19-21 December 2011, Kochi, India.
- **Sub-Track Chair,** *'Signal Processing Architectures for Communications',* 54th IEEE Midwest Symposium on Circuits & Systems, Aug. 2011, Seoul, South Korea.
- **Special Session Organizer,** *'Signal Processing for Software Defined and Cognitive Radios',* 54th IEEE Midwest Symposium on Circuits & Systems, Aug. 2011, Seoul, South Korea.
- **Special Session Organizer,** *"Signal Processing Advances for Cognitive Radio", 2011 URSI (International Union of Radio Science) General Assembly and Scientific Symposium,* Istanbul, Turkey, August 13-20, 2011.
- Technical Program Committee Member (TPC), *IEEE International Conference on Communications Systems,* Nov. 2012, Singapore.
- TPC, *6th International ICST Conference on Communications and Networking in China (CHINACOM),* Aug. 17-19 2011, Harbin, China.
- TPC, *IEEE International Conference on Communications Systems,* Nov. 2010, Singapore.
- TPC, IEEE International Conference on Communication and Signal Processing, Feb. 2011, Calicut, India.
- TPC, *IEEE International Symposium on Electronic System Design,* Dec. 2010, Bhubaneswar, India.
- TPC, *Sixth Advanced International Conference on Telecommunications* May 9 - 15, 2010, Barcelona, Spain.
- TPC, *IEEE Region 10 Conference (TENCON),* Singapore, November 2009.
- TPC, *IEEE International Symposium on Personal, Indoor and Mobile Radio Communications (PIMRC)*, Tokyo, Japan, September 2009.
- International Advisory Committee, *1st IEEE International Conference on Computer, Communication, Control and Information Technology,* Hoogly, West Bengal, India, February 2009.
- TPC, IEEE *International Symposium on Personal, Indoor and Mobile Radio Communications (PIMRC),* Cannes, France, September 2008.
- TPC, *11th IEEE International Conference on Communication Systems* Guangzhou, China, November 2008.
- TPC, *16th International Conference on Advanced Computing & Communication,* Chennai, India, December 14-17 2008.
- TPC, *National Conference on Communication Systems and Networking*, Guna, Madhya Pradesh, India, March 2008.
- TPC, 15th *IEEE International Conference on Advanced Computing & Communication,* Guwahati, India, December 2007.
- TPC, *IEEE International Conference on Communications, Circuits and Systems,* Fukuoka, Japan, August 2007.
- TPC, *Mosharaka International Conference on Communication and Information Technology,* Amman, Jordan, December 2007.

- **Organizer,** Special Session on Constraint-driven Hardware for Digital Signal Processing, *IEEE Asia Pacific Conference on Circuits and Systems,* Singapore, December 2006.
- **Organizer,** Special Session on Resource-Constraint DSP Hardware for Digital Communication Applications, *Tenth IEEE International Conference on Communication Systems,* Singapore, 30 Oct.-2 Nov. 2006.
- TPC, *IEEE International Conference on Communications Circuits and Systems,* Gui Lin, China, June 25-28, 2006.
- **Workshop Chair,** Future Computing, *International Multi-conference in Computer Science and Computer Engineering (CSREA),* Las Vegas, USA, June 2006.
- **Publicity Chair,** Tenth *Asia-Pacific Computer Systems Architecture Conference,* Singapore, October 24-27, 2005.
- Session Chair, Communication Receiver Design, *IEEE International Symposium on Circuits and Systems,* Kobe, Japan, May 2005.
- Organizing Committee Member, *International Conference on Signal Processing,* Istanbul, Turkey, 2004.

## 7. EXPERIENCE PRIOR TO JOINING NTU SINGAPORE:

### *A. Previous Teaching Experience*

#### *Courses taught in Singapore Polytechnic as a full-time Lecturer:*
- Digital Electronics (Lecture, Tutorial, Lab)
- Digital Signal Processing (Tutorial, Lab)
- Structured Programming (Tutorial, Lab)
- Multimedia DIGITAL Signal Processing (Lecture, Tutorial, Lab)
- Advanced Digital Signal Processing (Lecture, Lab)

#### *Curriculum Development and Related Activities during Lectureship in Singapore Polytechnic:*
- Involved in the curriculum development of a new course on *Digital Signal Processing* for a new Diploma course in Multimedia DSP.
- Set up a lab and developed the lab experiments for above course.
- Lecturer-in-charge of Multimedia Laboratory.
- Team Member, Singapore Polytechnic, in obtaining the award of the Singapore Quality Class, the ISO 9001:2000 and the People Developer (2001).

### *B. Previous Industry Experience*

**June 1997 – September 1998:** Instrumentation Engineer, Radiant Instrument and Electrical Engineering, Singapore (C/o Shell Singapore), Responsibilities include:
- Distributed Control System (DCS) based plant instrumentation maintenance.
- Programming and Troubleshooting of Programmable Logic Controllers (PLC).

**June 1996-March 1997:** Project Engineer, Kirloskar AAF Ltd., Bangalore, India, Responsibilities include:
- Instrumentation and control systems design engineering.
- Design of microprocessor based instrumentation systems for chemical plants, refineries, steel plants and pharmaceuticals.
- Programming, Installation, and Troubleshooting of PLCs – Siemens, Honeywell, Allen Bradley and Messung Systems.

**November 1995-May 1996:** Project Engineer (Industrial Automation) Tata Honeywell, Pune, India, Responsibilities include:

- Programming, Testing, and Commissioning of Honeywell PLCs.
- Developing Supervisory Computer Aided Data Acquisition (SCADA) systems for instrumentation and control systems of process plants.

**October 1993-November 1995:** Instrumentation Engineer, Kirloskar Snydergeneral Ltd., Bangalore, India, Responsibilities include:

- Installation, testing and commissioning of microprocessor based instrumentation systems.

## PUBLICATIONS

- Published **276 papers** in international refereed journals and international conferences.
- **Number of Journal Papers**: **94**

**Google Scholar Citation: 4125, h index 33, as at 27 January 2022**
**Scopus Citation: 2858, h index 27, as at 27 January 2022**

### Book Chapter

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2. P. K. Meher, C. H. Chang, O. Gustafsson, **A. P. Vinod,** and M. Faust, "Shift-add circuits for constant multiplications," Book Name: *Arithmetic Circuits for DSP Applications*, Wiley-IEEE Press, 2015.

### Refereed Journals

94. Praveen Kumar and **A. P. Vinod,** "Improving direction decoding accuracy during online motor imagery based Brain-Computer Interface using error-related potentials, *Biomedical Signal Processing and Control,* Accepted in January 2022 (Impact Factor: 3.88).
93. Rithwik P., Benzy VK and **A. P. Vinod**, "High Accuracy Decoding of Motor Imagery Directions from EEG-based Brain Computer Interface using Filter bank Spatially Regularised Common Spatial Pattern Method," *Biomedical Signal Processing and Control,* volume 72, part A, February 2022.
92. Sagila Gangadharan and **A. P. Vinod**, "Drowsiness detection using portable wireless EEG," *Computer Methods and Programs in Biomedicine,* Volume 214, February 2022, (Impact Factor 5.428).
91. Sunil P, Lakshminarayana G R, **A. P. Vinod**, Arun N, Rajagopal R and Somanathan C "A prospective single centre non-interventional study comparing oxygen saturation (SpO2) measured using pulse plethysmograph developed by IIT Palakkad, Kerala, to that obtained by standard multipara monitor," *Urology, Nephrology and Andrology International,* December 2021.
90. Praveen Kumar and **A. P. Vinod,** "Single-trial detection of EEG error-related potentials in serial visual presentation paradigm," *Biomedical Physics & Engineering Express*, Elsevier, 2021 Dec 22;8(1). doi: 10.1088/2057-1976/ac4200.
89. Neethu Robinson, Kavitha Thomas and **A. P. Vinod,** "Separability of Motor Imagery Directions Using Subject-Specific Discriminative EEG Features," *IEEE Transactions on Human Machine Systems,* vol. 51, no. 5, pp. 544-553, Oct. 2021.

88. Jijomon C. M. and **A. P. Vinod,** Person-Identification using Familiar-Name Auditory Evoked Potentials from Frontal EEG Electrodes," *Biomedical Signal Processing and Control,* Accepted in May 2021 (IF: 3.137).

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86. Praveen Kumar and **A. P. Vinod,** "Single Trial Detection of EEG Error-Related Potentials using Modified Power-Law Transformation," *Biomedical Signal Processing and Control,* Accepted in March 2021.

85. Arish S., Smitha K. G., Sharad Sinha and **A. P. Vinod**, "A Survey of Algorithmic and Hardware Optimization Techniques for Vision Convolutional Neural Networks on FPGAs," *Neural Processing Letters*, Accepted in February 2021.

84. N. Agrawal, Abhishek Ambede, Sumit Darak, **A. P. Vinod** and A. S. Madhukumar, "Design and Implementation of Low Complexity Reconfigurable Filtered-OFDM based LDACS", *IEEE Transactions on Circuits and Systems II*, doi: 10.1109/TCSII.2021.3053367, January 2021.

83. V K Benzy, **A. P. Vinod**, Subasree R, Suvarna Alladi and Raghavendra R., "Motor Imagery Hand movement Direction Decoding Using Brain Computer Interface to Aid Stroke Recovery and Rehabilitation," *IEEE Transactions on Neural Systems and Rehabilitation Engineering,* Accepted for publication in November 2020, doi: 10.1109/TNSRE.2020.3039331.

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56. Sumedh Dhabu and **A. P. Vinod**, "Design of modified second order frequency transformations based variable digital filters with large cutoff frequency range and improved transition band characteristics," *IEEE Transactions on Very Large Scale Integration Systems,* pp. 413-420, vol. 24, no. 2, February 2016.

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