Blended learning in embedded programming and microcontroller technique

• From teacher centered to active learning
• Experiences

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What is it about

Curriculum – learning outcome

What can it do and how?

the objectives of the course:

- Design and implement a structural program for a small microcontroller system
- Using C-language for control structures, pointers, data structures, functions and finite state machines
- Can use hardware C programming for activating the different hardware units, ports, timers, serial units etc.
- Can explain the architecture of a microcontroller, memory hierarchy, registers and its operations
- Can read the datasheet for a given microcontroller and use it in the C-programming
- Understand the difference between polling and interrupts and can use it appropriately in C-programs
- Verification of C-modules and make integration test using appropriately tools
- Carry out C-programming for a microcontroller interfacing different peripheral units
- Can use a professional development tool
- Carry out documentation for a C-program for an embedded system

The red is supported by video
Results

- Students get 1 hour in average more for writing c-programs
- Satisfaction
- Students can prepare everywhere
  - E-book
  - Videos – with slides and tutorials
  - Quiz for each video
Midterm evaluations

2017: 44 of 66 students answered

In 2016 Before video:
12 out of 50 answered
Students opinion

they is as a good supplement to the teaching

To get the material told several times and in several ways (videos / lectures / books), as this helps me to understand and remember.
Two types of video and tools

• On you tube – explaining slides

The AVR USART

• Number of USART modules allowed
  – Mega device: up to four
• USART signal pin assignment
  – Asynchronous mode (UART)
    • Transmit data (TXD) and receive data (RXD): 2 pins
  – Synchronous mode (USRT)
    • Transmit data (TXD) + receive data (RXD) + serial clock: 3 pins
  – Synchronous or SPI mode
  • Third pin needed for clock signal (SCK)

Camtasia

https://www.techsmith.com/

Tutorial how to work

playliste
Examples for viewing
How to get awareness

- Use the slide serie with link
- Use the calender i Campusnet
- Use the campusnet message:
  - ex:
    `then material and video is ready`

  watch video on https://youtu.be/4keMGm7ee1Y

  take the quiz on https://goo.gl/forms/qS9KxOX5bFHm7I333

  read the book Chapter 16 only acting on mega2560 not XMEGA examples and code!
Conclusion

- Videos create more activity in the class
- Review again and again
- Learning basic stuff from everywhere
- Gain more time to hands-on work

Challenge – not all students get prepared – how can that be improved?