Introduction to Robotics

Lecture 5: Bringing the Robot to a New Life

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Today Goal

- finish what we started last time
- implement "driver" for our robot using the MCU peripherals

Motivation – Task Progress

If you have made a progress on the tasks:

- you have an asynchronous API
- the motors are able to turn even in lower speeds
- the servo should be more stable
- the ultrasonic sensor should be less noisy

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Peripherals are precise, unlike software with many interactions.

Task 1: Generate PWM for the Motors

Use timer 0 to generate 2 PWM signals for motors.

- use its natural range
- use 1024 prescaler to obtain frequency around 60 Hz
- implement function(s) to set motor power and direction

Possible extension: use phase-correct PWM to obtain half the frequency and observe the difference. Is there any?

Task 2: Generate Signal for Servo

Use timer 1 to generate signal for servo.

- make its period 20 ms (choose prescaler and top value)
- implement functions to set servo position
- reminder: 0.5 ms = left, 1.5 ms = center, 2.5 ms = right

Task 3: Read Ultrasonic Sensor With Timer

Use timer 1 to read pulse width of the ultrasonic sensor.

- use input capture mode
- do not break servo signal generator (or at least make it switchable)
- hint: you can change orientation of the edge being detected in the interrupt