SV21POTR Course Info (80 YHP)

SV21POTR Programmering och utveckling av inbyggda system (YH3556004-5)

Embedded System Programming

In this course, the students learn programming and development of embedded systems.

Content of the course:

- Introduction to Embedded Systems & Programming
- Introduction to electrical and electronic circuits and basic components
- Digital and analog signals and convertors
- Time, timers and timing
- Sensors & Actuators
- Advanced programming in C
- Introduction to C++ language
- Computer System Components and Architecture
    - Microcontrollers and microprocessors
    - I/O, Serial, Parallel, Digital, Analog and PWM
    - Memories and Direct Memory Access
    - Interrupts and event-driven programming
- Device Driver Development
- Multitasking, Task Scheduling and Process Control
- Operating Systems & Real-Time Operating Systems
- Requirements and Software Architecture Design
- Software Unit and Integration Testing Including
    - Test Driven Development (TDD) & Behavior Driven Development (BDD)
- Dual Targeting , Design for test and SOLID module design
- Software analysing and calibration
- Software Debugging, Troubleshooting and Code Instrumentation
- Safety-critical systems, ISO 26262 and MISRA C
- Message Queuing Telemetry Transport (MQTT) protocol
- Systematic Code Generation
- Data integrity and Security

Teacher: Faroch Mehri (email: faroch.mehri@ya.se and phone: 0730301292)

Contact and communication: itslearning, Zoom, slack

You can contact the teacher from 09:00 to 16:00 all working days, Mondays to Fridays.

Lectures

Time: Weeks 50 and 01- 18 (Mon. 09:00 - 15:00, Tue. 09:00 - 12:00 and Wed. 09:00 - 16:00)

The lectures are run on Zoom, room Software Developer HT2021 Trollhättan (3556).

The literature/materials are uploaded to itslearning before the lectures and it is important to watch/study the materials before the lectures in order to prepare yourself for the lectures.

In this course most of the lectures are followed by exercises.

Planning

Week	Contents/Lectures	Activities/Assignment/Comment
50	Introduction to Electrical Circuits, Resistors, Capacitors, Inductors and Diodes and Transistors	
01	Introduction to Embedded Systems Digital and analog signals and convertors Time, timers and Timing	9 Exercises
02	Introduction to Modularity and Software Testing	3 Exercises
03	Modularity and Software Testing	2 Exercises
04	Modularity and Software Testing	2 Exercises
05	Modularity and Software Testing	2 Exercises **Assignment**
06	Computer System Components and Architecture	3 Exercises
07	Programming of Safety Critical Systems	1 Exercise
08	Programming of Safety Critical Systems	

09	Multitasking & Real-Time Operating System	3 Exercises
10	Requirements & Software Architecture Design	1 Exercise Greenhouse Project
11	Requirements & Software Architecture Design	Teamwork project Sprint review
12	Introduction to C++ Device drivers & Unit testing	Teamwork project Sprint review
13	Introduction to C++ Device drivers & Unit testing	Teamwork project Sprint review
14	Introduction to C++ Applications & Integration Testing	Teamwork project Sprint review
15	Provisioning & Update Over The Air Applications & Integration Testing	Teamwork project Sprint review
16	MQTT Protocol Applications & Integration Testing	Teamwork project Sprint review
17	Multitasking & Scheduling	Teamwork project Sprint review
18	Testing, demo and presentation of the project.	

Examination

The examination of the course is done by an individual assignment and a teamwork project.

Grading

The criteria for G(Godkänt) and VG(Väl Godkänt) will be specified in the assignments.

Resources

1. The uploaded materials to itslearning