

Graduate Student Research Seminar

Fall 2023

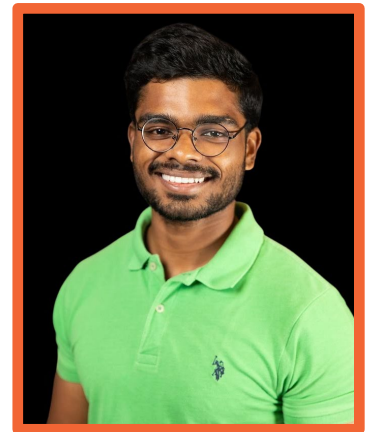
Safety Verification and Navigation of Autonomous Vehicles using Signal Temporal Logic

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Monday, November 13th

3:00 pm (EST) – 132 Fluor Daniel Building



Abstract

Safety verification is now an imminent task prior to the large-scale deployment of such convoluted models. The safety requirements for an AV can be dictated by Signal Temporal Logic (STL) specifications. We verify the satisfaction of the STL specifications by calculating the robustness value for each signal within the specification. Model Predictive Control (MPC) is a popular method to determine optimal solutions for navigation tasks of an AV. In this paper, we formulate a Mixed Integer Problem based on STL specifications that can generate safe trajectories for a linear discrete-time AV model. The MILP problem is then recursively solved and the control inputs are applied in a receding horizon fashion. Apart from the state, control and system dynamic bounds, STL constraints will act as an additional layer of constraints to ensure safe navigation from start to goal. We conduct experiments for the controller in 2D environments with obstacles and multiple waypoints.



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