

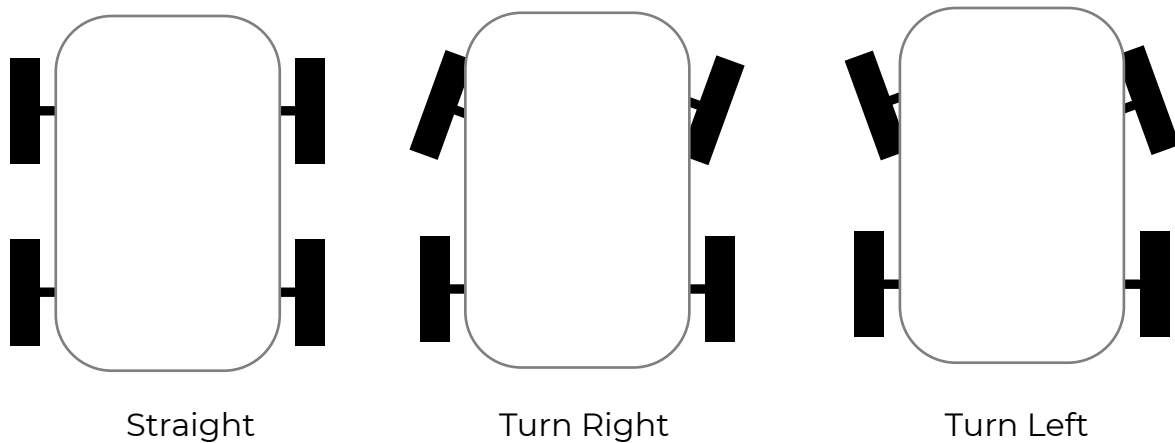
Build a Steering Robot

Project 3.01

In this workshop you will build a robot that has proper steering, like a real car!

How it works

The robot will use a mechanical design called **parallel steering**. The front wheels of the robot will move at an angle to steer it:

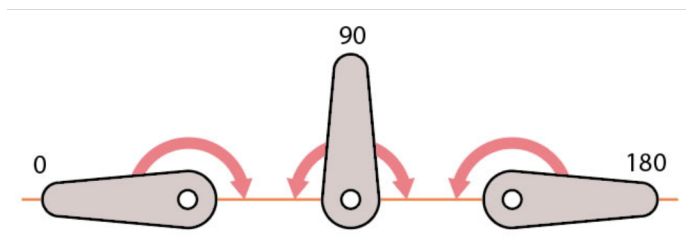


Notice that both wheels move at the same angle, so the wheels stay parallel to each other (this is why it is called parallel steering!).

You will build the mechanism to move the front wheels in this way and use a servo motor to move this mechanism in order to steer. A servo motor is a special type of motor which can only turn through 180 degrees. This is enough to steer the robot left and right:



Servo Motor



What to do

- Follow the instructions to build the robot
- Build the remote control
- Write code to send messages from the controller to the robot to control the steering, acceleration and braking!

Build the Robot

Build the Controller

Solutions

Robot Code

```
on start
  Servo S1 degree 90
  radio set group 11
  set speed to 0
  set angle to 90
```

Use a unique radio group number for your robot

```
on radio received name value
  if name = "speed" then
    set speed to value
    Motor M1 direction Forward speed speed
    Motor M2 direction Forward speed speed
  else if name = "steer" then
    set angle to round map value from low 100 high -100 to low 70 high 110
    Servo S1 degree angle
```

This code sets the motor speed when a "speed" message is received on the radio.

This code sets the angle of the servo motor when a "steer" message is received on the radio.

Start with a small range of angles: 70 to 110. Try out the steering and gradually increase the range until the steering works well.

Solutions

Controller Code

```
on start
  radio set group 11
  set speed to 0
  set direction to 0
  set pull pin P13 to up
  set pull pin P14 to up
  set pull pin P15 to up
```

Use the same number as you used for your robot

```
forever
  if digital read pin P13 = 0 then
    change speed by 10
    if speed > 100 then
      set speed to 100
  else if digital read pin P14 = 0 then
    change speed by -50
    if speed < 0 then
      set speed to 0
  else if digital read pin P15 = 0 then
    change speed by -10
    if speed < -100 then
      set speed to -100
  radio send value "speed" = speed
  plot bar graph of speed
  up to 100
  set direction to map analog read pin P0 from low 0 high 1023 to low -100 high 100
  radio send value "steer" = direction
  pause (ms) 100
```

Acceleration

Braking

Reversing

Steering