

Semantic Robot Programming and Defining the Discipline of Robotics

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The visions of interconnected heterogeneous autonomous robots in widespread use are a coming reality that will reshape our world. Similar to "app stores" for modern computing, people at varying levels of technical background will contribute to "robot app stores" as designers and developers. However, current paradigms to program robots beyond simple cases remain inaccessible to all but the most sophisticated of developers and researchers. In order for people to fluently program autonomous robots, a robot must be able to interpret user instructions that accord with that user's model of the world. The challenge is that many aspects of such a model are difficult or impossible for the robot to sense directly. We posit a critical missing component is the grounding of semantic symbols in a manner that addresses both uncertainty in low-level robot perception and intentionality in high-level reasoning. Such a grounding will enable robots to fluidly work with human collaborators to perform tasks that require extended goal-directed autonomy.

I will present our efforts towards accessible and general methods of robot programming from the demonstrations of human users. Our recent work has focused on Semantic Robot Programming (SRP), a declarative paradigm for robot programming by demonstration that builds on semantic mapping. In contrast to procedural methods for motion imitation in configuration space, SRP is suited to generalize user demonstrations of goal scenes in the workspace, such as for manipulation in cluttered environments. SRP extends our efforts to crowdsource robot learning from a demonstration at scale through messaging protocols suited to web/cloud robotics.

The launch of the new undergraduate Robotics Major at Michigan in Fall 2022 will also be presented, and the factors that helped it grow from 0 to 60 declared majors in 1.1 semesters.



Odest Chadwicke Jenkins, Ph.D., is a Professor of Robotics at the University of Michigan. Prof. Jenkins earned his B.S. in Computer Science and Mathematics at Alma College (1996), M.S. in Computer Science at Georgia Tech (1998), and Ph.D. in Computer Science at the University of Southern California (2003). He previously served on the faculty of Brown University in Computer Science (2004-15). His research addresses problems in interactive robotics and human-robot interaction, primarily focused on mobile manipulation, robot perception, and robot learning from demonstration. His research often intersects topics in computer vision, machine learning, and computer animation. Prof. Jenkins has been recognized as a Sloan Research Fellow and is a recipient of the Presidential Early Career Award for Scientists and Engineers (PECASE). His work has also been supported by Young Investigator awards from the Office of Naval Research (ONR), the Air Force Office of Scientific Research (AFOSR) and the

National Science Foundation (NSF). Prof. Jenkins is currently serving as Editor-in-Chief for the ACM Transactions on Human-Robot Interaction. He is a Fellow of the American Association for the Advancement of Science and Association for the Advancement of Artificial Intelligence, and Senior Member of the Association for Computing Machinery and the Institute of Electrical and Electronics Engineers. He is an alumnus of the Defense Science Study Group (2018-19).

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