Free Minor Embedded Software - Computer Science

Delft University of Technology | Formula Student Team Delft

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Introduction

Since 2011 Formula Student Team Delft has been building an electric powered race car. The car has evolved and has become more intelligent than ever before in terms of data and control algorithms. At the backbone of these improvements is the software department. Systems such as the central control unit, dashboard and accumulator management run real-time (FreeRTOS). To take the next step in the software development we are looking for motivated software engineers that would like to learn more on embedded programming.

The minor student will get the responsibility to design and test software for a component in the low voltage system in the car. This means writing C++ code, using a RTOS, working with an ARM Cortex-M processor and integrating this software in the electronics system as a whole. The difficulty of this work, and the time required to successfully fulfil this task will accredit to the 15 EC listed for this project. The assessment will be done by a final presentation, where focus should be put on the process applied and lessons learned. A paper needs to be written which will get a fail or pass result.

The idea behind the set-up of this minor is that several students working on different disciplines have 2 courses in common to ensure a basic level of understanding of project- and process management and decision making. This should enable the students to work more independently, while still performing as desired. The remaining ECTS will be gathered by following courses relevant for the discipline the student is working on, in this case embedded software development.

This minor is made for computer science students who want to broaden their knowledge in the embedded system domain and do that in a practical context.

Course	ECTS	Motivation	Period
SPM6102 Process Management and Decision Making	5	A well-structured process and good decision making are of vital importance in such a high-paced project as Formula Student.	Q2
ET3033TU Circuit Analysis	3	Basic electrical circuit analysis course to better understand the complications and implications of electrical design.	Q1
ET3604LR Electronic Circuits	3	Insight in the function of Electronics with modern systems. Introductory electronics course.	Q1
EE3331TU Structured Electronic Design - Basics	4	Follow up course of ET3604LR. Further explores the design of operational amplifiers and their uses in practical applications.	Q2
ET3051TU Electronic Power Conversion	4	Course on the fundamentals of electrical power generators and motors. Useful in understanding the electrical powertrain of the electric racecar	Q2
TI2726-B Embedded Software (If not passed yet!)	5	An introductory course to embedded programming. Places may be limited!	Q2
TI2716-A Signal Processing (If not passed yet!)	5	Course on the fundamentals of signal processing such as sampling, filtering and signal transformations.	Q1
CT3101 Project Management Basics	5	Project management skills are a big plus in such a complex, multidisciplinary project.	Q1

From these courses at least 15 ECTS should be filled. It is advised to take at least one management course. The list above is only a recommendation, other electives are allowed as long as:

- The elective is not part of the Computer Science major.

- The elective complements the project work.

The final course list needs to be approved by the exam committee of the EWI. The project work itself fills the other 15 ECTS.