Microcomputer circuits and systems - opis przedmiotu

Informacje ogólne

Nazwa przedmiotu	Microcomputer circuits and systems
Kod przedmiotu	06.5-WE-INFP-MicCirSys-Er
Wydział	Wydział Nauk Inżynieryjno-Technicznych
Kierunek	Informatyka
Profil	ogólnoakademicki
Rodzaj studiów	Program Erasmus pierwszego stopnia
Semestr rozpoczęcia	semestr zimowy 2021/2022

Informacje o przedmiocie

Semestr	5
Liczba punktów ECTS do zdobycia	7
Typ przedmiotu	obowiązkowy
Język nauczania	angielski
Sylabus opracował	• dr inż. Mirosław Kozioł

Formy zajęć

Forma zajęć	Liczba godzin w semestrze (stacjonarne)	Liczba godzin w tygodniu (stacjonarne)	Liczba godzin w semestrze (niestacjonarne)	Liczba godzin w tygodniu (niestacjonarne)	Forma zaliczenia
Wykład	30	2	-	-	Egzamin
Laboratorium	30	2	-	-	Zaliczenie na ocenę
Projekt	15	1	-	-	Zaliczenie na ocenę

Cel przedmiotu

- To provide knowledge about basic elements of microprocessor system and their mutual cooperation.
- To provide knowledge about the various methods of microprocessor system expansion with additional peripherals and methods of peripherals' handling by the central processor unit.
- To provide knowledge about the architecture of an exemplary microcontroller.
- To develop and shape the skills in the software design for microprocessor systems.
- To shape the skills in the design of microprocessor systems.

Wymagania wstępne

By entering this course, student should know the following isssues:

- basic laws of electrical circuits (e.g. Ohm's law, Kirchoff's laws),
- fundamental knowledge about semiconductors (transistor and diode),
- fundamentals of digital electronics (logic gates, flip-flops, counters, three-state buffer),
- operational amplifier basics (buffer, inverting and noninverting configuration, summing amplifier),
- fundamental knowledge about analog-to-digital and digital-to-analog converters,
- fundamentals of programing in the C language.

Zakres tematyczny

Microprocessor system and its basic components. The role of the tri-state buffers in accessing the data bus. Microprocessor vs. microcontroller.

Instructions. Instruction set. Execution of the instruction by the central processor unit of the microprocessor system. Basic addressing modes. Basic groups of instructions in the instruction set.

Memories in microprocessor systems. Basic memory types. Basic memory parameters. Exemplary timing charts during read and write operations. Examples of memory chips used in microprocessor systems based on microcontrollers.

Interfacing peripherals to the system bus. Isolated and memory mapped input-output devices. Address decoder design on the basis of middle scale digital logic circuits and SPLDs with examples.

Handling of peripherals. Polling. Interrupt system.

Transmission of information between microprocessor systems. Transmission of information with and without acknowledgement. Synchronous and asynchronous transmission. Parallel and serial transmission. Serial interfaces (RS-232C, RS-485).

Local serial interfaces. I2C, SPI.

MCS-51 family of microcontrollers as an example of single-chip microcomputer. The most significant features of their architecture. Functional blocks. Interfacing of external program and data memory. Available addressing modes. Instruction set. Embedded peripheral systems, i.e. timer-counters and serial interface. Interrupts. Parallel ports.

Programming examples of embedded peripherals in assembler and C.

Basic user interface in microprocessor system. Keyboard. LED and LCD displays.

Metody kształcenia

- Lecture: conventional/traditional lecture with elements of discussion.
- Laboratory: laboratory exercises, work in groups with elements of discussion.
- Project: work in groups with elements of discussion.

Efekty uczenia się i metody weryfikacji osiągania efektów uczenia się

Opis efektu	Symbole efektów	Metody weryfikacji	Forma zajęć
Student can design a microprocessor system based on a microcontroller.		• praca pisemna • przygotowanie projektu	• Projekt
Student can name and explain methods for servicing of peripherals in microprocessor system.		• dyskusja • egzamin - ustny, opisowy, testowy i inne	• Wykład
Student can name and explain various methods for extending of microprocessor systems by additional peripherals.		• bieżąca kontrola na zajęciach • dyskusja • egzamin - ustny, opisowy, testowy i inne • przygotowanie projektu	• Wykład • Laboratorium • Projekt
Student can name basic sub-components of microprocessor system, describe their functional purpose and co-operation.		• bieżąca kontrola na zajęciach • egzamin - ustny, opisowy, testowy i inne	• Wykład • Laboratorium
Student can write a program for a microprocessor system based on a microcontroller.		• bieżąca kontrola na zajęciach	• Laboratorium
Student knows the exemplary microcontroller architecture.		• bieżąca kontrola na zajęciach	• Laboratorium

Warunki zaliczenia

- Lecture: to receive a final passing grade student has to obtain positive grade from the final exam.
- Laboratory: to receive a final passing grade student has to obtain positive grades for all laboratory exercises provided in the laboratory syllabus.
- Project: to receive a final passing grade student has to receive positive grades for all defined projects.

Calculation of the final grade = lecture 30% + laboratory 36% + project 34%

Literatura podstawowa

1. Godse A.P., Godse D.A.: *Microprocessor, Microcontroler & Applications*, Technical Publications Pune, 2008.
2. Deshmukh A.V.: Microcontrollers. Theory and Applications. Tata McGraw-Hill, 2007.
3. Huang H-W.: *Embedded System Design with the C8051*, Cengage Learning, 2009.
4. James M.: Microcontroller Cookbook. PIC & 8051, Newnes, 2001.

Literatura uzupełniająca

Uwagi

Zmodyfikowane przez dr inż. Mirosław Kozioł (ostatnia modyfikacja: 15-07-2021 17:51)