

# Microcontrollers and Robotic

## Week 1: Introduction



Fenerbahçe University



## Professor & TAs

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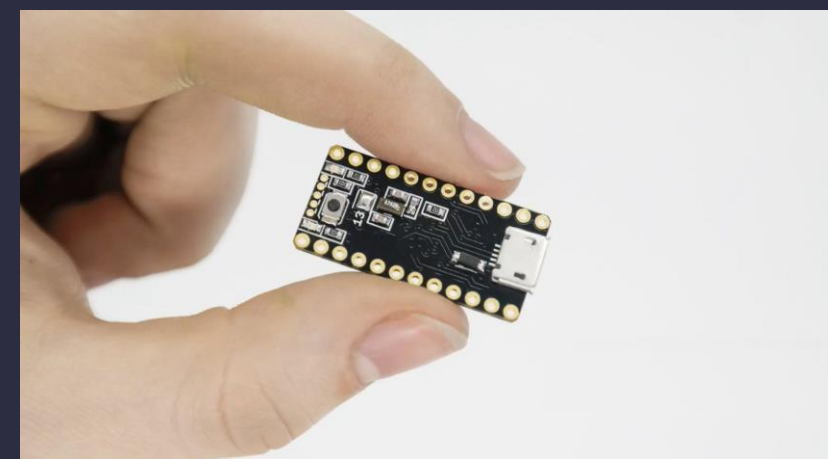
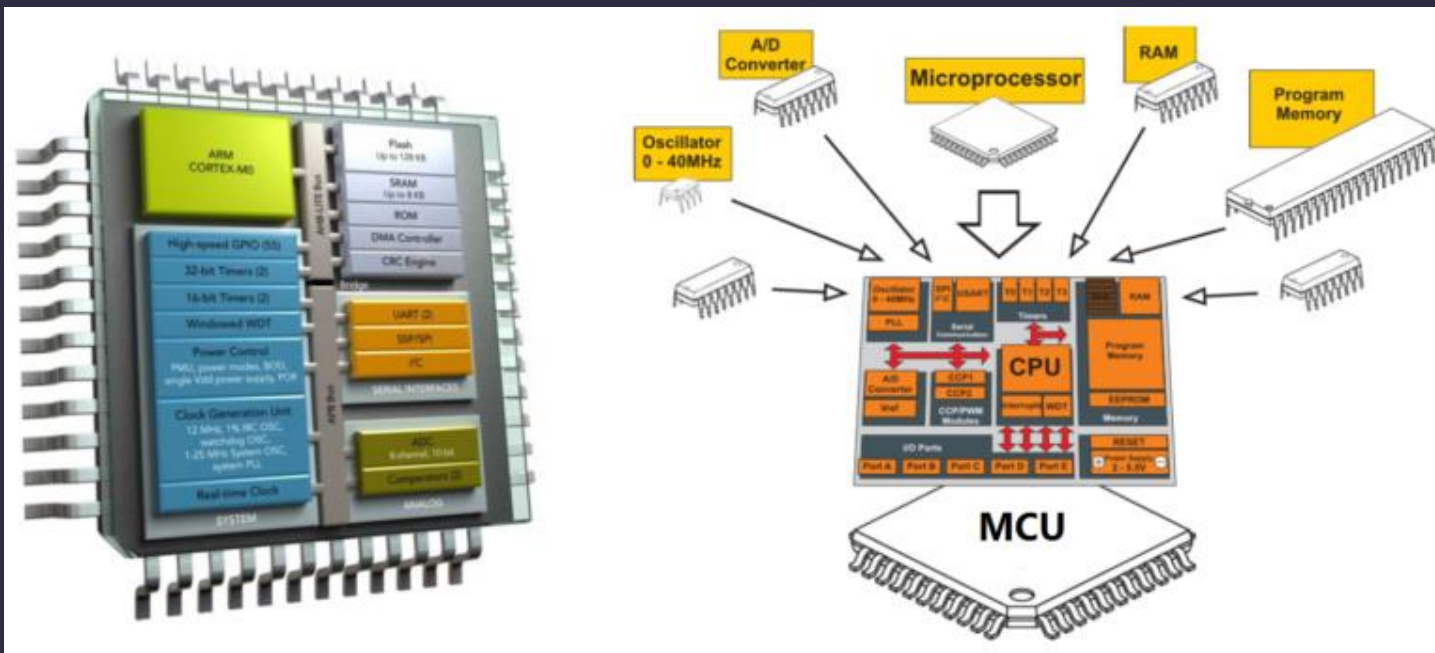
Email: [ugur.ozbalkan@fbu.edu.tr](mailto:ugur.ozbalkan@fbu.edu.tr)

# Course Plan

- Microcontrollers and Robotic
  - Introduction
  - MCU Architecture
  - Interfaces
  - Sensors
  - Motor Control
  - Robot Kit Assembly
  - Sumo Robot Algorithm
  - Simulator I
  - Simulator II
  - Control Algorithms I
  - Control Algorithms II
  - FPGA Based Control I
  - FPGA Based Control II

# Course Plan

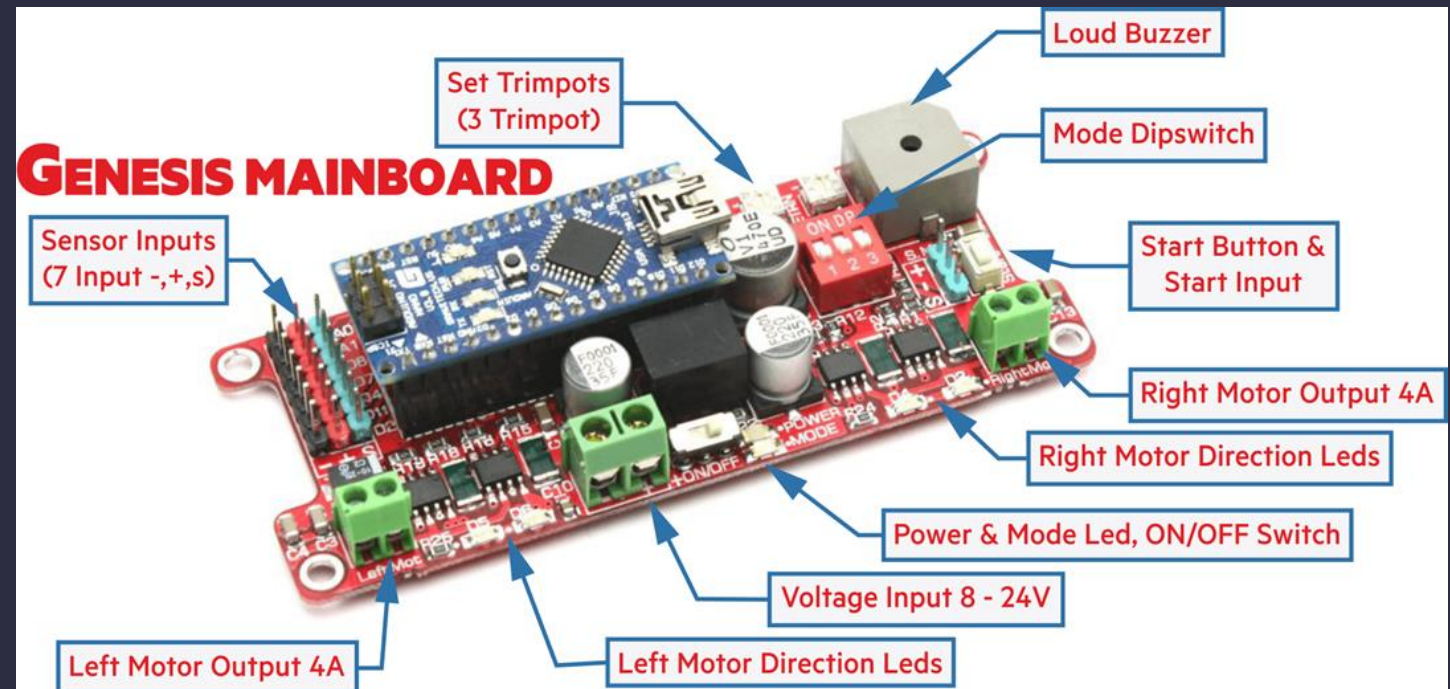
## MCU Architecture



# Course Plan

## Interfaces

- Digital RW
- Analog RW
- UART



# Course Plan

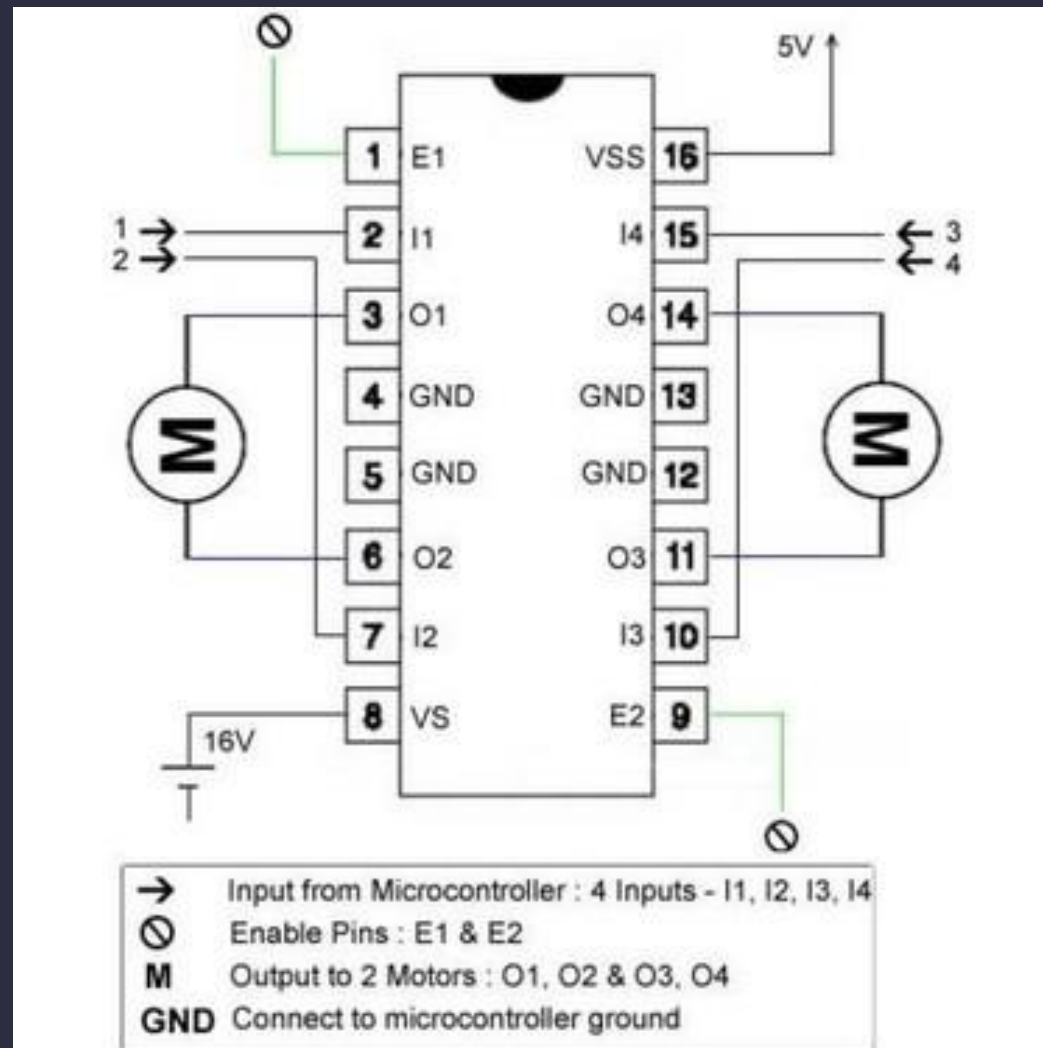
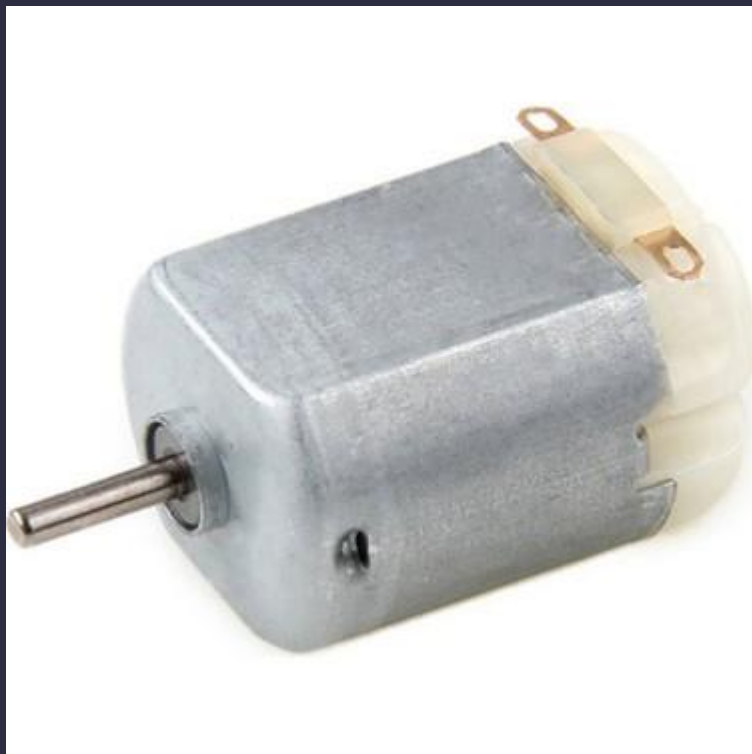
## Sensors

- Data capture from sensors



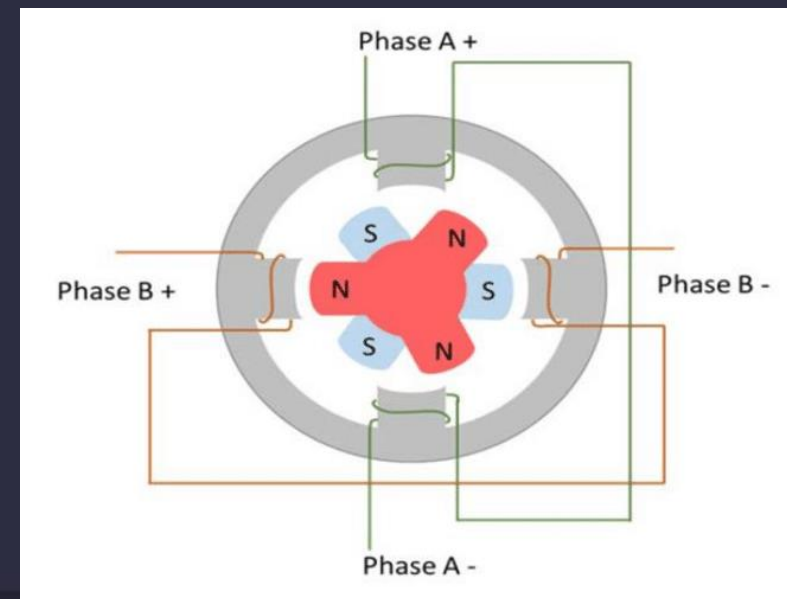
# Course Plan

## Motor Control



# Course Plan

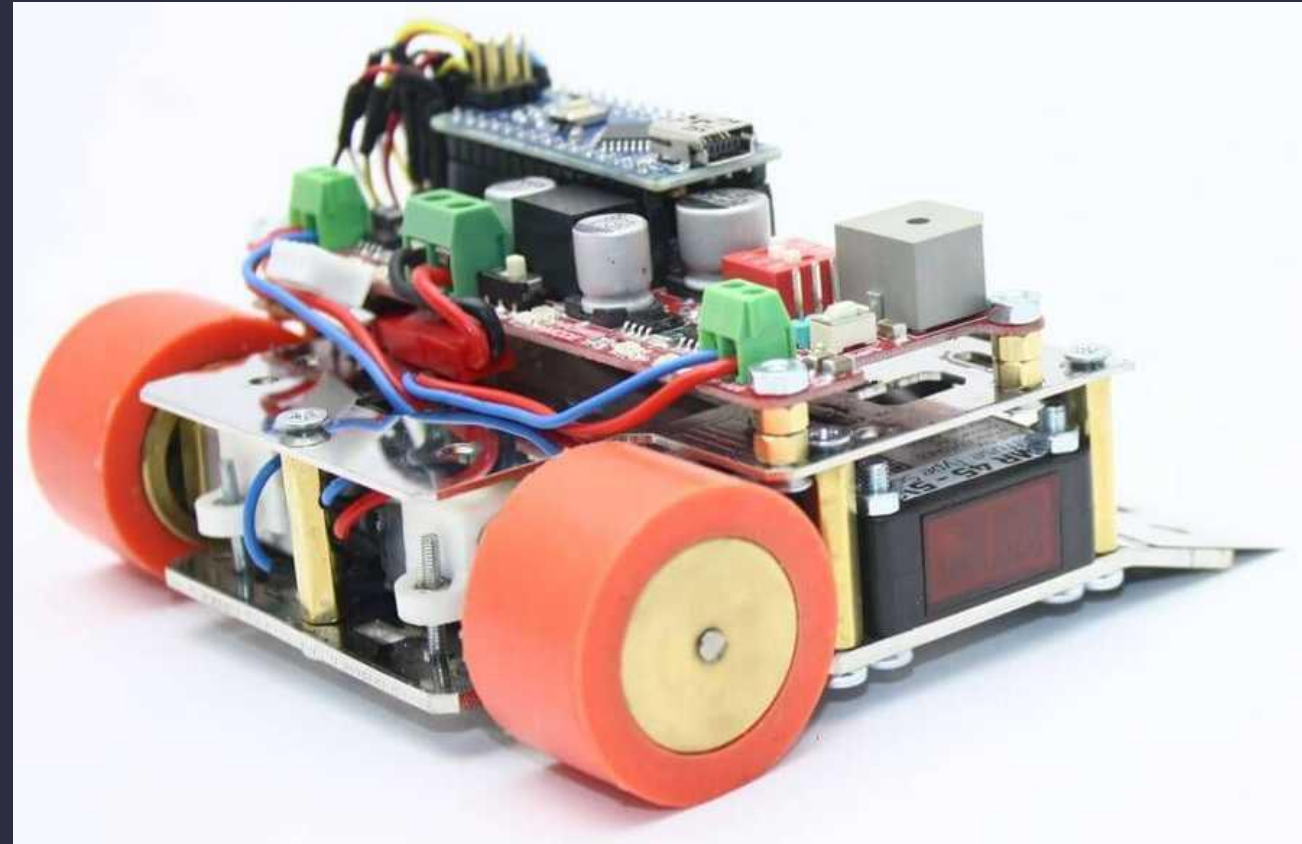
## Motor Control





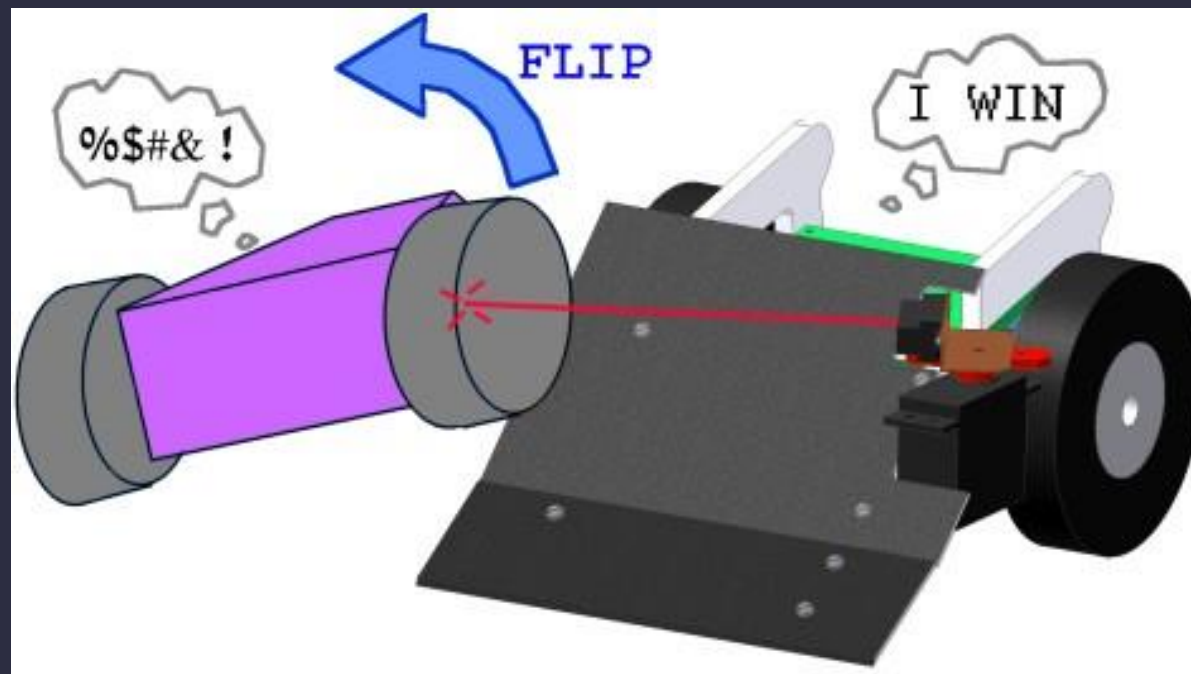
# Course Plan

## Robot Kit Assembly



# Course Plan

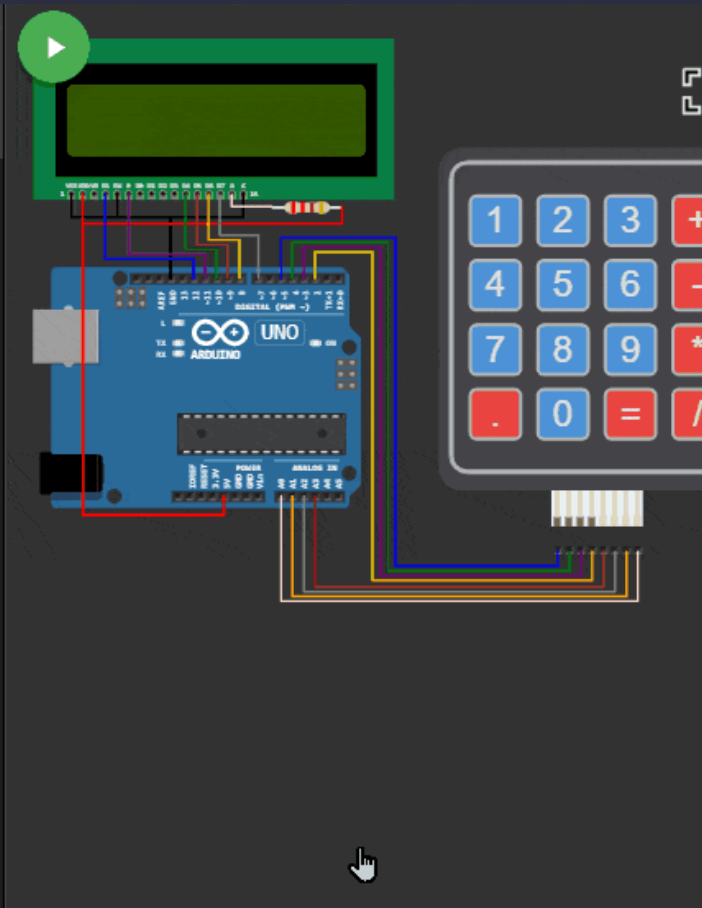
## Sumo Robot Algorithms



# Course Plan

## Simulator I-II

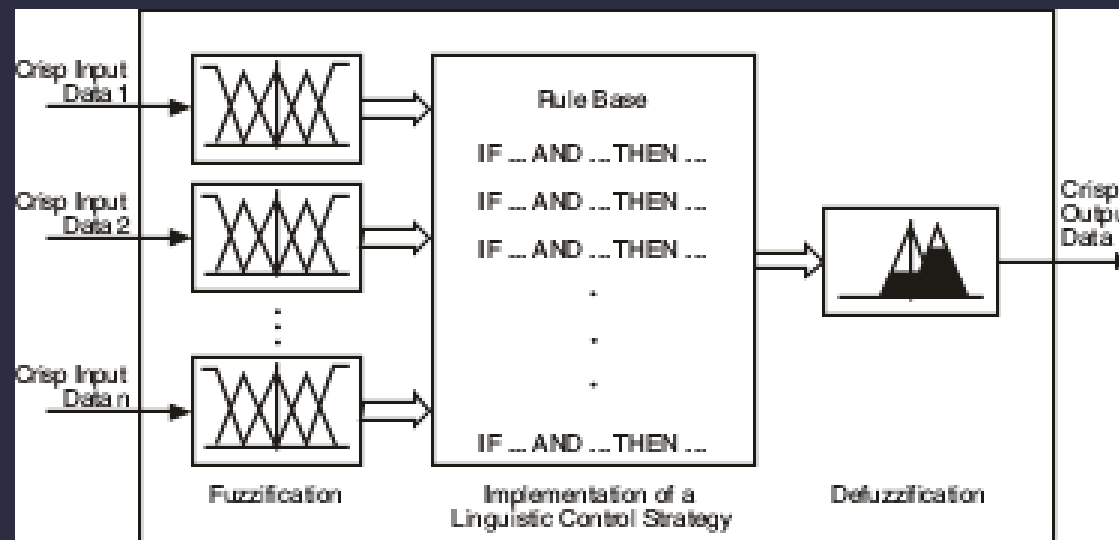
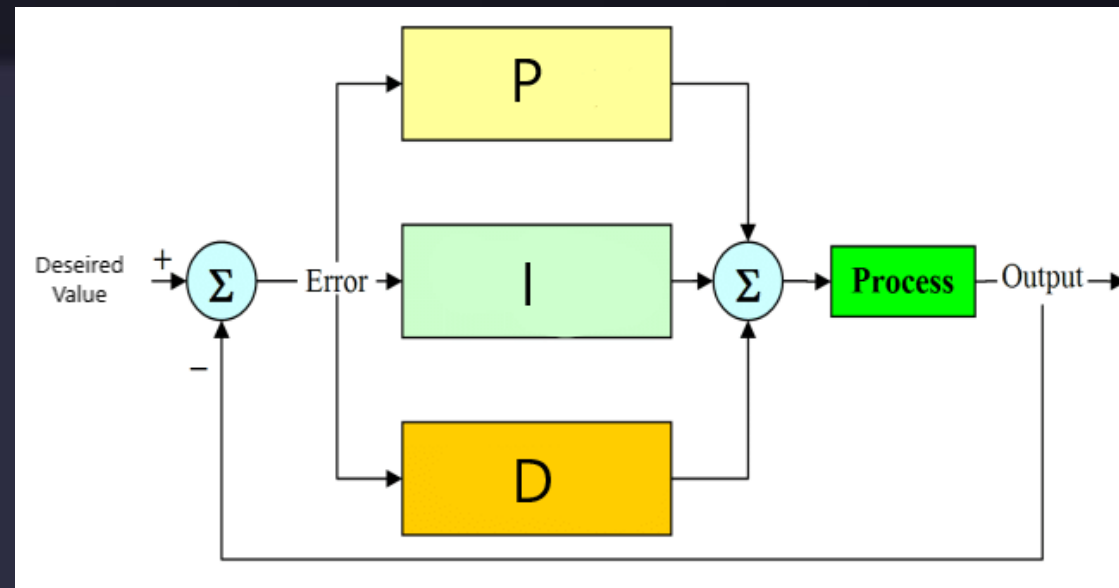
```
1  /**
2   * Arduino Calculator
3   *
4   * Copyright (C) 2020, Uri Shaked.
5   * Released under the MIT License.
6   */
7
8  #include <LiquidCrystal.h>
9  #include <Keypad.h>
10 #include <Servo.h>
11
12 /* Display */
13 LiquidCrystal lcd(12, 11, 10, 9, 8, 7);
14
15 /* Keypad setup */
16 const byte KEYPAD_ROWS = 4;
17 const byte KEYPAD_COLS = 4;
18 byte rowPins[KEYPAD_ROWS] = {5, 4, 3, 2};
19 byte colPins[KEYPAD_COLS] = {A3, A2, A1, A0};
20 char keys[KEYPAD_ROWS][KEYPAD_COLS] = {
21   {'1', '2', '3', '+'},
22   {'4', '5', '6', '-'},
23   {'7', '8', '9', '*'},
24   {'.', '0', '=', '/'}
25 };
26
27 Keypad keypad = Keypad(makeKeymap(keys), rowPins,
```



# Course Plan

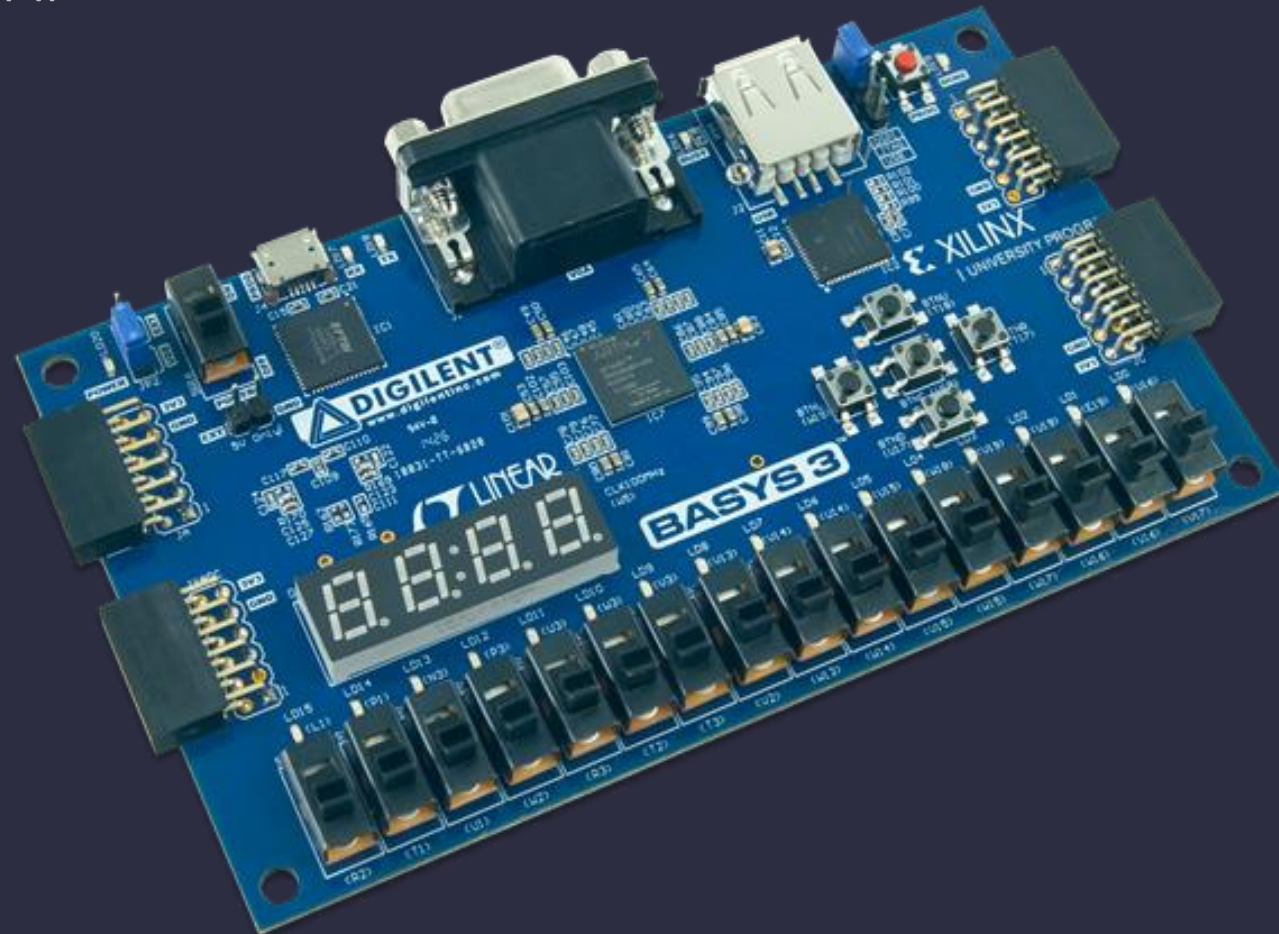
## Control Algorithms I - II

- On-Off
- PID
- Fuzzy



# Course Plan

## FPGA Based Control I-II





# Course Contents

Website: [levent.tc](http://levent.tc)

Courses> Microcontrollers and Robotic

# Course Contents

## Course Page Content;

- Syllabus
- Course Schedule
- Course Notes
- Homeworks
- Projects
- Exams
- LMS and Piazza
- Notes
- Feedback

# Course Contents

Syllabus;

Lesson hours;

Monday 9.00-13.00

Office Hours;

Dr. Vecdi Emre Levent - Monday 17.00-18.00

Assistant. Uğur Özbalkan - Tuesday 16.00-17.00, Friday 16.00-17.00



# Course Contents

Syllabus;

Between 2-3 homework will be given.

Class attendance is compulsory at a rate of 80%.

# Course Contents

Evaluation weights

Delivery time for assignments and quizzes  
for every passing hour

5 points will be deducted.

Activities	Percentages
Midterm	%20
Homework / Quiz	%10
Lab	%15
Projets	%30
Final	%25
Bonus	Up to 5 points

# Course Contents

Syllabus;

Grades

Point	Weight	Letter Grade
90-100	4.00	AA
85-89	3.50	BA
80-84	3.00	BB
75-79	2.50	CB
65-74	2.00	CC
50-64	1.50	DC
45-49	1.00	DD
0 -44	0	FF

# Course Contents

Syllabus;

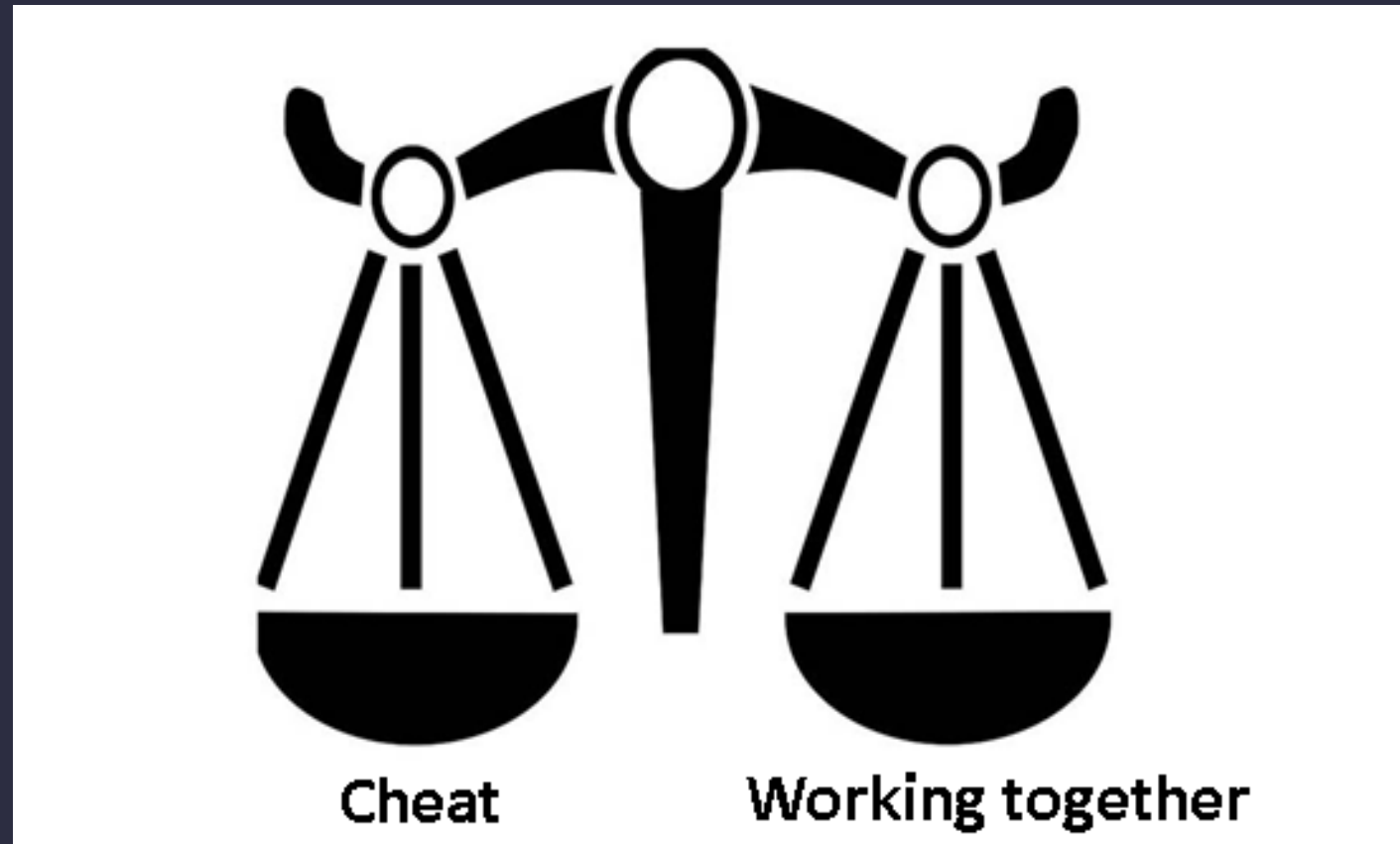
Expected effort

190 hours in total effort is expected.

Count	Hour	#Times	Total
Preparation	2	14	28
Repetition	2	14	28
Homeworks	4	6	24
Project	48	1	48
Course	4	14	56
Midterm and Finals	3	2	6

# Course Contents

Academic honesty



# Course Contents

## Course schedule

Hafta	Konu	Tarih
1	Giriş	
2	MCU Architecture	
3	Interfaces	
4	Sensors	
5	Motor Control	
6	Robot Kit Assembly	
7	Sumo Robot Algorithm	
8	<b>Vize</b>	Sınav Haftası
9	Simulator I	
10	Simulator II	
11	Control Algorithms I	
12	Control Algorithms II	
13	FPGA Based Control I	
14	FPGA Based Control II	
15	<b>Final ve Proje Sunumları</b>	Sınav Haftası



# Course Contents

Homeworks;

The assignments to be given and their solutions will be shared on the homework page.



# Course Contents

Projects;

Projects to be completed by each student will be announced at the end of the term.





# Course Contents

Exams;

Sample questions and solutions of exams will be shared for midterm and final exams.

# Course Contents

Piazza;

The Piazza system is a classroom question and answer platform. Whenever you have a topic about lecture, homework or exams, you can write on this platform. The questions you write are seen by teachers and students. You can also help each other measuredly through this platform.



# Course Contents

Grades;

On the Grades page, all the grades you have collected in the course are given.

You can see how many points you have collected from midterm, homework, quiz, lab, final and bonuses by browsing through the pages.