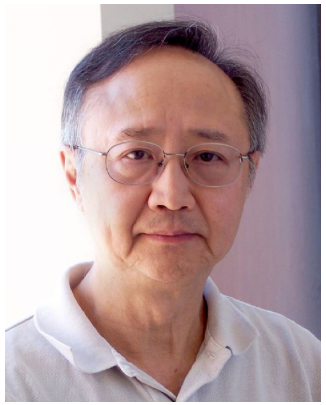
Keynote speakers

(a) Dr. Nan Chu



(b) Prof. James Lo

(c) Prof. Yuri Shelepin

(d) Prof. Men-Tzung Lo

(e) Prof. Yu-Te Wu

(f) Prof. Kirill Krinkin

(a) Dr. Nan Chu, CWLab International, Los Angeles, USA.
Date: 22 September, Time: 13:30-14:30 Taiwan Time, (UTC+8)
Topic: Challenges in Exploration of Neuroscience for Consumer Neurotechnology

(b) Prof. James Ting-Ho Lo, Univ. of Maryland Baltimore County, USA
Date: 22 September, Time: 17:00-18:00 Taiwan Time, (UTC+8)
Topic: Deep Learning and a New Approach for Machine Learning

(c) Prof. Yuri Shelepin, I. P. Pavlov Institute of Physiology, Russian Academy of Sciences, St. Petersburg, Russia
Date: 23 September, Time: 13:30-14:30 Taiwan Time, (UTC+8)
Topic: Conscious and Unconscious Vision

(d) Prof. Men-Tzung Lo, National Central University, Taiwan
Date: 23 September , Time: 14:30-15:30 Taiwan Time, (UTC+8)
Topic: A Real-World Implementation of Cloud-Based AI System for Large-Scale AFib Screening

(e) Prof. Yu-Te Wu, National Yang-Ming University, Taipei, Taiwan
Date: 24 September, Time: 16:00-17:00 Taiwan Time, (UTC+8)
Topic: Combining analysis of multi-parametric MR images into a convolutional neural network: Precise target delineation for vestibular schwannoma treatment planning

(f) Prof. Kirill krinkin, St. Petersburg Electrotechnical University (LETI).
Date: 24 September, Time: 17:00-18:00 Taiwan Time, (UTC+8)

Keynote Title: Challenges in Exploration of Neuroscience for Consumer Neurotechnology – by 朱南玉 N. Nan Chu, IEEE Brain Initiative Representative & CWLab International, California, USA

- **Abstract:**

IEEE Brain Initiative has sponsored hackathons, challenges and competitions in a manner of quick exploration about brain computer interface and brain data bank, also employing neural network modeling and deep learning in the realm of artificial intelligence, multi-modal physiological signal interactions, games to improve multi-tasking performance, epilepsy detection in mobile devices, all contributing to consumer usage of neuroscience/technology. This presentation will summary some open-source research we have engaged since 2016, identify gaps of brain image data collection and certain deficiency associated with neural network analytics, for future improvements.

Keynote Speaker: Dr. N. Nan Chu's Biography

Dr. N. Nan Chu, 朱 南 玉, retired from the industry in 2009, as an Executive Program Manager, responsible for a $500M product line of Digital Set Top Box manufacturing and deployment. Her technical contributions have grown along the transformation from digital voice, Internet data, to digital video distribution and processing, where she engineered the 1st digital STB standard.

While primarily engaged with the telecom and consumer electronics industry, Dr. Chu has forged collaboration with the academia by corporate grant management and adjunct teaching in Universities from the East Coast to the West Coast in the USA and in Taiwan. Most notably, she was the Director of Research & Services at California State University – Northridge. She has started 2 companies and currently running CWLab International, among other entrepreneurial activities in Chicago, Southern California, and overseas.

She has published more than 80 papers in areas related to digital communication/networking technologies, and edited 2 books. She has been credited as the co-author of Digital Set-top Box Standards in the national SCTE and international CCITT Study Group 9, receiving Corporate awards for the early digital cable conversion standardization. Her interests in research and product development continue to evolve along social networking, cloud computing, data security, Internet connectivity to e-Healthcare, with the latest global involvement in brain communication.

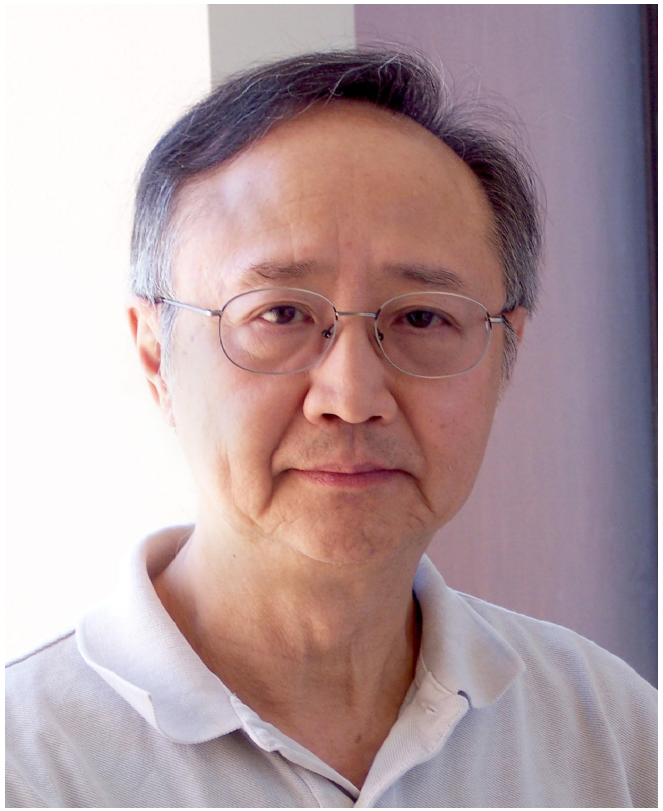
Dr. Chu has volunteered in IEEE professional services since the 1980's, and she is a Life Senior Member, having served on Board of Governors in Consumer Electronics Society, RFID, and Sensors Council, and General and/or Industry Chair for AAEA, BICS, GLOBECOM, IGIC, SPCN, etc. For the last 4 years, she has been the Founding Chair of the IEEE Brain Initiative Brain Data Bank Challenges, an extension from her earlier role in Brain Computer Interface Hackathons.

She received B.S. from National Tsing Hua University, M.S. from Iowa State University, and Ph.D. from Northwestern University, major in Nuclear Engineering, in 1972, 1973, and 1977, respectively.

Keynote Title: Deep Learning and a New Approach for Machine Learning - by Prof. 羅定和 James Ting-Ho Lo, Univ. of Maryland Baltimore County, USA

Abstract:

The essence of modern AI is machine learning, whose state of the art is mainly the highly publicized deep learning at present. Due to its unique capabilities, deep learning is indispensable for many applications. However, its development for a wide range of other applications especially those related to cognitive signal processing has been stagnant. In this talk, some fundamental shortcomings of deep learning will be discussed in connection with big or streaming data. A new approach to machine learning will be proposed, and some results, which actually explain how the biological neural networks encode, learn, memorize, recall and generalize as a "learning machine" will briefly be summarized.



Keynote Speaker: Prof. James Lo's biography

James Ting-Ho Lo is a Professor in the Department of Mathematics and Statistics of the University of Maryland Baltimore County. He received the BS degree from the National Taiwan University and the Ph.D. degree from the University of Southern California and was a Postdoctoral Research Associate at Stanford and Harvard University. His research interests have included optimal filtering, system control and identification, active noise and vibration control, and machine learning. In 1992, he solved the long-standing notorious problem of optimal nonlinear filtering in its most general setting and obtained a best paper award.

Subsequently, he conceived and developed adaptive neural networks with long- and short-term memories, accommodative neural network for adaptive processing without online processor adjustment, and robust/adaptive neural networks with a continuous spectrum of robustness; which constitute an effective systematic general approach to robust or/and adaptive processing for system control/identification/estimation and signal processing.

He has been developing a convexification method for avoiding nonglobal minima in data fitting (e.g., training deep neural networks and estimating regression models), which is ready for application and is nearing a complete solution of the long-standing notorious "local minimum problem", a main obstacle in data fitting.

In recent years, Dr. Lo has also been developing a low-order model of biological neural networks. The model comprises biologically plausible models of axonal/dendritic trees, synapses, spiking/nonspiking somas, unsupervised/supervised learning mechanisms, a maximal generalization scheme, and feedbacks with different delay duration; which integrate into a biologically plausible learning/retrieving algorithm and answer numerous fundamental questions in neuroscience.

Keynote Title: Conscious and Unconscious Vision –
Prof Yuri Shelepin, I. P. Pavlov Institute of Physiology, Russian Academy of Sciences, St. Petersburg, Russia

Abstract:

The channels for unconscious signal processing were investigated. The signal was hidden by masking on the periphery of the visual field and presented for a short period of time. The hidden signal on peripheral vision channels was activated by loading the central vision channel with a "pseudo-goal". We assumed that at these conditions it is easy to activate the channels of unconscious vision. We argue that if descriptions of unconscious signals are stored in memory, obtaining this stored information for its analysis in an experiment is possible only indirectly, by controlling the subject's unconscious reactions. The hidden information can be revealed by measuring involuntary movements under conditions of uncertainty.

Keynote Title: A Real-World Implementation of Cloud-Based AI System for Large-Scale AFib Screening - by Prof. Men-Tzung Lo, National Central University, Taiwan

Abstract:

Atrial fibrillation (AFib) is the most common arrhythmia, and the patients with AFib have five times higher risk for stroke. The prevalence is around 10% for the population over 65 years old. However, the occurrence of AFib can be episodic and sometimes asymptomatic which leads to underdiagnoses of AFib. New miniaturized intermittent ECG devices were adopted in several studies, and both population screening and home-based monitoring can significantly increase the detection rate. To develop an efficient and sustainable strategy for detecting undiagnosed AFib, we propose a cloud-based AI system for arrhythmia screening, especially for AFib. This system can be ubiquitously connected by incorporating with mobile devices in different scenarios such as health examination with real-time feedback or home-based monitor for the patients with 7-14 days screening. The system has been applied for Arrhythmia screening from Oct 2018 and over 14,000 people had been screened with 13.4% arrhythmia detection rate.

Keynote Speaker: Prof. Men-Tzung Lo's biography

Men-Tzung Lo, Ph.D., is Distinguished Professor of Department of Biomedical Sciences and Engineering, National Central University. The joint Lab directed by him and Dr. Chen Ln, Associated Professor of Department of Biomedical Sciences and Engineering, devote to two main research interests which are time varying interactions between multiple biological signals of human subjects and the changes of nonlinear properties in different physiological and pathological statuses. The Lab has been developing time saving nonlinear dynamic methods and revealing basic physiological principles and applying them to medicine for over 10 years. The Lab has published over 100 original peer-reviewed articles and has been invited to present their research at international conferences (e.g., The 4th and the 5th Asia Pacific Heart Rhythm Society Scientific Sessions; The 3rd Asian Epilepsy Surgery Congress). The Lab holds 16 US patents demonstrating the innovative nature of their work. One of their prowess accomplishments was the development on the methodology of cardiac fibrillation and catheter ablation, their works has been published on several target journals. Recently, the Lab is known for the live demo of mapping system for real time identification of the source of atrial fibrillation maintenance on the Asia Pacific Heart Rhythm Society 2013 at Hong Kong, this work has been recognized at 11th National Innovational Award, Taiwan.

Keynote Title: Combining analysis of multi-parametric MR images into a convolutional neural network - Precise target delineation for vestibular schwannoma treatment planning

- by Prof. Yu-Te Wu, National Yang Ming University, Taiwan

Abstract:

Manual delineation of vestibular schwannoma (VS) by magnetic resonance (MR) imaging is required for diagnosis, radiosurgery dose planning, and follow-up tumor volume measurement. A rapid and objective automatic segmentation method is required, but problems have been encountered due to the low through-plane resolution of standard VS MR scan protocols and because some patients have non-homogeneous cystic areas within their tumors. In this talk, a two-pathway U-Net model using multiparametric MR images (T1-weighted, T2-weighted (T2W), and T1-weighted with contrast images.) with different image contrasts as input for effectively segmenting tumors will be discussed.

Keynote Speaker: Prof. Yu-Te Wu's biography

Yu-Te Wu received a B.S. degree in electrical engineering from National Cheng-Kung University, Tainan, Taiwan, R.O.C., in 1988, and M.S. and Ph.D. degrees in electrical engineering from the University of Pittsburgh, Pittsburgh, PA, in 1992 and 1997, respectively. He was a Research Associate at the Robotics Institute, Carnegie Mellon University, Pittsburgh, PA, during 1997–1998. Currently, he is the Dean, Office of Research and Development, and Distinguished Professor, Institute of Biophotonics, at National Yang-Ming University, Taipei, Taiwan, R.O.C. He has published more than 100 articles in the areas of neuroimaging, machine learning, and brain-computer interface.

Prof. Wu has long been dedicated in brain magnetic resonance (MR) imaging analysis and applications using machine learning. The image-biomarkers, such as fractal dimension (FD), gyrification index (GI), curvedness (CVD), shape index (SI), and brain network connectivity have been applied to quantify the change of cortical morphology and network properties on structural and functional MR images, respectively. He has investigated the modulation of structural and functional brain network and association between structural/functional alteration and clinical syndromes of neuropsychiatric and neurodegenerative disorders, such as major depressive disorder, bipolar disorder, spinocerebellar ataxia (SCA), and multiple system atrophy type C (MSA-C). In addition, these structural and functional image biomarkers subserve as important features for differentiating some neuropsychiatric and neurodegenerative disorders where the structural changes of the cerebrum and cerebellum are difficult to identified via visual inspection.

In recent years, Prof. Wu has collaborated with the Gamma Knife team at Taipei Veterans General Hospital (VGHTPE), Taipei, Taiwan, to develop a gamma knife treatment decision assisting system for vestibular schwannoma. The goals of this study include the development of deep-learning based method for automate tumor segmentation and application of deep-learning model to predict the VS treatment response. In addition, He also collaborated with the Department of Radiology, VGHTPE, in the application of machine learning for quantitative digital subtraction angiography for improvement of hemorrhagic risk stratification of brain arteriovenous venous malformations.

Integration AI to a society. Threats, benefits, challenges

Kirill Krinkin. Ph.D, Saint Petersburg Electrotechnical University "LETI"

Abstract

Modern AI applications give us many benefits in an immense amount of domains. In many cases the performance of AI systems significantly overtake human abilities. Technologies grow much faster than society is able to seamlessly adapt them. There are many problems and contradictions which are hindering wide applications of new kind of systems. A few examples: personal data privacy conflicts to data availability for machine learning algorithms; absence of fully interpretable AI systems based on machine learning; the lack of standards allowing produce reliable AI products; uncertainty with responsibility transferring from human to autonomous systems like self driving cars; rapid division of labour system transformation causes vanishing some professions and creating new ones. The main threats, benefits and challenges of AI systems will be summarized and modern approaches to solving existing problems will be discussed

Kirill Krinkin

Kirill Krinkin is an Adjunct Professor, Head Software Engineering and Computer applications Department in Saint Petersburg State Electrotechnical University “LETI”, Director of International Innovation Institute on Artificial Intelligence, Cybersecurity, and Communications (Popov Institute). He is a professional member of IEEE, ACM, Robotics, and Automation Society. For the last more than twenty years, Kirill has been doing research and development with international companies and Universities in Software Engineering, Autonomous Mobile Robots, and related domains. Kirill Krinkin is an Author and co-author of more than 100 technical papers. He is actively giving lectures in universities on Mobile Robotics and operating systems development. He is an organizer of many hands-on STEM schools in Russia and Europe. He is a supervisor of the student team in Artificial Intelligence driving Olympics Challenge – a benchmark the state of the art of artificial intelligence in autonomous driving technologies in standardized simulation and hardware environments for tasks related to multi-sensory perception and embodied AI. His team took the 1st place twice in this challenge in 2019 at ICRA2019 and NeuroIPS2019 conferences.