

# Call for Graduate Research Assistant (Ph.D)

**Project Title:** Optimization of hybrid Empirical Mode Decomposition and Canonical Correlation Analysis (EMD-CCA) Algorithm for real-time removal of ocular artifacts in Electroencephalogram (EEG)

**Source of Funding:** Fundamental Research Grant Scheme FRGS (Ministry of Education, Malaysia)

**Project Duration:** 3 years, Jan 2015 till Dec 2017

**Basic Monthly Allowance:** RM 2300.00

**Top Up Allowance**<sup>1</sup> - Up to RM 1700.00 from Universiti Teknologi PETRONAS (giving a total monthly allowance of up to RM 4000.00).

**Location:** Centre of Intelligent Signal and Imaging Research, Department of Electrical & Electronic Engineering, Universiti Teknologi PETRONAS, Bandar Seri Iskandar, Tronoh, Perak.

## Project Background

Ocular or eyeblink artifacts are the most prominent type of artifacts present in Electroencephalogram (EEG) data. Most of the techniques used for eyeblink artifact removal from EEG can only be used for offline processing of EEG data due to the complex and time-consuming computations involved. In a previous project, we have proposed a novel algorithm for ocular artifact removal based on Empirical Mode Decomposition (EMD) and Canonical Correlation Analysis (CCA). This algorithm has been shown to achieve comparable performance to other popular techniques in terms of artifact detection and removal, but with significantly less computation time. The main objective of this project is to extend our work on the EMD-CCA based algorithm and enhance it so that it can be applied for real-time removal of ocular artifacts in EEG by removing computation redundancies, adopting faster implementations of EMD and CCA and utilizing faster and more efficient coding techniques.

## Project Objectives

The objectives of this research are:

- 1) To enhance our already developed algorithm based on Empirical Mode Decomposition (EMD) and Canonical Correlation Analysis (CCA) for real-time removal of ocular or eyeblink artifacts from EEG.
- 2) To test the effectiveness and evaluate the performance of the enhanced algorithm in real-time removal of ocular artifacts from EEG signals.

**Project Research Area:** Signal Processing, Biomedical Engineering

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<sup>1</sup> Subject to candidate meeting certain criteria and requirements.

**Benefits of the project include but are not limited to:**

- Enrolment for On Campus Full Time mode in PhD programme under the Department of Electrical & Electronic Engineering at UTP.
- Tuition fee waiver under the UTP Tuition Fee Assistantship Scheme<sup>2</sup>.
- Full or partial funding for attending local and overseas conferences.
- Funding to cover publication fees in ISI/SCOPUS-indexed journals.
- Research is parked under the Centre of Intelligent Signal and Imaging Research (CISIR), which was awarded National Higher Institution Centre of Excellence (HICoE) status by the Ministry of Education.

**Requirements:**

- Malaysian national.
- Master's degree in Electronic Engineering/Computer Engineering/Computer Science/Mathematics or equivalent, preferably a Master by research degree.
- For Master by coursework degree, a CGPA of 3.5 and above.
- Proficiency in Matlab/C++ languages.
- Excellent command in written and oral English.
- Proactive and able to carry out research independently.

Interested applicants can contact Dr. Nasreen Badruddin by email: [nasreen.b@petronas.com.my](mailto:nasreen.b@petronas.com.my)/  
[nasreen.badr@gmail.com](mailto:nasreen.badr@gmail.com). Please use the subject :**FRGS GRA Application** and include your  
resume/CV. Shortlisted candidates will be contacted for interview.

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<sup>2</sup> Candidate will be assigned 3-4 hours of academic activities per week in the form of tutorials or laboratory demonstration or any other related academic activities.