Table of Contents

Welcome

Project Willy

- History of Willy
- Project Willy
- Publicity
- Sponsors

Getting started

- Introduction to ROS
- Development Guide
- Driving Willy
- Manual
- Wiki Manual

Build of Willy

- Design history
- Hardware

Architecture

- Software Architecture
- ROS topic design

Raspberry Pi’s

- Sensor node
- Social Interaction node
- Power node

1. Sonar

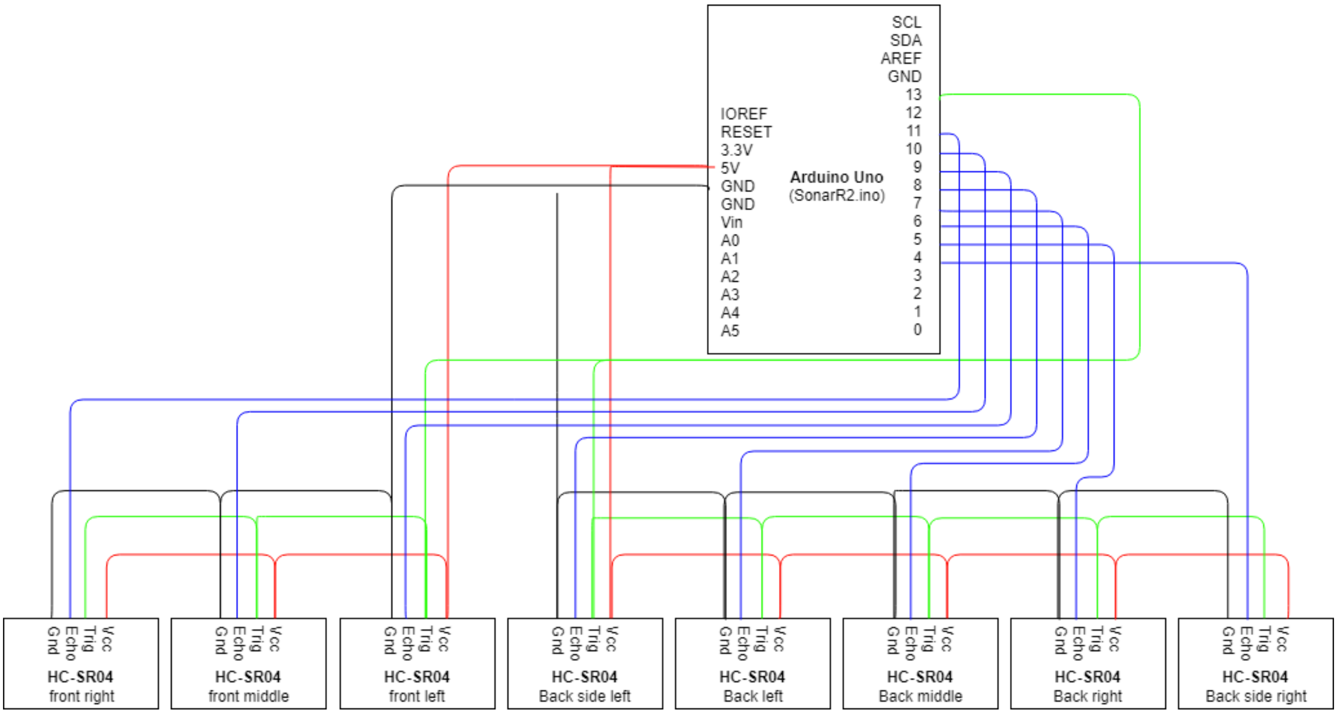
As the LIDAR is not able to detect glass consistently, Willy is equipped with 8 sonar sensors. The sensors used are HC-SR04 ultrasonic sensor. These sensors are mounted on 3D printed ball joints, as shown in the picture below.

1.1. Repository

Windesheim-Willy/sonar

1.2. Electrical setup

The sensors are connected to an Arduino Uno with one continuous wiring harness, provided with connectors. The power and trigger wires are looped and the echo signal is separated as can be found in the schematic below:



1.3. Software

1.3.1. Arduino Uno

The code on the Arduino which reads out the sonars is pretty straightforward. It will calculate the distance and limit the value to 2 meters. The data is read out and send via serial sequentially a.s.a.p.

1.3.2. PI

The PI will tag the sensors (left, right etc.) and publish the data to ROS. The Pi will not start automatically. Therefore the following steps have to be taken:

On willy’s laptop:

```
ssh ubuntu@192.168.0.13
password can be found in sharepoint
```

Make sure ROS master runs on the laptop:

```
startwilly
```

Then this command will start the Pi:

```
./start_sensornode.sh
```

1.3.3. RVIZ

RVIZ will visualise the data of the sensors and represent the locations and distance for each sensor.

1.4. Advice

The current sonar sensors, the HC-SR04, are only capable of pinging distance in a straight line, with a very narrow F.O.V. This is detrimental to WTR's ability to detect obstacles such as table legs, especially when reversing. If this proves to be a serious detriment, parking sensors or industrial ultrasonic sensors could be the solution.

1.5. Notes

1.5.1. View cone

The view cone of the sensor is very limited. It will only detect a obstacle if the angle with the sensor straight in line. This is a drawback for the effectiveness on detecting small objects like table legs.

1.5.2. Minimum range

The minimum range is 5 cm. If a object gets closer the Arduino will report 2m distance.