Örebro University

Project: Differential Drive via WiFi

Project presentation

Benny Frost, Tom Olsson

Örebro University

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Outline

1. Project

2. Physical design

3. Motor setup and tuning

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Hardware: Arduino Due [1], Motor Shield rev. 3 [2], WiFi Shield [3]

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  - ⇒ Much better performance, but some issues because of the swivel (shopping cart syndrome)

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- ▶ Similarly, the main Arduino board was battery powered by a 9 V battery

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- ▶ To reduce the impact of the deadband, all actuation values from 10 to 700 were set to 700, and all below 10 were set to 0
- ▶ We also added feedback in the PID controller, so that some of the current output PWM is counted as "promised speed", which smoothes the PID output by approximating the smoothing applied to the velocity reading

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- Because of these problems, eventually we replaced the WiFi shield with an ESP8266 microcontroller as WiFi card

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- ▶ In this case, it is used like a router, only relaying information between two communicating devices
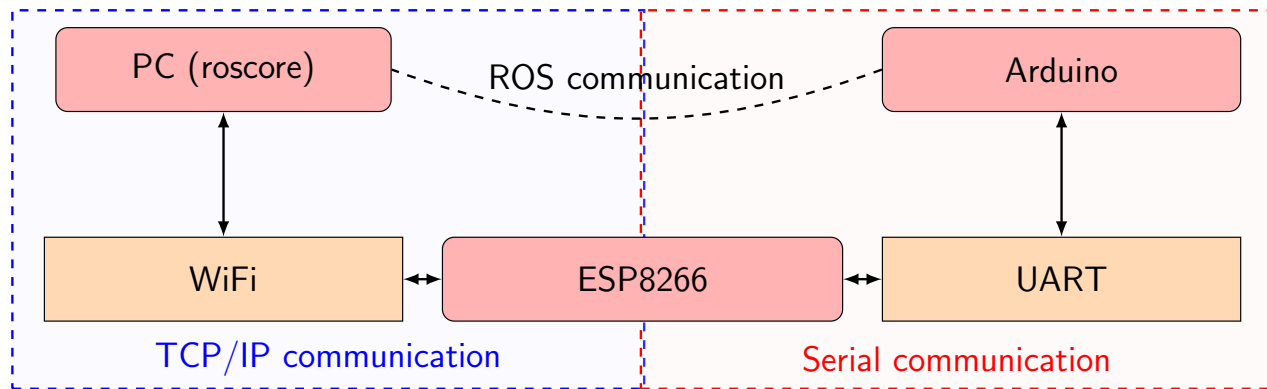
Communication

Figure: System view of communication

PC setup

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- ▶ Two nodes are used on the PC to control the robot:
    - ▶ rosserial_python in TCP/IP mode to handle communication and serialization
    - ▶ a Python script for sending command messages to the robot (geometry_msgs::Twist). This script comes from Husqvarna and is intended for research with their robotic mower

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- ▶ It also makes sure that the WiFi connection is maintained

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- ▶ And as mentioned before, a feedback term was added to the PID controller

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$\Rightarrow$ When reading empty, the Arduino will (by default) drop the message entirely and ask for a resynchronization... which will fail too

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- ▶ By doing this, it is easy to see that the error is introduced each time a turn is made, and that this error is caused by the swivel wheel going the wrong way when starting to move forward after the turn

📄 Arduino LLC, "Arduino - arduino due." https://www.arduino.cc/en/Main/ArduinoBoardDue.
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