

## FREIE UNIVERSITÄT BERLIN

Fachbereich Mathematik und Informatik

Promotionsbüro, Arnimallee 14, 14195 Berlin

## DISPUTATION

**Freitag, 23. Januar 2026, 12:00 Uhr**

**Ort: Seminarraum 031**

**(Fachbereich Mathematik und Informatik, Arnimallee 6, 14195 Berlin)**

**Disputation über die Doktorarbeit von**

**Oleg Schell**

**Thema der Dissertation:**

**Lightweight Physical-based Intrusion Detection Systems for In-Vehicle Communication Networks**

**Thema der Disputation:**

**Preventing or Detecting? Considerations and Challenges of Security Controls for Automotive Networks**

Die Arbeit wurde unter der Betreuung von **Prof. Dr. J. Eichler** durchgeführt.

**Abstract:** The increasing connectivity and software complexity of modern vehicles have significantly expanded their attack surface, as demonstrated by numerous researchers and real-world attacks over the last decade. While standards and regulations mandate the systematic consideration of cybersecurity, the question of which security controls to select for a protection of in-vehicle communication under automotive constraints cannot be answered unambiguously.

After a brief introduction to automotive security and the principle of defense in depth, this talk focuses on secure in-vehicle communication and corresponding security controls. Approaches for attack prevention, including cryptographic mechanisms such as SecOC, MACsec, and CANsec, are examined alongside approaches for an attack detection, with a focus on configuration-based and anomaly-based intrusion detection systems (IDSs). By systematically comparing these security controls, the talk will highlight their respective strengths and limitations, emphasizing the challenge in selecting a suitable security control.

The second part of the talk addresses physical-based IDSs, a specific type of anomaly-based approaches. By leveraging unique physical characteristics of electronic control units (ECUs) during communication, these systems are able to assess message authenticity. Having developed different types of physical-based IDSs, their functional principles and performance are presented and compared to the previously discussed security controls, allowing an assessment of their viability for protecting in-vehicle communication in current and future vehicles.

Die Disputation besteht aus dem o. g. Vortrag, danach der Vorstellung der Dissertation einschließlich jeweils anschließenden Aussprachen.

**Interessierte werden hiermit herzlich eingeladen**

Der Vorsitzende der Promotionskommission  
Prof. Dr. J. Eichler