

THINK DIFFERENTLY

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Remote Controlled Omni Drive Robot

Mathematic Methods Of Electrical Engineering
Freshmen Project WS 2010/2011

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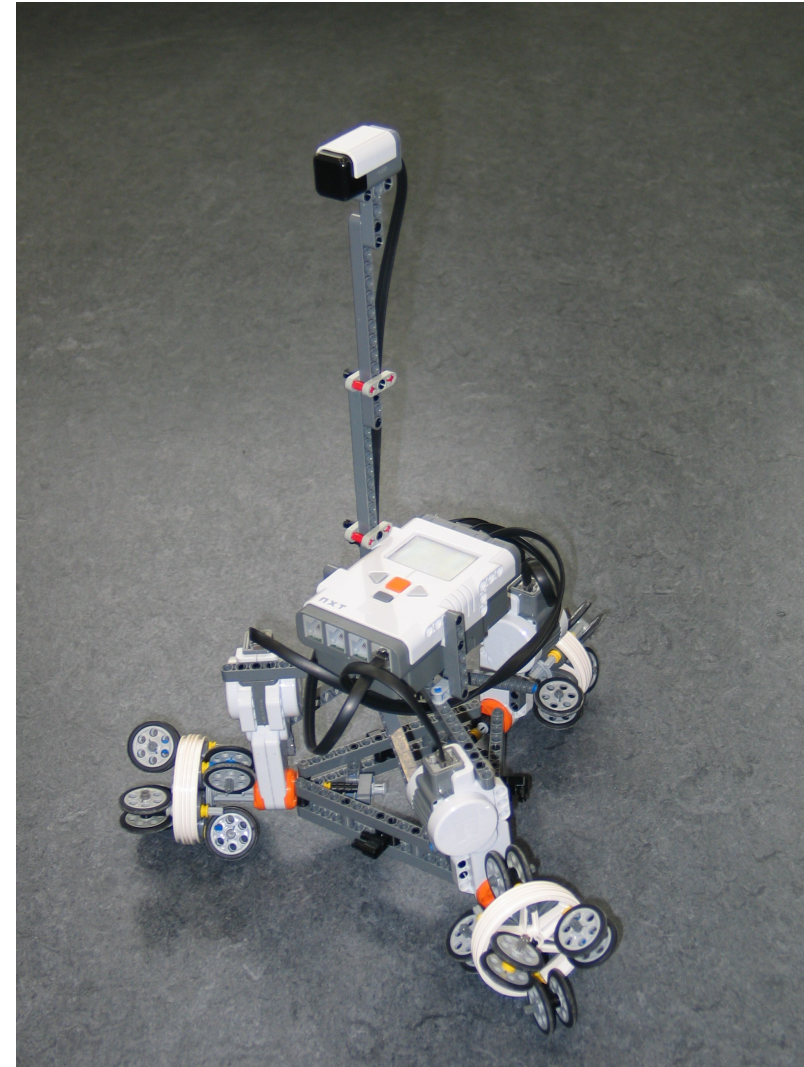
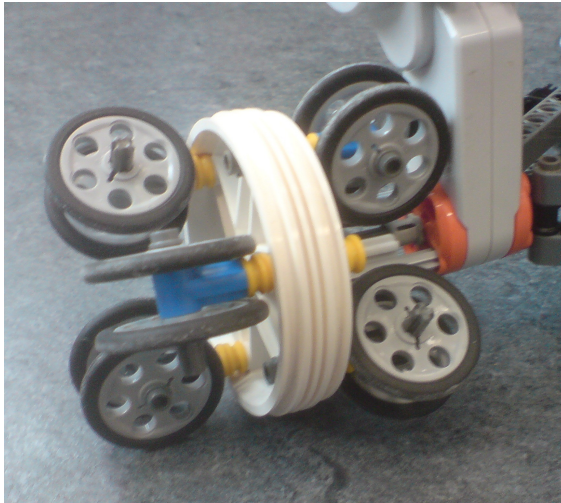
RWTH Aachen, Department of Wireless Networks

Ideas

- Omnidrive (holonomic drive)
 - Robot being able to move into all directions as well as spin around
 - Three independent omni wheels
- Remote Control
 - Control via accelerometer
 - Two axes: forward/backward, left/right
 - Speed set by tilt angle

Construction

- Robot NXT
 - Three Motors with one omni wheel each
 - Three ultrasonic sensors for distance measurements
 - Compass sensor for orientation



Construction

- Remote NXT
 - Accelerometer for robot control
 - Three switches for button functions
 - Start/Stop
 - Horn
 - Switch between rotation/transition



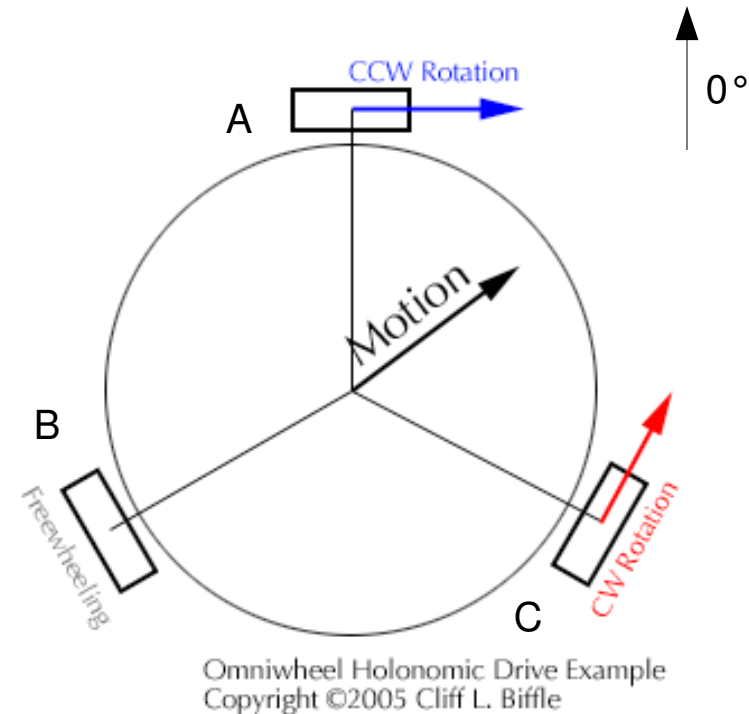
Algorithms/Programming

```
connect();                               % to remote and robot
while (~button_pressed)                  % main loop
    read_buttons();                       % (3-6 times per second)
    read_acceleration();
    calculate_motorspeeds();
    drive();                              % send updated speeds
    plot_direction();
end                                       remote
disconnect();                            robot
```

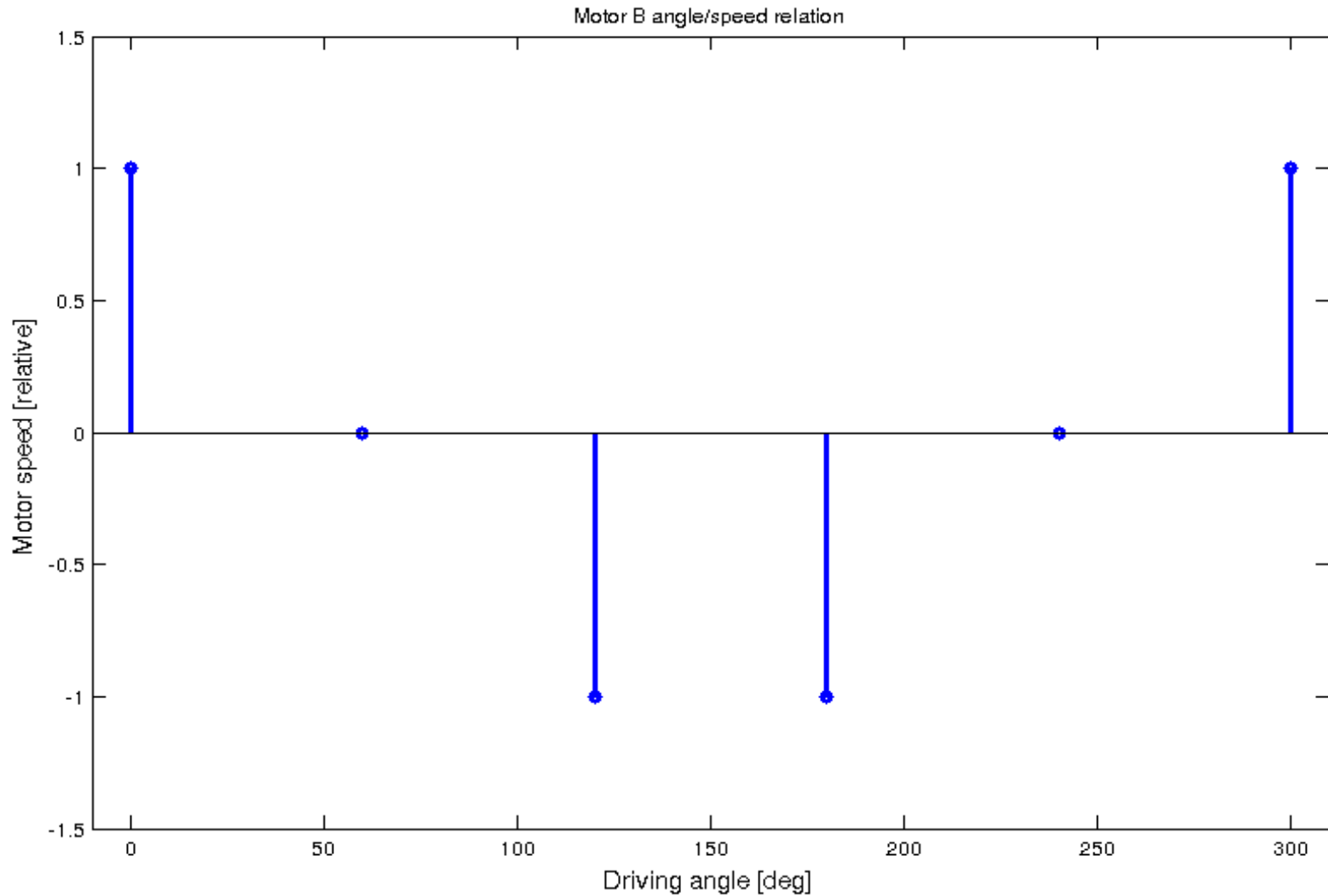
Calculating drive commands

- Calculate motor speeds depending on desired driving angle
- 6 trivial angles:

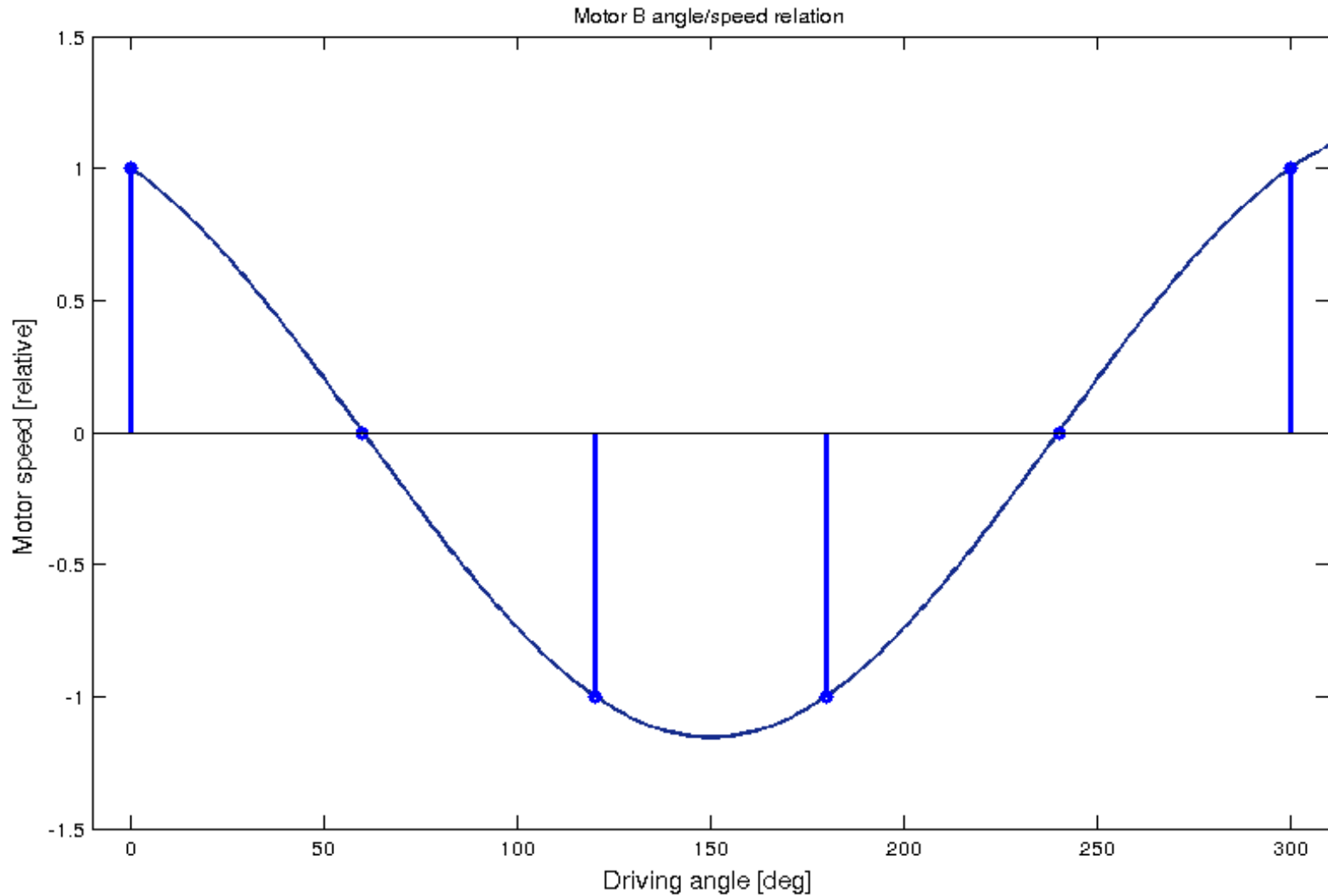
Angle	Motor A	Motor B	Motor C
0°	OFF	CCW	CW
60°	CCW	OFF	CW
120°	CCW	CW	OFF
180°	OFF	CW	CCW
240°	CW	OFF	CCW
300°	CW	CCW	OFF



Calculating drive commands



Calculating drive commands



Problems/unimplemented ideas

- Latency issues (less than two updates per second)
- Ultrasonic sensors with audio feedback
 - Comparable to park distance control
- Two Compass sensors
 - Linking remote and robot orientation
 - Sensor too inaccurate
 - Calibration did not help