Path Planning in unstructured and often uncharted environments, where free maneuvering is allowed, is often modeled on top of a grid-based representation of the surroundings with a list of static and dynamic obstacles positioned somewhere on that grid. On the other hand, planning in structured environments is often confined to corridors bounded by curbs or lane markings. In both scenarios, the goal is to find a suitable and smooth trajectory path from the initial robot location to a desired goal location.

Many challenges need to be coped with during the planning, such as obstacle avoidance, updating previous trajectories based on dynamically moving obstacles, nonholonomic constraints of the robot, uncertain and limited sensor information, limited planning time or real-time computation, and feasible optimal trajectories that go easy on mechanical components.

This talk presents a hybrid approach for path planning in both structured and unstructured environments. In detail, a new incremental motion planning and replanning algorithm for mobile robots with nonholonomic constraints is introduced for unstructured environments. The method generates dynamically feasible and smooth trajectories over a non-uniform cost grid with respect to static and dynamic obstacles."