

Colloquium

科學計算於大腦神經科學與應用

Computational Modeling for Brain Neuroscience Research and Applications

主講人：柯立偉 教授(Dr. Li-Wei Ko)

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地 點：應用數學系多媒體教室（理 408 室）

摘 要：

近年來在醫學診斷和神經生物學研究中，腦電波訊號(Electroencephalogram, EEG)已成為非常有用的非侵入式生理訊號工具，主要因為它能在時域上提供較高的訊號解析度，直接反映出神經細胞群體中動態的變化。在所有量測大腦造影的醫療工具中，量測腦電波訊號最不受任何限制，因為在量測過程中，受試者不需受到固定身體和保持頭不動等限制。然而，若將現今市面上的腦波監測系統應用到日常生活中卻會深深受到許多限制，例如：需在頭皮上塗抹導電膠才能量測腦電波訊號，系統缺乏高精確度的量測，即時訊號處理和有效去除雜訊等功能，皆是主要腦波監測系統的缺失。本演講將介紹新穎腦機介面(Brain Computer Interface)開發設計和測試，並如何應用科學計算方法於量測腦波訊號處理，建立一人類大腦認知狀態(human cognition)評估系統，可應用於日常生活環境裡，即使是在多變的環境中做不同的工作任務，亦能直接擷取大腦活動變化。在擷取腦波生理訊號後，訊號處理尤為重要，因此將接著介紹常用科學計算方法於腦波訊號源擷取分離(Brain Source Separation)，事件相關誘發電位(ERP)和事件相關頻譜動態分析(ERSP)等分析，並結合計算智慧型技術(Computational Intelligence)開發即時認知狀態估測系統，以交大腦科學研究中心建構之環繞式虛擬實境動態駕駛平台為實例進行探討受試者駕車時的認知精神狀態的腦動態變化。

～本次演講亦歡迎大學部同學參加～

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Li-Wei (Leo) Ko received the B.S. degree in mathematics from National Chung Cheng University in 2001, the M.S. degree in educational measurement and statistics from National Taichung University in 2004, and the Ph.D. degrees in Electrical Engineering from National Chiao Tung University (NCTU), Taiwan, in 2007. He currently is an assistant professor in both Department of Biological Science and Technology, and Brain Research Center (BRC) in NCTU.

He is also the visiting scholar at Institute for Neural Computation in University of California, San Diego (UCSD). In academic service, he serves as the **Associate Editors** of IEEE Transactions on Neural Networks and Learning Systems (TNNLS, **Impact Factor: 4.370, Rank: 2/102, Top: 1.96% of COMPUTER SCIENCE, THEORY & METHODS**) in IEEE Computational Intelligence Society (CIS) since 2010, and Journal of Neuroscience and Neuroengineering (JNSNE) since 2012. Dr. Ko is invited to be the **Editor Board members** of ISRN Automotive Engineering journal and the Scientific World Journal since 2013. Dr. Ko is the technical committee members of **Neural Network Technical Committee (NNTC)** and **Fuzzy Systems Technical Committee (FSTC)** in IEEE CIS. Dr. Ko chaired a task force on “Fuzzy Modeling in Brain Computer Interactions and Cognitive Systems” in FSTC. His primary research interests are Neural Engineering and Mobile Wireless Healthcare including EEG signal processing and applying computational intelligence technologies to analyze neural physiological activities associated with human cognitive functions and develop the mobile and wireless brain machine interface in daily life applications. Dr. Ko currently has published **32** journal papers, **71** conference papers, **8** book chapters, **20** program committees in international conferences, **14** invited talks, and **15** paper awards.