



פרופסור סטיבן לאבאל

פרופסור לרובוטיקה ומציאות מדומה
אוניברסיטת אולו, פינלנד
אוניברסיטת אילינוי באורבנה-שמפיין, אילינוי, ארה"ב

Professor Steven LaValle

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קולוקוויום במדעי המחשב | Computer Science Colloquium

FUNDAMENTAL CHALLENGES IN ROBOTICS AND EMBODIED AI

The Colloquium will be held on Sunday
2 November 2025, at 11:00
Room 420, Check Point Building
Tel-Aviv University, Ramat-Aviv

הקולוקוויום יתקיים ביום ראשון
2 בנובמבר 2025, בשעה 11:00
חדר 420, בניין צ'ק פוינט
אוניברסיטת תל-אביב, רמת-אביב

Abstract

The field of robotics is wildly exciting and rapidly gaining worldwide attention, yet it is often an enigma in terms of its scope and scientific foundations. Throughout the decades it has been variously viewed as an application field of more mature disciplines such as computer science (AI, algorithms, machine learning) and mechanical engineering (kinematics, dynamics, nonlinear control). This talk will argue that robotics has its own unique and growing scientific core, with deep questions and modeling challenges that should inspire new directions in computer science, engineering, and mathematics. We will start with a Turing-inspired way to view robotics or embodied AI, leading to results that characterize minimally sufficient amounts of sensing, actuation, or computation required to solve physical tasks. Interspersed throughout will be results and perspectives from my research in the field over three decades, produced with many inspiring students, mentors, and collaborators.



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November 2, at 11:00

Room 420, Check Point Building

FUNDAMENTAL CHALLENGES IN ROBOTICS AND EMBODIED AI ●●●

The field of robotics is wildly exciting and rapidly gaining worldwide attention, yet it is often an enigma in terms of its scope and scientific foundations. Robotics involves the design, programming, and analysis of movable machines that accomplish useful work through sensing and manipulation of the surrounding world. Throughout the decades it has been varyingly viewed as an application field of more mature disciplines such as computer science (AI, algorithms, machine learning) and mechanical engineering (kinematics, dynamics, nonlinear control). This talk will argue that robotics has its own unique and growing scientific core, with deep questions and modeling challenges that should inspire new directions in computer science, engineering, and even pure mathematics.

We will start with a Turing-inspired way to view robotics or embodied AI, leading to some of our recent results that characterize minimally sufficient amounts of sensing, actuation, or computation required to solve physical tasks. Questions addressed include: How are learning, planning, and control related? How do we know when it is impossible to solve a task? When will learning fail, even with an infinite amount of data? Does a universal action sequence exist that would cause a robot to solve any possible task without modification? How important are semantics and representations? Interspersed throughout the talk will be results and perspective from my research in the field over three decades, produced with many inspiring students, mentors, and collaborators.

STEVEN M. LAVALLE has been Professor of Computer Science and Engineering, in Robotics and Virtual Reality, at the University of Oulu, Finland since 2018. Since 2001, he has been a professor in the Department of Computer Science at the University of Illinois. He has also held positions at Stanford University and Iowa State University.

His research interests include robotics, virtual reality, sensor fusion, planning algorithms, computational geometry, and control theory. In research, he is mostly known for his introduction of the Rapidly exploring Random Tree (RRT) algorithm, which is widely used in robotics and other engineering fields. He also authored the books Planning Algorithms, Sensing and Filtering, and Virtual Reality. He currently leads an Advanced Grant project from the European Research Council on the Foundations of Perception Engineering.

With regard to industry, he was an early founder and chief scientist of Oculus VR, acquired by Facebook for \$3 billion in 2014, where he developed patented tracking technology for consumer virtual reality and led a team of perceptual psychologists to provide principled approaches to virtual reality system calibration, health and safety and the design of comfortable user experiences.

From 2016 to 2017, he was a Vice President and Chief Scientist of VR/AR/MR at Huawei Technologies, where he was a leader in mobile product development on a global scale. He has worked as an angel investor and adviser to startups in robotics and virtual reality.