I2-C2 Robot Circuit And Control

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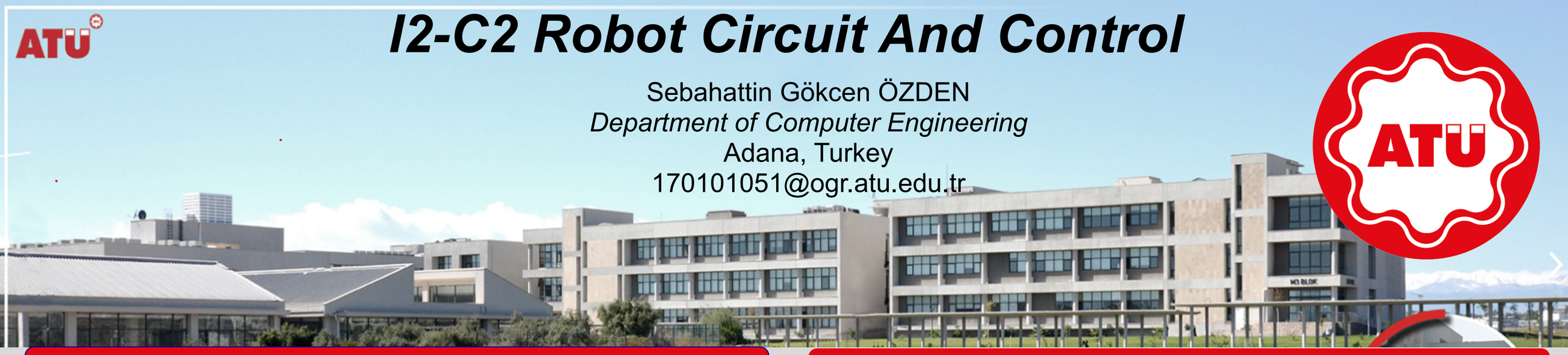

Introduction

In this project, we managed to control the I2-C2 Robot, as we named it, using a relay mechanism that allows controlling the direction of the current in lithium-ion batteries.
By using the ICBYTES library, we ensured the hardware's control and interaction with the environment. Additionally, obtaining essential parts for the robot, such as battery holders, through recycling made our project even more valuable.
The design of the rear wheels with a 20-degree angle for direction determination also eliminated the need for a steering mechanism, reducing costs.

Reley Circuit Design

In a standard circuit, electrical current flows in a single direction, causing the motor to operate in only one direction. Fundamentally, reversing the motor's rotation requires altering the polarity of the power source. However, by integrating relay components at both terminals of the motor, it becomes possible to achieve this without changing the battery's orientation.

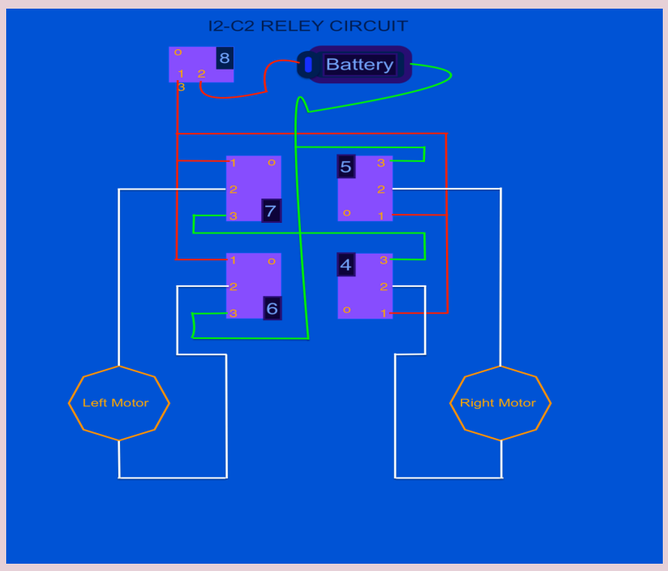

Figure 2. Reley Design

When a relay is in the normally closed position, terminals **2** and **3** are connected. When an electrical current is applied to activate the relay, terminals **2** and **1** become connected. This configuration not only allows the relays to function as simple switches but also enables control over the direction of the current flow.
The relay at terminal 8 is responsible for regulating the system's power input. When relays 7 and 5 are activated, the motors move forward, whereas activating relays 6 and 4 causes the motors to move in the reverse direction.

Reley Moving Table

Reley Numbers ->	8	7	6	5	4	Result
	0	0	0	0	0	Stop
	1	1	0	0	0	Left Forward
	1	0	1	0	0	Left Back
	1	0	0	1	0	Right Forward
	1	0	0	0	1	Right Back
	1	1	0	1	0	Full Forward
	1	0	1	0	1	Full Back
	1	1	0	0	1	Turn Right
	1	0	1	1	0	Turn Left

Figure 3. Reley Moving Table

Of course we are not use only one side move cause this is not effective.
When observed carefully, the motors are connected to each other on the right and left sides and operate in synchronization. This indicates that the system has a different structure compared to conventional front-wheel-drive or rear-wheel-drive principles. This configuration plays a key role in direction determination within our system.

Robot Control Panel

After connecting the relays to our computer via a USB cable,
we can test them using the control panel created with the **ICBYTES library.
The arrangement of the direction keys, as specified in the table, along with the ability to manage the relay activation time, allows for precise movement control.

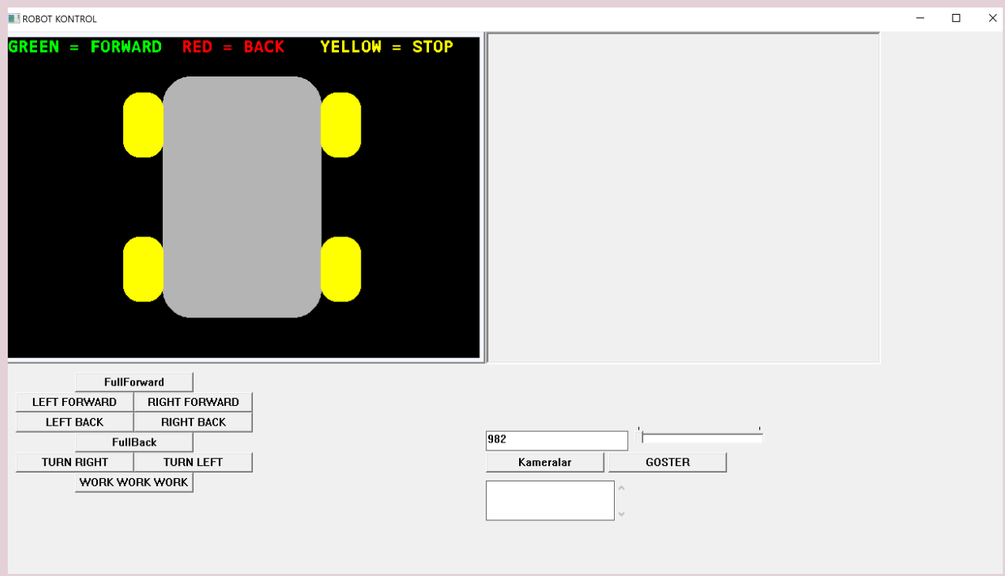

Figure 4: I2-C2 Control Panel

On the right side of the panel, a frame has been added to display the image from the connected camera. When a successful connection is established, an informational message is displayed in the Multi Line Edit area.

Conclusion

In this project, we successfully developed a system that allows precise control over motor direction and movement using relays, without
altering the battery's orientation. By integrating the ICBYTES library, we were able to efficiently manage the hardware and its interaction with the environment. The innovative design of synchronized motors, as well as the ability to
control their movement through a custom control panel, has demonstrated the versatility of the system. Additionally, the inclusion of a camera display
on the panel and real-time feedback through the Multi Line Edit area has enhanced the user experience and ensured smooth operation.
Designing and drawing the relay circuit for this project was like solving a puzzle, and it became one of the most educational aspects of the process. The potential challenges of teamwork also emerged throughout the project, but they were crucial in driving collaboration and problem-solving. Overall, the system represents a significant advancement in motor control and can be applied to various robotic and automation projects.

References

Prof.Dr.Lütfü Sarıbulut (röleler)
ICBYTES Kütüphanesi - Dr. İbrahim Cem Baykal