AI & SUSTAINABILITY
IN VET EDUCATION

AI-VET Mooc Project

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1. Project Title:

"Traffic light for regulating traffic at an intersection with a countdown displayed on a 7-segment display"

2. Project Category:

- ☐ AI for Sustainable Development
- ☐ Connected Systems and Smart Data (AI + IoT)
- ☐ AI for Industry 4.0
- ☐ Social Impact and Inclusive AI
- ☐ Computer Vision and Image Recognition
- ☐ Predictive Analytics and Decision Support
- ☐ Intelligent Automation and Control Systems
- ☐ Smart Environments and Monitoring
- ☐ **Other:_____ ”Automatic system”_____**

3. Project Description:

This project simulates the operation of a traffic light that is actually used to regulate traffic in everyday life. Three diodes are used that alternately light red-yellow-green-yellow-red, which are controlled by a program and turn on and off. There is also a connected 7-segment display with a common cathode that counts down the remaining time of the red and green diodes. The red and green diodes light up for 10 seconds each, and the yellow one for two seconds.

4. Keywords:

traffic light, intersection, traffic, regulation, 7-segment display

5. Target Audience:

- ☐ Students

6. Project Objectives:

The goal of this project is to gain basic knowledge of working with Raspberry Pi, programming in Python and inserting libraries. This exercise teaches:

1. To install an operating system for Raspberry Pi
2. Hardware connection of elements

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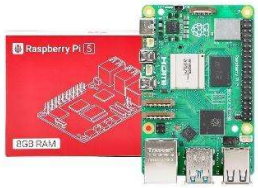
3. Understanding the basic integration of hardware (diodes) and software (Python, libraries). 4. Connecting a 7-segment display and programming it 5. To demonstrate hardware-software interaction using Python through controlling LEDs and a 7-segment display

7. Project Timeline:

- Start Date: 14.3.2026
- End Date: 15.3.2026

8. Tools and Technologies Used:

1. Components of the AI-VET kit:

	Компонента	picture	Функција
1.	Raspberry Pi 5 – 4GB		Used as the central control unit (“brain”) of the system. After receiving results from the camera, it processes them and sends them to the display for visualization.
2.	Raspberry Pi metal case with fan		Provides protection and cooling for the device. The metal case protects the Raspberry Pi from dust, mechanical damage, and accidental contact, while the fan helps reduce the temperature during operation.
3.	LED lights – red, green, yellow		Used to build traffic lights for vehicles and pedestrians.
4.	7-segment display (common cathode)		Displays the remaining time for the red and green lights.

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5.	Resistors – 330 Ω		Their role is to protect the LEDs from burning out.
6.	Breadboard and jumper wires		Jumper wires are used to connect components on the breadboard and to the microcontroller (Raspberry Pi).
7.	Micro HDMI to HDMI cable (1 m)		Used to connect the system to a display, transmitting video and audio signals.
8.	27W USB Type-C power supply for Raspberry Pi 5		Power supply cable.
9.	Micro SDHC card – 64GB		Used for storing the operatir

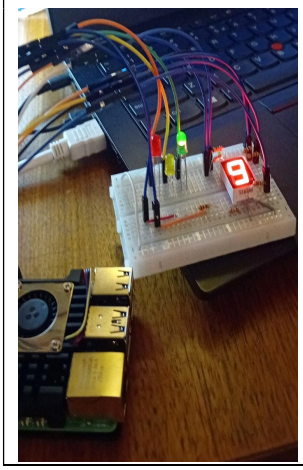
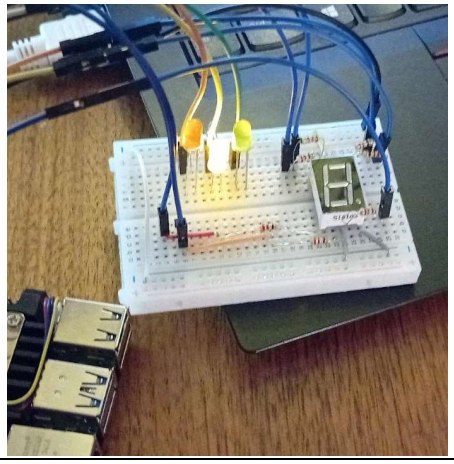
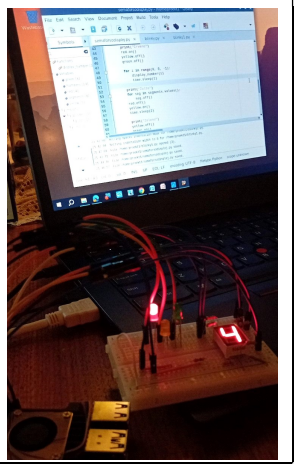
2. AI-VET Assembly Manual with step-by-step instructions
3. Python code and libraries
4. Datasheet for the 7-segment display

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9. Step-by-Step Implementation Plan:

1. **Project plan / idea:** Working on a traffic light that will work as follows: red and green will light up for 10 seconds, and yellow for 2 seconds.
2. **Preparation of hardware components:** Gather all the necessary materials - Raspberry Pi 5, diodes, 7-segment display, wires, breadboard, power cables, and then connect them.
3. **Assembly of Raspberry Pi 5 and case with cooling fan:** Assemble the Raspberry Pi 5 in a case with a temperature-controlled cooling fan.
4. **Installing the Raspbian OS:** Install Raspbian OS on the SD card and configuring network access via VNC or SSH and updating system packages.
5. **Integrating the hardware components:** Mounting the diodes, resistors, and 7-segment display on the breadboard and connecting them with wires to the Raspberry Pi 5
6. **Programming with Python and using libraries**
7. **This is the beginning of a modern intersection regulation project.**
8. **Testing the project functionality**

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10- Code

```
from gpiozero import LED
import time

red = LED(17)
yellow = LED(22)
green = LED(10)

segments = {
    'a': LED(15),
    'b': LED(14),
    'c': LED(3),
    'd': LED(25),
    'e': LED(24),
    'f': LED(18),
    'g': LED(23)
}

numbers = {
    0:['a','b','c','d','e','f'],
    1:['b','c'],
    2:['a','b','g','e','d'],
    3:['a','b','g','c','d'],
    4:['f','g','b','c'],
    5:['a','f','g','c','d'],
    6:['a','f','g','c','d','e'],
    7:['a','b','c'],
    8:['a','b','c','d','e','f','g'],
    9:['a','b','c','d','f','g']
}

def display_number(num):
    for seg in segments.values():
        seg.off()

    for seg in numbers[num]:
        segments[seg].on()


```

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```
try:
    while True:

        print("Red")
        red.on()
        yellow.off()
        green.off()

        for i in range(9, 0, -1):
            display_number(i)
            time.sleep(1)

        print("Yellow")
        for seg in segments.values():
            seg.off()
        red.off()
        yellow.on()
        time.sleep(2)

        print("Green")
        yellow.off()
        green.on()

        for i in range(9, 0, -1):
            display_number(i)
            time.sleep(1)

        print("Yellow")
        for seg in segments.values():
            seg.off()
        green.off()
        yellow.on()
        time.sleep(2)

except KeyboardInterrupt:
    print("Stop")

    red.off()
    yellow.off()
    green.off()

    for seg in segments.values():
        seg.off()

```

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11. Evaluation Criteria:

- **Student Feedback:** Feedback will be collected through questionnaires to evaluate how well students understood traffic light control, timing logic, and the use of a 7-segment display. It will also measure how interesting and useful they found the project.
- **Project Success Metrics:** Success will be measured by the correct and stable operation of the traffic light system, including proper switching of lights and an accurate countdown on the 7-segment display. The system should run continuously without errors.
- **Skills Assessment:** Students will be assessed on their programming skills (Python/C++), ability to connect electronic components, and understanding of timing logic, GPIO control, and basic embedded system design.

12-Credits

Ana Nikoloska, III-4 – Worked independently on the project, including the idea development, research, assembly, installation, hardware design, connections, and software programming.

Professor Gordana Naumovska – Provided guidance and support throughout the development of the project.

13- Video presentation link (max. 5 minutes)

https://drive.google.com/file/d/18JeZOMaYEgnwa8rIpEDmwUyxAP7v80EP/view?usp=drive_link

14- Declarations

I declare that I have read and agree with the following statements:

1- The project is original and developed by the listed team members.

2- All technologies and sources are properly cited.

3- The project was developed using components from the AI-VET kit.

4- We authorize the dissemination of the project for educational and promotional purposes (non-exclusive rights).

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