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**VILNIUS UNIVERSITY  
SIAULIAI ACADEMY**

PROGRAMŲ SISTEMOS BACHELOR STUDY PROGRAMME

Software engineering

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**Programming of Embedded Systems**

**Laboratory work No.1**

**I/O Ports**

Šiauliai, 2025

**Laboratory Work Report**

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# **The Aim of the Laboratory Work**

The aim of this laboratory work is to develop a MicroPython program for the NUCLEO\_F756ZG microcontroller to generate an analog output using DAC2 (on pin D13). The output voltage should be controlled by pressing a button (SW), which adjusts the voltage in predefined steps (either increasing or decreasing). The generated voltage is connected to an ADC pin (D24) and read by the program. The program then converts the ADC value to a corresponding sensor measurement, such as humidity, and displays the result in the terminal.

# **Variant No and Data**

**Variant No:** 9



**Date:** 18/02/2025

# **Program Algorithm**

A diagram of a flowchart

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# **Program Body with Comments**

1. # main.py -- put your code here!
2. from pyb import DAC
3. from machine import Pin
4. from machine import ADC
5. import time
6. # create DAC 2 on pin D13
7. dac = DAC(2)
8. pin\_SW = Pin("SW", Pin.IN, Pin.PULL\_DOWN)
9. # write a value to the DAC (makes D24 1.65V)
10. D24 = Pin("D24", Pin.ANALOG)
11. adc = ADC(D24)
12. #D24 is connected to A0 via wire
13. a=0
14. while True:
15. if pin\_SW.value() !=0:
16. if (a >= 255):
17. a = 0
18. else:
19. a += 15
20. if (a > 255):
21. a=0

24. dac.write(int (a))
25. val = adc.read\_u16()


29. #print value in 16 bit ADC range
30. # print (val)
31. print (a)
33. #print value in Volts
34. print ("Humidity = ",val\*(100/65536),"%")
35. time.sleep\_ms(1000);
36. **Screenshot of execution**

A screenshot of a computer

AI-generated content may be incorrect.

# **Conclusions**

In this laboratory work, a MicroPython program was created to control the output voltage on pin D13 using the DAC2 feature of the NUCLEO\_F756ZG microcontroller. The voltage was adjusted by pressing a button (SW), which either increased or decreased the voltage by a specified step. The voltage output was connected to the ADC input (D24), and the program successfully read and converted the ADC value into a humidity percentage, which was then displayed in the terminal. The program worked as intended, providing an effective way to control and monitor the voltage output and sensor readings. This task provided practical experience with using DAC and ADC peripherals in MicroPython.