



## Introduction to Embedded Systems

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### Task 5: Using Peripherals of Raspberry Pi Pico with Arduino IDE

**Implement two given projects on real-life hardware, one for a sensor, other for an actuator**

**Individual variant:** two given projects chosen based on the number of student

#### Subtasks:

- 1) Implement Project I composing and running ES hardware-software complex.
- 2) Implement Project II composing and running ES hardware-software complex.

**Optional study:** how to debug projects on Raspberry Pi Pico

#### Directions:

- For each project provide the following info:
  - Verbal description
  - Component list
  - Electric circuit layout
  - Hardware connection
  - Arduino sketch
  - Screen images of compilation and uploading process
  - Scheme explaining ES work
  - Photo of connected hardware
  - Video of ES functioning with the author's interview

**Questions to muse:** How to interact with multiple sensors and actuators

#### References:

- Lecture 1 – Basic concepts of Embedded Systems
- Lecture 5 – Practical ES design with Raspberry Pi Pico in Arduino IDE
- Lecture 6 – Modern microcontrollers
- Lecture 7 – Peripheral devices of ES

**Supplemental materials:** Freenove Tutorial for RP Pico with Arduino IDE

#### Task variants:

**Project I.** Implement a given Tutorial Chapter project using a *sensor* according to the following table:

Stud. no.	1	2	3	4	5	6	7	8	9	10
Chapter no.	28	9	27	11	26	12	25	22	13	23

*Sensors* to study and use: Photoresistor, Thermistor, Ultrasonic Ranging, Attitude Sensor, Hygrothermograph, Potentiometer, RFID, Joystick, Matrix Keypad, Infrared Remote

**Project II.** Implement a given Tutorial Chapter project using an *actuator* according to the following table:

Stud. no.	1	2	3	4	5	6	7	8	9	10
Chapter no.	7	15	16	17	18	19	20	21	17	19

*Actuators* to study and use: Relay & Motor, Stepper Motor, Servo, Buzzer, 7-Segment Display, LED Matrix, Display Screen

