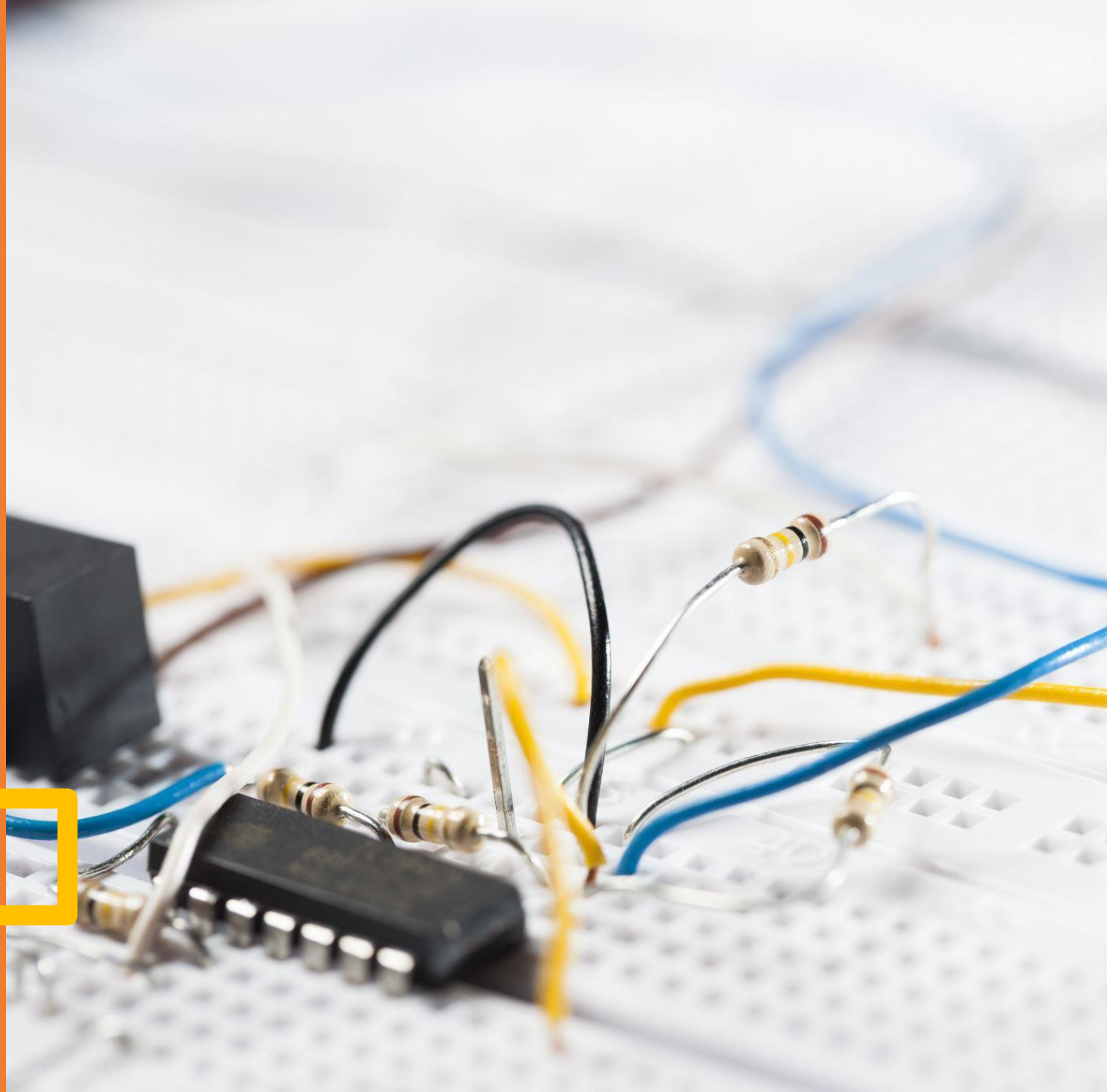


LineSenseBot: Intelligent Line Following Robot

Group Members

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Introduction

Objective

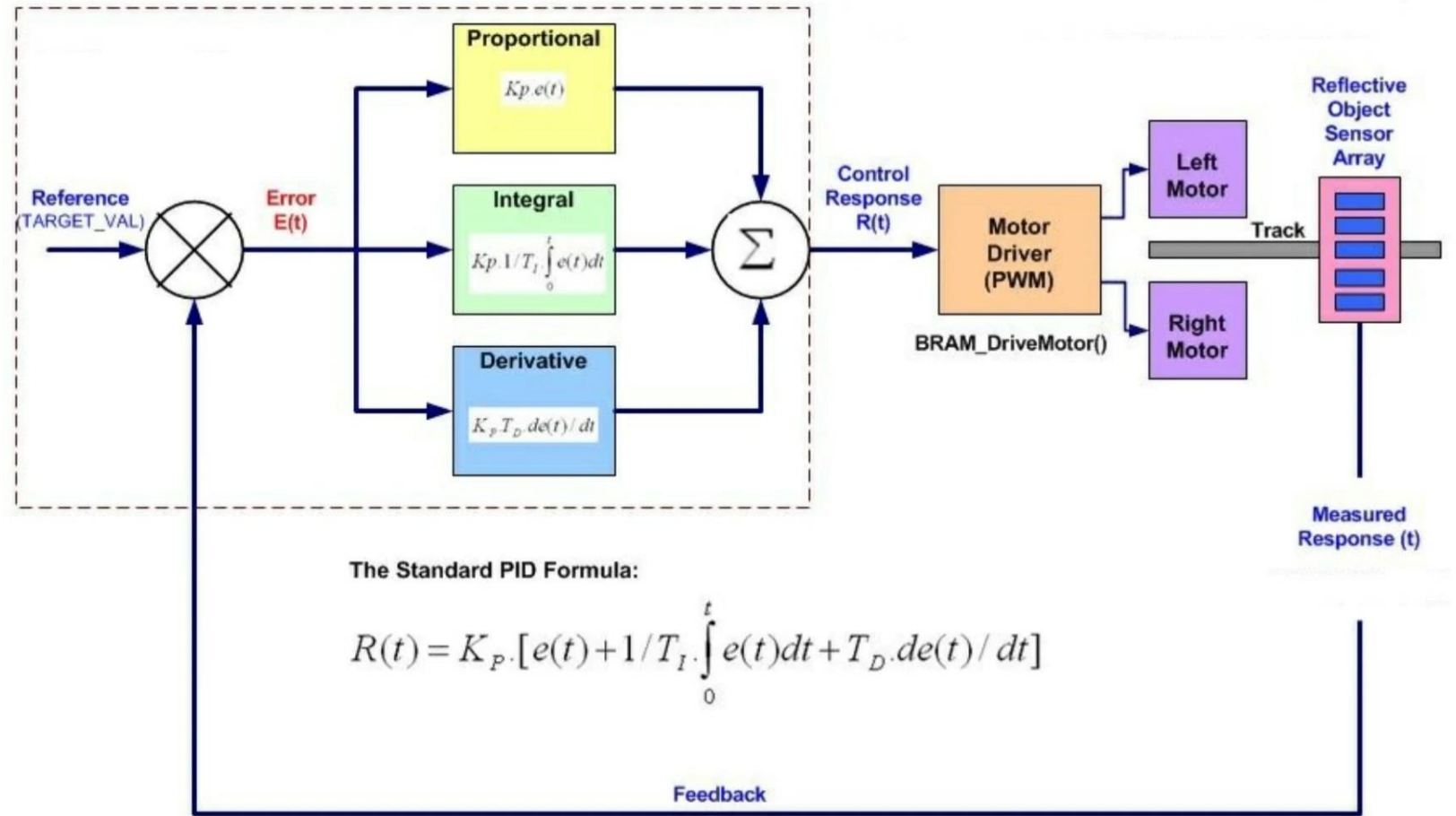
- Create an intelligent robot to autonomously follow a black line on a white surface.

Components

- Arduino UNO R3
- QTR-8RC Sensor Array
- L298n Motor Driver
- 2 x DC Motors
- 2 Wheel Robot Chassis
- Roller Caster Ball
- 12 Volt Battery

Mechanism

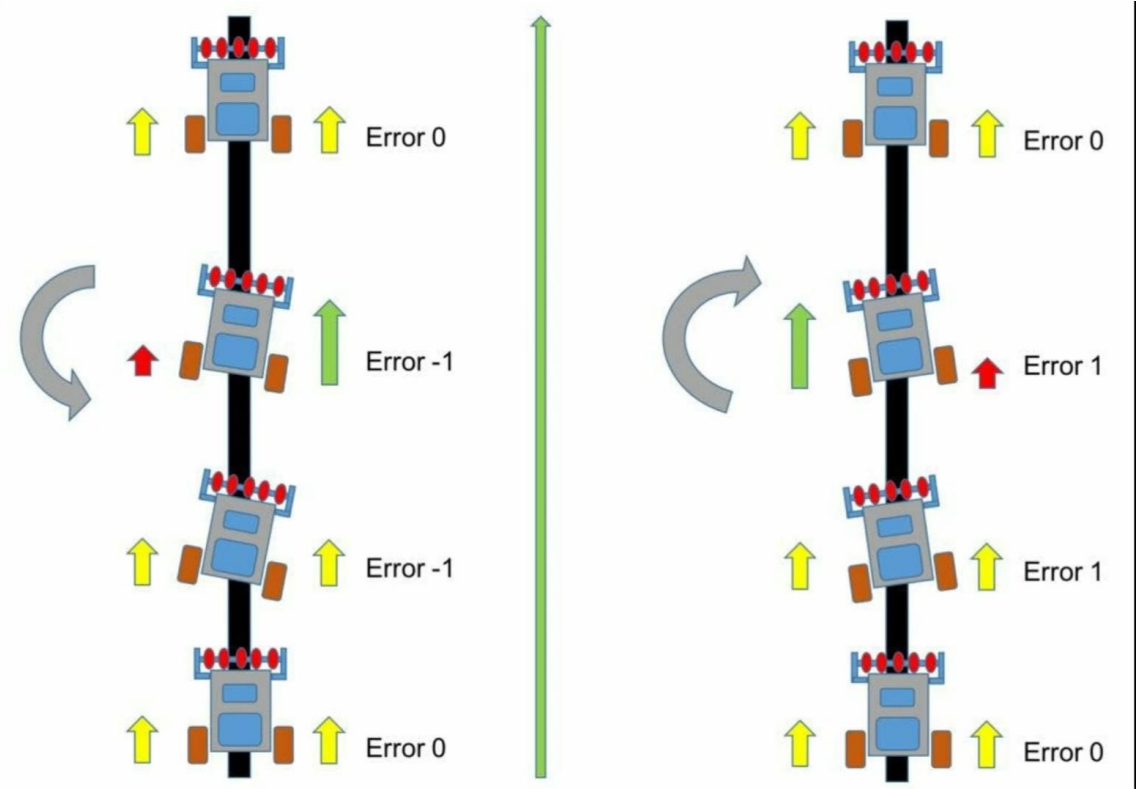
- Our robot utilizes the PID algorithm to minimize error to the fullest extent. As illustrated in the diagram, the error feedback is provided to the PID controller, which employs three constants (K_p , K_d , K_i) to mitigate the calculated error.



BRAM II Proportional Integral and Derivative Control

Error Calculation

- During a left turn, the error calculated is -1, as illustrated, whereas it is +1 for a right turn. To ensure continuous line tracking, these errors are fed back to the PID controller, which utilizes a formula to minimize the error.



Error Calculation Formula

Error = target value - sensor value (i)

Integral = integral + Error (ii)

Derivative = Error - Last Error (iii)

Correction = (Error*Kp) + (Integral*Ki) + (Derivative*Kd)

PID Control

PID Tuning

- Proportional Gain (K_p)
- Integral Gain (K_i)
- Derivative Gain (K_d)

Tuning

- Adjusting constants to minimize oscillations.

Connections

- Wiring Connections:
 - Pin A1: L298n Pin 1 (Right Motor)
 - Pin A2: L298n Pin 2 (Right Motor)
 - Pin A4: L298n Pin 3 (Left Motor)
 - Pin A5: L298n Pin 4 (Left Motor)
 - Pin 10: PWM Right Motor
 - Pin 11: PWM Left Motor
 - Pins 2-9: QTR-8RC Sensor (1-8)
 - Pin 12: QTR-8RC Sensor IR

Applications

- Applications:
 - Automobiles (Self-Driven Cars)
 - Industrial Robots
 - Floor Cleaning Robots
- Versatility:
 - Potential for various automation tasks.



Conclusion

- LineSenseBot offers precise line following capabilities through PID control.
- Opens doors to numerous automation opportunities.



Thank You

