SEMINAR ANNOUNCEMENT

DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING
COLLEGE OF DESIGN AND ENGINEERING
Website: https://cde.nus.edu.sg/ece

Area: Control, Intelligent Systems & Robotics

Host: Assoc Prof Prahlad Vadakkepat

Research Seminar

TOPIC	:	**Towards Discovering Essential Locomotion Science and Methodology for Bipedal Robotic Systems**
SPEAKER	:	**Dr Xiong Xiaobin** **Postdoctoral Scholar, Dept of Mechanical & Civil Engineering** **California Institute of Technology**
DATE	:	**Thursday, 24 February 2022**
TIME	:	**10.00AM to 11.00AM**
WEBINAR	:	**Join Zoom Meeting** **https://nus-sg.zoom.us/j/4156763801?pwd=NUwzUWhwdlZIcGt3cmhyTzFId1V0QT09** **Meeting ID: 415 676 3801** **Passcode: 662108**

ABSTRACT

Bipedal robots are designed to move like a human with two legs, and thus they have advantages over wheeled ones in traversing in human environments. The complexity of legs, however, imposes several challenges in the locomotion behavior realization. The motion of the internal degrees of freedom must be planned and controlled for balancing (in terms of not-falling); robustness must be realized to accommodate model discrepancy and external disturbances. Traditional approaches with ad-hoc style demonstrations still lack fundamental understanding, robustness, or efficiency for motion generations. I will argue what has been missing is the utilization of feedback structures in the hybrid dynamics of locomotion itself. To illustrate this, I will show how the investigation of feedback structures can effectively and elegantly provide solutions to the motion synthesis problem for realizing various dynamic underactuated bipedal walking behaviors such as periodic walking, path tracking, and push-recovery with significant computation-efficiency, versatility, and robustness. I will also touch upon some previous and ongoing works such as bipedal jumping, walking on granular terrain and stepping-stones, and blind traversing on stairs that share the same philosophy of using feedback structures of locomotion. The overarching goal is to thoroughly and rigorously understand and solve the bipedal mobility problem in structured and unstructured environments so that future bipedal robot-related applications such as package delivery (loco-manipulation) and robotic assistive mobility (via exoskeleton and prosthesis) can be safely, faithfully, and robustly realized in real life with guaranteed performances.

BIOGRAPHY

Xiaobin Xiong is currently a postdoc scholar in the Department of Mechanical and Civil Engineering at the California Institute of Technology (Caltech). His research centers around bipedal locomotion on designing effective methodologies and theoretical foundations for solving the motion synthesis and control problems on the physical robots in real life. Broadly speaking, his interests are on the enhancement of the physical intelligence of legged robots to move and work in human society. He has studied and realized 3D underactuated bipedal walking, jumping, and walking on granular terrains on complex robotic hardware. He received his B.S. from Tongji University, Shanghai, China in 2013, M.S. from Northwestern University in 2015, and Ph.D. from Caltech in 2021, all in mechanical engineering. He has received several awards, including Amazon Fellowship in Artificial Intelligence, Simoudis Discovery Fund from Caltech, and the 2019 IROS RoboCup Best Paper Award.