Parking Maid

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Overview and Objectives

• To design a smart parking robot that can detect empty parking space and park into the area automatically with FPGA control

• Functions that Robot can perform
  • Move forward and backward
  • Make turns
  • Parallel Parking
  • Garage Parking
  • Automatic Trace Adjustment
Hardware Design Architecture

Servo Motor

- PD
- 12V (in)
- C1 (in)
- C2 (in)
- GND (in)

- 3.3V

- Schottky diode - 1N5818
- 47 Ohm resistor

Ultrasonic

- PD
- 12V (in)
- GND (in)

- 5V - L298N
- 3.3V - HSMC pin

Voltage sources:
- 12V - battery box
- 5V - L298N
- 3.3V - HSMC pin

- PD
- GND (in)
- echo (out)
- trigger (in)
- 5V (in)
- RXO (out)
- Level shifter

L298N - Convert IN1, IN2 from 3.3V to 12V and send to C1, C2 of Motors. In addition, it can provide 5 V output.
Design Architecture

• Ultrasonic Modules
• Regular and Servo Motors
• FPGA daughter card
• Voltage Converters
• Ultrasonic
Parallel Parking
Distance Tracking
Two identical trace curve paths
Position Calculation
Experiences and Issues

- Hardware Failure
- SD Card
- Wireless Card
- Ultrasonic Accuracy
- Ultrasonic Positioning
• Add protection to all the critical pins
• Power Management
• Parking Algorithm Design
• Operating System Issues
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