2024 / 25

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South East Technological University

Module Descriptor

Automotive Software Concepts (Computing and Mathematics)

Automotive Software Concepts (A13602)

Short Title: Automotive Software Concepts
Department: Computing and Mathematics
Credits: 5 **Level:** Introductory

Description of Module / Aims

This module introduces the student to automotive software development concepts, beginning with an overview of vehicle electronic architectures and the automotive software development lifecycle. Students will learn how microcontroller-based software is designed, developed and tested to control in-vehicle systems such as climate control, engine management and ABS brakes. Students will use automotive industry-standard development tools to construct basic vehicle control systems in the laboratory.

Programmes

		stage/semester/status
COMP-0407	BSc (Hons) in Applied Computing (WD_KACCM_B)	1 / 2 / E
COMP-0407	BSc (Hons) in Applied Computing (WD_KCOMP_B)	1 / 2 / E
COMP-0407	BSc (Hons) in Computer Science (WD_KCMSC_B)	1 / 2 / E

Indicative Content

- Automotive industry overview
- Vehicle electronic architecture
- Automotive software lifecycle: V-cycle
- Microcontroller software design: Event detection; Polling; Interrupts; Statecharts
- Model-Based Development and Testing: Development phases; HiL testing
- Vehicle networks: Introduction to Controller Area Network (CAN)
- AUTOSAR software architecture: Software Components; Runtime Environment; Basic Software; Workflow

Learning Outcomes

On successful completion of this module, a student will be able to:

1. Explain how software applications are structured and distributed in an automotive environment.
2. Discuss the AUTOSAR software architecture.
3. Use industry-standard tools to simulate and test a basic in-vehicle event-driven, distributed application.

Learning and Teaching Methods

- Combination of lectures and lab-based practicals.
- The lectures will cover the theory and underlying technologies in automotive software development.
- The lab-based practicals, building on the theoretical knowledge from the lectures, provide the practical skills to design, simulate and test automotive software applications.
- Students will be encouraged to enhance their lab work and assessment submissions using self-directed research and learning into the broader automotive industry topics and current issues.

Learning Modes

Learning Type	F/T Hours	P/T Hours
Lecture	12	
Practical	36	
Independent Learning	87	

Assessment Methods

	Weighting	Outcomes Assessed
Continuous Assessment	100%	
Assignment	50%	1,2
Lab Report	50%	3

Assessment Criteria

<40%: Unable to describe the key methodologies of the automotive software development process.

40%–49%: Able to describe the key methodologies of automotive software development.

50%–59%: Able to demonstrate the use of key methodologies to design basic automotive software components.

60%–69%: Able to incorporate non-functional requirements such as testability and performance into automotive software designs.

70%–100%: All of the above to an excellent level. Be able to analyse and design solutions to a high standard, using appropriate skills and tools to analyse the quality and performance of specific solutions.

Essential Material(s)

- "AUTOSAR Organisation." www.autosar.org
- "Automotive News Europe." www.automotivenewseurope.com

Supplementary Material(s)

- Oshana, R. and M. Kraeling. *Software Engineering for Embedded Systems.* Waltham, MA., USA.: Newnes, 2013.
- Schaeuffele, J. and T. Zurawaka. *Automotive Software Engineering.* Stuttgart, Germany.: Springer, 2013.

Requested Resources

- Computer Lab: BYOD Lab