



# Security-Aware Scheduling for Real-Time Tasks on Multi-Core Systems

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### Context

Autonomous systems, e.g., in the automotive and the aerospace domain, require on-board data processing and sophisticated control algorithms, which demand high performance computing resources. Therefore, multi-core platforms become more attractive for embedded real-time systems. Multi-core real-time systems were the topic of dozens of research papers in last two decades because the scheduling and schedulability analysis of single-core systems are not straightforward applicable to multi-core systems [3]. As a result of the intensive research, global, partitioned and clustered scheduling were proposed [1]. Real-time tasks are subject to security threats [2], which jeopardize the schedulability of time-critical tasks. Hence, we are interested in developing a security-aware scheduling for the real-time tasks on multi-core systems.

### Requirements

- High motivation for learning new things
- Very good programming skills: Python
- Good understanding of real-time systems
- Basic understanding of security
- **Basic** understanding of Integer-Linear Programming (ILP)

### Are you Interested?

please send your full application (CV, current transcript of records) to (mohammad.hamad@tum.de).

## References

- R. I. Davis and A. Burns. A survey of hard real-time scheduling for multiprocessor systems. ACM computing surveys (CSUR), 43(4):1–44, 2011.
- [2] M. Nasri, T. Chantem, G. Bloom, and R. M. Gerdes. On the pitfalls and vulnerabilities of schedule randomization against schedule-based attacks. In 2019 IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS), pages 103–116, 2019.
- [3] S. Saidi, R. Ernst, S. Uhrig, H. Theiling, and B. D. de Dinechin. The shift to multicores in real-time and safety-critical systems. In 2015 International Conference on Hardware/Software Codesign and System Synthesis (CODES+ ISSS), pages 220–229. IEEE, 2015.