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PREFACE

Preface for Cyber-Attack Detection and Resilient Control of Intelligent and Connected Vehicles

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Intelligent and connected vehicles (ICVs), as a critical future product of the automotive industry, have developed rapidly in recent years. The insertion of a cyber chain between vehicles can bring considerable benefits, including shared perception information, improved traffic efficiency, enhanced vehicle safety, optimized energy utilization, and reduced carbon emissions.

However, highly skilled cyber attacks have shown the potential to bypass security mechanisms and control ICVs remotely, which has become a major concern. To address this issue, there is a growing need for cyber-attack detection and resilient control techniques that can effectively detect complex attacks and apply corresponding security measures. While some theoretical works on these topics exist in the literature, the results are far from enough to detect complex attacks in practical applications.

This Feature Topic brings together experts from the industry and academia to discuss the progress of the latest works on cyber-attack detection and resilient control of ICVs. In this Feature Topic, we have selected four papers among dozens of submissions to showcase the latest research progress. The highlights of these papers are introduced as follows.

Highlights:

(1) Authored by researchers from Università degli Studi di Catania and Istituto Nazionale di Astrofisica, Italy, the paper titled "A Double Assessment of Privacy Risks Aboard Top-Selling Cars" presents a privacy risk assessment framework that can be easily applied to any automotive-based scope. The paper considers both the asset-oriented ISO approach and the threat-oriented STRIDE approach in parallel.

(2) The researchers from China and France present the paper titled "Fuzzy Unknown Input Observer for Estimating Sensor and Actuator Cyber-Attacks in Intelligent Connected Vehicles", which investigates the estimation problem of cyber-attacks launched on the sensors and actuators of Connected Vehicle Systems. Several CarSim-based test scenarios are performed to show the effectiveness of the developed cyber-attack estimation method.

(3) In the work titled "Observer-Based Resilient Control of CACC Vehicle Platoon Against DoS Attack", the authors from Wuhan University of Science and Technology study the security resilience control for a cooperative adaptive cruise control system subject to denial of service (DoS) attacks. The paper proposes an approach to estimate the delay caused by DoS attacks and compensate for the delay in the resilient controller design.

(4) The study titled "An Adversarial Attack on Salient Regions of Traffic Sign", conducted by researchers from China and Germany, investigates the relationship between physical adversarial attack, SOTIF, and causality theory. The paper proposes a physical adversarial attack approach to disturb the salient image regions for a targeted fraud, under which the speed-limit-60 traffic sign would be recognized as the speed-limit-80 traffic sign.

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Together, these papers provide valuable insights into the latest research progress on cyber-attack detection and resilient control of ICVs, and we hope they will inspire further research in this area.

Guest Editors

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