

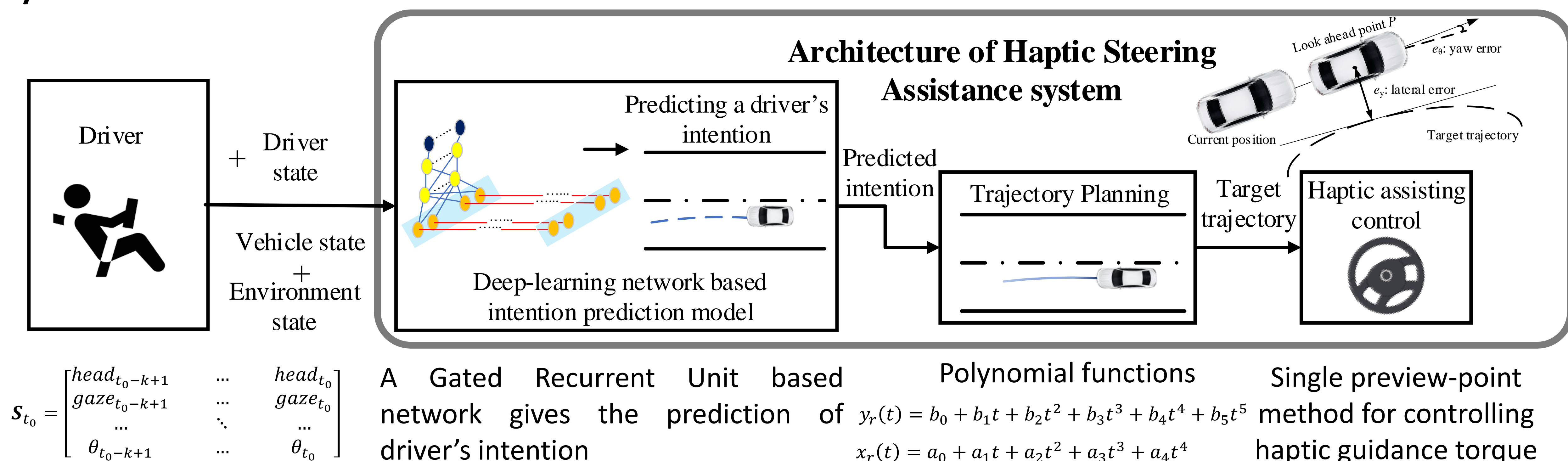
Haptic Steering Assistance Based on Prediction of the Future Trajectory in Line with the Intention of the Driver

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Introduction

This research explores the development and evaluation of machine learning models and a haptic steering assistance system which can predict future trajectory to assist human driver. Several driving experiments to evaluate the proposed system are conducted.

System Architecture

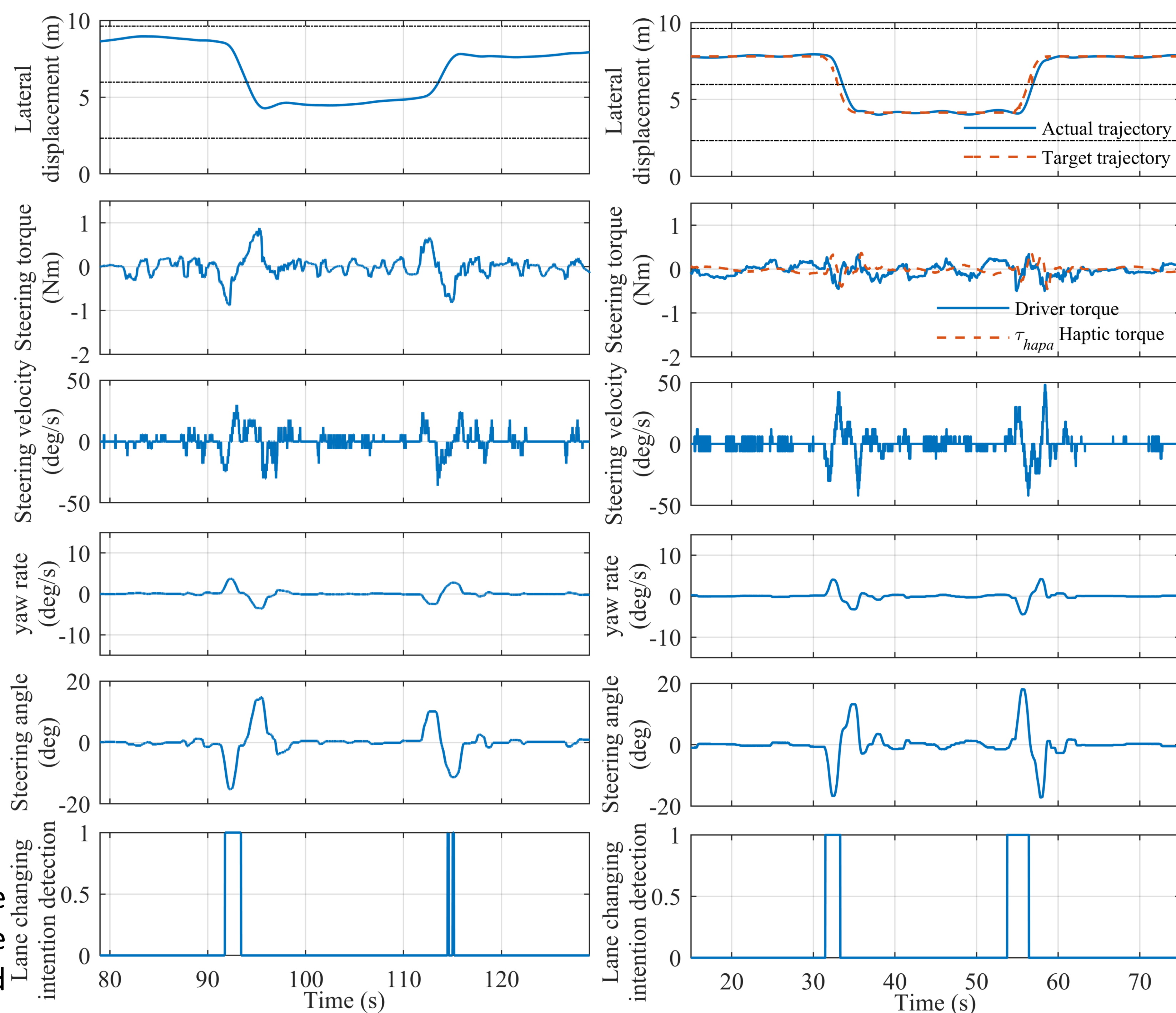
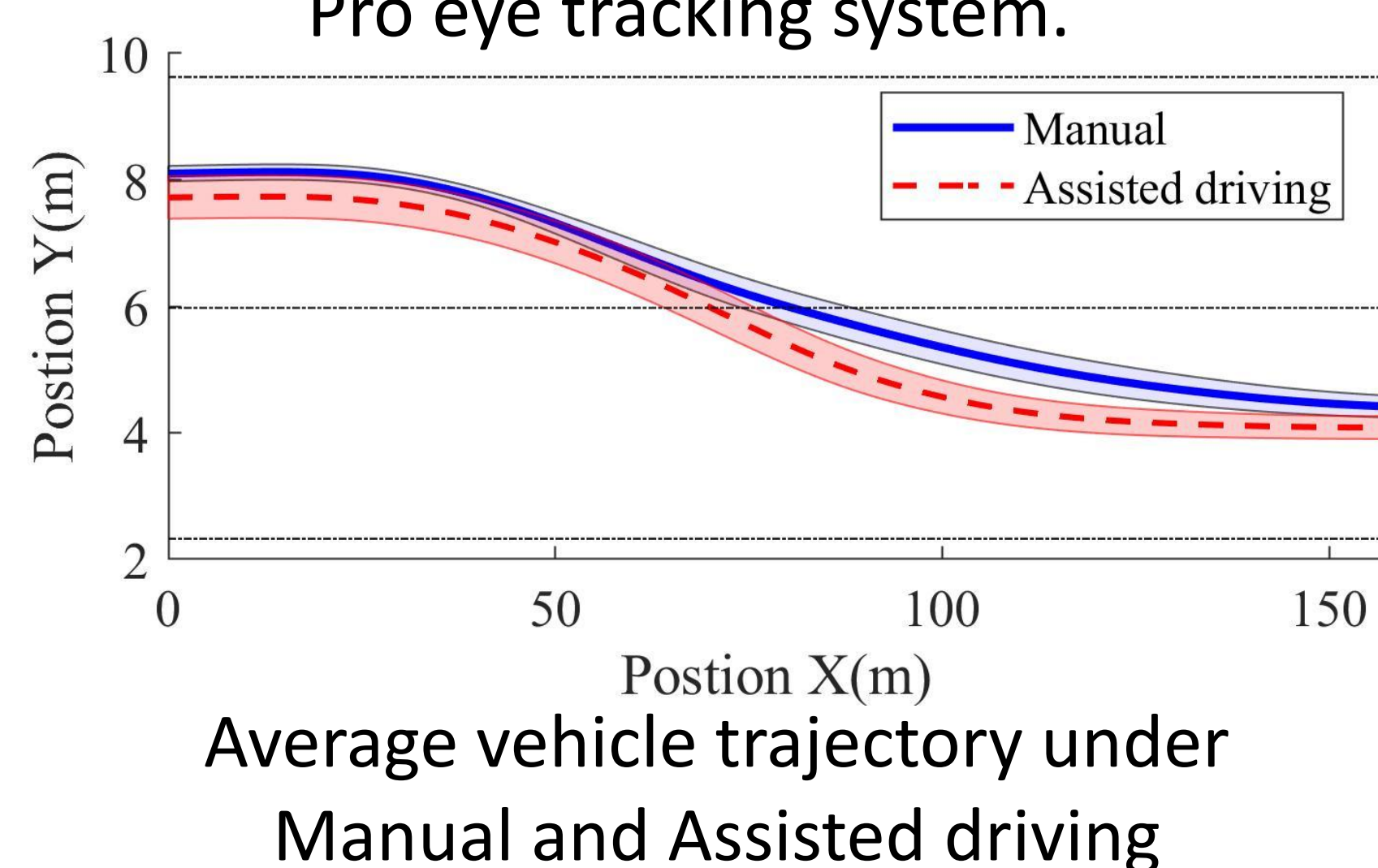


Driving simulator experiments

Several experiments were conducted on a driving simulator to compare manual and assisted driving. A Smart Eye, Pro eye tracking device, is used to collect driver's head and gaze movement



Fixed driving simulator and Smart Eye Pro eye tracking system.



(a) Manual driving

(b) Assisted driving

Conclusion

The experiment demonstrated that the supporting system decreased the lane departure risk in the lane keeping tasks and could support a fast and stable lane changing maneuver.

Publications

Yan Z., Yang K., Wang Z., Yang B., Kaizuka T., Nakano K., 2021, "Intention-Based Lane Changing and Lane Keeping Haptic Guidance Steering System," *IEEE Trans. Intell. Veh.*, vol. 6, no. 4, pp. 622–633,

Yan Z., Yang K., Wang Z., Yang B., Kaizuka T., Nakano K., 2019, "Time to lane change and completion prediction based on Gated Recurrent Unit Network," in *IEEE Intelligent Vehicles Symposium, Proceedings*, vol. 2019-June, pp. 102–107