

Understanding and Optimizing Situational Acceptance in Automated Driving

Fund: NICT Beyond 5G(6G)

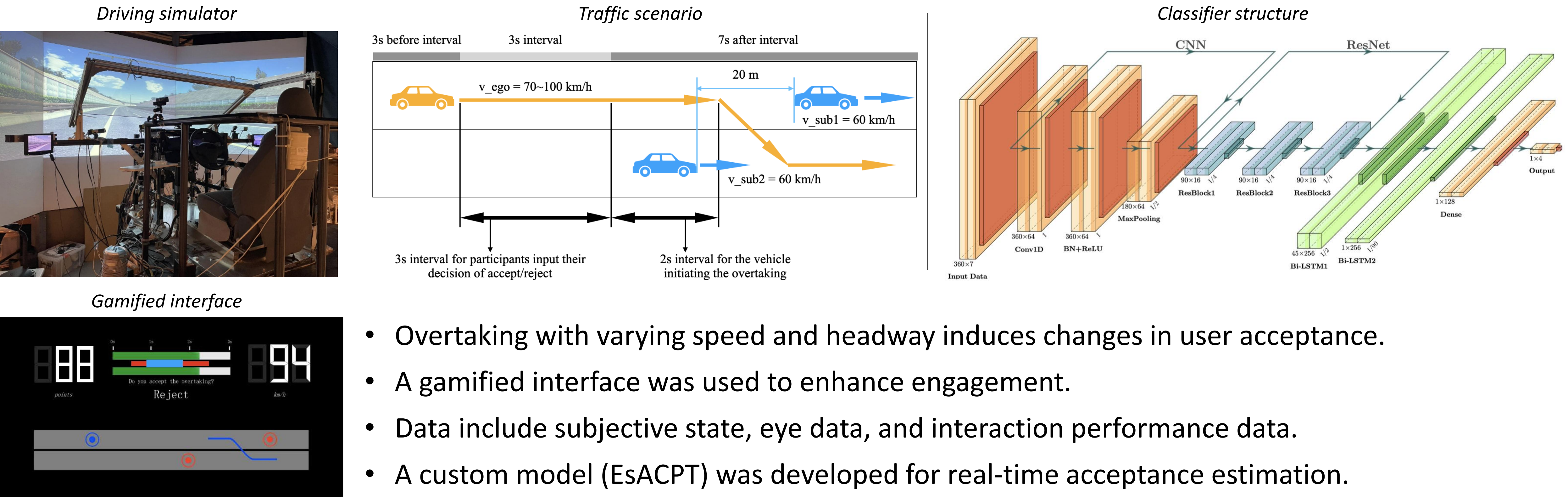
Introduction

With the rapid advancement of automation and electrification technologies, low technology acceptance—driven by users’ psychological resistance—has become a major barrier to the commercialization of intelligent transportation. Meanwhile, most existing studies conceptualize acceptance as a pre-use decision to adopt or reject a technology, overlooking its dynamic and situational attributes during interaction.

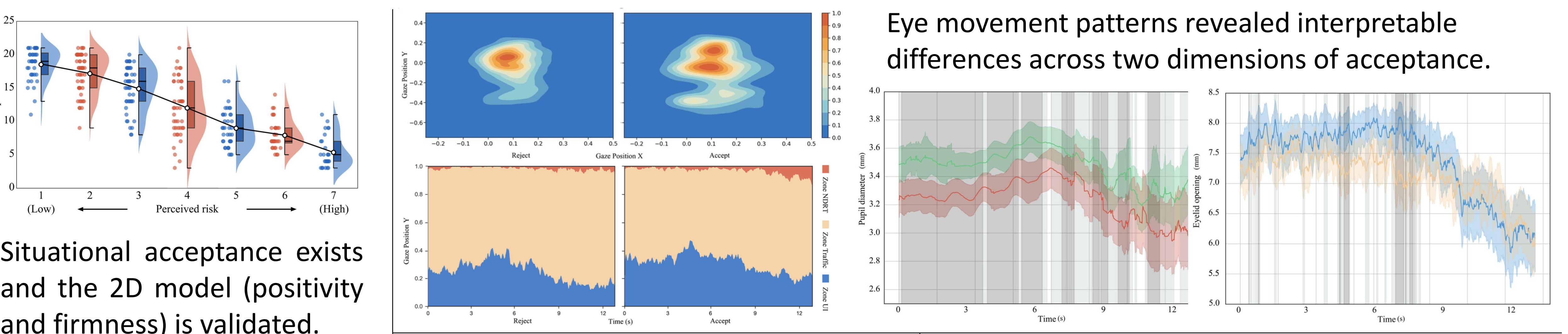
To address this gap, a series of driving simulator studies were conducted, leading to the following key contributions:

- Validation and definition of situational acceptance
- Indication of situational acceptance with physiological feature
- Estimation of situational acceptance with eye data and self-design machine-learning model
- Optimization of situational acceptance with gamification through interpretable mechanism

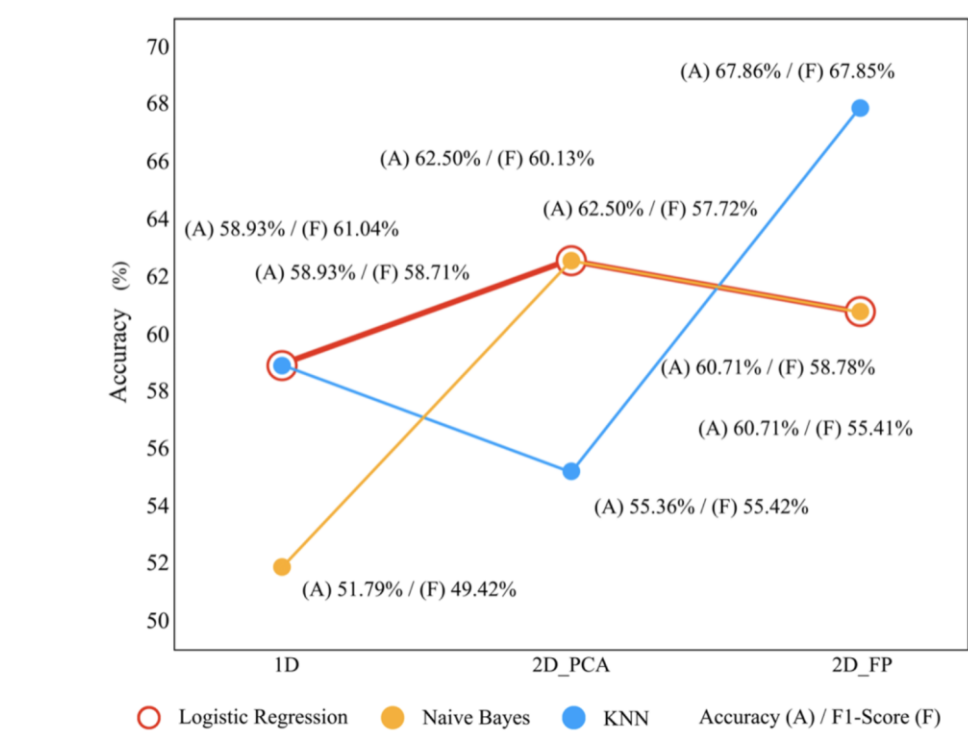
Methodology (Experiments setting & classifier design)



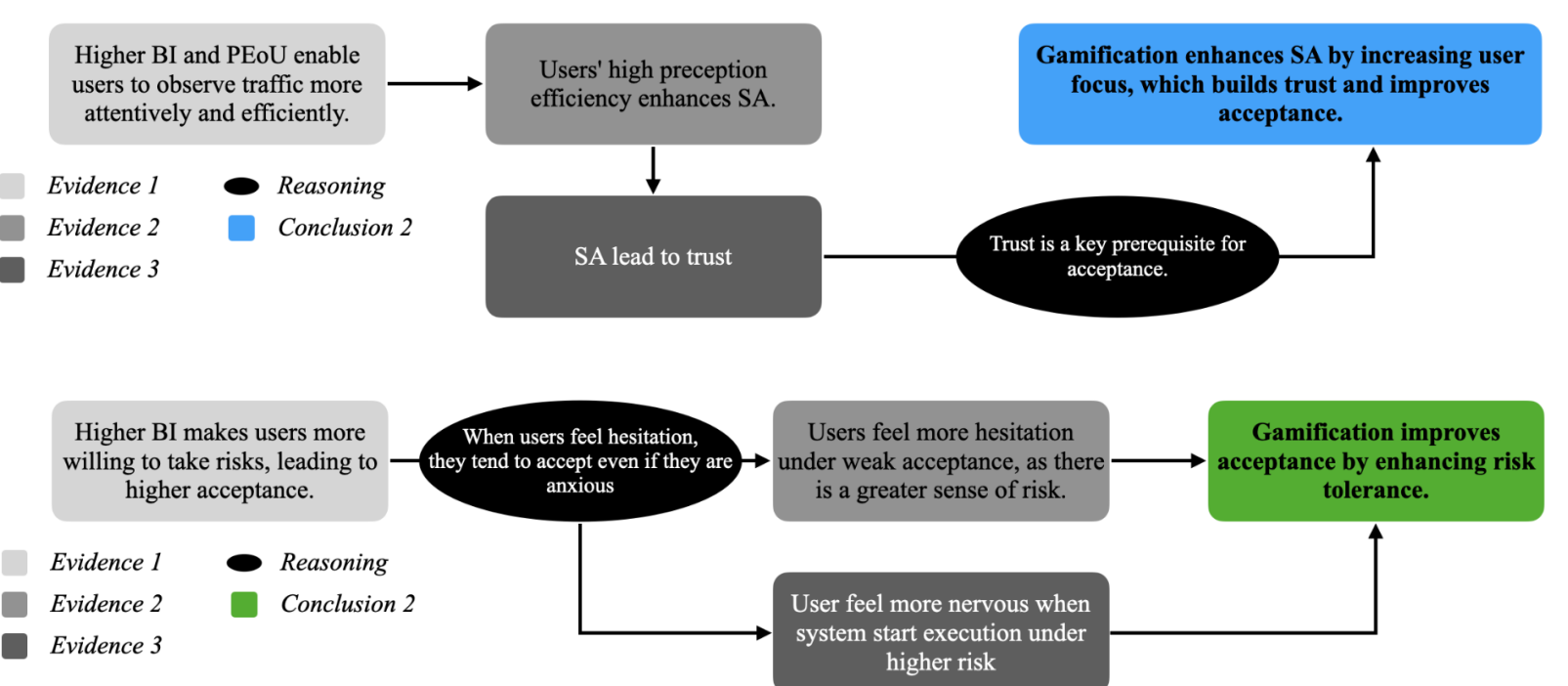
Results



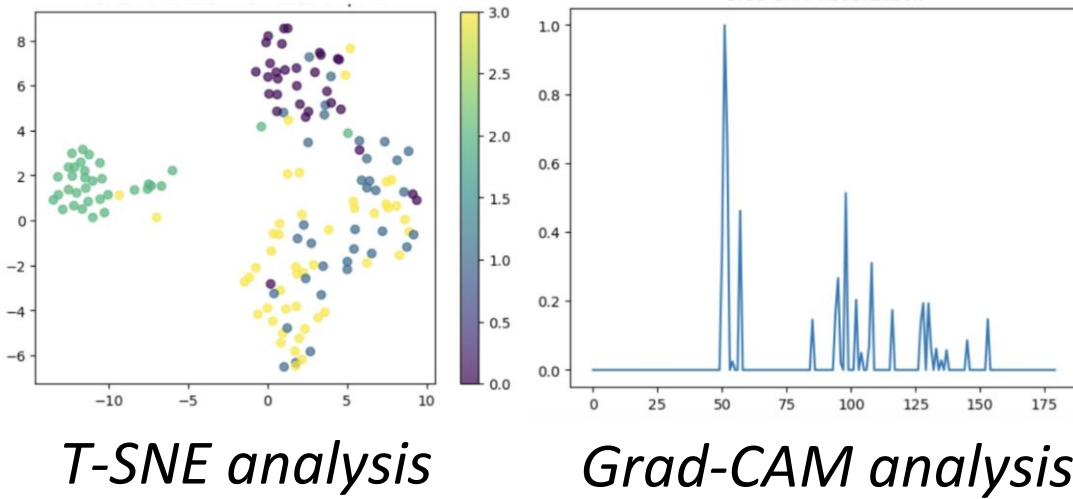
Situational acceptance exists and the 2D model (positivity and firmness) is validated.



Gamification is proven to be effective by:



Target	Model	Accuracy	Precision	Recall	f1-score
Acceptance (Four task)	CNN	0.4966	0.5028	0.4664	0.4359
	ResNet	0.6531	0.6396	0.6390	0.6309
	Bi-LSTM	0.5578	0.5515	0.5470	0.5336
	EsACPT	0.7279	0.7492	0.7278	0.7283



EsACPT shows superior and interpretable performance.

Publications

C. Li, Z. Wang, B. Yang, M. Guan, C. Huang and K. Nakano, "The Impact of System Transparency on Passenger’s Quality of Experience in Highly Automated Driving," 2023 IEEE Intelligent Vehicles Symposium (IV), Anchorage, AK, USA, 2023, pp. 1-7, doi: 10.1109/IV55152.2023.10186700.

C. Li, B. Yang, M. Guan and K. Nakano, "Driving Simulator Study to Explore the Situational Acceptance and the Objective Indication Under Automated Driving," 2024 IEEE 27th International Conference on Intelligent Transportation Systems (ITSC), Edmonton, AB, Canada, 2024, pp. 3619-3625, doi: 10.1109/ITSC58415.2024.10920126.

Li, Chenchang and Yin, Rao and Yang, Bo and Guan, Muhua and Xie, Kun and Nakano, Kimihiko, Enhancing Acceptance of Automated Vehicles Through Gamification: Insights from a Driving Simulator Study. Available at SSRN: <https://ssrn.com/abstract=5152032> or <http://dx.doi.org/10.2139/ssrn.5152032> [Under review]