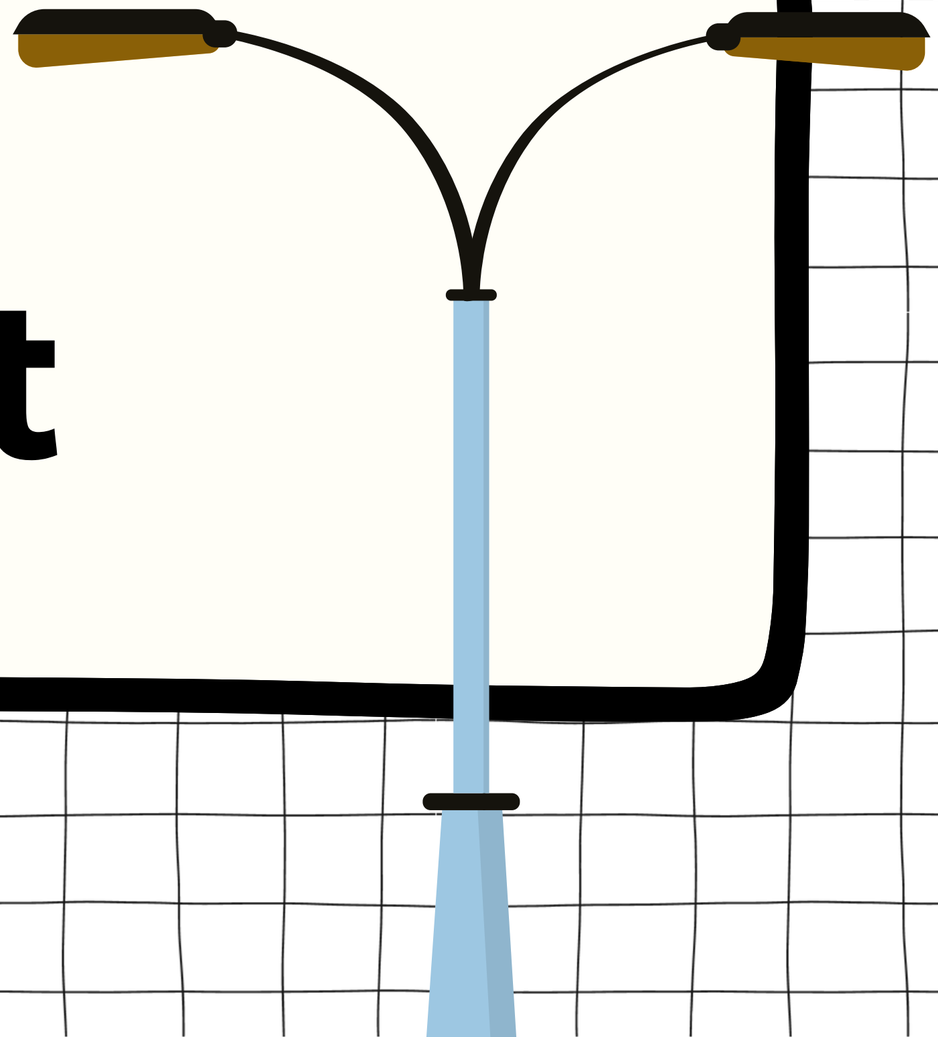
Smart Street Light

MCTA 3103 Mechatronics Control Lab



objectives

01 automatically adjusts brightness based on ambient light conditions.

02 implements a closed-loop control system for optimal performance and efficiency.

How It Works

1. Sensing Ambient Light

*A *Light Dependent Resistor (LDR)* detects the sunlight levels. Based on this data, the system adjusts the brightness of the LED lights.*

2. Closed-Loop Feedback

A second LDR monitors the actual brightness of the LED. This feedback is sent back to the controller to ensure the LED's brightness matches the desired level.

3. Real-Time Adjustments

The system continuously monitors and adjusts the LED brightness, ensuring efficient energy use while maintaining optimal illumination.

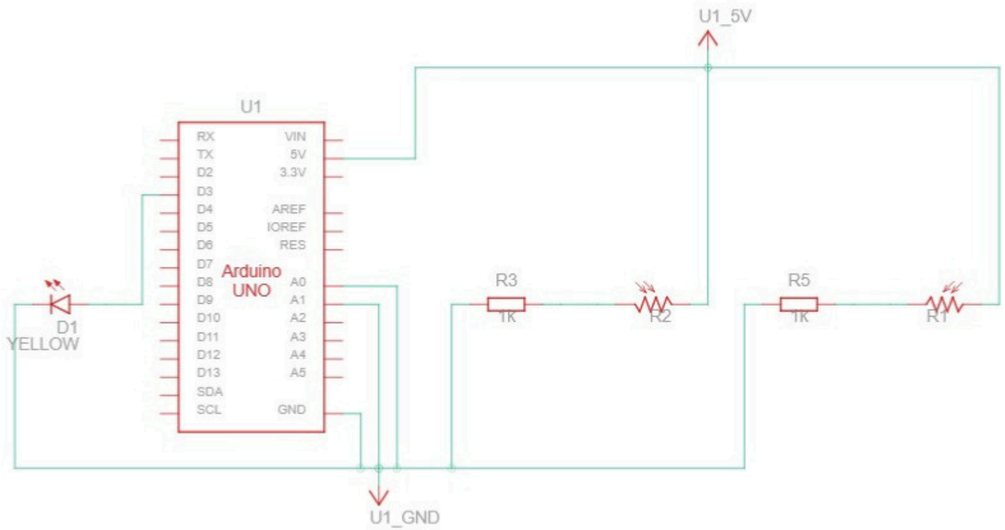
Technical Details

1. We used MATLAB and Simulink to design and implement a PID controller for our system.

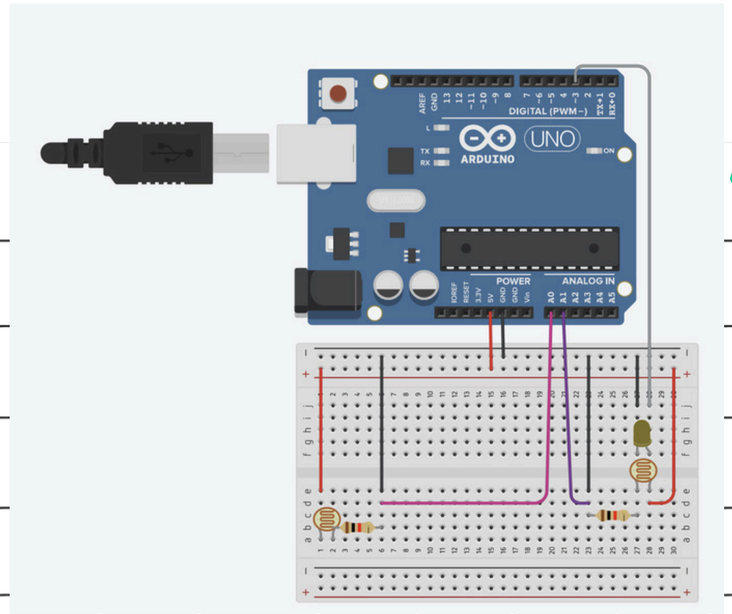
   - The PID controller processes the input from the first LDR and adjusts the LED brightness to match the desired illumination level.

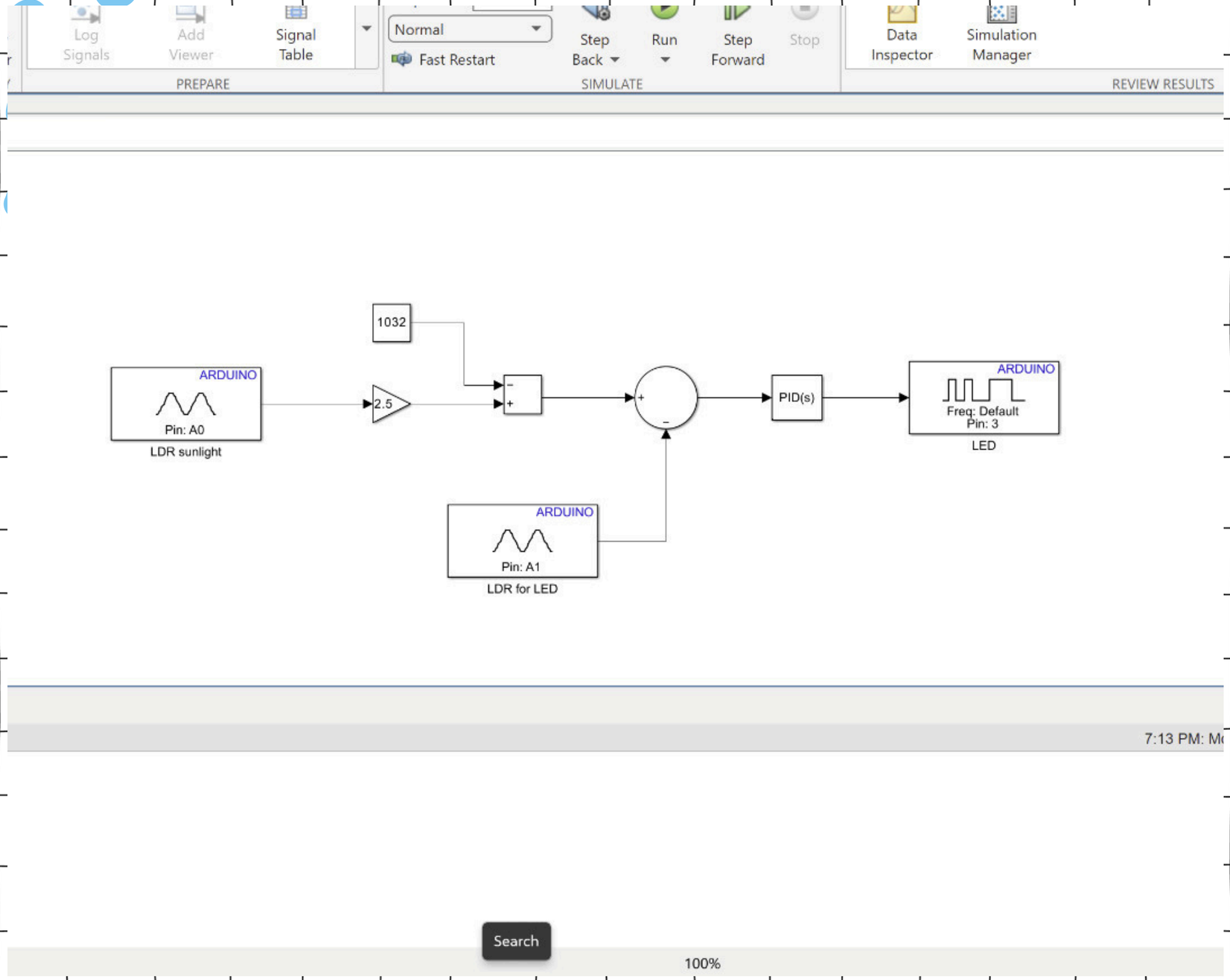
2. The second LDR in the system allows us to implement a closed-loop control system.

   - By providing feedback to the controller, this ensures that the system responds accurately to real-world variations, such as fluctuations in ambient light or LED performance.



matlab and simulink

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Add Viewer
Signal Table
PREPARE
Normal
Fast Restart
Step Back
Run
Step Forward
Stop
SIMULATE
Data Inspector
Simulation Manager
REVIEW RESULTS
1032
ARDUINO
Pin: A0
LDR sunlight
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LDR for LED
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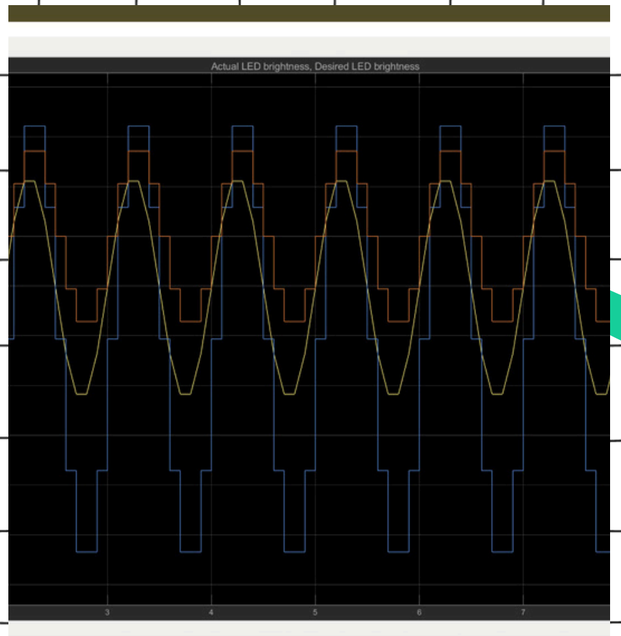
Actual LED brightness, Desired LED brightness

benefits

- Energy Efficiency:
By adjusting brightness dynamically, the system reduces unnecessary energy usage.

- Reliability:
The closed-loop control system ensures stable and precise performance.

Conclusion

In conclusion, our project demonstrates a practical and innovative approach to improving street lighting systems, combining modern technology with energy-saving principles.

Thank you