Robot Car

1. Raspberry Pi Pico Microcontroller:
Inputs:
-Ultrasonic Sensor Data
-Infrared Sensor Data for line following
-Infrared Sensor Data for barcode recognition
-Magnetometer Data
Outputs:
-Motor Control Signals
-Barcode Recognition Output
-Navigation and Mapping Info
Processes:
-PID Controller

2. 2-Wheel Robot Car:
-Sub-components:
-Motors (2x)
-Wheels (2x)
-Chassis

3.Sensors:
-Ultrasonic Sensors
-Infrared Sensors (for line following and barcode recognition)
-Magnetometer

4.User Interface:
Inputs:
-Start/Stop Robot
-Adjust PID parameters
Outputs:
-Visualization of car's performance
-PID Controller behavior

Diagram 1:

- Magnometer → Input → Raspberry Pi Pico Microcontroller
- Infrared Sensor for line following → Input → Raspberry Pi Pico Microcontroller
- Infrared Sensor for bar code → Input → Raspberry Pi Pico Microcontroller
- Ultrasonic Sensor → Input → Raspberry Pi Pico Microcontroller
- Wheel Encoder → Input → Raspberry Pi Pico Microcontroller
- Wifi

- Raspberry Pi Pico Microcontroller → Process → Navigation and Mapping → Controls → Updating X, Y and Z coordinates → Output → Change in position
- Process → Barcode Recognition
- Process → Line Following
- Process → Obstacle Avoidance
- Process → PID controller → Controls → Motors → Output → Robot Car

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Robot Car

Diagram 2:

- Magnometer → Input → Raspberry Pi Pico Microcontroller
- Infrared Sensor for line following → Input → Raspberry Pi Pico Microcontroller
- Infrared Sensor for bar code → Input → Raspberry Pi Pico Microcontroller
- Ultrasonic Sensor → Input → Raspberry Pi Pico Microcontroller
- Wheel Encoder → Input → Raspberry Pi Pico Microcontroller
- Wifi

- Raspberry Pi Pico Microcontroller → Process → Navigation and Mapping → Controls → Updating X, Y and Z coordinates → Output → Change in position
- Process → Barcode Recognition
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