

SEMINAR ANNOUNCEMENT**DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING**

Faculty of Engineering

Website: <https://www.eng.nus.edu.sg/ece/>**Area: Control, Intelligent Systems & Robotics****Host: Assoc Prof Xiang Cheng****Teaching Seminar**

TOPIC	:	Biological Learning in Humanoid Robotics
SPEAKER	:	Prof Gordon Cheng, Technical University of Munich
DATE	:	15 August 2019, Thursday
TIME	:	10am to 11am
VENUE	:	E5-03-20, Engineering Block E5, Faculty of Engineering, NUS

ABSTRACT

Learning can provide a powerful method in teaching complex tasks to robots. Especially robots with many degrees of freedom, e.g. a humanoid robot. This first lecture will provide students with a basic introductory to Humanoid Robotics, follow by an entry level overview to biological-based learning for robots.

Lessons to follow will cover: ii) The cerebellum: Facts, Anatomy, Neural circuitry, Effects of cerebellar disease; iii) Computational model of the cerebellum: Associative memory, Cerebellar model articulation controller (CMAC) iv) The basal ganglia: Anatomy and major components, Projections from and to other brain regions, Direct and indirect pathway, Basal ganglia loops; v) Reinforcement learning (RL): Characteristics, Reward, Agent and environment, Major components of a RL agent, Temporal difference learning; vi) Self-organizing maps (SOMs); vii) The central pattern generator (CPG): Biological approach, Computational model, Multilayered CPG.

BIOGRAPHY

Gordon Cheng holds the Chair for Cognitive Systems (2010-), Prof. Cheng is Founder and Director of Institute for Cognitive Systems, Faculty of Electrical and Computer Engineering at Technical University of Munich, Munich/Germany. He is the coordinator of the Center of Competence Neuro-Engineering (2013-). He is the director of the Elite Master of Science program in Neuroengineering (MSNE) of the Elite Network of Bavaria (2016-).

He received a PhD (2001) in Systems Engineering from the Department of Systems Engineering, The Australian National University. Bachelor (1991) and Master (1993) degrees in Computer Science from the University of Wollongong, Australia. He has extensive industrial experiences in consultancy as well as contractual development of large software systems. He was also the Founder/CEO of the company, G.T.I. Computing (1995-2006), a company he founded specializing in networking and transport management systems in Australia.

His research interests include, humanoid robotics, cognitive systems, artificial robot skin, brain machine interfaces, bio- mimetic of human vision, computational neuroscience of vision, action understanding, human-robot interaction, active vision and mobile robot navigation. He is the co-inventor of approximately 20 patents and author of approximately 300 technical publications, proceedings, editorials and book chapters. He has been named IEEE Fellow 2017 for "contributions in humanoid robotic systems and neurorobotics".

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