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Title:	**5G NR Codes and Modulation Deep-RL Optimization for uRLLC in Vehicular OCC**
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Published Journal Name:	IEEE Transactions on Intelligent Transportation Systems
Type of Publication:	Journal
Volume:	25 **Issue** 12
Publisher:	IEEE
Publication Date:	November 27, 2024
ISSN:	1524-9050 (Print), 1558-0016 (Online)
DOI:	10.1109/TITS.2024.3462742
URL:	https://ieeexplore.ieee.org/document/10700659
Other Related Info.:	Page **19592-19604**

Abstract:

In dynamic and time-varying vehicular networks, existing vehicular communication systems cannot guarantee ultra-reliable and low latency communication (uRLLC). To address this, we propose a novel deep reinforcement learning-based vehicular optical camera communication (OCC) system with an aim to maximize the throughput and ensure uRLLC. To achieve this, our scheme chooses the optimal code rate, modulation scheme and speed of vehicles for multiple vehicular links. We use OCC, which offers interference-free communication as an alternative to radio frequency systems. Moreover, we employ 5G New Radio low-density parity-check codes and an adaptive modulation scheme to support variable rates and ultra-reliability. The proposed large-scale and continuous problem is solved through an actor-critic algorithm based on Wolpertinger architecture. We extendedly evaluate the system performance and compare it with several other schemes from the literature as well as with variants of our scheme. We observe from the results that the proposed method achieves higher average throughput and lower latency than all the other schemes under comparison. Further, the proposed scheme can meet the uRLLC constraints, whereas other schemes under comparison fail to respect these constraints most of the time.