
Platypus Boat Documentation

Release 0.1

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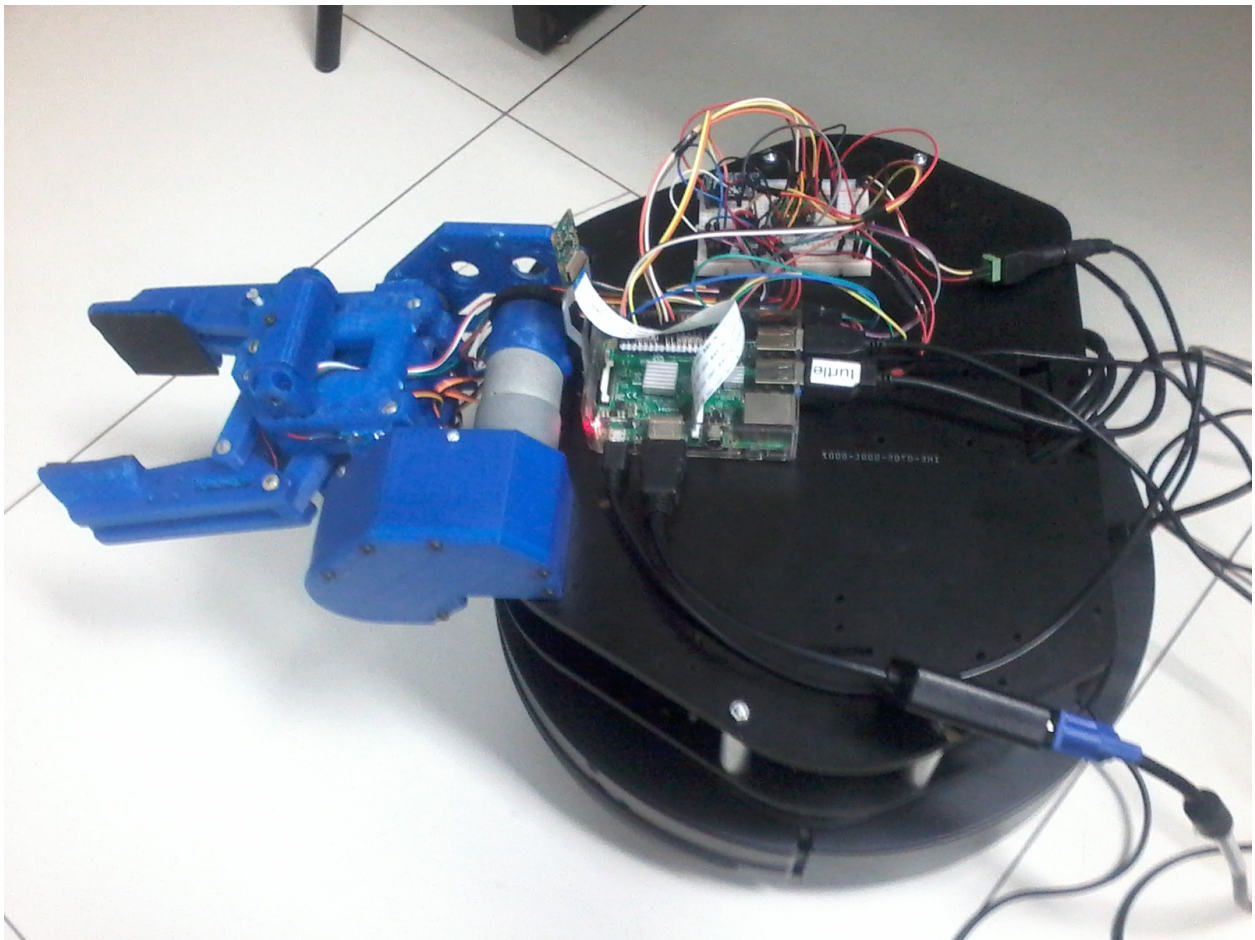
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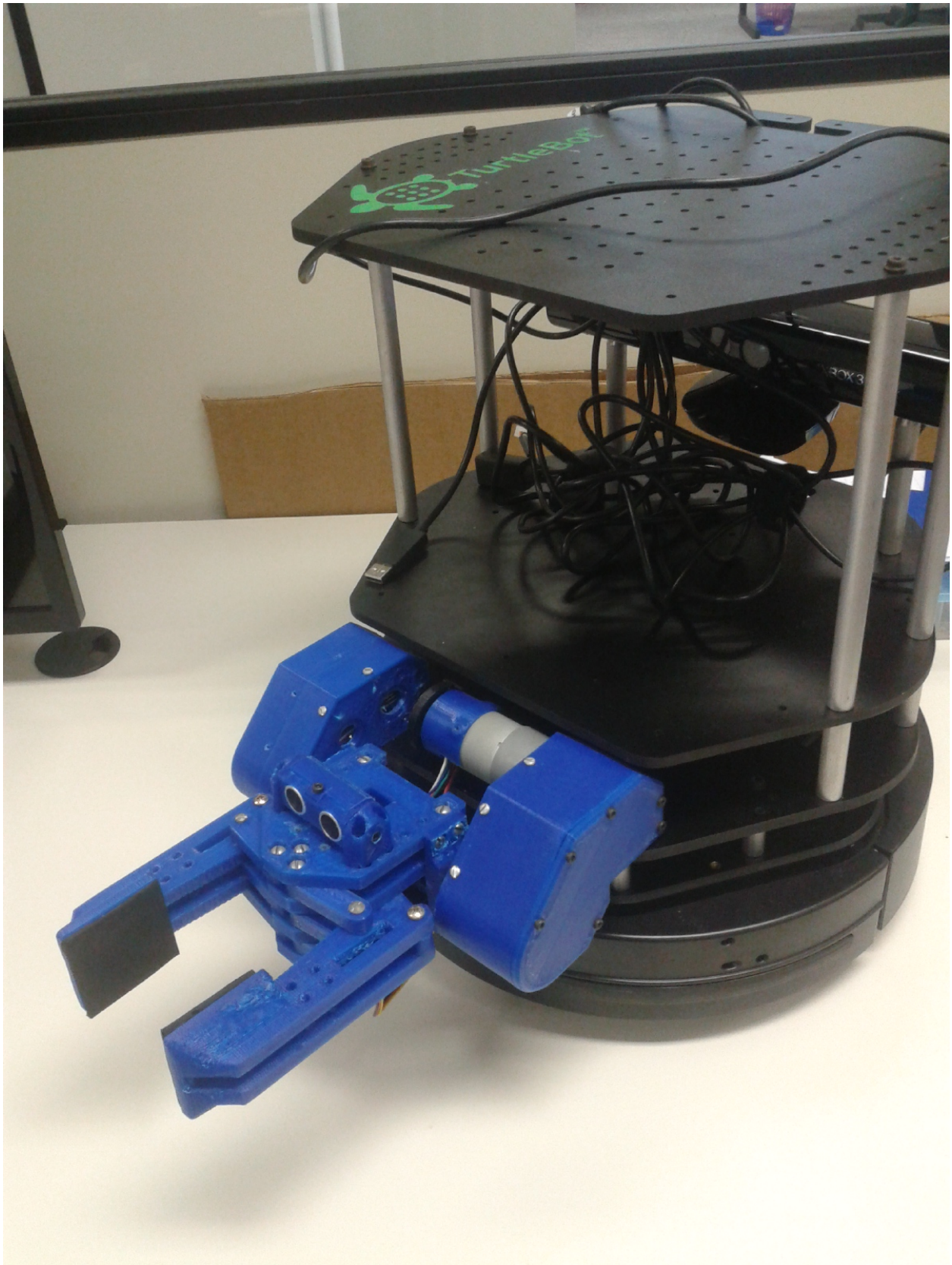
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CHAPTER 1

About the Gripper





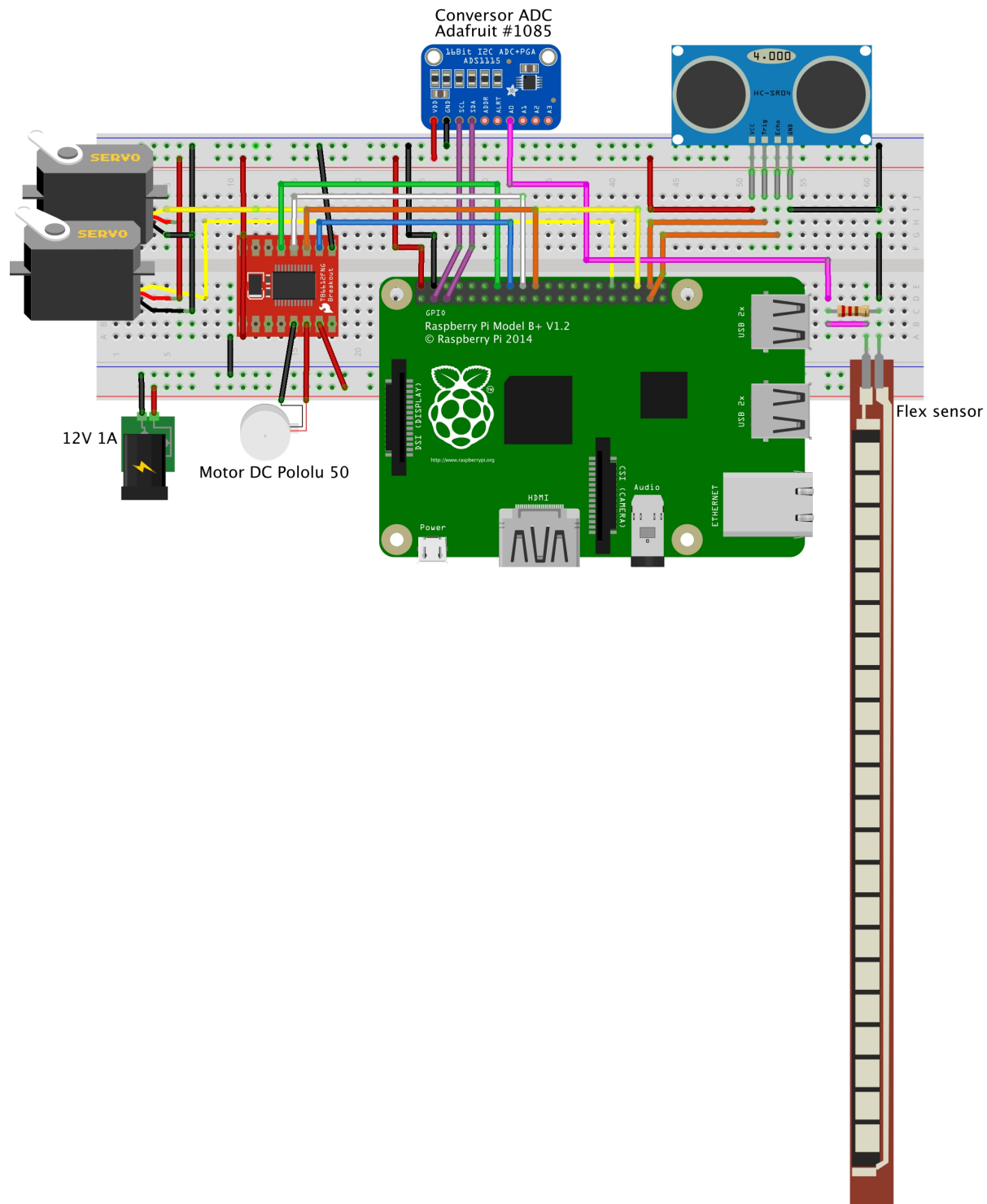
This is the oficial documentation for Intelligent Gripper for Turtlebot based on Raspberry Pi 3. It was made in the

autonomous systems laboratory, LSA, of FACIN at PUCRS.

2.1 Setting Up the Hardware

Gripper robot was designed with microprocessor [Raspberry Pi version 3](#). You will find a guide to setting up the hardware: Raspberry Pi and circuit schematic.

Warning: @ To be done !!! place here the fritzing schematics and



2.1.1 Hardware Specification

- Microprocessor: Raspberry Pi 3
- Raspberry Pi Camera version 2

- Motor Driver: TB6612-Dual Motor Driver
- 2 Servos motores Tower PRO 996R
- 1 Dc Motor Pololu 50:1 37Dx54L
- 1 Ultrasonic sensor HC-SR04
- 1 Sensor Força FSR 406
- 1 Current sensor ACS712
- 1 Analog-Digital converter with 4 channels ADS1115

2.2 Setting Up the Software

This session We'll presente details about each topic.

2.2.1 Installing the OS

The OS version used on Raspberry Pi 3 is Ubuntu MATE 16.04.2. The ROS version is Kinetic Kame. Kinetic was released early last year and is compatible with [Ubuntu Mate 16.04](#).

Pre Built Image

There is a prebuilt image with Ubuntu MATE 16.04.2 and ROS Kinetic at the [German Robot webpage](#), made in February 2017. This is the fastest way to get the job done.

Prepare yourself the Image

If you want to do it yourself, then follow these steps:

- Download [Ubuntu Mate image](#) for raspiberry 2/3 - Version 16.04 (Xenial)
- Use *Etcher* <<https://etcher.io/>> or *Win32 Disk Imager* <<https://sourceforge.net/projects/win32diskimager/>> _ to burn the image to the SD card.
- how to the partitioning (to be completed)
- you might need to resize the image if your disk is larger then 8GB. You can easily do it with `raspi-config` or `gparted`.
- plug the SD card and HDMI cable, then power on the board.

Setting Up the OS

It might be required to setup the OS (TO BE DONE)

- which basics packages to install
- how to setup the wireless
- main depedencies to intall
- setup automatic login
- how to enable the rpi pins and protocols (i2c, gpio, pwm, spi,camera etc)

Image is ready ! let's install ROS!

2.2.2 Installing ROS

About ROS

ROS (Robot Operating System) <<http://wiki.ros.org/>> provides libraries and tools to help software developers create robot applications. It provides hardware abstraction, device drivers, libraries, visualizers, message-passing, package management, and more. ROS is licensed under an open source, BSD license.

How to install the driver and its dependencies

Install ROS

The first step in installing ROS on Raspberry Pi 3 is : - Followed the steps on the download page, and within minutes I managed to have a Pi 3 running Ubuntu Mate.

- **Step 1:** Go to System -> Administration -> Software & Updates
- **Step 2:** Check the checkboxes to repositories to allow “restricted,” “universe,” and “multiverse.”
- **Step 3:** Setup your sources.list

```
sudo sh -c 'echo "deb http://packages.ros.org/ros/ubuntu $(lsb_release -sc) main" > /  
→etc/apt/sources.list.d/ros-latest.list'
```

- **Step 4:** Setup your keys

```
wget http://packages.ros.org/ros.key -O - | sudo apt-key add -
```

- **Step 5:** To be sure that your Ubuntu Mate package index is up to date, type the following

```
sudo apt-get update
```

- **Step 6:** Install ros-kinetic-desktop-full

```
sudo apt-get install ros-kinetic-desktop-full
```

- **Step 7:** Initialize rosdep

```
sudo rosdep init  
rosdep update
```

- **Step 8:** Setting up the ROS environment variables

```
echo "source /opt/ros/kinetic/setup.bash" >> ~/.bashrc  
source ~/.bashrc
```

- **Step 9:** Create and initialize the catkin workspace

```
sudo apt-get update  
mkdir -p ~/catkin_workspace/src  
cd catkin_workspace/src  
catkin_init_workspace  
cd ~/catkin_workspace/  
catkin_make
```

- **Step 10:** Add the catkin_workspace to your ROS environment

```
source ~/catkin_workspace/devel/setup.bash
echo "source ~/catkin_workspace/devel/setup.bash" >> ~/.bashrc
```

- **Step 11:** Check the ROS environment variables

```
export | grep ROS
```

2.2.3 Hooking Up Peripherals to the Raspberry Pi

This section shows how to add the following peripherals to the RPi board

Installing the Raspicam

The v2 Camera Module has a Sony IMX219 8-megapixel sensor (compared to the 5-megapixel OmniVision OV5647 sensor of the original camera).

- **You can buy the Raspberry Pi Camera Module v2 on official website** [official website](#)
- The lab LSA has the camera module V2 **‘This available to prototype <https://lsa-pucrs.github.io/resources/>’** _
- Power supply is provided by board, you just need to plug
- The require material is only flat cable to connect the camera into raspberry
- You need only to enable the camera setup

Installing the ADC - Analog digital converter

The ADS1115 4-channel digital analog converter is a suitable component for circuits where the microcontroller does not have an ADC (Analog Digital Converter) built-in, or when you need a high-precision converter in your design.

This converter operates with voltages between 2 and 5.5VDC, and the maximum voltage on the analog pins is equal to the supply voltage. Analog pins can be programmed as 4 independent pins, or two differential channels.

The communication interface used by the board is I2C, easy to connect to boards such as Arduino, Raspberry Pi, Beaglebone, etc.

- **You can buy the Analog digital converter on**
– [fillipeflop website](#)

Installing the ADC sensor

You just need to :

```
$ sudo pip install adafruit-ads1x15
```

2.3 LSA Contributors

The list of contributors to this document.

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CHAPTER 3

Disclaimer

The purpose of this document is for the use of [LSA](#) group only, but we open it in case it can be usefull for someone else. Thus, we dont fill obliged to give any technical support, although we might help in some special situations.

Everything you find here is without absolutly no waranty and I'm not responsible for any inconveniences or issues that might occurs.

CHAPTER 4

Feedback

Don't hesitate to ask about some additional info or next guides and also if you find some mistakes, please let me know. This can be done by submitting an issue or a push request on github.