Prelab Section:

For the preparation of these experiments, we practiced by connecting a PLC in the lab environment. First, the XT218A1PCM12 digital sensor was integrated into the PLC system, and its functionality was checked. The sensor's output was monitored through digital inputs/outputs to ensure correct operation.
Next, the XUB5BPANL2 digital sensor was added to the system, and both sensors' responses were verified. Sensitivity adjustments were made to ensure proper detection under varying environmental conditions.
This preparation process helped us gain the necessary skills to integrate and work with both sensors in the PLC system.

Photo from laboratory

Procedure Section:

What was implemented ?

In this experiment, a control system was developed using the SoMachine software with the TM238LFDC24DT controller to manage sensor-based activation. The system was designed to count the activations of a proximity sensor and perform specific actions based on the count. After five activations, an output (run lamp) was triggered to indicate the condition was met. The sensitivity of the sensor could be adjusted using a trimpot, allowing precise calibration for optimal performance.

A reset functionality was implemented through a stop button, enabling users to manually reset the counter. However, during initial testing, it was observed that the counter faced issues due to a sensor lag. Specifically, the counter reset immediately upon reaching the threshold of 5, instead of waiting for the 6th activation. To address this issue, a timer was integrated into the circuit, introducing a 1-second buffer to eliminate the lag. This ensured that the counter only reset after the 6th activation. The final system provided reliable counting and reset functionality, resolving the lag issue effectively.

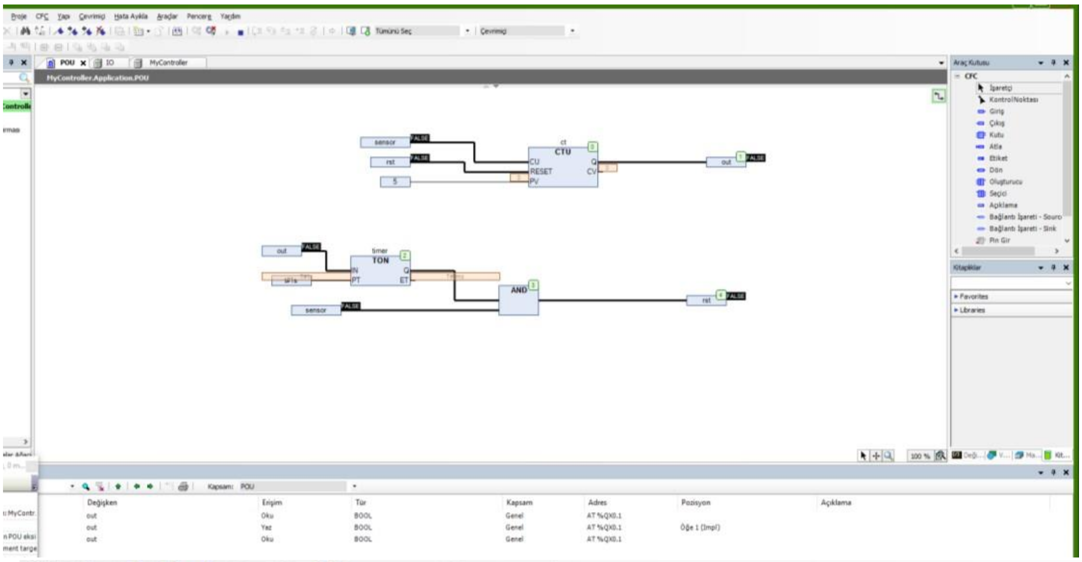
How was it implemented ?

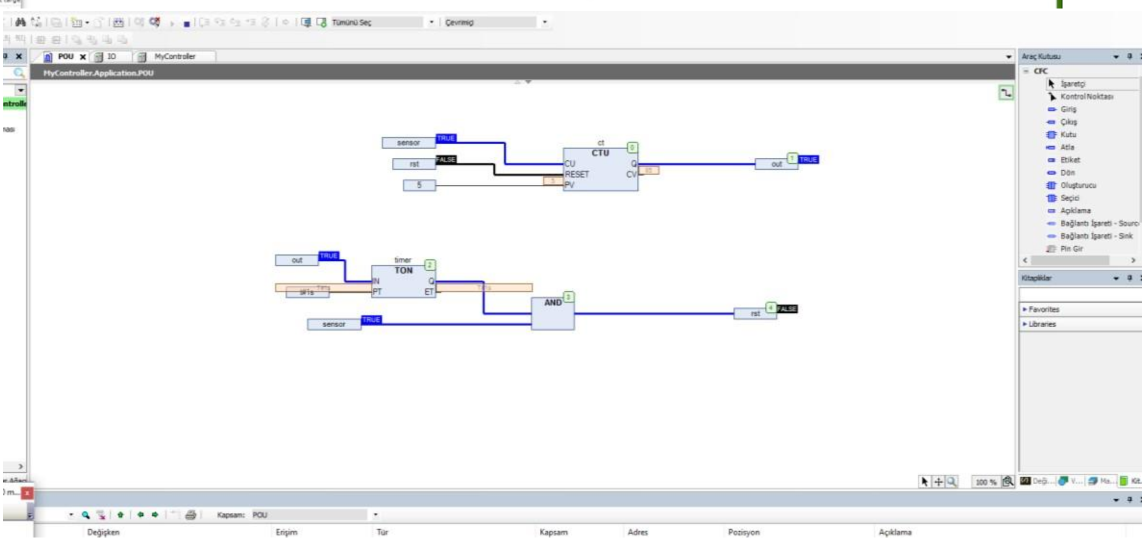
- A new project was created in SoMachine software with the TM238LFDC24DT controller selected.
- A new Program Organization Unit (POU) was added to the project, and "Continuous Function Chart (CFC)" was chosen as the programming environment. This allowed for clear and logical circuit representation.
- Two input variables (sensor for sensor input and rst for the stop button) and one output variable (out) were defined.
- The physical connections for XT218A1PCM12 were established. The sensitivity of the proximity sensor was calibrated using the trimpot to ensure proper activation when a hand was placed near the sensor.
- The initial logic was implemented to count the activations of the sensor. Upon the fifth activation, the run lamp output was triggered. The stop button was connected to reset the counter manually when needed.
- During testing, a sensor lag issue was identified. The counter would reset immediately after reaching the threshold of 5 activations, instead of waiting for the 6th attempt.
- To resolve this, a timer was added to the circuit. The timer introduced a 1-second delay, acting as a buffer to prevent premature resetting of the counter.
- The updated circuit was tested, and the timer successfully ensured that the counter reset only after the 6th sensor activation. The system now worked as intended, providing both accurate counting and lag prevention.

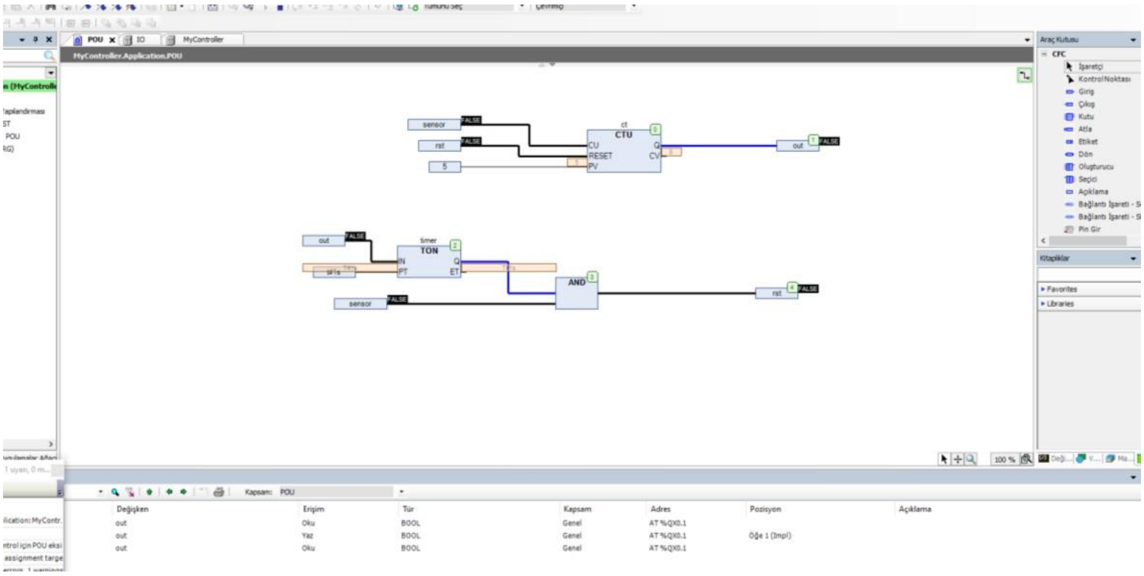
In this section two , a circuit was designed and implemented using the XUB5BPANL2 sensor to evaluate its functionality and the ability to adjust its sensitivity. The sensor was integrated into the system, and the built-in trimpot was used to fine-tune its sensitivity. This adjustment allowed the sensor to detect objects or movements within a specific range, making it adaptable to various operational and environmental conditions.
The testing process involved manually bringing an object or hand close to the sensor to activate it, ensuring the adjusted sensitivity settings were functioning correctly. By carefully turning the trimpot, the detection range was calibrated to achieve precise and reliable performance without requiring additional visual feedback mechanisms like LEDs. These adjustments ensured the

sensor responded consistently and effectively in different scenarios, highlighting its adaptability and precision

Photos From Simulations:



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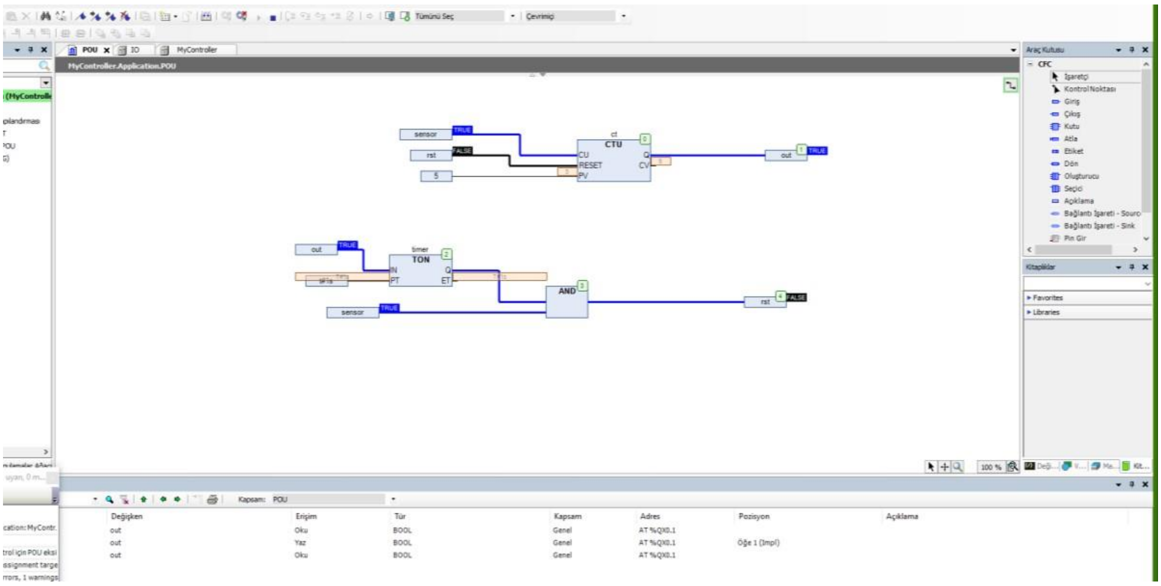
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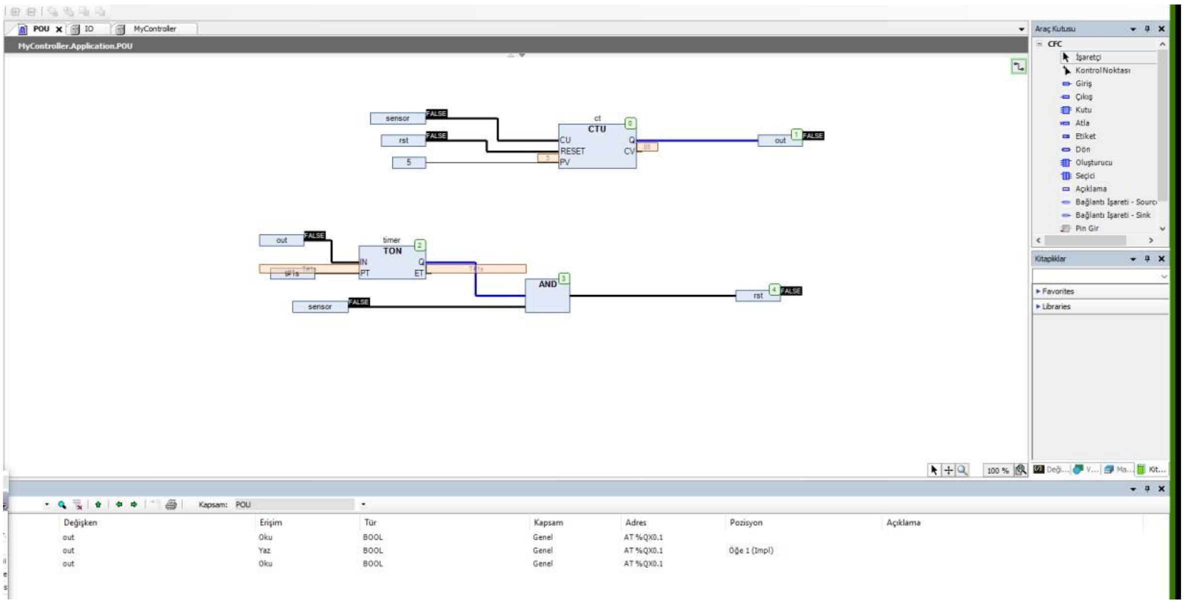

Result:

In this experiment, a circuit was designed and implemented using both the XUB5BPANL2 sensor and the XT218A1PCM12 digital sensor. The primary objective was to test the functionality, sensitivity adjustments, and overall integration of both sensors within the system. The XUB5BPANL2 sensor's sensitivity was successfully calibrated using the trimpot. By adjusting the trimpot, the sensor's detection range was fine-tuned, allowing it to detect objects or movements within the desired range. Manual tests, such as bringing objects or hands close to the sensor, confirmed that the system responded accurately, ensuring reliable detection under different conditions.

The XT218A1PCM12 digital sensor was also integrated into the system, and its functionality was verified. The digital sensor provided accurate on/off status feedback, allowing the system to react accordingly. Both sensors worked in harmony, with the digital sensor providing a clear and reliable output when triggered.

The experiment demonstrated that the proper calibration of the XUB5BPANL2 sensor's sensitivity and the correct integration of the XT218A1PCM12 digital sensor were essential for ensuring accurate and consistent system performance. Fine-tuning the sensors allowed the system to function smoothly, with each sensor responding appropriately to its respective triggers. The circuit and sensors were successfully integrated, meeting the desired performance standards for both detection and response.