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### **Probabilistic Techniques for Mobile Robot Navigation**

Probabilistic approaches have been discovered as one of the most powerful approaches to highly relevant problems in mobile robotics including perception and robot state estimation. Major challenges in the context of probabilistic algorithms for mobile robot navigation lie in the questions of how to deal with highly complex state estimation problems and how to control the robot so that it efficiently carries out its task. In this talk, I will present recently developed techniques for efficiently learning a map of an unknown environment with a mobile robot. I will also describe how this state estimation problem can be solved more effectively by actively controlling the robot. For all algorithms I will present experimental results that have been obtained with mobile robots in real-world environments including autonomous cars, logistics applications, and robots navigating in city environments.