

## **Roundabout Situational Awareness for Automated Vehicles with Hybrid Machine Learning Approach**

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**Abstract** – In this paper, a hybrid approach for situational awareness in roundabouts is presented that can produce traffic participants' behaviour for arbitrary horizons. This real-time implementable strategy consists of dynamic Bayesian network and a continuous variable prediction module (CVPM) as its subparts, making it a data-driven approach while providing the facility to incorporate experts' knowledge into the predictions. Being a data-driven approach, the data is obtained using SUMO as a simulation platform, and three different CVPMs are experimented with, namely recurrent neural network (RNN), gated recurrent unit (GRU), and long short-term memory networks (LSTM). The chosen RNN yields a correlation higher than 0.895 and RMSE less than 0.036 for 10 seconds predictions.

**Keywords:** Machine learning, situational awareness, traffic participants behaviour prediction, dynamic Bayesian network, recurrent neural network, gated recurrent unit, long short-term memory