TECHNISCHE UNIVERSITÄT
CHEMNITZ

Fakultät für Informatik
Professur Technische Informatik

# Automotive Software Engineering

## Lecture 1 - Introduction

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**12th October 2015**

# ASE Practical overview

- 4 Tracks:
  - Friday from 15:30 to 18:45 PM
    **Group 1:** each 2nd week, starting at **23th October 2015**
    **Group 3:** each 2nd week, starting at **30th October 2015**
  - Friday from 11:30 to 15:15 PM
    **Group 2:** each 2nd week, starting at **23th October 2015**
    **Group 4:** each 2nd week, starting at **30th October 2015**

    **→Be punctual!**
    **→Prepare units at home**
    **→Explain your solution**

- **Register in OPAL → link on website of professorship (13th October 2015)**

  **http://www.tu-chemnitz.de/informatik/ce/lectures/lectures.php**

# Lecture ASE

- The lecture prepares you for the units, it gives you the most important facts about the next practical unit

- Each second week, starting at 12th October 2015,
  Room: 1/219
  Time: 09:15 AM – 10:45 AM

- Topics of Lecture:
  Communication, Bus Systems, AUTOSAR, Test of ECUs

# ASE Practical overview

| | Group 1 | Group 2 | Group 3 | Group 4 |
|---|---|---|---|---|
| **Unit 1** | 23.10.2015 | 23.10..2015 | 30.10.2015 | 30.10.2015 |
| **Unit 2** | 06.11.2015 | 06.11.2015 | **20.11.2015** | **20.11.2015** |
| ***Consider the break of one week for preparation of unit 3!*** | | | | |
| **Unit 3** | **04.12.2015** | **04.12.2015** | **27.11.2015** | **27.11.2015** |
| **Unit 4** | **18.12.2015** | **18.12.2015** | **11.12.2015** | **11.12.2015** |
| **Unit 5** | **22.01.2016** | **22.01.2016** | **15.01.2016** | **15.01.2016** |
| ***Unit 6 (optional)*** | *(???)* | *(???)* | *(???)* | *(???)* |
| Repeating Unit | 04.02.2016/05.02.2016 | | | |

**Register for one group!**

# ASE Practical – overview of units

- Each unit starts with a short written test

  **Be punctual!** The test is written at the beginning of each unit – if you are not present, you will fail.

- 5 (+1) Units – each Unit 5 Points = Overall 25 Points

| | |
|---|---|
| Short Test | 2 or 3 Points |
| Practical | 3 or 2 Points |

  →>0 points in Test **AND** in Practical are needed to pass a Unit

- You can repeat **exactly** one unit one time (if a Unit is not passed)

- Repeating unit is at the end of the semester (shortly before exams)

# ASE Practical – schedule of each unit

| TEST | PRACTICAL | PRESENTATION | RESULT |
|---|---|---|---|
| Written Test of each student | Practical itself, executing code prepared at home, little help by supervisors possible | Presentation of ALL Tasks to supervisor | Result of written test AND practical |
| 5 to 15 minutes | round about 160 minutes, depending on other slots | 5 minutes **!!!** | 2 minutes |

- Prepare Units at home (algorithms, code) → compile and debug in practical
- Show and explain your results – Explain the important facts/features
- If you did not present your tasks until the end of the unit, your practical unit is defined as failed (0 points)
- Consider lunch break for Friday groups

# ASE Practical – exam

- „Studienordnung 2010“:
  - Do all 5 units → you will get 2 credits
  - No exam

- „Studienordnung 2013“:
  - Do all 5 units → if you pass them, you can register for the exam
  - Practical units + exam → you will get 5 credits
  - Exam handles topics of the units – 90 minutes written exam

# ASE Practical – topics of units

**1 Unit** (Introduction): *(3+2 Points)*
To get to know the Board

**2. Unit** (CAN1): *(2+3 Points)*
Easy CAN, Connection ECU/PC, R/W CAN

**3. Unit** (CAN2): *(2+3 Points)*
Teamwork, Bus-System CAN

**4. Unit**(AUTOSAR): *(2+3 Points)*
AUTOSAR Application

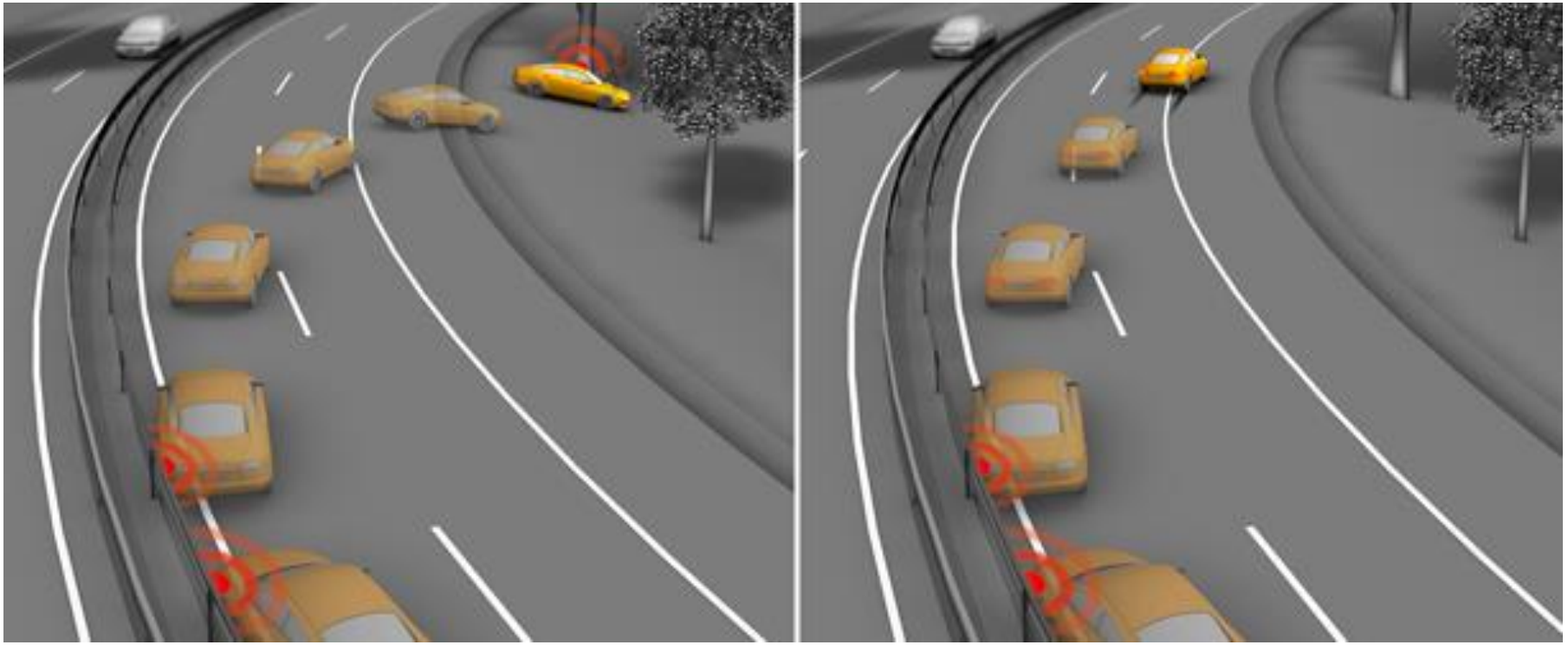
**5. Unit** (Test): *(2+3 Points)*
Black Box Test ECU, manual an automatic

***6. Unit** (Simulink):* *(3+2 Points)*
*Changes in Yellow Car Application*

# Example ASE: Pre-Crash-System


Source: http://www.auto-motor-und-sport.de/bilder/pre-safe-und-pre-cash-system-schutz-bereits-vor-dem-crash-1205775.html

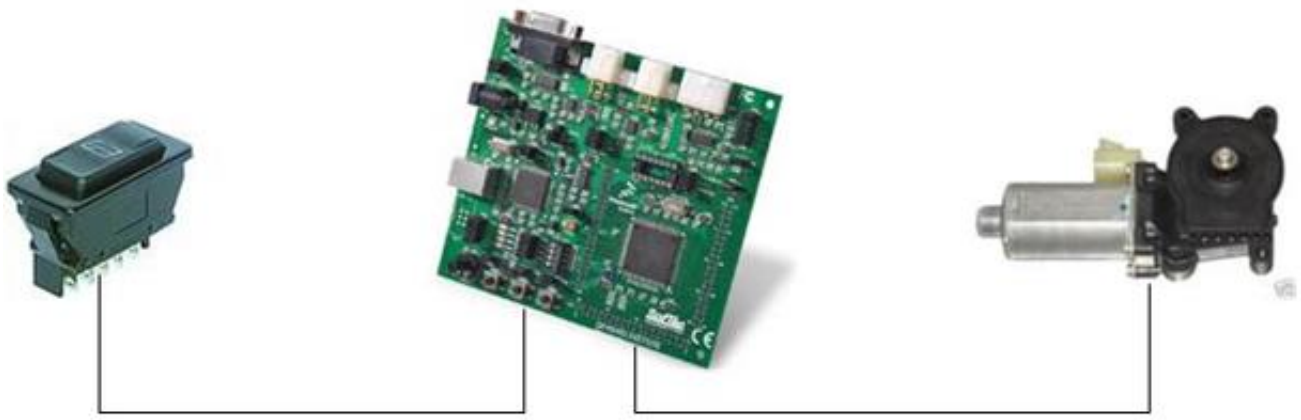
# Example ASE: Post-Crash-System



Source: http://www.atzonline.de/Aktuell/Nachrichten/1/16280/Neues-Post-Crash-Bremssystem-von-Continental-verhindert-Folgeunfaelle.html

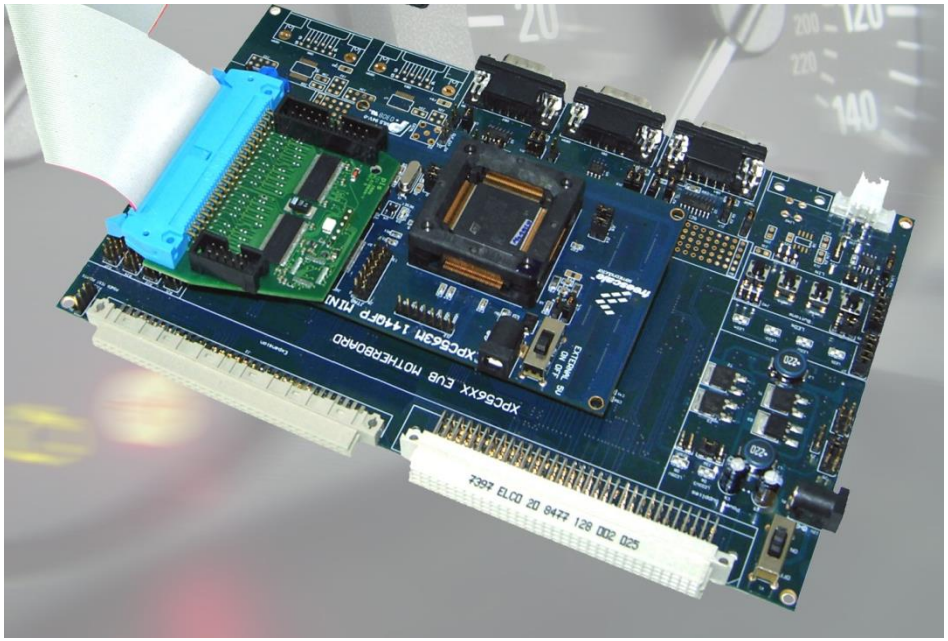
# ECU overview

- ECU = Electronic Control Unit
- ECU integrates functionalities for calculation, analysis of sensor data and controlling actuators
- A premium car has up to 80 ECUs – connected to different bus systems (like CAN Bus)

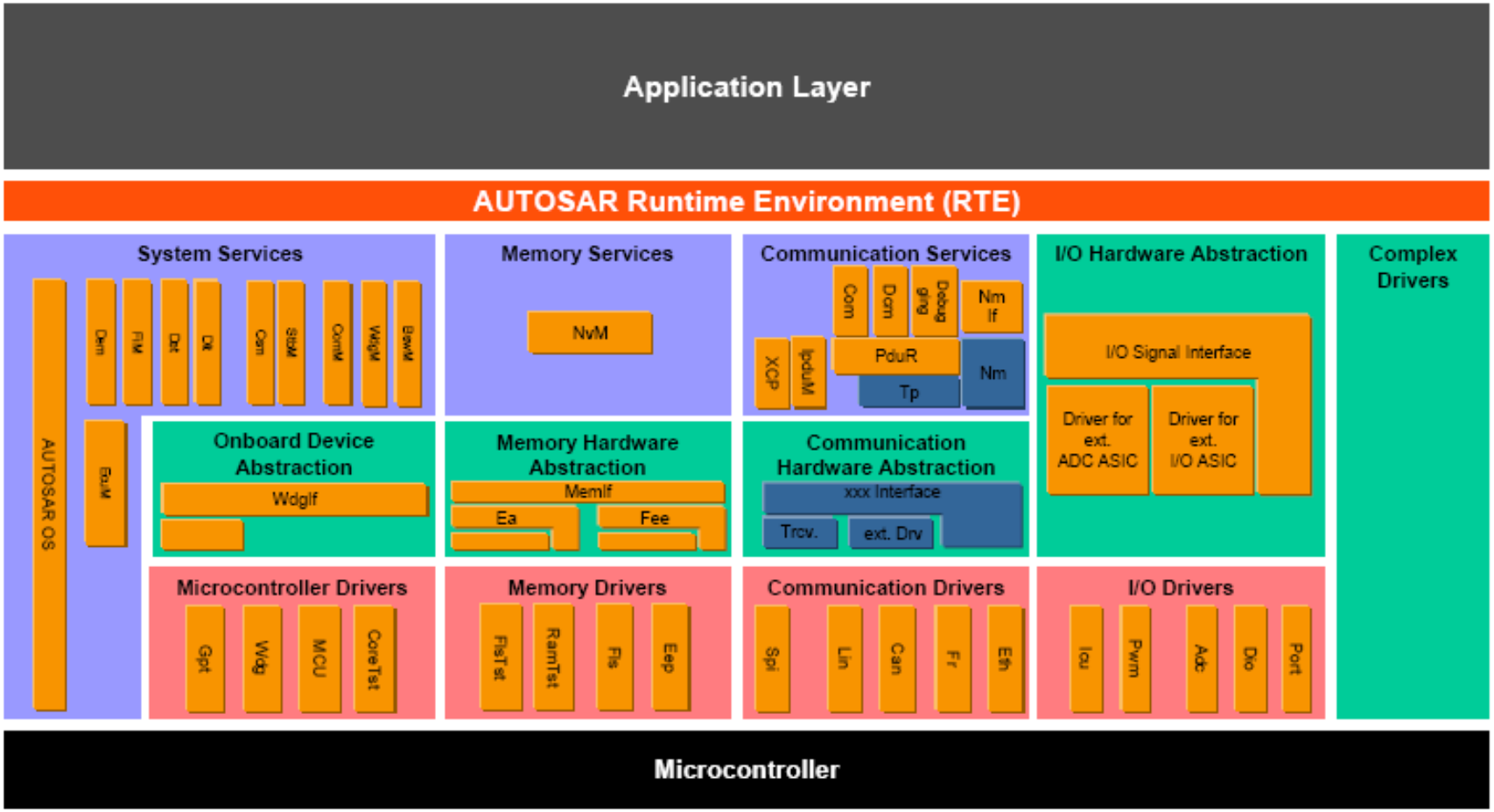


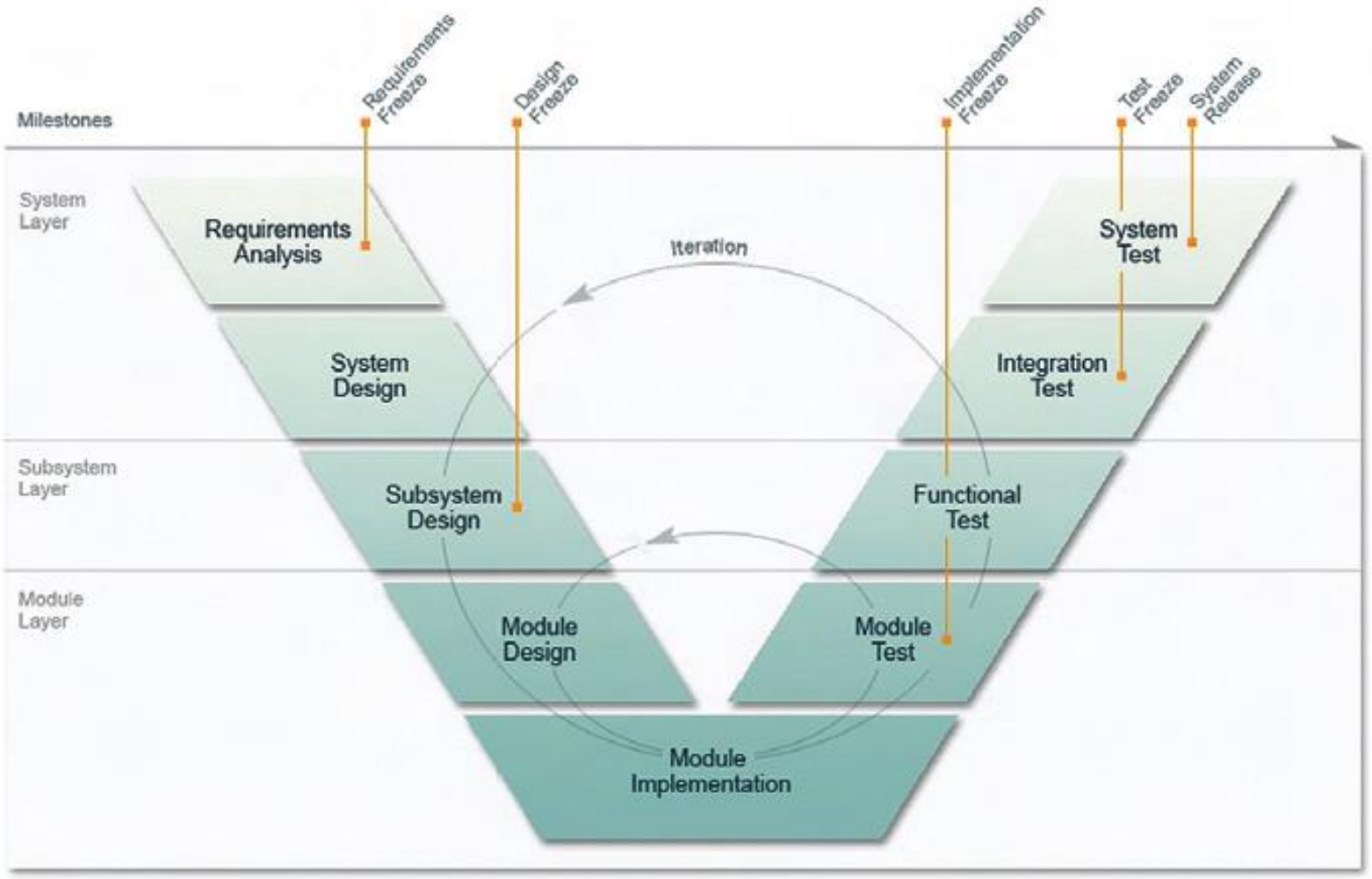
# ECU used in practical

STM SPC560 (AUTOSAR 3.1) → used in Yellow Car demonstrator



# AUTOSAR Overview




Milestones
Requirements Freeze
Design Freeze
Implementation Freeze
Test Freeze
System Release
System Layer
Requirements Analysis
System Design
Iteration
System Test
Integration Test
Subsystem Layer
Subsystem Design
Functional Test
Module Layer
Module Design
Module Test
Module Implementation

**Thanks for your attention!**

**Good luck with your Master Course!**