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IEEE Galveston Bay Section

Joint Technical Societies Chapters

Present

**"ROBOTICS and AUTOMATION WEEK"**

**with special Webinars**

**on**

 **MONDAY September 5th, WEDNESDAY-September 7th and THURSDAY-September 8th**

**MONDAY- September 5th, 11:00 AM US-Central**

**TOPIC:** **"Application of Particle Swarm Optimization in Robot Manipulator Inverse Kinematics"**

**SPEAKER: Hasan Danaci, Polytec Company**

**PRESENTATION:**

Particle Swarm Optimization (PSO) is one of the most popular Swarm Intelligence paradigms and is a population-based stochastic algorithm that can be used to solve many types of optimization problems in engineering. This presentation will show how to solve the inverse kinematics problem for serial robotic manipulators using PSO. Inverse kinematics is a fundamental problem in robotics: a set of joint angles must be calculated so that the robot arm can be manipulated to the corresponding desired end effector position and orientation. Traditional solution techniques include analytical methods which may or may not exist for a particular robot, numerical methods such as Newton-Raphson, Jacobian inverse and other techniques using swarm intelligence have been developed. Many of the current robotic manipulator inverse kinematics solutions using swarm intelligence only deal with end effector position and not its orientation. We have developed a PSO technique that provides the convergence of a complete end effector pose. This solution technique will be demonstrated using the Baxter Research Robot which has two seven-joint arms although the method can be applied to any general serial robotic manipulator.

**PRESENTER:**

Hasan Danaci is a robotic software engineer at Polytec Company. He graduated from the University of Houston Clear Lake with a Master's degree in Computer Engineering in August 2021 and plans to pursue a Ph.D. program in the near future. Hasan also built his own software company DESTECH to help fund his graduate education. Hasan's research interests include swarm intelligence, robot operating systems (ROS), and manipulator inverse kinematics. He is currently working on a project involving parallel processing of the robot inverse kinematics solution using the Swarm Particle Optimization algorithm.

**Complimentary Registration on VTool**

**events.vtools.ieee.org/event/register/320721**

**Deadline for registration: Sunday, September 4th, 5:00 PM US-Central**

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**WEDNESDAY-September 7th, 11:00 AM US-Central**

**TOPIC: From Industry 4.0 to Healthcare 4.0: Problems, Opportunities, and Challenges in Smart and Interconnected Healthcare System**

**SPEAKER: Dr Jingshan Li, University of Wisconsin­-Madison**

**PRESENTATION:**

In recent years, there has been growing interest in healthcare systems research worldwide to improve care quality, patient safety, and operation efficiency. In this talk, we will first discuss the evolution of Industry 4.0, then introduce the idea of Healthcare 4.0, i.e., the smart and interconnected healthcare systems. We will present lessons we learned and results we obtained during the journey of manufacturing systems research to healthcare delivery system study. We will introduce the problems and issues, and then address the difficulties and opportunities in healthcare delivery systems. In addition, we will provide a brief description of recent studies in healthcare delivery systems carried out at the Production and Service Systems Lab at the University of Wisconsin-Madison. Finally, we will discuss the challenges and future directions in smart and interconnected healthcare systems research.

**PRESENTER:**

Dr. [Jingshan Li](https://directory.engr.wisc.edu/ie/faculty/li_jingshan) received his BS, MS, and Ph.D. from Tsinghua University, Chinese Academy of Sciences, and University of Michigan, in 1989, 1992, and 2000, respectively. He was with GM R&D Center (2000­2006), and the University of Kentucky (2006­2010). He is now a Professor in the Department of Industrial and Systems Engineering, and Associate Director of the Wisconsin Institute of Healthcare Systems Engineering, at the University of Wisconsin-Madison. Dr. Li has published 1 textbook, 6 book volumes, 110 journal articles, 15 book chapters, and 120 refereed conference proceedings. He is the Senior Editor of IEEE T­ASE and IEEE RA­L, Department, Area, and Associate Editor of many other journals. He was General and Program Co­Chair of 2013 and 2015 IEEE CASE and is the Program Chair in 2019. He was the founding Chair of the Technical Committee on Sustainable Production Automation and has been the Chair of TC on Automation in Healthcare Management since 2016. Dr. Li is an IEEE Fellow. He received the NSF CAREER Award, IEEE RAS Early Career Award, and multiple Best Paper Awards from IEEE T­ASE, IIE Transactions, IEEE CASE, and many flagship international conferences. His research interests are in the design, analysis, improvement and control of production and healthcare systems.

**Complimentary Registration on VTool:**

**https://events.vtools.ieee.org/event/register/320798**

**Deadline: Tuesday September 6th, 5:00 PM US-Central**

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**Thursday, September 8th, 11:00 AM US-Central**

**TOPIC:** **On Safe Autonomous Driving: Past, Present, and Future**

**SPEAKER: Prof. Mohan Trivedi, University of California, San Diego**

**PRESENTATION:**

 Engineers and scientists engaged in making artificially intelligent systems have successfully resolved many challenging technical problems and have demonstrated the practical viability of autonomous driving on test tracks and carefully selected roads. These are major milestones in engineering and a clear harbinger of a transformative new era of moving goods, supplies, and people from point A to point B. Yet, along with these accomplishments come many new challenges that are not only of a technical nature, but also of a broader social, legal, and even “ethical” nature.  Such issues become more urgent and important as collisions and accidents involving self-driving or semi-autonomous vehicles occur more often – injuring and even killing humans in the real world. A key challenge that needs to be addressed is making sure that artificially engineered automobiles and humans cohabit in a harmonious, safe, and secure manner. For researchers, this provides the exciting opportunity to pursue important problems from a broad range of topics in distributed perception, cognition, planning, and control. We will present a “Human-Centered” approach to the development of highly automated vehicle technologies. We will also present a brief sampling of contributions in the development of systems and algorithms to perceive situational criticalities, predict intentions of intelligent agents, and plan/execute actions for safe &  smooth maneuvers and control transitions. We will highlight major research milestones in the area of the autonomous vehicle and discuss issues that require deeper, critical examination and careful resolution to assure the safe, reliable, and robust operation of these highly complex systems in the real world.

**PRESENTER:**

Mohan Trivedi is a Distinguished Professor of Electrical and Computer Engineering at the University of California San Diego and founding director of the Computer Vision and Robotics Research Laboratory (est. 1986), as well as the Laboratory for Intelligent and Safe Automobiles (LISA) (est. 2001). Trivedi and his team are pursuing research in intelligent vehicles, human-centered autonomous driving, machine perception, machine learning, human-robot interactivity, and advanced driver assistance. LISA research outputs have directly impacted a broad range of commercially deployed ADAS, driver monitoring, active safety, and high autonomy systems, including lane departure warning, lane keeps assist, lane/road/vehicle/pedestrian/traffic sign detection/tracking modules, panoramic surround viewing, trajectory prediction and collision avoidance, driver attention, activities, intent and readiness prediction modules. The LISA team has won over 30 “Best/Finalist” paper awards, six best dissertation awards, the IEEE ITS Society’s Outstanding Research Award and LEAD Institution Award, as well as the Meritorious Service and Pioneer Award (Technical Activities) of the IEEE Computer Society. Trivedi has received Distinguished Alumnus awards from BITS-Pilani, India, and Utah State University. He has given over 130 keynote/plenary talks. He regularly serves as a consultant to various industry and government agencies in the US and abroad. He frequently serves on panels dealing with technological, strategic, privacy, and ethical issues surrounding research areas he is involved in.

Dr. Trivedi has served as the Chair of the Robotics Technical Committee of the IEEE Computer Society, Governing Board member of the IEEE Systems, Man & Cybernetics, and IEEE ITSC societies. Trivedi is a Fellow of IEEE (life), SPIE, and IAPR.

**Complimentary Registration on VTool**

https://events.vtools.ieee.org/event/register/320885

**Deadline: Wednesday September 7th , 5:00 PM US-Central**

GBS "RAS WEEK" Coordinator:

Dr Zafar Taqvi, Chair GBS Joint Societies Chapter/ University of Houston Clear Lake

GBS Website //r5.ieee.org/gb