Robotics & Autonomous Systems

A Practical Introduction with NXT and JAVA

Motor Control

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Advanced Motor Control

- The NXT motors are sophisticated beasts, capable of much richer behaviours than just setPower(…) and stop()
- In this lecture we will investigate APIs that provide more sophisticated access to motors
- !!!WARNING!!!: Be careful about mixing APIs when accessing motors and sensors. Stick to one API per program…

The DifferentialPilot Class

- Motor control in our standard robot is *differential* in the sense that we can control the motors independently of each other
- The NXT motors have a *tachometer* built in, which allows us to keep track of how many revolutions a motor has made
- The DifferentialPilot class provide an API for our robot that exploits these features to provide a simple and intuitive interface for motor control

The DifferentialPilot Class Constructor

- The DifferentialPilot class constructor method takes 4 parameters:
  - Diameter of motor wheels in centimetres (you have to use the same wheels for left and right motor wheels!)
  - Axle width in centimetres (distance from centre of front left wheel to centre of the front right wheel)
  - Port of left motor
  - Port of right motor

Methods for DifferentialPilot

- `void setTravelSpeed(double speed)`
  - Sets the speed at which the vehicle will travel
- `void forward()`
  - Start the robot moving forward (speed as set above)
- `void backward()`
  - Start travelling backward
- `void travel(double distance)`
  - Robot moves by amount `distance`

Methods for DifferentialPilot

- void rotate(double d)
  - rotate counterclockwise by d degrees

Prog07.java

```
import lejos.nxt.Motor;
import lejos.robotics.navigation.DifferentialPilot;

public class Prog07 {

        public static void main(String[] args){
                DifferentialPilot p= new DifferentialPilot(
                3.22f, // wheel diameter
                19.5f, // axle width
                Motor.B, // left motor
                Motor.A // right motor );
                p.travel(40); // move forward for 40 cm
                p.stop();
                p.rotate(360); // rotates counterclockwise 360 deg
                p.stop();
        }
}
```