BMD201 - MICROCONTROLLERS - Meslek Yüksekokulu - Elektronik ve Otomasyon Bölümü

General Info

Objectives of the Course

To teach the historical development process of microprocessors and microcontrollers. To understand the functions and operation of microcontroller hardware units. To write the appropriate program to control the microcontroller. To make button, LED, 7 segment display, matrix display, character LCD, keypad, ADC and serial communication applications with microcontroller.

Course Contents

Differences between microprocessor and microcontroller systems systems, microcontroller systems, programmer card, the program into machine language translation, the compiled program to microcontroller installation, algorithms, flow charts, the memory map of the microcontroller, the microcontroller commands editor program the microcontroller, the microcontroller basic blocks of the program, the basic input-output programs , microcontroller program, compile, run the compiled program step by step, push-button and LED applications with microcontroller, microcontroller circuit applications with a 7-segment display, keypad with microcontroller applications, lcd with microcontroller applications.

Recommended or Required Reading

Çiçek, S. (2021). CCS C ile PIC Programlama. Altaş Yayıncılık.

Akademi B. (2014). Herkes için PIC Programlama. Pusula Yayıncılık.

Planned Learning Activities and Teaching Methods

Lecturing, question and answer, group work, skills development training

Recommended Optional Programme Components

Haftalık Ders Notlarına Linkten Ulaşabilirsiniz:

https://disk.yandex.com/d/SIqhp8EKEiiAMQ

Instructor's Assistants

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Presentation Of Course

The course is taught in the Computer Laboratory with Microcontroller Training Sets.

Dersi Veren Öğretim Elemanları

Inst. Rıdvan Canbaz

Program Outcomes

1. Knows the general structure of microcontrollers, their hardware units, where they are used and the differences between them and microprocessors.
2. Knows the C programming language command structure required to program the microcontroller.
3. Knows how to use a compiler program. Translates a program written in C programming language into machine language using a compiler program and can load the program into the microcontroller.
4. You can perform button and LED applications (Button usage, LED usage, 7 segment display usage, matrix display usage, keypad usage) by using basic level input and output commands on the microcontroller.
5. Can perform advanced circuit designs (using LCD screen, ADC, serial communication) on microcontroller.

Weekly Contents

Order	PreparationInfo	Laboratory	TeachingMethods	Theoretical	Practise
1	Textbook: Serdar Çiçek – PIC Programming with CCS C, pp. 11–22 Learning Outcome: LO1	Introduction of microcontroller hardware components and demonstration through a sample circuit	Lecture, question–answer, problem solving, demonstration	Examination of the basic structures of microprocessors and microcontrollers	Explaining and comparing the differences between microprocessors and microcontrollers through applied examples
2	Textbook: Serdar Çiçek – PIC Programming with CCS C, pp. 43–77 Learning Outcome: LO1	Demonstration of port definitions and input/output operations on the PIC16F877 microcontroller	Lecture, question–answer, problem solving, demonstration	Examination of the hardware structure, ports, and oscillators of PIC microcontrollers	Applying the use of ports as input/output by examining the microcontroller hardware structure
3	Textbook: Serdar Çiçek – PIC Programming with CCS C, pp. 105–115 Learning Outcome: LO2	Implementation of application examples in CCS C program for port input/output operations	Lecture, question–answer, problem solving, demonstration	Examination of port input/output commands, variables, and data types	Demonstrating input/output operations by using variable definitions and data types in practice
4	Textbook: Serdar Çiçek – PIC Programming with CCS C, pp. 124–142 Learning Outcome: LO2	Development of simple application examples using the main() function and while loop	Lecture, question–answer, problem solving, demonstration	Examination of the main() function, while loop, and delay functions	Performing simple timing applications using the while loop and delay functions in CCS C environment
5	Textbook: Serdar Çiçek – PIC Programming with CCS C, pp. 55–58 Learning Outcome: LO2	Development of application examples related to the use of operators	Lecture, question–answer, problem solving, demonstration	Examination of arithmetic, logical, and relational operators in CCS C language	Performing decision-making and calculation applications using logical and arithmetic operators

Order	PreparationInfo	Laboratory	TeachingMethods	Theoretical	Practise
6	Textbook: Serdar Çiçek – PIC Programming with CCS C, pp. 124–130 Learning Outcome: LO2	Implementation of simple application examples using decision structures and loops	Lecture, question–answer, problem solving, demonstration	Examination of decision structures and loops (if, while, for, do-while) in CCS C language	Developing applications that control program flow using if, for, and while structures
7	Textbook: Serdar Çiçek – PIC Programming with CCS C, pp. 127–135 Learning Outcome: LO2, LO1	Demonstrating the effects of goto, break, and continue commands on program flow through applications	Lecture, question–answer, problem solving, demonstration	Examination of goto, break, and continue commands in CCS C language	Performing applications using goto, break, and continue commands to change program flow
8	Review of textbook pages covered in weeks 1–7 Learning Outcomes: LO1, LO2			Midterm Exam	
9	Textbook: Serdar Çiçek – PIC Programming with CCS C, pp. 247–275 Learning Outcome: LO3	Implementing LCD connections and applying lcd_init, lcd_putc, lcd_gotoxy functions	Lecture, question–answer, problem solving, demonstration, practice	Examination of LCD usage with microcontrollers	Performing character and message display applications on the LCD screen with a microcontroller
10	Textbook: Serdar Çiçek – PIC Programming with CCS C, pp. 173–184 Learning Outcome: LO3	Demonstrating the working principles of the interrupt mechanism and performing basic applications with RB0 interrupt	Lecture, question–answer, problem solving, demonstration, practice	Mikrodenetleyicilerde kesme kavramının ve kesme yapısının incelenmesi (RB0 kesmesi örneğiyle)	Demonstrating the use of interrupts in circuit control with microcontrollers (with applications using RB0 interrupt as an example)
11	Textbook: Serdar Çiçek – PIC Programming with CCS C, pp. 174–200 Learning Outcome: LO3	Triggering RB4–RB7 port change interrupts and performing applications on a sample circuit	Lecture, question–answer, problem solving, demonstration, practice	Examination of port change interrupts in microcontrollers (with RB4–RB7 interrupts as an example)	Using port change interrupts to control inputs connected to the microcontroller
12	Textbook: Serdar Çiçek – PIC Programming with CCS C, pp. 197–213 Learning Outcome: LO3	Configuring Timer1 and Timer2 interrupts and performing sample applications	Lecture, question–answer, problem solving, demonstration, practice	Examination of timer interrupts in microcontrollers (with Timer1 and Timer2 examples)	Developing applications for time measurement and periodic operations using timer interrupts
13	Textbook: Serdar Çiçek – PIC Programming with CCS C, pp. 217–237 Learning Outcome: LO4	Configuring the CCP module and performing applications related to PWM signal generation	Lecture, question–answer, problem solving, demonstration, practice	Examination of the Capture/Compare/PWM (CCP) module in microcontrollers	Performing motor control and frequency measurement applications using PWM
14	Textbook: Serdar Çiçek – PIC Programming with CCS C, pp. 291–305 Learning Outcome: LO4	Configuring the ADC module and performing applications related to reading data from analog inputs	Lecture, question–answer, problem solving, demonstration, practice	Examination of the Analog-to-Digital Converter (ADC) module in microcontrollers	Performing applications of data acquisition from different sensors and digital processing using ADC
15	Textbook: Serdar Çiçek – PIC Programming with CCS C, pp. 337–343 Learning Outcomes: LO4, LO5	Configuring serial communication and performing data exchange applications with a computer	Lecture, question–answer, problem solving, demonstration, practice	Examination of serial communication (UART/USART) structure in microcontrollers	Performing applications of sending and receiving data between the microcontroller and the computer using UART/USART

Workload

Activities	Number	PLEASE SELECT TWO DISTINCT LANGUAGES
Teorik Ders Anlatım	14	3,00
Uygulama / Pratik	14	1,00
Ev Ödevi	14	2,00
Proje	1	4,00
Ara Sınav Hazırlık	7	1,00
Vize	1	1,00
Final Sınavı Hazırlık	14	1,00
Final	1	1,00
Ders Öncesi Bireysel Çalışma	9	1,00

Assesments

Activities	Weight (%)
Vize	40,00
Final	60,00

Elektronik ve Otomasyon Bölümü / BİYOMEDİKAL CİHAZ TEKNOLOJİSİ X Learning Outcome Relation

	P.O. 1	P.O. 2	P.O. 3	P.O. 4	P.O. 5	P.O. 6	P.O. 7	P.O. 8	P.O. 9	P.O. 10	P.O. 11	P.O. 12	P.O. 13	P.O. 14
L.O. 1	5	2	2	2	2		1					1	2	3
L.O. 2	4	2	5	3	3		2					1	4	4
L.O. 3	4	2	5	2	2		1					1	4	4
L.O. 4	3	2	4	3	3		1					1	5	4
L.O. 5	3	2	4	3	3		1						5	4

Table :

P.O. 1 : Mesleği ile ilgili temel, güncel ve uygulamalı bilgilere sahip olur.

P.O. 2 : Mesleği için güncel gelişmeleri ve uygulamaları takip eder, etkin şekilde kullanır.

P.O. 3 : Mesleği ile ilgili bilişim teknolojilerini (yazılım, program, animasyon vb.) etkin kullanır.

P.O. 4 : Mesleki problemleri ve konuları bağımsız olarak analitik ve eleştirel bir yaklaşımla değerlendirme ve çözüm önerisini sunabilme becerisine sahiptir.

P.O. 5 : Mesleki problemleri ve konuları bağımsız olarak analitik ve eleştirel bir yaklaşımla değerlendirme ve çözüm önerisini sunabilme becerisine sahiptir.

P.O. 6 : Bilgi ve beceriler düzeyinde düşüncelerini yazılı ve sözlü iletişim yolu ile etkin biçimde sunabilir, anlaşılır biçimde ifade eder.

P.O. 7 : Alanı ile ilgili uygulamalarda karşılaşılan ve öngörülemeyen karmaşık sorunları çözmek için ekip üyesi olarak sorumluluk alır.

P.O. 8 : Kariyer yönetimi ve yaşam boyu öğrenme konularında farkındalığa sahiptir.

P.O. 9 : Alanı ile ilgili verilerin toplanması, uygulanması ve sonuçlarının duyurulması aşamalarında toplumsal, bilimsel, kültürel ve etik değerlere sahiptir.

P.O. 10 : Bir yabancı dili kullanarak alanındaki bilgileri takip eder ve meslektaşları ile iletişim kurar.

P.O. 11 : Biyomedikal cihazların çalışma prensiplerini açıklar, tasarımını ve montajını yapar.

P.O. 12 : Biyomedikal cihazlarda meydana gelebilecek arızaları tespit eder ve arızaları giderir.

P.O. 13 : Tıbbi cihazlar için yazılım ve kontrol sistemleri geliştirir.

P.O. 14 : Biyomedikal sensörler ve ölçüm sistemleri konusunda bilgi sahibi olur ve uygulamalar geliştirir.

L.O. 1 : Mikrodenetleyicilerin genel yapısı, donanım birimleri, kullanım yerleri ve Mikroişlemciler ile arasındaki farkları bilir.

L.O. 2 : Mikrodenetleyici programlamak için gerekli C programlama dili komut yapısını bilir.

L.O. 3 : Derleyici program kullanmayı bilir. C programla dilinde yazılan programı derleyici program vasıtası ile makine diline çevirir ve mikrodenetleyiciye programı yükleyebilir.

L.O. 4 : Mikrodenetleyicide temel düzeydeki giriş çıkış komutlarını kullanarak buton ve led uygulamaları (Buton kullanımı, led kullanımı, 7 segment display kullanımı, matris display kullanımı, tuş takımı kullanımı) yapabilir.

L.O. 5 : Mikrodenetleyicide ileri düzey devre tasarımları (LCD ekran kullanımı, ADC kullanımı, Seri haberleşme kullanımı) yapabilir.