

IEEE CIS Distinguished Lecture Program

By Prof Yi Lu Murphey, University of Michigan-Dearborn

Date of Event: 12th March 2021
Time: 10 AM – 11 AM (GMT+8)
Event Platform: Virtual (Google Meet)

Hosted by: IEEE Computer Intelligence (CIS) Malaysia Chapter
Coordinator: Dr Veronica Lestari Jauw
(Veronica.Jauw@nottingham.edu.my)
Executive Committee, IEEE CIS Malaysia Chapter

Attendance: 52 (Registered)
DLP Title: Driving Maneuver Early Detection via Sequence Learning
from Vehicle Signals and Video Images

Abstract

Driving Maneuver Early Detection (DMED) is particularly useful for many applications of intelligent vehicle systems, including driver warning and collision avoidance systems. In this talk, I will introduce a robust DMED model, denoted as University of Michigan Dearborn (UMD)-DMED, developed using innovative features and deep learning techniques. The UMD-DMED model contains three major computational components, distance-based representation of driving context, combined vehicle trajectory features and visual features, and a Long Short-Term Memory (LSTM)-based neural network that captures temporal dependencies of driving maneuvers. To properly evaluate the performances of UMD-DMED, I will present two DMED systems based on the UMD-DMED model, one system is based on partially observed evidence of maneuver events, and another on features observed ahead of the time that driving maneuvers take place. We conducted the extensive experiments using a data set containing 1078 maneuver events extracted from 37 hours of real-world driving trips. The results will demonstrate that the UMD-DMED model is capable of learning the latent features of five different classes of driving maneuvers, i.e. left turn, right turn, left lane change, right lane change, driving straight. Comparing to four different state-of-the-art DMED systems, the UMD-DMED achieved better detection

performances in both, the detection based on partial observations of driver maneuvering, and based on driving context observed ahead-of-time.

Bibliography

Dr. Yi Lu Murphey received a M.S. degree in computer science from Wayne State University, Detroit, Michigan, in 1983, and a Ph.D degree with a major in Computer Engineering and a minor in Control Engineering from the University of Michigan, Ann Arbor, Michigan, in 1989. She is currently a Full Professor at the ECE (Electrical and Computer Engineering) department.

She has authored over 150 publications in refereed journals and conference proceedings in the areas of areas of machine learning, pattern recognition, computer vision and intelligent systems with applications to intelligent vehicle systems, optimal vehicle power management, data analytics, automated and connected vehicles and automated and connected vehicles and robotic vision systems.

She has received many research grants and contracts over the last twenty years from US National Science Foundation, US Department of Defense, and many industrial companies including Ford Motor Company, ZF-TRW Automotive, Hyundai, and Toyota Research Institute. Dr. Murphey is a Distinguished Lecturer for the IEEE Society of Vehicular Technologies and the IEEE Society of Computational Intelligence, and a fellow of IEEE.

Events

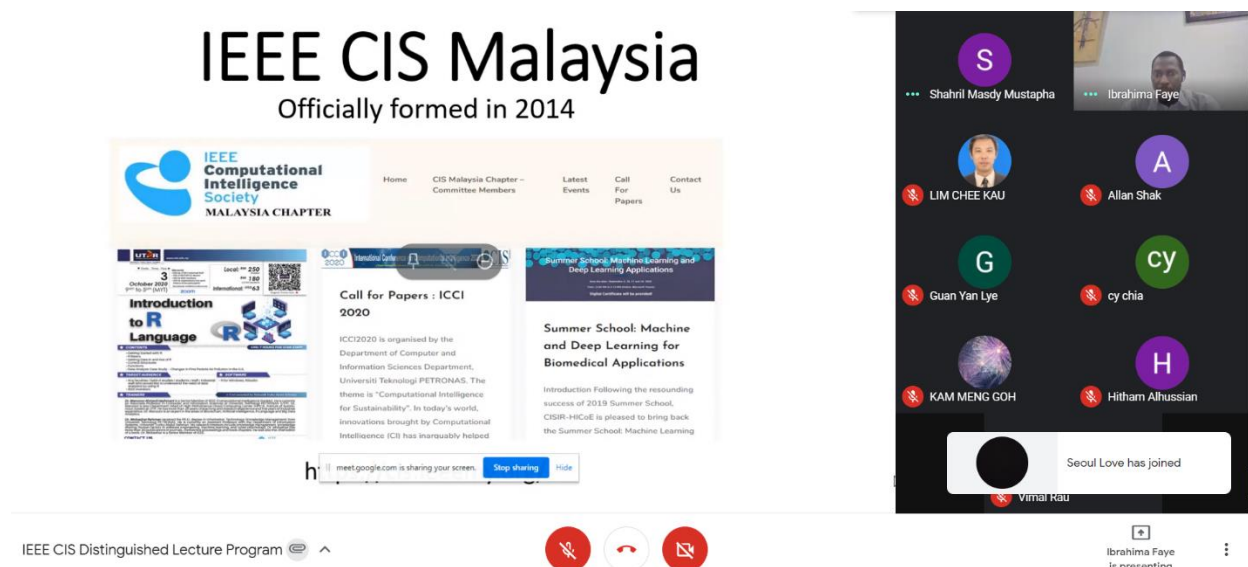


Figure 1. Dr Ibrahima Faye, Chairman of IEEE CIS Malaysia Chapter, introducing IEEE CIS

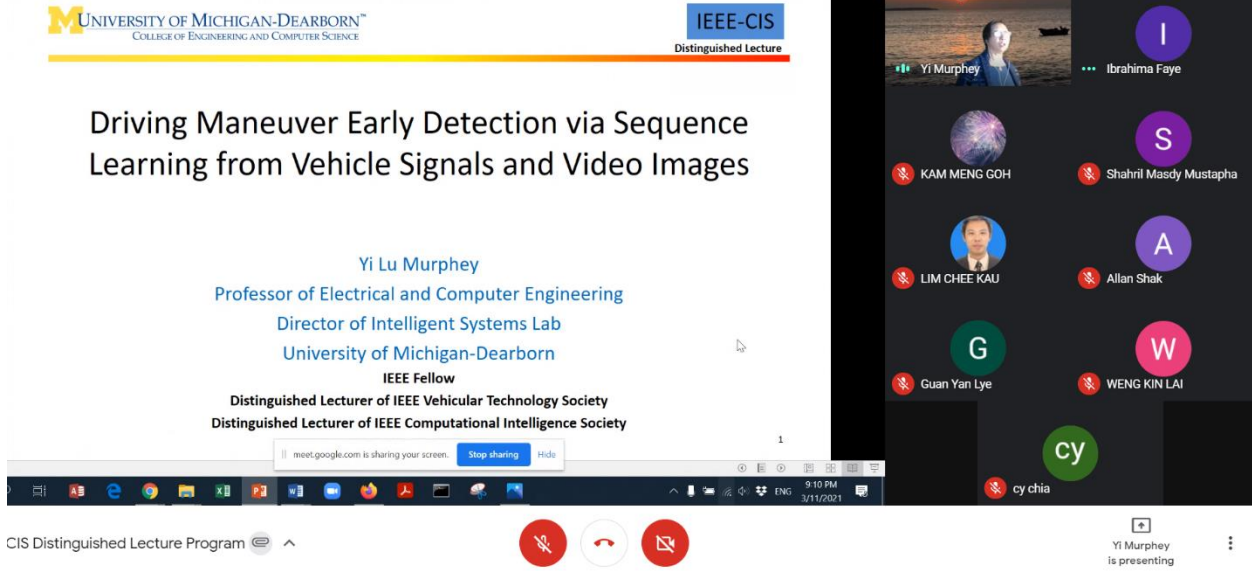


Figure 2. The DLP topic presented by Prof Yi Lu Murphey

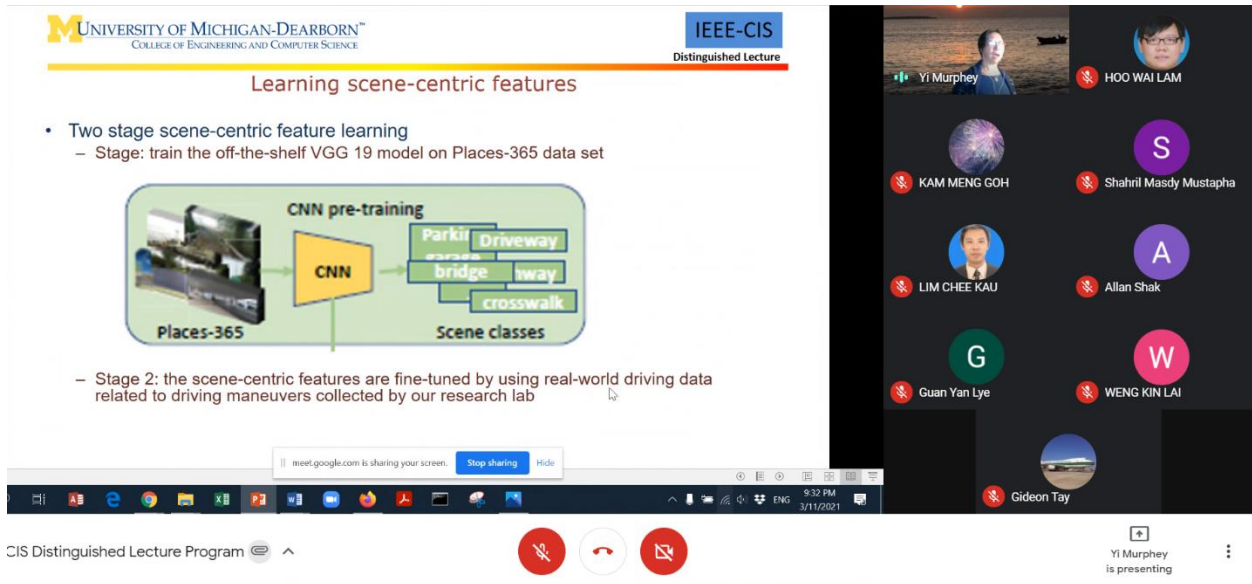




Figure 3. Methodology of self-maneuver presented by Prof Yi Lu Murphey



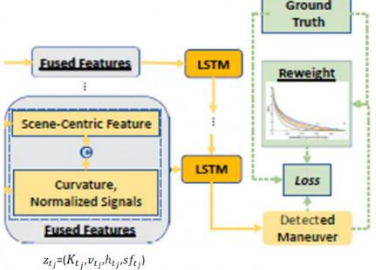
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Multi-modality features used for driver maneuvering early detection

- Features extracted from a sequence of distance-based driving context at time t_j are
- $z_{t_j} = (K_{t_j}, v_{t_j}, h_{t_j}, sf_{t_j})$
- K_{t_j} : driving trajectory curvature
- v_{t_j} : vehicle speed
- h_{t_j} : vehicle heading
- sf_{t_j} : scene-centric feature vector generated from the front view images.



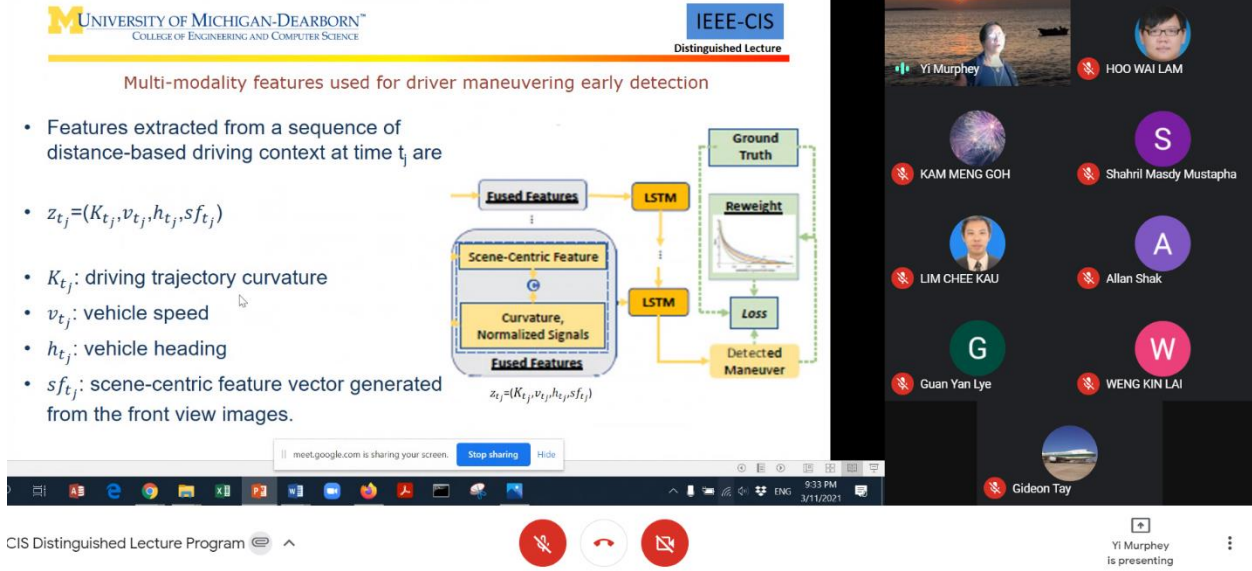


Figure 4. A more detailed feature learning used in self-maneuver

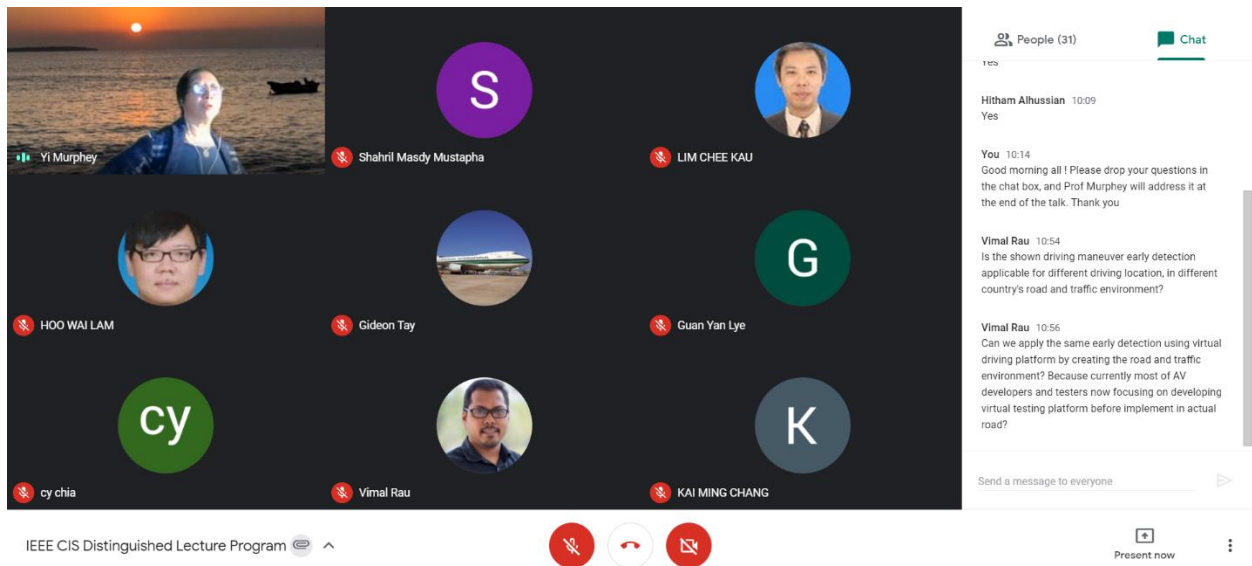


Figure 5. Q&A session

List of Participants

Full Name	Affiliations	IEEE Member (Y/N)
Lim Li Li	Tunku Abdul Rahman University College	Y
Chor Wai Tong	Tunku Abdul Rahman University College	N
Ibrahima Faye	Universiti Teknologi Petronas	Y
Nurshahrily Idura Ramli	Universiti Teknologi Mara Malaysia	Y
Ahmed Mubarak	Universiti Tenaga Nasional	Y
Weng Kin Lai	Tunku Abdul Rahman University College	Y
Ali Selamat	Universiti Teknologi Malaysia	Y
Saadi bin Ahmad Kamaruddin	Universiti Utara Malaysia	Y
Raenu Kolandaisamy	UCSI University	Y
Husna Zainol Abidin	Universiti Teknologi Mara Malaysia	Y
Fadhlan Hafizhelmi Kamaru Zaman	Universiti Teknologi Mara Malaysia	Y
Shahrel Azmin Suandi	Universiti Sains Malaysia	Y
Chan Choon Kit	Tunku Abdul Rahman University College	Y
Lucyantie Mazalan	Universiti Teknologi Mara Malaysia	N
Mohd Alif Hasmani Abd Ghani	Universiti Malaysia Perlis	Y
Ismail Jail Ahmed	IEEE	Y
Vijayapragas Muniandy	Tunku Abdul Rahman University College	N
Wong Jee Keen Raymond	Tunku Abdul Rahman University College	Y
Prabakaran	Universiti Malaysia Perlis	Y
Muhammad Reazul Haque	Multimedia University	Y
CH Tan	EDS	Y
Andre Franzen	Universiti Teknologi Petronas	Y
Hoo Wai Lam	Universiti Malaya	Y
Shahhril Masdy bin Mustapha		Y
Chan Choon Kit	Tunku Abdul Rahman University College	Y
Chia Chieu Yin	MIMOS Berhad	Y
Joshua Terence Dolinting	Institut Engineering Malaysia	N

Ng Yuan Weun	University of Nottingham Malaysia	N
Ooi Jun Hong	University of Nottingham Malaysia	N
Chee Jie Wei	University of Nottingham Malaysia	N
Ng Jun Lin	University of Nottingham Malaysia	N
Lee Chong Jin	ITSM	Y
Habib Ahmat Rato	Universiti Teknologi Petronas	N
Mohamad Haziq Abdul Hamid	Universiti Teknologi Petronas	N
Abang Noor Firdaus bin Abang Mohamad Isa	Universiti Teknologi Petronas	N
Tan She Chong	University of Nottingham Malaysia	N
Lye Guan Yan	University of Nottingham Malaysia	N
Avianish	University of Nottingham Malaysia	N
Allan Shak Tze Ren	University of Nottingham Malaysia	Y
Tay Han Minn	University of Nottingham Malaysia	Y
Choo Sheng Kai	University of Nottingham Malaysia	N
Chua Shen Yik	University of Nottingham Malaysia	N
Justin Goh Ti Kean	University of Nottingham Malaysia	N
Ng Kok Weng	University of Nottingham Malaysia	N
Lee Chen Hong	University of Nottingham Malaysia	N
Wong Xuan Jie	University of Nottingham Malaysia	N
Jessilyn Teh Jing Ying	University of Nottingham Malaysia	N
Tan Zhi Liang	University of Nottingham Malaysia	N
Vimal Rau Aparow	University of Nottingham Malaysia	Y
Lim Chee Kau	University of Malaya	Y
Poh Tik Jie	University of Nottingham Malaysia	N

Amirul Hakeem Zakaria	Universiti Teknologi Petronas	N
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