Multi-layered planning for autonomous underwater vehicles

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Recent technology advances have made it possible for autonomous underwater vehicles to operate for weeks or even months at a time without refueling or recharging. The ability to communicate with such vehicles once they are deployed is often very limited, which means that they must be truly autonomous and cannot depend on human supervision. In this talk, I'll describe some of our work on motion planning for such vehicles at various scales. Planning over different time horizons requires not just different spatial resolutions in planning but also different vehicle models. I'll describe how planning at higher levels can inform planning at lower levels. Specifically, I'll present some recent results on geometric primitives called 3D Dubins curves that are used to efficiently compute paths. I'll also present a replanning scheme where a kinodynamic planner can use such geometric paths as a guide to synthesize dynamically feasible trajectories.

. Dr. Mark Moll is a Senior Research Scientist focused on planning and autonomy at Metron, a leading company in providing mathematical and scientific tools that aid in decision making. Dr. Moll has worked in robotics for more than 25 years, with a focus on motion planning. Previously, he was the Director of Research at PickNik, a robotics software development and consultancy company that is supporting the MoveIt motion planning framework. Prior to that, he was a senior research scientist in the Computer Science Department at Rice University, where he led the development of the Open Motion Planning Library (OMPL), which is widely used in industry and academic research (often via MoveIt / ROS). He has over 85 peer-reviewed publications with research contributions in applied algorithms for problems in robotics and computational structural biology. He has extensive experience deploying novel algorithms on a variety of robotic platforms, ranging from NASA's Robonaut 2 to autonomous underwater vehicles and self-reconfigurable robots. Dr. Moll received an M.S. in Computer Science from the University of Twente in the Netherlands and a Ph.D. in Computer Science from Carnegie Mellon University.

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