- Report -

2020 IEEE CIS Online Summer School on Computational Intelligence for Human and Robot Co-learning

Aug. 21-23, 2020

Tokyo Metropolitan University, Tokyo, Japan
Taiwan AI Academy, Taiwan

2020 IEEE CIS Online Summer School on Computational Intelligence for Human and Robot Co-learning

Aug. 21-23, 2020
Tokyo Metropolitan University, Tokyo, Japan
Taiwan AI Academy, Taiwan

Learning has become a very popular approach for cybernetics systems. This topic has always been considered a research in the Computational Intelligence (CI) area. With the recent success of AlphaGo, there has been a lot of interest among students and professionals to apply machine learning to gaming and in particular to the game of Go. Several conferences have held competitions human vs. computer programs or computer programs against each other. While computer programs are already better than humans (even high level professionals), machine learning still offers interesting prospects, both from the fundamental points of view (1) to even further the limits of game playing (having programs playing against each other), (2) to better understand machine intelligence and compare it to human intelligence, and from the practical point of view of enhancing the human playing experience by coaching professionals to play better or training beginners. Hence, in 2018 and 2019, we proposed a summer school on "**Computational Intelligence for Human and Robot Co-learning**" in Taiwan. In addition, we also set up an ***AI-FML International Academy*** (https://sites.google.com/asap.nutn.edu.tw/ai-fml-international-academy/home) in 2020, including the IEEE CIS members from Japan, Canada, Taiwan, Italy, Spain and UK. The objectives of organizing the **Computational Intelligence for Human and Robot Co-learning** summer school in Japan and in Taiwan in 2020 are to gather more students from senior high schools, undergraduate colleges, graduate schools, and even post-graduate that eager to learn some ideas from the CI area.

- Venue: **Virtual Seminars** (Zoom in Japan and Taiwan)
- Dates: **Aug. 21-23, 2020** (Duration: 3 days)
- Official Summer School Page:
  https://sites.google.com/view/2020ieeecissummerschool/home
  https://sites.google.com/asap.nutn.edu.tw/ai-fml-international-academy/home
- **Zoom:** You can receive the passcode to access to the schedule (CFP) on the file;
  http://www.comp.sd.tmu.ac.jp/CcS2020/cis_ss_zoom.pdf
- **Registration** (Registration Fee: Free)**:**
  https://docs.google.com/forms/d/e/1FAIpQLSegI8-A_8Q101iI2xBKoClf8YLhZXNfYkR7i-r7_kWFpqvAuw/viewform
- The number of Participants: 134 (Seminars), 74 (Workshop 1 & 2)
- **Co-sponsor :**
  Community-centric Systems Research Core, Tokyo Metropolitan University, Japan
  International Interfaculty Initiative in Computational Systems Care, Tokyo Metropolitan University, Japan
- **Technical Co-sponsors :**
  KWS Center, National University of Tainan, Taiwan (http://kws.nutn.edu.tw)
  Taiwan AI Academy, Taiwan (https://aiacademy.tw/)
  Artificial Intelligence Industry and Academia Alliance, Taiwan (https://aiiaa.narlabs.org.tw/)
  Information Education Center, National Kaohsiung Normal University, Taiwan
- **Supporters :**
  IEEE Systems, Man, and Cybernetics Society, Japan Chapter
  Technical Committee on Computational Intelligence, Division of Systems and Information, SICE, Japan
  Tokyo Artificial Intelligence Community, Japan

1. Plenary Talks and Invited Lectures

Plenary Talk 1: **Prof. Chang-Shing Lee**

Affiliation: Department of Computer Science and Information Engineering
National University of Tainan, Taiwan

Title: AI-FML Robot and Human Co-Learning for Future Educational Applications

Abstract: The currently observed developments in Artificial Intelligence (AI) and its influence on different types of industry mean that human-robot cooperation is of a special importance. Various types of robots have been applied to the so-called field of Edutainment, i.e., the field that combines education with entertainment. This talk introduces a novel fuzzy-based system for a human-robot cooperative Edutainment. We propose an AI-FML robotic agent for student learning behavior ontology construction which can be applied in English speaking and listening domain. The AI-FML robotic agent with the ontology contains the perception intelligence, computational intelligence, and cognition intelligence for analyzing student learning behavior. In addition, there are three intelligent agents, including a perception agent, a computational agent, and a cognition agent in the AI-FML robotic agent. We deploy the perception agent and the cognition agent on the robot Kebbi Air. Moreover, the computational agent with the Deep Neural Network (DNN) model is performed in the cloud and can communicate with the perception agent and cognition agent via the Internet. The proposed AI-FML robotic agent is applied in Taiwan and tested in Japan. In the future, we hope the AI-FML Robot and Human Co-Learning will solve such an existing problem in the classroom that the high-performing students feel the learning contents are too simple to motivate their learning or the low-performing students are unable to keep up with the learning progress to choose to give up learning.

Chang-Shing Lee is currently a Professor with the Department of Computer Science and Information Engineering, National University of Tainan (NUTN), Taiwan. He was the Director of Computer Center from February 2006 to July 2011, and Dean of Research and Development Office from January 2011 to July 2015. He also co-organized TANET 2010 (General Co-Chair) and FUZZ-IEEE 2011(Program Chair) during his Director of Computer Center term. He handled the university assessment affairs of NUTN in 2011 and assisted Ministry of Education (MOE, Taiwan) to deal with the gender equality event and state compensation of The Affiliated School for Students with Hearing Impairments of National University of Tainan (2013/10-2015/1) to implement University Social Responsibility (USR) during his Dean of RD Office term. Since Sept. 2007, he has assisted MOE to establish the platform of remedial instruction for students from elementary schools and junior high schools. In 2017, he utilized the resources of Taiwan's academic institutes and research institutes to co-invite Facebook AI Research (FAIR) Director Yann LeCun to visit Taiwan and to give public speeches in Taiwan. It is hoped to speed up Taiwan's AI industrial development and real-world applications.

His current research interests include artificial intelligence, adaptive assessment and self-learning, intelligent agent, ontology applications, Capability Maturity Model Integration (CMMI), fuzzy theory and applications, and machine learning. He also holds several patents on Fuzzy Markup Language (FML), ontology engineering, document classification, image filtering, and healthcare. He was awarded Certificate of Appreciation for outstanding contributions to the development of IEEE Standard 1855TM-2016 (IEEE Standard for Fuzzy Markup Language). In addition, he was awarded Certificates of contributions to Human and Smart Machine Co-Learning and contributions to FML-based Machine Learning Competition for Human Prediction and Applications on Game of Go awarded by IEEE SMC 2017 and FUZZ-IEEE 2017, respectively. He was a keynote speaker of Intelligent Agents Symposium of IEEE SSCI 2017 (Hawaii).

He is IEEE CIS Content Curation Subcommittee Chair and was IEEE CIS Summer Schools Subcommittee Chair in 2018 and 2019. He was IEEE CIS Tainan Chapter Chair (2015/8-2017/7), IEEE CIS Emergent Technologies Technical Committee (ETTC) Chair from 2009 to 2010, and ETTC Vice-Chair in 2008. He is also an Associate Editor or Editor Board Member of International Journals, such as IEEE Transactions on Computational Intelligence and AI in Games (IEEE TCIAIG), Applied Intelligence, Soft Computing, Journal of Information Science and Engineering (JISE), and Journal of Advanced Computational Intelligence and Intelligent Informatics (JACIII). According to Google Scholar, Prof. Lee has published over 150 papers and his papers' cited number on Google Scholar is over 3400. His h-index and i10-index are 28 and 61, respectively. Prof. Lee was awarded the outstanding achievement in Information and Computer Education & Taiwan Academic Network (TANet) by Ministry of Education of Taiwan in 2009 and the excellent or good researcher by National University of Tainan from 2010 to 2016. He is a senior member of the IEEE CIS and a member of the Taiwanese Association for Artificial Intelligence (TAAI).

Plenary Talk 2: **Dr. Eri Sato-Shimokawara**

Affiliation: Department of Computer Science and Information Engineering
Tokyo Metropolitan University, Japan

Title: Human Oriented AIoT Application

Abstract: Various sensors are used around our daily life as multi-modal data, conventional recognition approaches deal with each sensor data respectively for recognizing human's activity. Considering a human internal state, each modal closely related mutually, so this talk introduces how to recognize human behaviors according to individual differences of human personality. Firstly, a multi characteristic model architecture that combines the personalized machine learning models and utilizes each model's prediction score in the inference is introduced. This architecture formed with reference to ensemble machine learning architecture. Secondly talks about robot expression based on individual traits adapting parameters thus shows different expressions to satisfy certain types of interlocutors. Our approach researches viewpoint from interaction in the mutual process, significant behavior explores the corresponding relationship between individual behaviors. Finally, I will talk about a comprehensive interaction robot application using a heart rate sensor and a brain-computer interface considering the internal state in the case of chatting towards co-learning.

Eri Sato-Shimokawara (S'04–M'07) received the B.E., M.E., and D.E. degrees in systems engineering science from the Tokyo Metropolitan Institute of Technology, Tokyo, Japan, in 2002, 2004, and 2007, respectively.,She was a Research Fellow of Japan Society for the Promotion of Science from 2004 to 2007. She has been an Assistant Professor with the Faculty of System Design, Tokyo Metropolitan University, Hachioji, Japan, since 2007. Her current research interests include human–machine interactions, multimodal interactions, soft computing, and intelligent robotics.,Dr. Sato-Shimokawara is a member of the Institute of Electronics Information and Communication Engineers, the Japan Society for Fuzzy Theory and Intelligent Information, and the Japanese Society for Artificial Intelligence.

Plenary Talk 3: **Prof. Li-Wei Koh**

Affiliation: Institute of Bioinformatics and Systems Biology
National Chiao Tung University, Taiwan

Title: Brain-Computer Interface (BCI) Technology for Human Learning

Abstract: As the proliferation of technology dramatically infiltrates all aspects of social life, the development of strategies and techniques to enhance human–machine interaction is becoming increasingly important. Brain-computer interface (BCI) is the new concept of neuro-technology developments in the neural engineering field which is based on a direct communication pathway between the human brain and an external device. Several novel BCI developments have been primarily applied in the laboratory and clinical settings. However, there still exists challenges for the current BCI developments:

(1) Lack of new sensors and technologies to measure high-quality neural, physiological, behavioral, and contextual data in real-world environments,

(2) Request advanced signal-processing and machine-learning algorithms to jointly analyze the real-time physiological data,

(3) What are the sensible real-world applications of BCIs?

(4) Deal with the human variability both across different individuals and within the same individual over time.

In this talk, I will introduce the latest BCI developments to overcome part of the major challenges. Combining artificial intelligence, BCI, internet of things, big data, and cloud/edge computing can leverage the benefits of these technologies. Furthermore, I will show the newly dry EEG sensors and the miniaturized biomedical circuits and systems design for developing the wearable BCI devices depending on different applications. Theses device are currently being applied to the ongoing clinical studies of neurological diseases such as sleep, migraine, and neural rehabilitation including the aspects of assistive diagnosis, syndrome prediction, and treatment feedback. We do hope the latest BCI developments can offer more opportunities to revolutionize human–machine interaction to improve human life quality and enhance understanding of human functions in complex real-world settings including daily life and clinical applications.

Li-Wei (Leo) Ko received the Ph.D. degrees in Electrical Engineering from National Chiao Tung University (NCTU), Taiwan, in 2007. Dr. Ko currently is Professor in Institute of Bioinformatics and Systems Biology in NCTU and Director of Interdisciplinary Neuroscience Ph. D. program of NCTU since 2018. He is also the visiting scholar in Institute for Neural Computation in University of California, San Diego (UCSD).

Dr. Ko leads the Neural Engineering Laboratory in NCTU and primary research interest is focusing on neurotechnology developments in the neural engineering field, especially in brain computer interface (BCI), smart healthcare, real-world neuroimaging (RWN) studies, and neural computation in the clinical applications.

In academic service, Dr. Ko currently is **Associate Editor** of IEEE Transactions on Neural Systems and Rehabilitation Engineering and the Chair of the IEEE Computational Intelligence Society Taipei Chapter from 2019-2020**.** He ever served as the **Associate Editor** of IEEE Transactions on Neural Networks and Learning Systems from 2010-2015. Dr. Ko is the technical committee members of **Neural Network Technical Committee** (NNTC) and **Fuzzy Systems Technical Committee** (FSTC) in IEEE CIS.

Plenary Talk 4: **Prof. Giovanni Acampora**

Affiliation: Department of physics "ettore pancini"
University of Naples Federico II, Italy

Title: IEEE 1855: Foundations, Applications, Education

Abstract: This seminar introduced IEEE 1855, the first IEEE standard technology in the area of computational intelligence. IEEE 1855 is based on the original idea of a Fuzzy Markup Language (FML), an abstract tool for representing fuzzy systems in a human-readable and hardware-independent way. Thank to its capabilities, IEEE 1855 is currently used to design and develop enhanced frameworks for AI and, moreover, it is going to become a consolidated tool for education in primary and secondary schools. This seminar will provide summer school students with the basic concepts of IEEE 1855 and its applications, so as to allow them the start a new exciting experience in the area of FML-based AI systems.

Giovanni Acampora (Senior Member, IEEE) received the Ph.D. degree in computer science from the University of Salerno, Fisciano, Italy, in 2007.,From July 2011 to August 2012, he was a Hoofddocent Tenure Track of process intelligence with the School of Industrial Engineering, Information Systems, Eindhoven University of Technology, Eindhoven, The Netherlands. He was a Reader of computational intelligence from the School of Science and Technology, Nottingham Trent University, Nottingham, U.K., from September 2012 to June 2016. Since 2016, he has been an Associate Professor of artificial intelligence with the University of Naples Federico II. He is the Chair of IEEE-SA 1855WG, the working group that has published the first IEEE standard in the area of fuzzy logic. His main research interests include computational intelligence, fuzzy modeling, evolutionary computation, and ambient intelligence. Prof. Acampora is a member of the scientific board of the Interdepartmental Center for Advanced Robotics in Surgery (ICAROS). He was a recipient of two prestigious awards: the IEEE-SA Emerging Technology Award in 2016 and the 2019 Canada-Italy Innovation Award for Emerging Technologies. In 2017, he acted as a General Chair of IEEE International Conference on Fuzzy Systems, the top leading conference in the area of fuzzy logic. He serves as an Editor in Chief of Springer Quantum Machine Intelligence, an Associate Editor of Springer Soft Computing, and an editorial board member of Springer Memetic Computing, Elsevier Heliyon, Inderscience International Journal of Autonomous and Adaptive Communication Systems, and the IEEE Transactions on Fuzzy Systems.

Plenary Talk 5: **Prof. Marek Reformat**

Affiliation: Department of Electrical and Computer Engineering
University of Albert, Canada

Title: Semantic Web Technology for Human and Machine Interaction

Abstract: Knowledge Graphs provide a semantically rich representation of data and information. They focus on expressing different types of relations existing between entities and forming their feature-based descriptions.

This talks provides an introduction to Resource Description Framework - RDF - as one of the most popular standards governing construction of knowledge graphs. It also presents two undertakings illustrating advantages of using such representation of information for humans: 1) a learning process that integrates new information represented as relations; and 2) a knowledge graph based Question-Answering (QA) system that allows users to ask natural language questions containing linguistic terms, such as SMALL, LARGE, or TALL.

Marek Reformat focus on developing more human-aware and human-like systems via combining: elements of Computational Intelligence - granular (fuzzy) computing, neuro computing, and evolutionary computing - able to capture relationships between pieces of data and knowledge, as well as mimic human ways of reasoning; with techniques capable of dealing with uncertainty - possibility theory, probability theory, Dempster-Shafer's evidence theory; and with Semantic Web based knowledge representation forms, especially Resource Description Framework (RDF)

Plenary Talk 6: **Dr. Kunihiko Fukushima**

Affiliation: Fuzzy Logic Systems Institute, Japan

Title: Deep Convolutional Neural Network for Artificial Vision

Abstract: Recently, deep convolutional neural networks (deep CNN) have become very popular in the field of visual pattern recognition. The neocognitron, which was first proposed by Fukushima (1979), is a network classified to this category. It is a hierarchical multi-layered network. Its architecture was suggested by neurophysiological findings on the visual systems of mammals. It acquires the ability to recognize visual patterns robustly through learning. Although the neocognitron has a long history, improvements of the network are still continuing. This talk discusses the recent neocognitron, focusing on differences from the conventional deep CNN. Several networks extended from the neocognitron are also discussed.

Kunihiko Fukushima received a B.Eng. degree in electronics in 1958 and a PhD degree in electrical engineering in 1966 from Kyoto University, Japan. He was a professor at Osaka University from 1989 to 1999, at the University of Electro-Communications from 1999 to 2001, at Tokyo University of Technology from 2001 to 2006; and a visiting professor at Kansai University from 2006 to 2010. Prior to his Professorship, he was a Senior Research Scientist at the NHK Science and Technology Research Laboratories. He is now a Senior Research Scientist at Fuzzy Logic Systems Institute (part-time position), and usually works at his home in Tokyo.

He received the Achievement Award and Excellent Paper Awards from IEICE, the Neural Networks Pioneer Award from IEEE, APNNA Outstanding Achievement Award, Excellent Paper Award from JNNS, INNS Helmholtz Award, and so on. He was the founding President of JNNS (the Japanese Neural Network Society) and was a founding member on the Board of Governors of INNS (the International Neural Network Society). He is a former President of APNNA (the Asia-Pacific Neural Network Assembly).

Invited Lecture 1: **Prof. Naoyuki Kubota**

Affiliation: Department of Mechanical Systems Engineering
Tokyo Metropolitan University, Japan

Title: Robot Edutainment - Learning on Robots, Learning through Robots and Learning with Robots

Abstract: Recently, various types of robots have been applied to the fields of education from nursery schools to colleges. Basically, there are three different aims in robot edutainment (education with entertainment). One is to develop knowledge and skill of students through project-based learning by the development of robots (Learning on Robots). Students can learn basic knowledge on robotics itself by the development of a robot. The next one is to learn the interdisciplinary knowledge on mechanics, electronics, dynamics, biology, and informatics by using robots (Learning through Robots). The last one is to apply human-friendly robots instead of personal computers for computer-assisted instruction (Learning with Robots). The topic on human – robot co-learning can be recognized as Learning with Robots. In this talk, we introduce the basic idea of robot educations, and show several examples of Learning on Robots, Learning through Robots and Learning with Robots.

Naoyuki Kubota received the B.Sc. degree from Osaka Kyoiku University, Kashiwara, Japan, in 1992, the M.Eng. degree from Hokkaido University, Hokkaido, Japan, in 1994, and the D.E. degree from Nagoya University, Nagoya, Japan, in 1997.,He joined the Osaka Institute of Technology, Osaka, Japan, in 1997. He joined the Department of Human and Artificial Intelligence Systems, University of Fukui, Fukui, Japan, as an Associate Professor, in 2000. He joined the Department of Mechanical Engineering, Tokyo Metropolitan University, Tokyo, in 2004. He was an Associate Professor (2005–2012), and has been a Professor with the Department of System Design, Tokyo Metropolitan University, since 2012.

Invited Lecture 2: **Prof. Yusuke Nojima**

Affiliation: Department of Computer Science and Intelligent Systems
Osaka Prefecture University, Japan

Tentative Title: Introduction to Evolutionary Multiobjective Optimization

Abstract: Real-world optimization problems often include multiple objective functions to be optimized at the same time. If all/some of objective functions are conflicting among others, there exists no single optimal solution. There are a number of Pareto optimal solutions with different tradeoffs among objectives. Evolutionary multiobjective optimization utilizes a population-based search ability to efficiently find a number of Pareto or near-Pareto optimal solutions by its single run. This lecture introduces the basic idea of evolutionary multiobjective optimization algorithms, the quality indicators, and some recent topics including many-objective optimization, large scale optimization, evolutionary multitasking, and innovization.

Yusuke Nojima received the B.S. and M.S. Degrees in mechanical engineering from Osaka Institute of Technology, Osaka, Japan, in 1999 and 2001, respectively, and the Ph.D. degree in system function science from Kobe University, Hyogo, Japan, in 2004. Since 2004, he has been with Osaka Prefecture University, Osaka, Japan, where he was a Research Associate and is currently an Associate Professor in Department of Computer Science and Intelligent Systems. His research interests include evolutionary fuzzy systems, evolutionary multiobjective optimization, and parallel distributed data mining. He was a guest editor for several special issues in international journals. He was a task force chair on Evolutionary Fuzzy Systems in Fuzzy Systems Technical Committee of IEEE Computational Intelligence Society. He was an associate editor of IEEE Computational Intelligence Magazine (2014-2019).

Invited Lecture 3: **Dr. WeiHong Chin**

Affiliation: Department of Mechanical Systems Engineering
Tokyo Metropolitan University, Japan

Title: Introduction to Machine Learning

Abstract: The field of machine learning, which can be described briefly as enabling computers to make accurate predictions using past experiences, has recently shown a remarkable development with the aid of the rapid increase in computer storage capacity and processing power. Machine learning methods have been widely used in bioinformatics, robotics, business analysis with many other disciplines. In this lecture, I will walk you step-by-step into the fundamental of Machine Learning. I will explain some popular machine learning algorithms and show its application using Python.

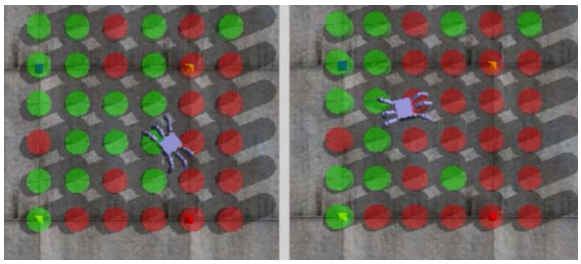
Wei Hong Chin completed his B.E. (Hons.) degree in Robotics and Automation from the Multimedia University, Malaysia in 2011. He received the Master of Computer Science degree from the University of Malaya, Kuala Lumpur, Malaysia, in 2015 and the Ph.D. degree from the Tokyo Metropolitan University, Tokyo, Japan, in 2019. He is currently an assistant professor in the Department of Systems Design of Tokyo Metropolitan University. His current research interests include biologically-inspired robot navigation, lifelong machine learning, biologically-inspired robot mapping, and multimodal learning. He has published more than 20 refereed journal and conference papers in the interest research area. He has served as the session chair of ICIRA 2019 and WCCI 2020.

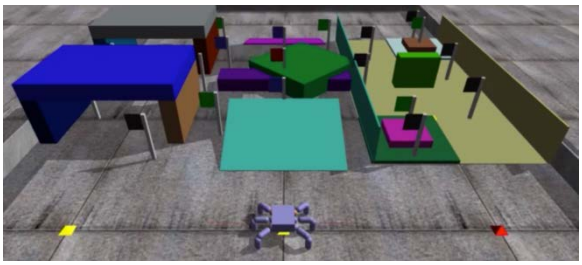
2. Workshops

Workshop 1 in Japan: Design of Locomotion Patterns and Robot Contest on Flag Strike

Chair: WeiHong Chin

Abstract: Various types of robots have been applied to educational fields. Basically, there are three different aims in robot edutainment (education with entertainment): Learning on Robots, Learning through Robots and Learning with Robots. An educational partner robot can teach something through interaction with students in daily situation. The human-robot co-learning is a kind of Learning with Robots and we have developed various types of robot partners. To enhance the natural communication and interaction with students, we have to design the robot motion. Therefore, we focus on Learning through Robots in this workshop. This workshop provides the participants with the practice on the design of locomotion patterns for multi-legged robots using ODE (Open Dynamics Engine, https://www.ode.org/) from the viewpoint of Learning through Robots. Basically, participants don't need the programming skill, but we assumed that participants install ODE on Windows, Macintosh or UNIX PC beforehand. First, participants learn the basic mathematical formulation of robot geometry and kinematics by trigonometric functions. Next, participants understand how to conduct multi-legged locomotion by computer simulations with ODE, and design locomotion patterns by text files as a group work. Finally, participants join a flag strike robot contest.

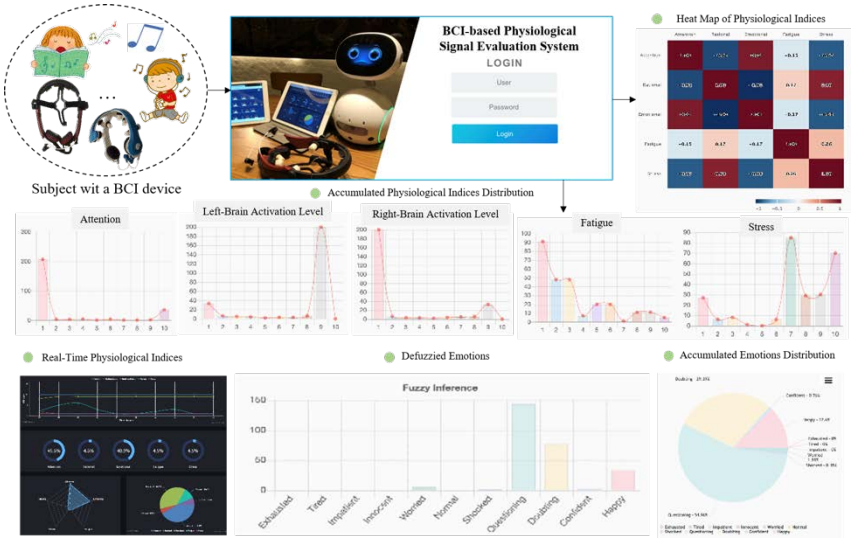




Workshop 2 in Taiwan: Human and Robot Co-Learning

Chair: Chang-Shing Lee

Abstract: Dynamic assessment with an intelligent agent can differentiate the capabilities and proficiency of students. It can therefore be advocated as an interactive approach to conduct assessments on students in learning systems. We propose an AI-FML agent for robotic Go game, language, mathematics, and AIoT real-world co-learning applications. The proposed AI-FML agent publishes the inferred result to communicate with the robot Kebbi Air based on MQTT protocol to achieve the goal of human and smart machine co-learning. From Sept. 2019 to Jul. 2020, we introduced the AI-FML agent into the teaching and learning fields in Taiwan. The learning performance and feedback from students and teachers has been extremely positive, especially from remedial students. The experimental results show the robots and students can co-learn AI tools and FML applications effectively. In the future, we hope to deploy the AI-FML agent to more available robot and human co-learning platforms through the established AI-FML International Academy in the world.



3. Program

(Japanese Time; GMT +09:00)

<table>
<tr><th>Time / Date</th><th>Day 1
Aug. 21, 2020</th><th>Day 2
Aug. 22, 2020</th><th>Day 3
Aug. 23, 2020</th></tr>
<tr><td>09:45 – 10:00</td><td>Opening Address</td><td colspan="2"></td></tr>
<tr><td>10:00 – 11:00</td><td>Plenary Talk 1
Chang-Shing Lee
Taiwan</td><td>Plenary Talk 5
Marek Reformat
Canada</td><td>Invited Lecture 2
Yusuke Nojima
Japan</td></tr>
<tr><td>11:00 – 11:10</td><td colspan="3">Break</td></tr>
<tr><td>11:10 – 12:10</td><td>Plenary Talk 2
Eri Sato-Shimokawara
Japan</td><td>Plenary Talk 6
Kunihiko Fukushima
Japan</td><td>Invited Lecture 3
WeiHong Chin
Japan</td></tr>
<tr><td>12:10 – 13:00</td><td colspan="2">Break</td><td rowspan="4">Workshop 2
in Taiwan
Human and Robot
Co-Learning</td></tr>
<tr><td>13:00 – 14:00</td><td>Plenary Talk 3
Li-Wei Ko
Taiwan</td><td>Invited Lecture 1
Naoyuki Kubota
Japan</td></tr>
<tr><td>14:00– 14:30</td><td colspan="2">Break</td></tr>
<tr><td>14:30 – 15:30</td><td>Plenary Talk 4
Giovanni Acampora
Italy</td><td rowspan="2">Workshop 1
in Japan
Design of Locomotion
Patterns and Robot
Contest of
Flag Strike</td></tr>
<tr><td>15:30 – 17:00</td><td></td><td></td></tr>
</table>

August 21, Friday

Opening Address: 9:45 – 10:00 Chair: Yusuke Nojima (Osaka Prefecture University, Japan)
Plenary Talk 1: 10:00 - 11:00 Chair: Naoyuki Kubota (Tokyo Metropolitan University, Japan)
Prof. Chang-Shing Lee (National University of Tainan, Taiwan)
Title: AI-FML Robot and Human Co-Learning for Future Educational Applications

Plenary Talk 2: 11:10 - 12:10 Chair: Naoyuki Kubota (Tokyo Metropolitan University, Japan)
Dr. Eri Sato-Shimokawara (Tokyo Metropolitan University, Japan)
Title: BCI-based AIOT Applications

Plenary Talk 3: 13:00 - 14:00 Chair: Chang-Shing Lee (National University of Tainan, Taiwan)
Prof. Li-Wei Koh (National Chiao Tung University, Taiwan)
Title: Brain-Computer Interface (BCI) Technology for Human Learning

Plenary Talk 4: 14:30 - 15:30 Chair: Chang-Shing Lee (National University of Tainan, Taiwan)
Prof. Giovanni Acampora (University of Naples Federico II, Italy)
Title: Fuzzy Markup Language and Applications

August 22, Saturday

Plenary Talk 5: 10:00 - 11:00 Chair: Yusuke Nojima (Osaka Prefecture University, Japan)
Prof. Marek Reformat (University of Albert, Canada)
Title: Semantic Web Technology for Human and Machine Interaction

Plenary Talk 6: 11:10 - 12:10 Chair: Naoki Masuyama (Osaka Prefecture University, Japan)
Dr. Kunihiko Fukushima (Fuzzy Logic Systems Institute, Japan)
Title: Deep Convolutional Neural Network for Artificial Vision

Invited Lecture 1: 13:00 - 14:00 Chair: Kentaro Kurashige (Muroran Institute of Technology, Japan)
Prof. Naoyuki Kubota (Tokyo Metropolitan University, Japan)
Title: Robot Edutainment - Learning on Robots, Learning through Robots,
and Learning with Robots

Workshop 1 in Japan: 14:30 - Chair: WeiHong Chin (Tokyo Metropolitan University, Japan)
Design of Locomotion Patterns and Robot Contest on Flag Strike

August 23, Sunday:

Invited Lecture 2: 10:00 - 11:00 Chair: Hiroyuki Mausta (Toyama Prefectural University)
Prof. Yusuke Nojima (Osaka Prefecture University, Japan)
Title: Introduction to Evolutionary Multiobjective Optimization

Invited Lecture 3: 11:10 - 12:10 Chiar: Takenori Obo (Tokyo Polytechnic University, Japan)
Dr. WeiHong Ching (Tokyo Metropolitan University, Japan)
Title: Introduction to Machine Learning

Workshop 2 in Taiwan: 13:00 - Chair: Chang-Shing Lee (National University of Tainan, Taiwan)
Human and Robot Co-Learning

4. Organizers

- General Chai
Naoyuki Kubota, Tokyo Metropolitan University, Japan (kubota@tmu.ac.jp)

- General Co-Chairs
Toru Yamaguchi, Tokyo Metropolitan University, Japan (yamachan@tmu.ac.jp)
Chang-Shing Lee, National University of Tainan, Taiwan (leccs@mail.nutn.edu.tw)

- Advisory Committee Members
Toshio Fukuda, Meijo Universiy, Japan
Kunihiko Fukushima, Fuzzy Logic Systems Institute, Japan
Hisao Ishibuchi, Osaka Prefecture University, Japan
Tomohiro Yoshikawa, Nagoya University, Japan
Kay Chen Tan, City University of Hong Kong
Bernadette Bouchon-Meunier, Université Pierre et Marie Curie, France
Hung-Duen Yang, National Sun Yat-Sen University, Taiwan
Hiroshi Tsuji, University Public Corporation Osaka, Japan

- Organizing Committee Members
Roysuke Saga, Osaka Prefecture University, Japan
Marek Reformat, University of Albert, Canada
Li-Wei Ko, National Chiao Tung University, Taiwan
Eri Sato-Shimokawara, Tokyo Metropolitan University, Japan
Toshiharu Hatanaka, Osaka University, Japan
Yusuke Nojima, Osaka Prefecture University, Japan
Naoki Masuyama, Osaka Prefecture University, Japan
Jinseok Woo, Tokyo University of Technology, Japan
Takenori Obo, Tokyo Polytechnic University, Japan
Shinji Fukuda, Tokyo University of Agriculture and Technology, Japan
Hiroyuki Masuta, Toyama Prefectural University, Japan
Hisashi Handa, Kindai University, Japan
Kentarou Kurashige, Muroran Institute of Technology , Japan
Takahiro Takeda, Daiichi Institute of Technology, Japan
Jose M. Alonso, NCentro Singular de Investigación en Tecnoloxías Intelixentes, Spain
Jose M. Soto Hidalgo, University of Cordoba, Spain
Po-Hsun Cheng, National Kaohsiung Normal University, Taiwan
Marie-Jeanne Lesot, Université Pierre et Marie Curie, France
Amir Pourabdollah, Nottingham Trent University, UK

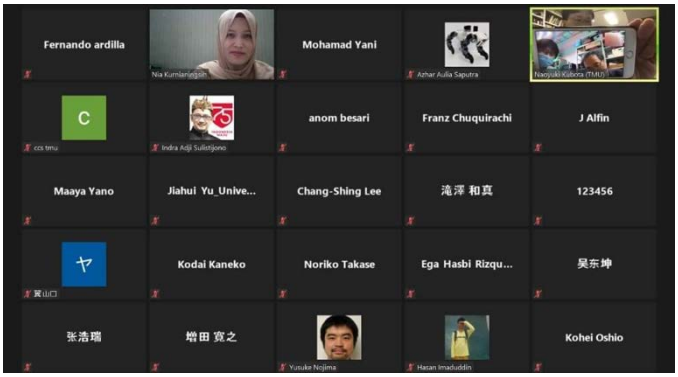
- Secretariat
Contact to WeiHong Chin, Tokyo Metropolitan University, Japan (weihong@tmu.ac.jp)

5. Photos at Plenary Talks and Invited Talks

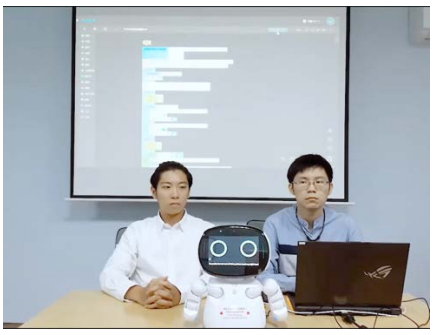
August 21, Friday

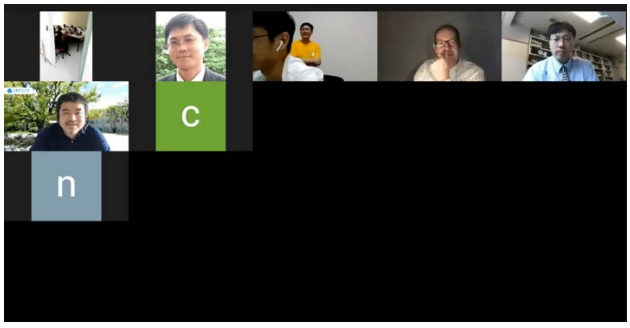
Prof.Naoyuki Kubota, General Chair.

Prof.Toshio Fukuda, IEEE President 2020



Opening Ceremony

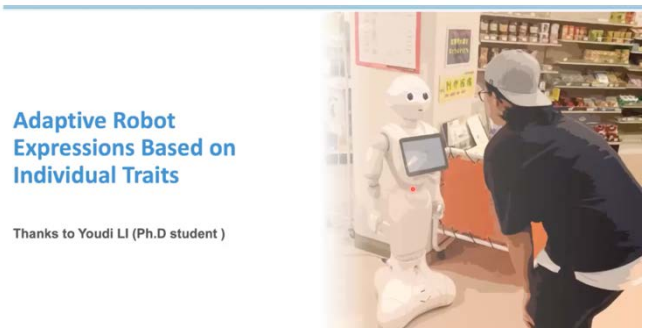


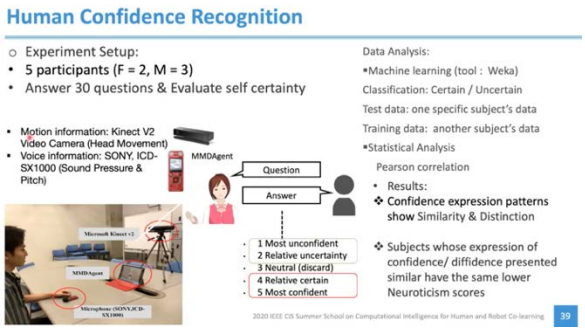


Plenary Talk 1: 10:00 – 11:00

Prof. Chang-Shing Lee (National University of Tainan, Taiwan)

Title: AI-FML Robot and Human Co-Learning for Future Educational Applications

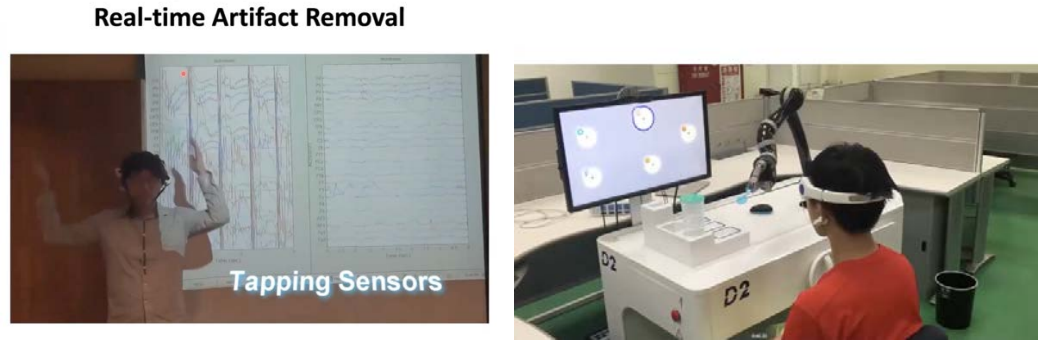




Plenary Talk 2: 11:10 – 12:10

Dr. Eri Sato-Shimokawara (Tokyo Metropolitan University, Japan)

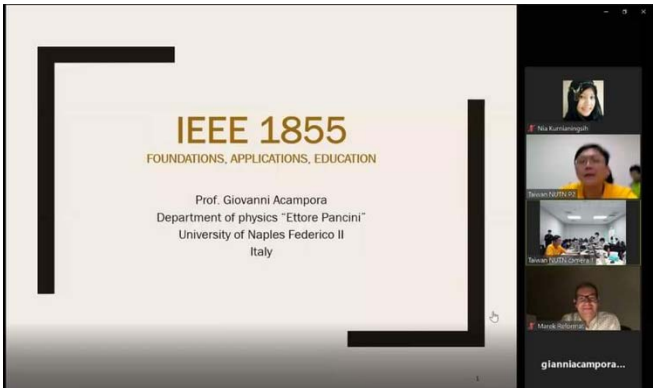
Title: BCI-based AIOT Applications

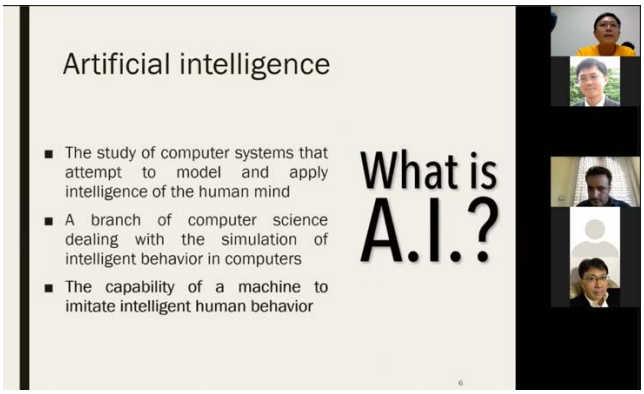


Plenary Talk 3: 13:00 – 14:00

Prof. Li-Wei Koh (National Chiao Tung University, Taiwan)

Title: Brain-Computer Interface (BCI) Technology for Human Learning



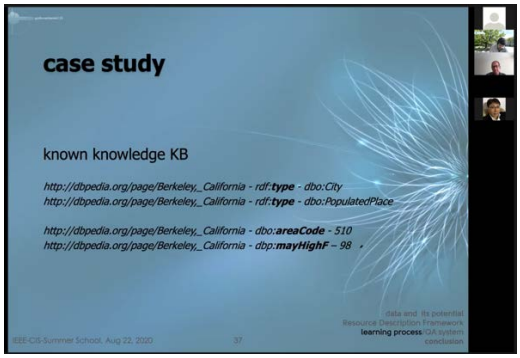


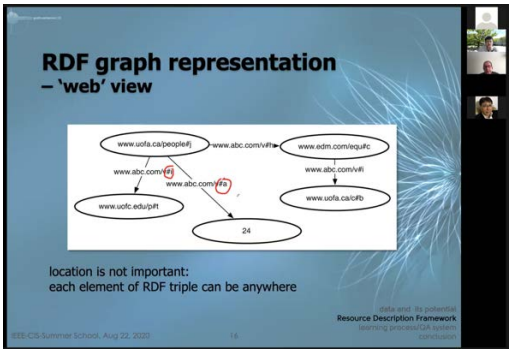
Plenary Talk 4: 14:30 – 15:30

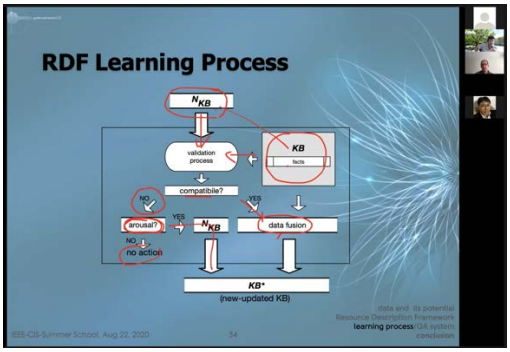
Prof. Giovanni Acampora (University of Naples Federico II, Italy)

Title: Fuzzy Markup Language and Applications

August 22, Saturday



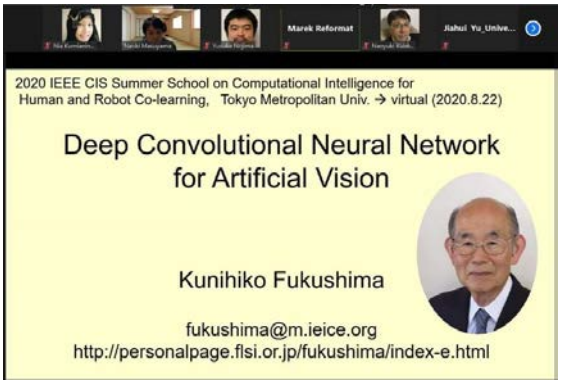


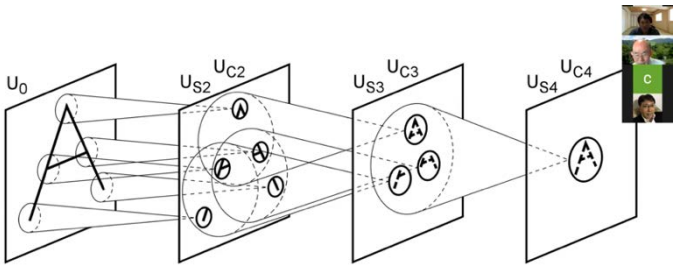


Plenary Talk 5: 10:00 – 11:00

Prof. Marek Reformat (University of Albert, Canada)

Title: Semantic Web Technology for Human and Machine Interaction



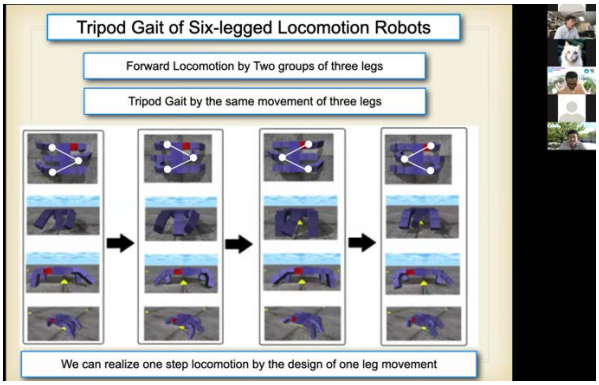


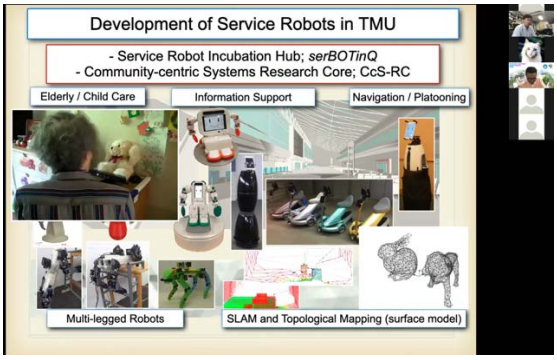
Hierarchical information processing
in the layered network

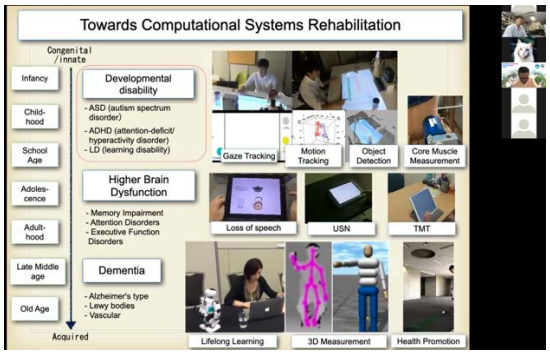
Plenary Talk 6: 11:10 – 12:10

Dr. Kunihiko Fukushima (Fuzzy Logic Systems Institute, Japan)

Title: Deep Convolutional Neural Network for Artificial Vision





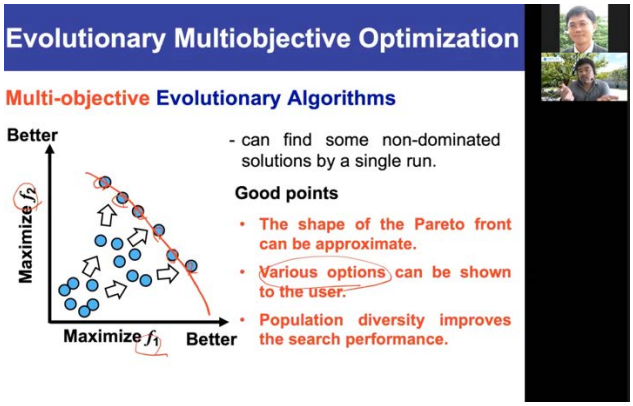


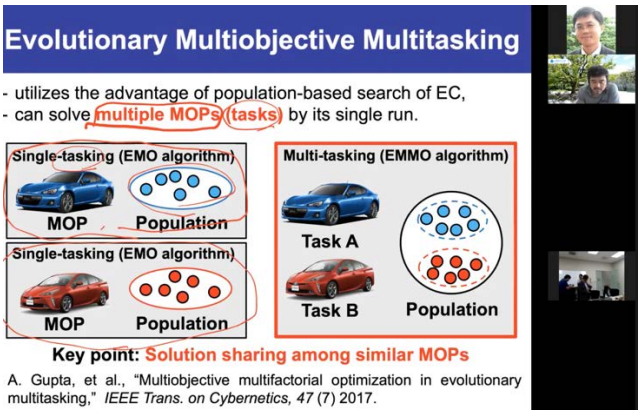
Invited Lecture 1: 13:00 – 14:00

Prof. Naoyuki Kubota (Tokyo Metropolitan University, Japan)

Title: Robot Edutainment - Learning on Robots, Learning through Robots, and Learning with Robots

August 23, Sunday

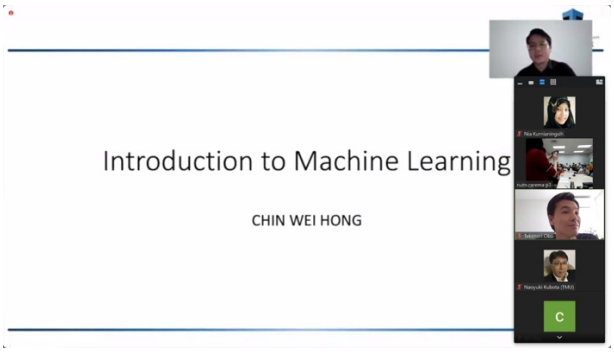


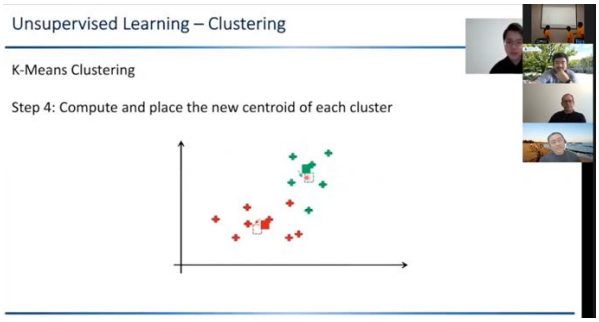


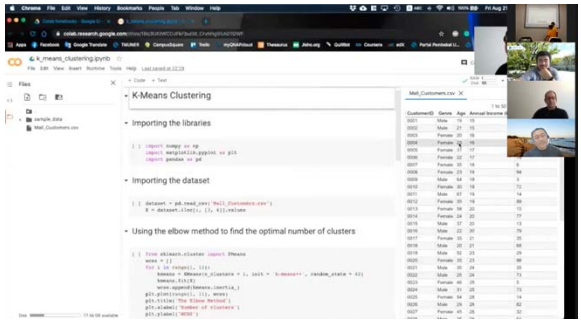
Invited Lecture 2: 10:00 – 11:00

Prof. Yusuke Nojima (Osaka Prefecture University, Japan)

Title: Introduction to Evolutionary Multiobjective Optimization







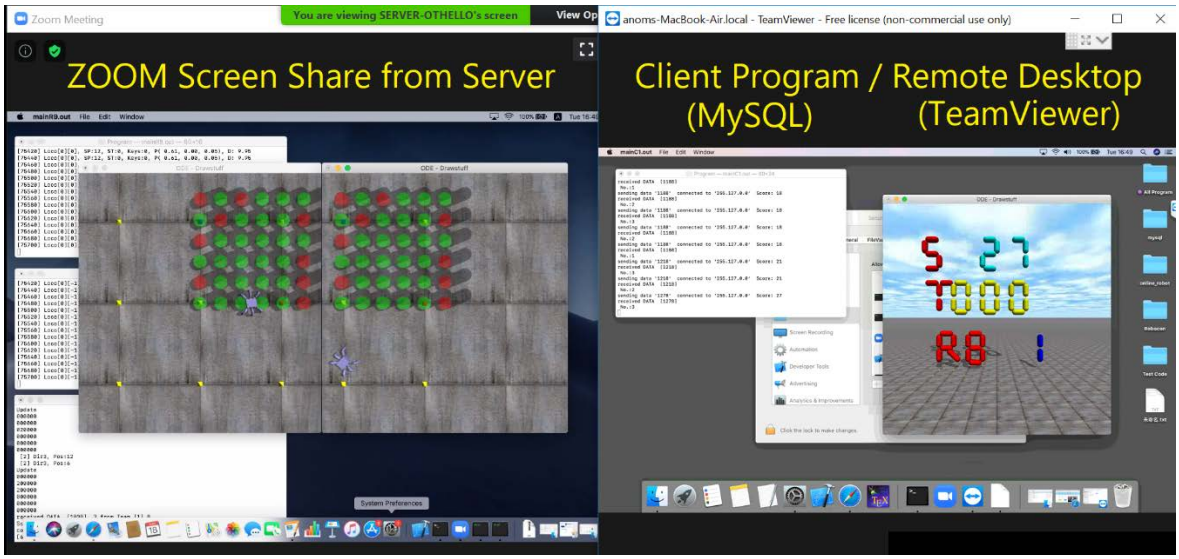
Invited Lecture 3: 11:10 – 12:10

Dr. WeiHong Ching (Tokyo Metropolitan University, Japan)

Title: Introduction to Machine Learning

6. Results and Photos at Workshops

August 22, Saturday
Workshop 1 in Japan: 14:30 - Design of Locomotion Patterns and Robot Contest on Flag Strike



Server side View of the Robot Contest

Participant of Workshop

Greetings form Fukuda-sensei to participant.

Certificate of Winner for Nobby

Certificate Runner-Up for Alfin

August 23, Sunday
Workshop 2 in Taiwan: 13:00 - Human and Robot Co-Learning

Discussion with Prof.Naoyuki Kubota at Zoom

Group Photo with attendances in Japan at Zoom

Award Ceremony for winners of FUZZ-C1.

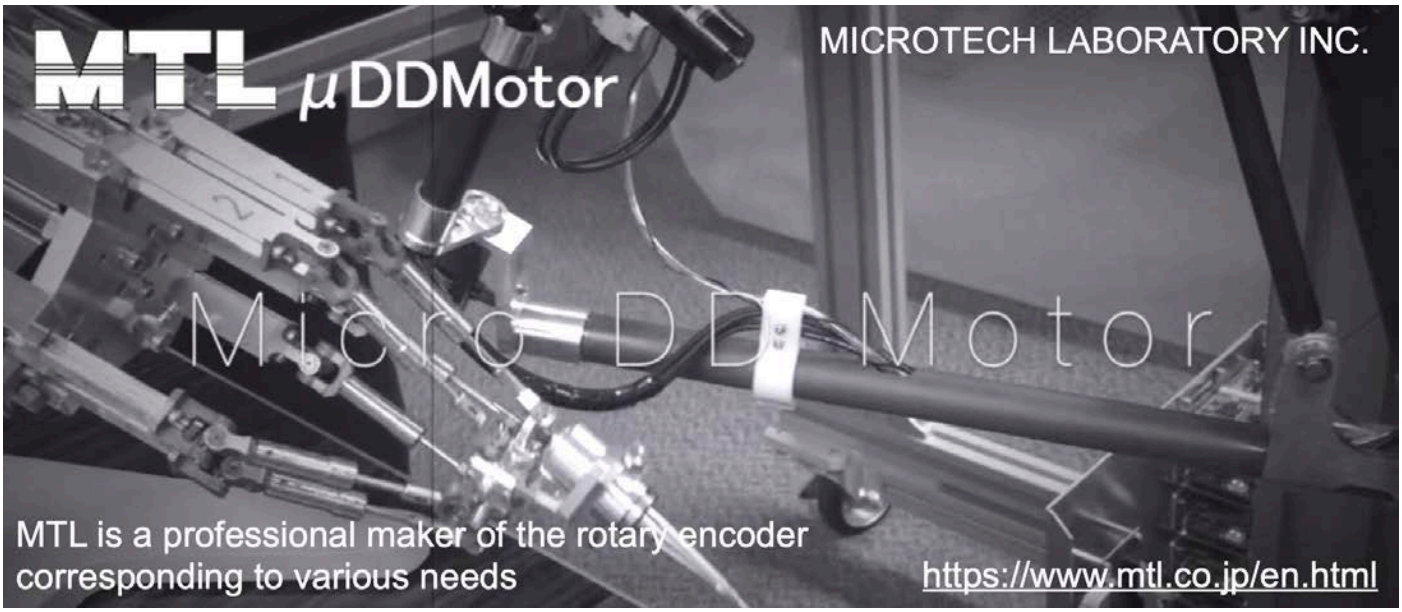
2020 AI-FML Competition Description

7. Supporting Companies

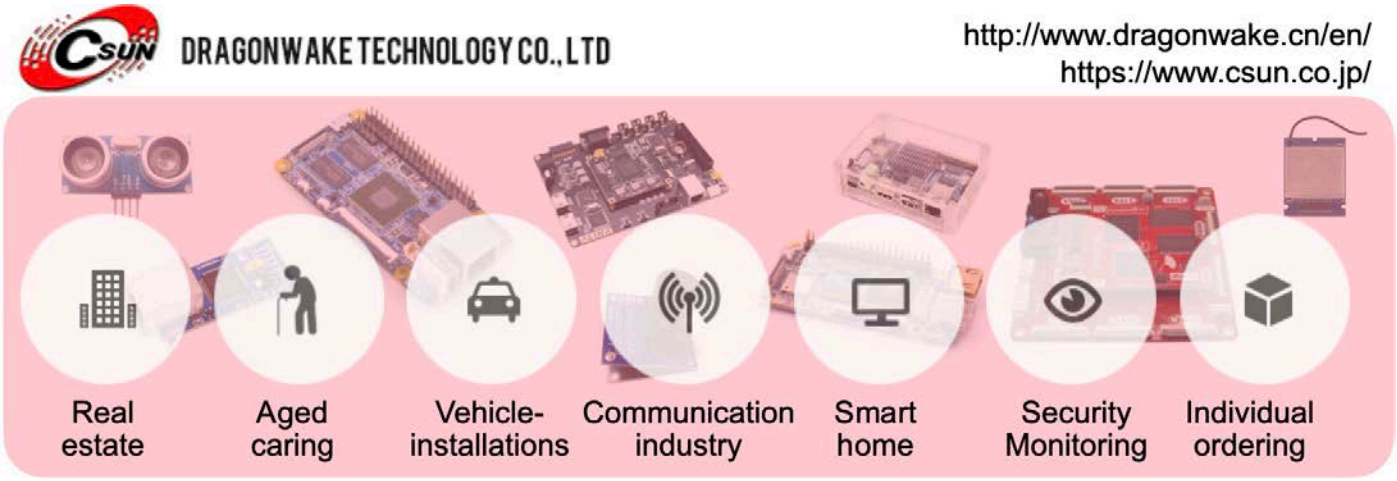
https://palro.jp/en/

http://vecto3.com/

http://www.infitechm.com/en/index.html



https://www.mtl.co.jp/en.html



http://www.dragonwake.cn/en/
https://www.csun.co.jp/

http://www.new-sensor.com/


ZSYSTEM
Technology Co., Ltd.
AI Software & System
Design & Development
Cloud services
Multimedia
Processing
www.zsystem.com.tw


WEBDUINO
The Easiest Way to
LEARN IoT
https://webduino.io/
A
B
0
1
2
3V
GND

Taiwan AI Academy

click108 科技紫微網

K.W.S

國立高雄師範大學 資訊教育中心

NUTN CSIE CASE

RC CcS TMU