Distributed and Networked Systems
(formerly known as Communication Systems)

Distributed Systems
Prof. Dr. Jens Schmitt

Networked Systems
Prof. Dr. Reinhard Gotzhein
Distributed and Networked Systems – What are they?

**Distributed System**
- Collection of interacting components
  - Realization of distributed applications and large-scale systems
  - Improve scalability and avoid performance bottlenecks
  - Increase resilience to service outages

“*A distributed computer system is one in which the failure of a computer you didn’t even know existed can render your own computer unusable.*”

Leslie Lamport

**Networked System**
- Collection of components exchanging messages
  - Wired vs. wireless communication
  - Stationary vs. mobile nodes
  - Infrastructure vs. ad hoc
Trend Towards Distributed and Networked Systems

Past: **Centralized, Sequential Systems**
- Mainframes hosted in computing centers
- Batch-processing
- Stand-alone embedded systems

Today: **Distributed and Networked Systems**
- Internet (of Things), World Wide Web
- Mobile communication: 3G, 4G, 5G, ...
- Distributed embedded systems, Industrie 4.0
- Cloud Computing
- Automotive Systems
- Sensor networks, Cyber-Physical systems
What We Offer in Distributed and Networked Systems
(Close To Our Research)

Functional Aspects

• Systematic Development
• Correctness of Protocols
• Fundamental Algorithms
  – time synchronization, duty cycling, clustering, ...

Non-Functional Aspects

• Performance Analysis, Control, Optimization
  – meeting (hard) deadlines
  – achieving high utilization at good QoS
  – flexible dimensioning
• Security
  – what threats are out there?
  – how to defend: reactive vs. proactive
Classes, Seminars, Projects

Networked Systems, Quantitative Aspects of Distributed Systems (Foundations)

Protocol Engineering

Specification of Networked Systems

Algorithms in Ad-Hoc-Networks

Communication Systems (S)

Development of Networked Systems (P)

Gotzhein

Protocols and Algorithms for Network Security

Network Security

Worst-Case Analysis of Distributed Systems

Stochastic Analysis of Distributed Systems

Distributed Computer Systems (S)

Performance Evaluation of Distributed Systems (P)

Schmitt

Specialization: Distributed and Networked Systems
Questions?