Prelab Section:

Before proceeding with the experiments, we first worked with a PLC in the laboratory to control buttons and LEDs. The goal was to familiarize ourselves with the basics of PLC programming and the interaction between digital inputs (buttons) and outputs (LEDs). In this preliminary setup, we programmed the PLC to monitor the state of the buttons and control the LEDs accordingly, such as turning the LED on when the button was pressed and off when the button was released. This hands-on exercise helped us understand the fundamentals of control systems, including how to map inputs and outputs. It provided a solid foundation for more complex tasks, such as implementing the Set/Reset (RS) control circuit, and gave us practical experience with PLC programming, preparing us for the advanced digital control systems we would explore in the following experiments

Photo from laboratory

Procedure Section:

***Task** 1*

What was implemented ?

In this experiment, a simple on-off control circuit was designed to control a lamp using a button. This setup provides a clear demonstration of digital switching functionality using an input (button) and output (lamp). The purpose of this implementation is to illustrate the basic concept of on-off control, where pressing a button switches the lamp on, and releasing the button switches it off. This experiment exemplifies how digital input and output elements can work together to achieve basic control functions, which are essential in understanding fundamental control system principles.

How was it implemented?

In SoMachine, an input (I1 - Button) and an output (Q1 - Lamp) were set up. When the button is pressed, the program sends a signal to activate the lamp; when the button is released, the lamp turns off. This setup demonstrates basic on-off control, with each button press switching the lamp on, and each release switching it off. This simple input-output interaction is foundational for understanding digital control circuits.

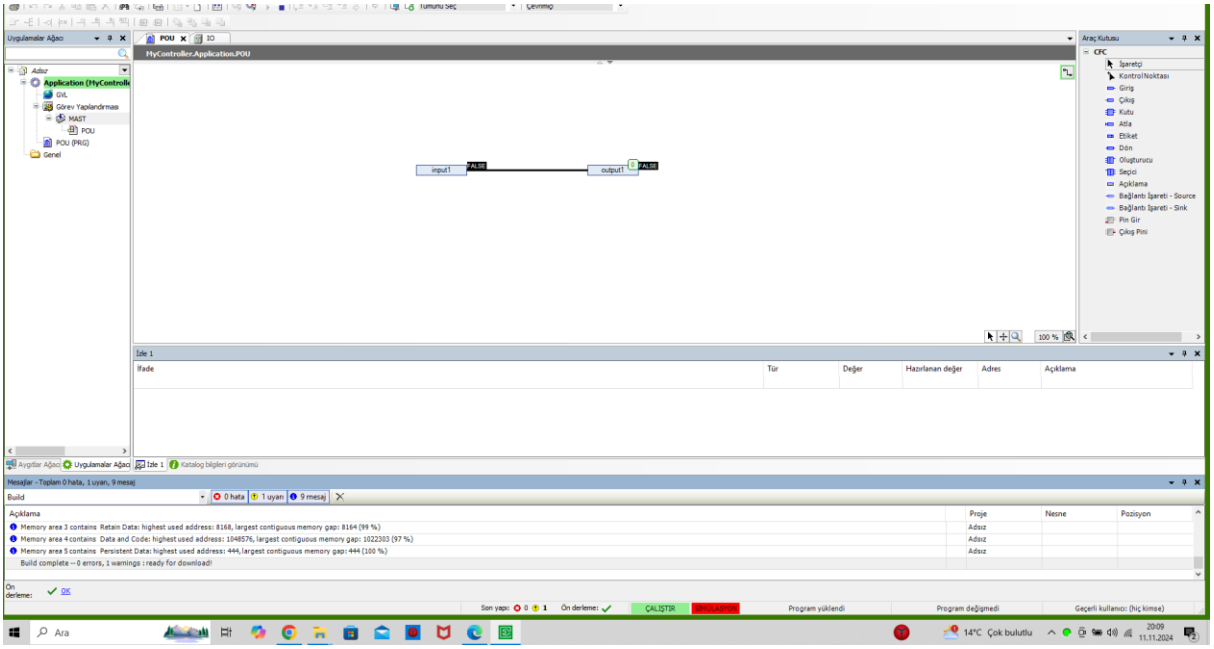

Photo from So machine applicatiıon on – off task

In this on-off control circuit, Input1 (button) and Output1 (lamp) are defined as the primary components. The setup allows the lamp to turn on when the button is pressed and turn off when it is released. The program continuously monitors the state of Input1. When the button (Input1) is pressed, it sends a signal to the program, which then activates Output1, turning the lamp on. When the button is released, the signal from Input1 stops, and the program cuts off the signal to Output1, causing the lamp to turn off. This cycle repeats with each press and release of the button. The interaction between input and output here demonstrates a basic digital control function, effectively showcasing the principle of on-off control.

Task 2

What was implemented ?

In task 2, a Set/Reset (RS) box was used to implement a set-reset control circuit for a lamp. This circuit ensures that once the set signal is applied, the lamp remains on even if the button is released. The lamp can only be turned off when the reset signal is applied. This experiment

demonstrates how memory elements work in digital control systems, allowing devices to maintain a certain state in memory. These types of circuits are commonly used in automation and control systems to maintain the long-term state of a device. The Set/Reset mechanism enables the system to hold onto a specific state (on or off) until a reset is triggered.

How was it implemented ?

In the SoMachine program, the Set/Reset box (RS box) was used, and the input elements Input1 (Set) and Reset were defined. Output1 was connected to the lamp. When the Input1 (Set) button is pressed, the RS box sends a signal to Output1, turning the lamp on. In this state, even if the button is released, the lamp stays on because the RS box "remembers" the on state. When the Reset button is pressed, the RS box sends a signal to the output (Output1) to turn off the lamp.

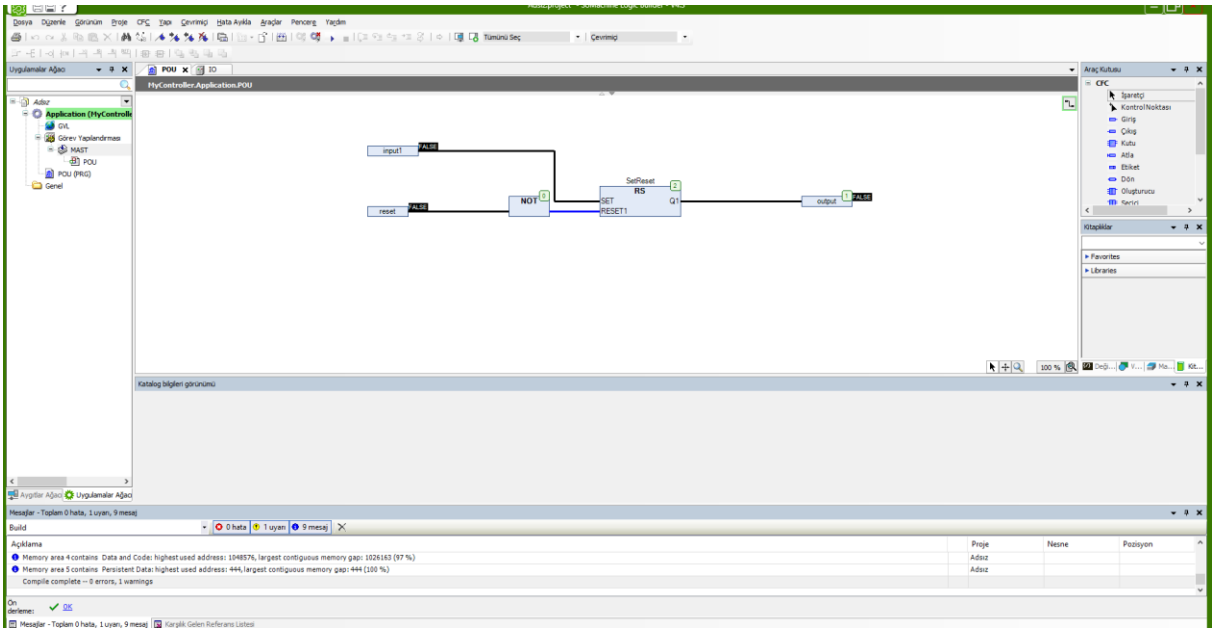

Photo from So machine applicatiıon Set-Reset task

This setup ensures that the lamp stays on until the reset signal is provided, demonstrating the functionality of memory elements in digital circuits. The behavior of the Set/Reset mechanism, where the lamp remains on until a reset is triggered, is a crucial example of how memory elements work and how the system can retain its state in an automated control system. This circuit is an important part of understanding how devices can hold onto a state and how this functionality is utilized in industrial automation and control systems.