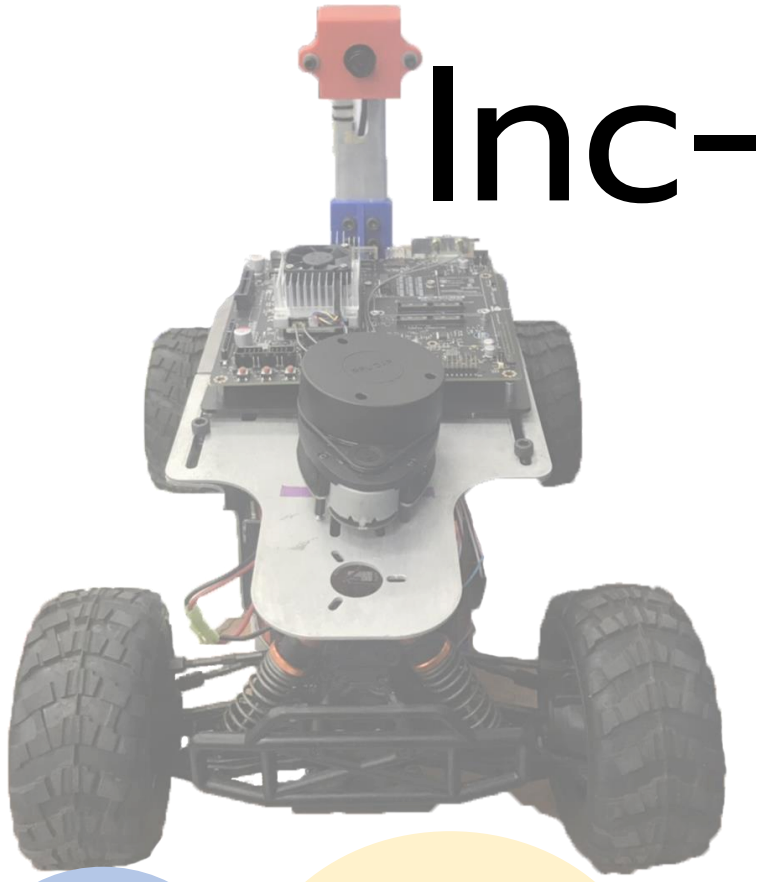
# Inc-Racing 2020 Lecture1



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# Agenda

01 Introduction and benefits of ROS

02 Why we choose robot-car?

03 Benefits of ROS

04 Objective of inc-racing 2020

05 Install program + Install and Remote SSH

06 Car designing + basic equipment

07 circuit design

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# Objective of this competition

1. Encouraging the robot developer skill for INC students
2. Knowing what is ROS?
3. Learning how to programming
4. Knowing the technique to write a program in c++ and python
5. Be able to create program and build a Node in ROS
6. Be able to write a program to control the robot
7. Knowing how to create SLAM
8. Knowing how to create Navigation
9. Finding people for robot developer team for sending to other competition



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# benefits of ROS


ROS = Robot operating system

This is  the software for people who worked with robot

Operating system= Linux, Windows, Mac, etc.

Contain various of tools and library

It has big robot developer community



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# Why we choose robot-car?

Robot is the machine that worked as a human by designing the step for their work and can use in different field of work such as moving the object. Robot can move the part , equipment and other special part in different way depend on the algorithm or function for their specific usage.



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# Why we choose robot-car?




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# Why we choose robot-car?

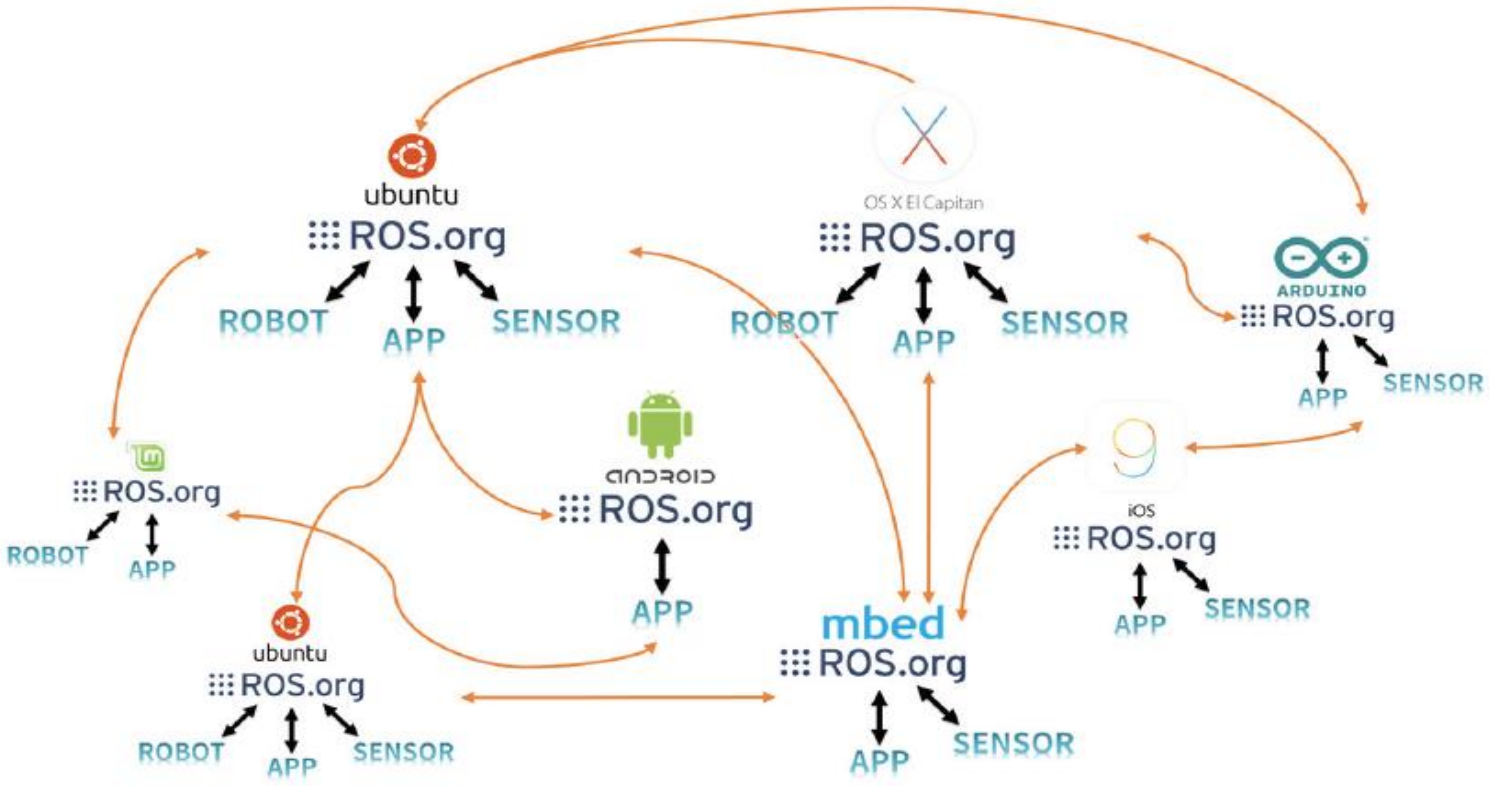


FIGURE 2-2 ROS Multi-Communication



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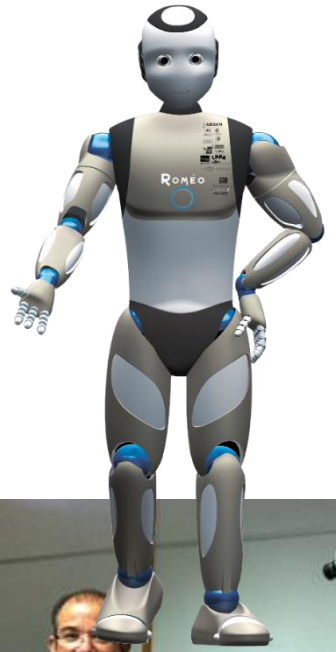
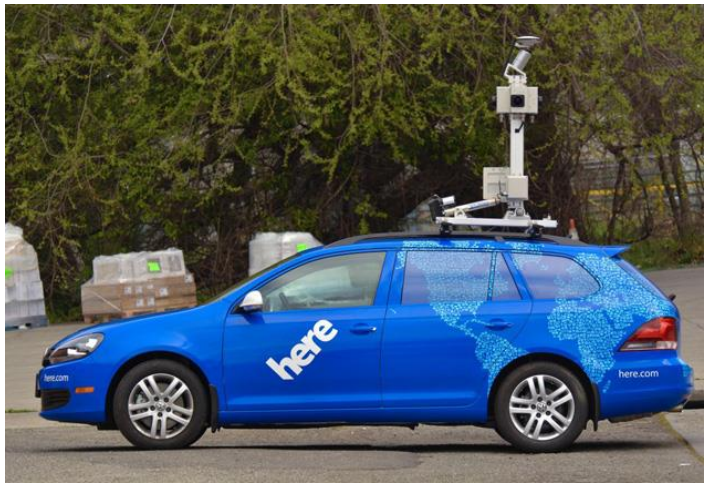
# Why we choose robot-car?




Lecture1

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# Why we choose robot-car?




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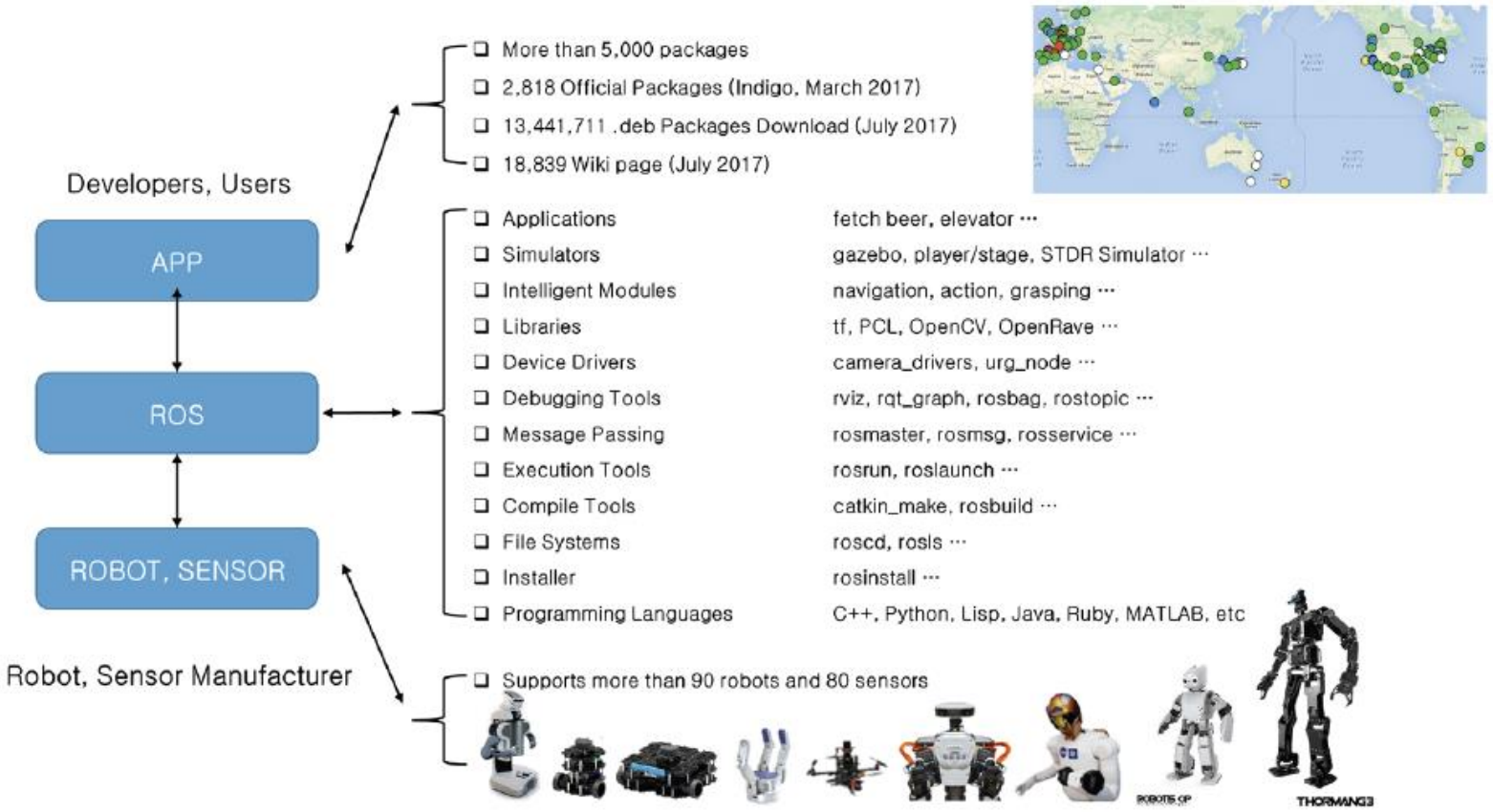
# Why we choose robot-car?



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# What should we know before using ROS

Physics

Electronics

Math

Programming

ROS Structure

ROS Library

Programming

Debugging

EtcB



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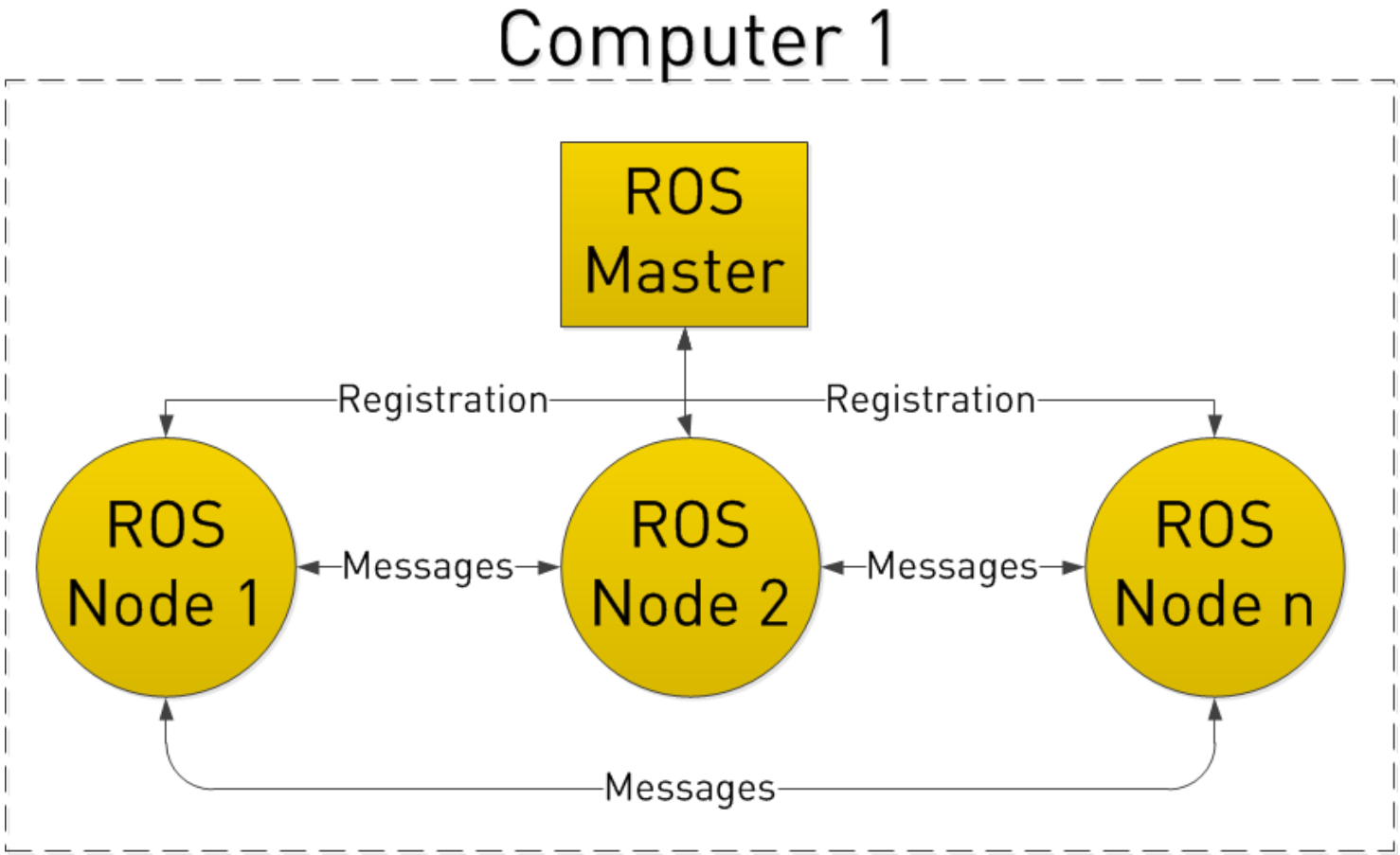
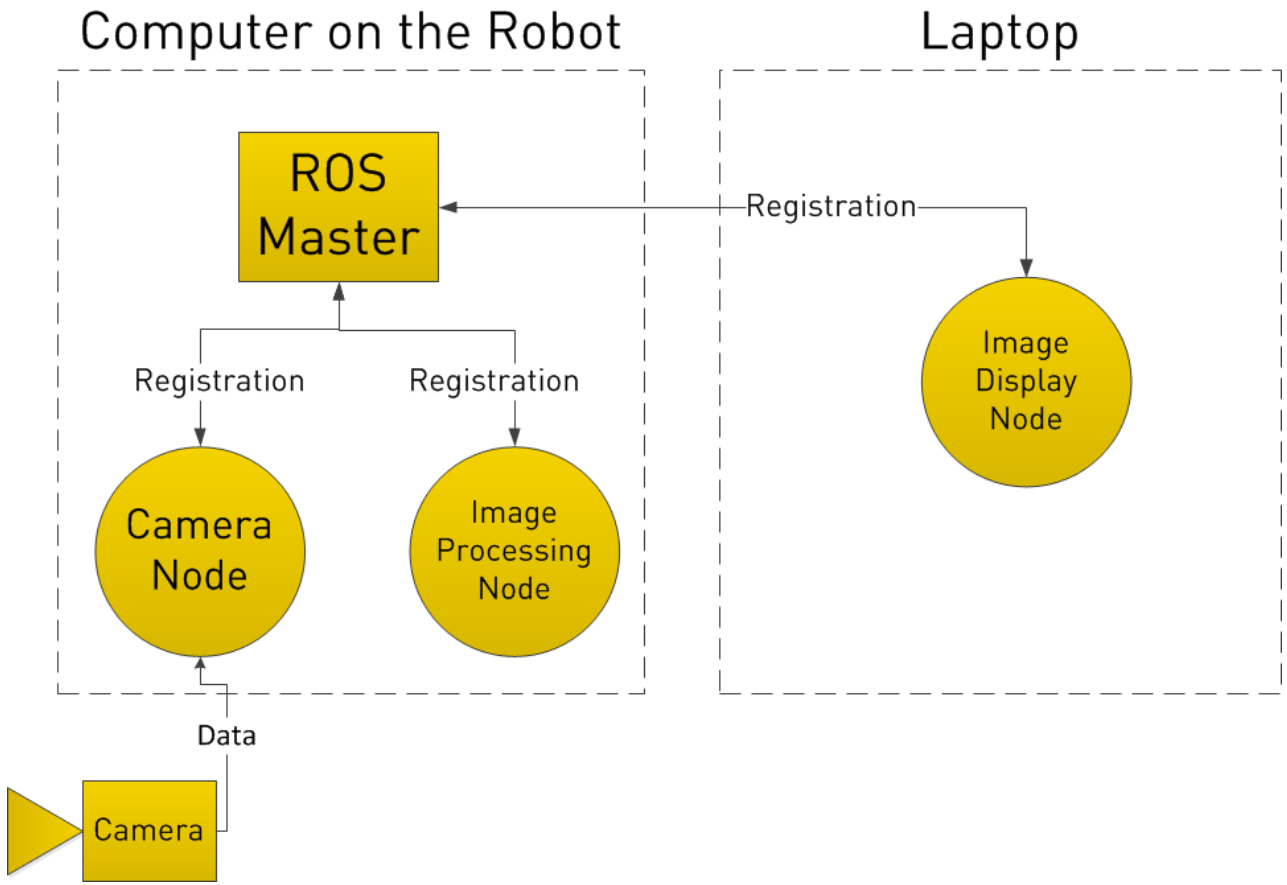
# Structure of ROS



## work as a network



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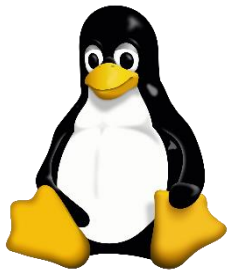
# Install program + Install and Remote SSH



1.Install VM Ware

2.Install ubuntu 16.04

3.Install ros kinetic

ROS



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Type of Robot : Differential Drive

3 wheels

Motivated by 2 wheels

Easy to build

Front wheel is free

Worked for real



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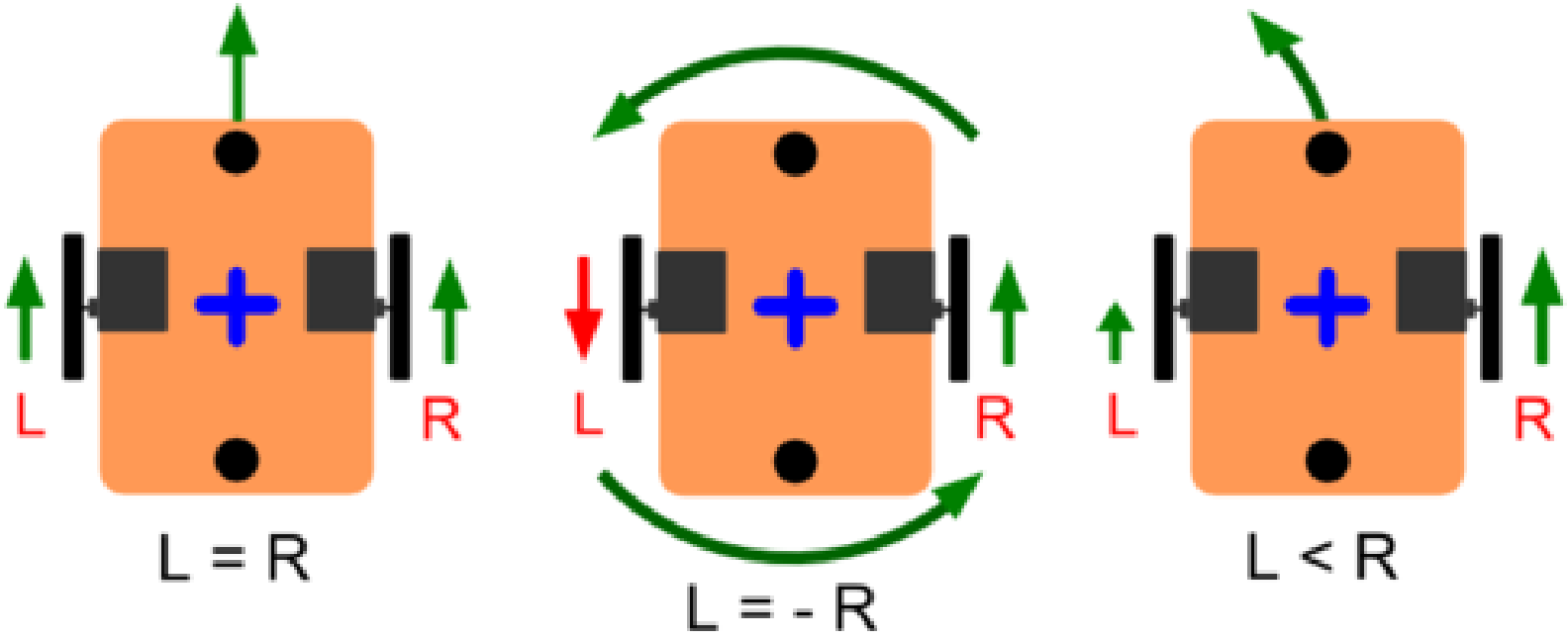
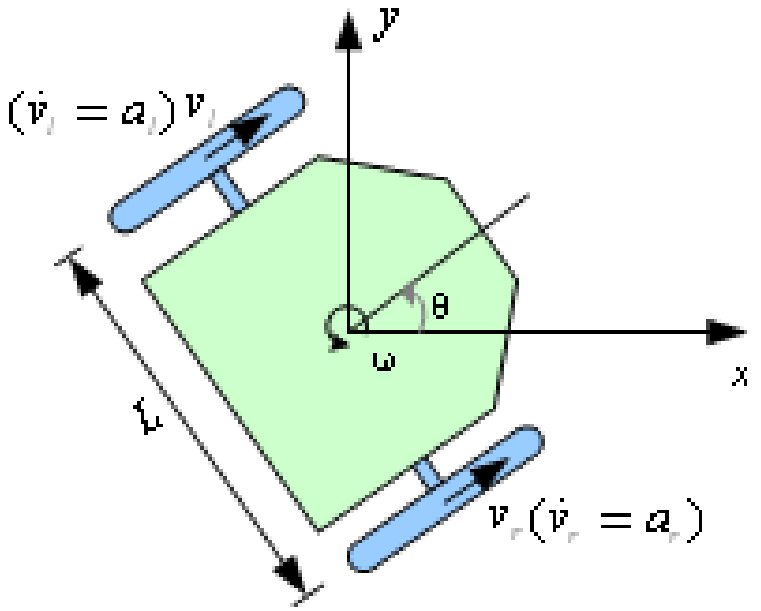
# Principle for motion of robot : Differential Drive



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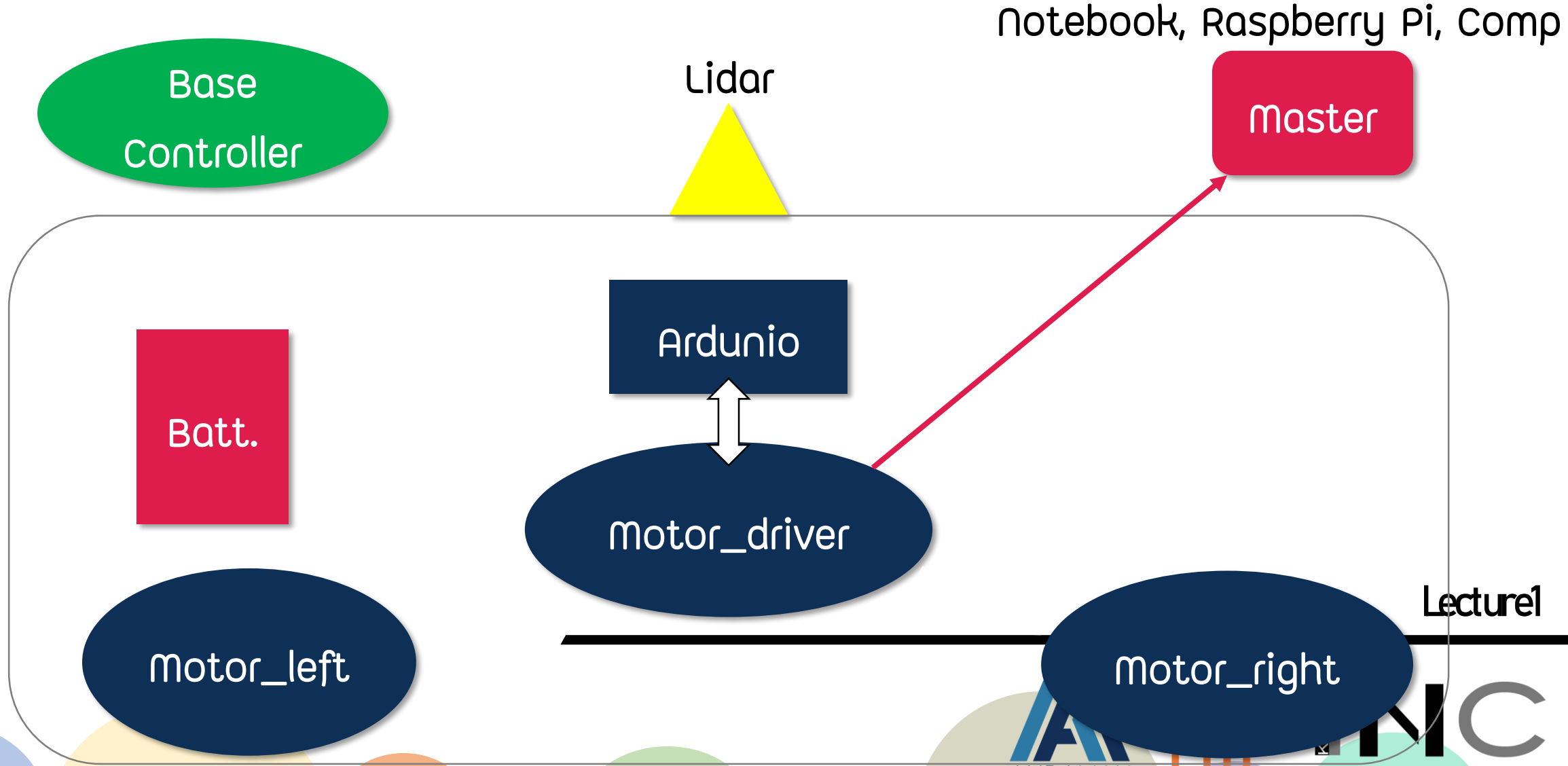
Robot structure (Hardware only)



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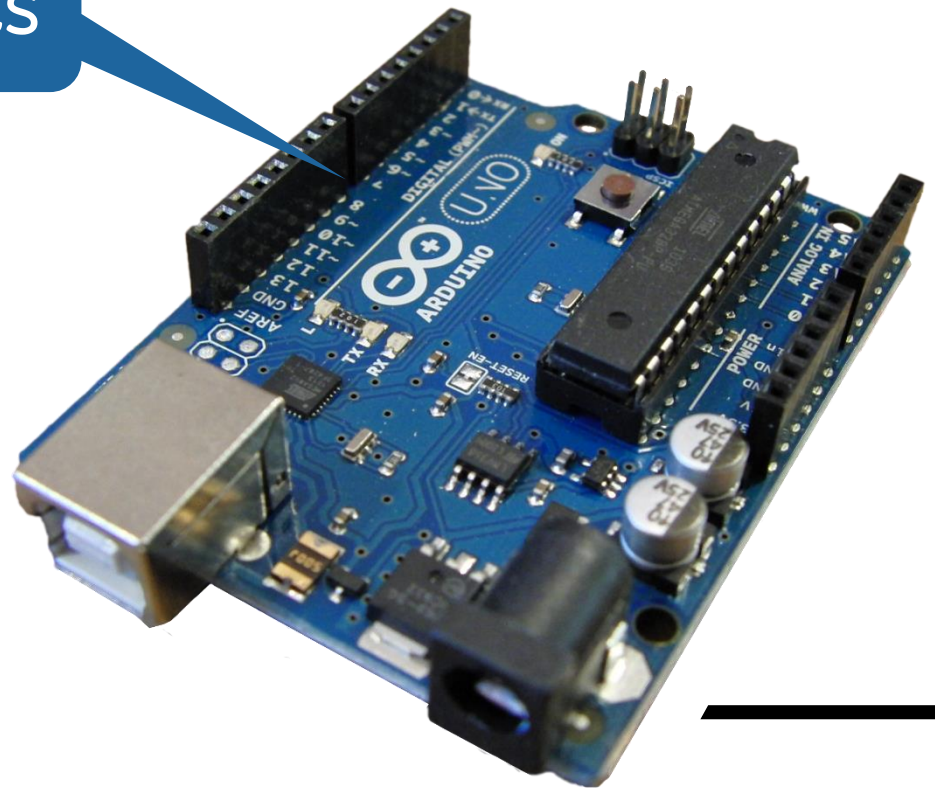
# 1. Base Controller

There are various controller for control the motion part and base

- Computer
- Arduino
- Raspberry Pi
- Linux Box

# Arduino

Benefits




Variety of Library

Lot of programming example

Expert in Hardware

Easy to worked with ROS



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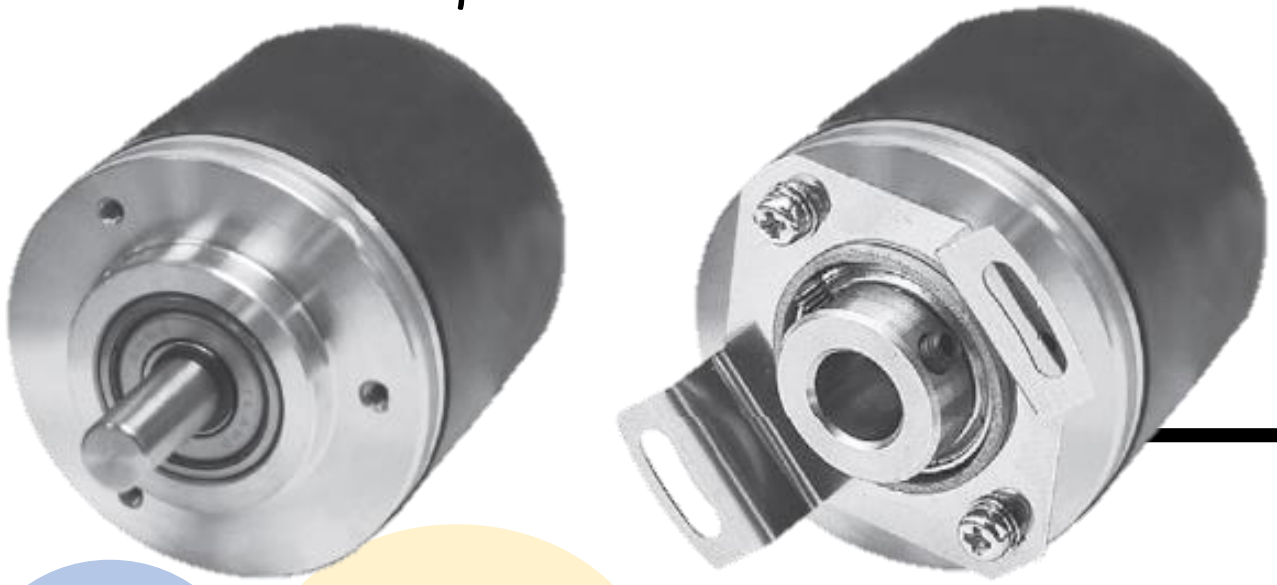
# Motor

- DC, AC – most used in robot is DC motor
- For Ros Navigation need Enconder
- Encoder – the ability to measure the distance and speed



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# wheels

- Load of motor, if use too big, it will use a big amount of energy (can't move)
- Environmental space, maintenance with road or motor, diameter of the wheel need to become a factor to calculate distance for the motion



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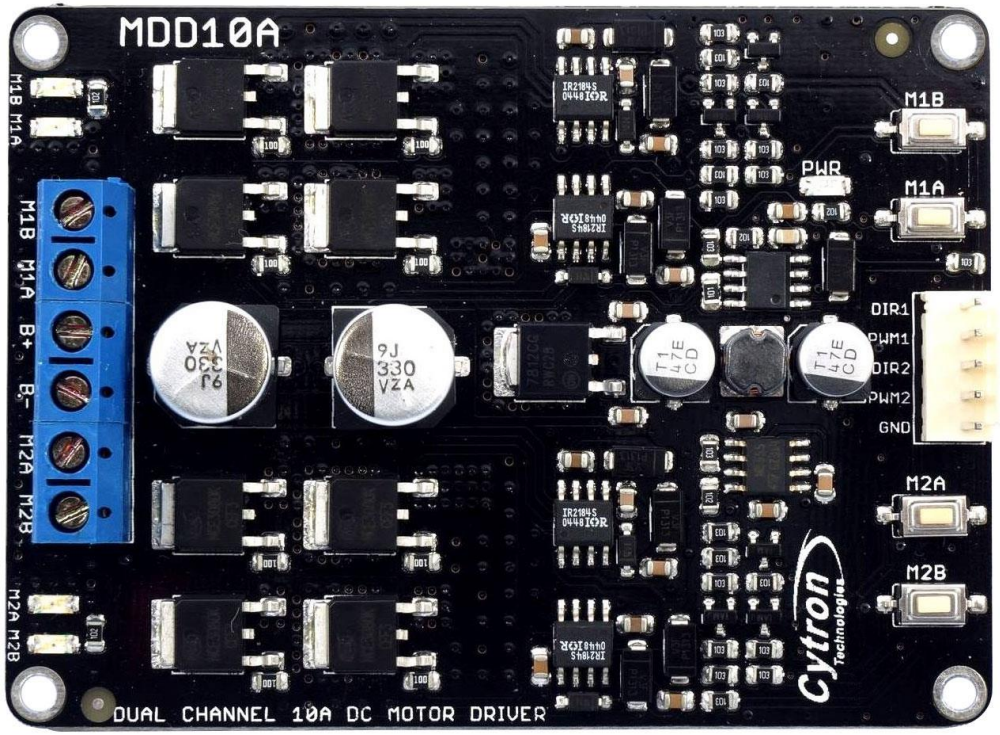
# Motor Driver

- Circuit that control DC motor
- H-bridge circuit => switch the rotate direction
- Managing in electric current
- Using the electric need to divide to part for Arduino and comp.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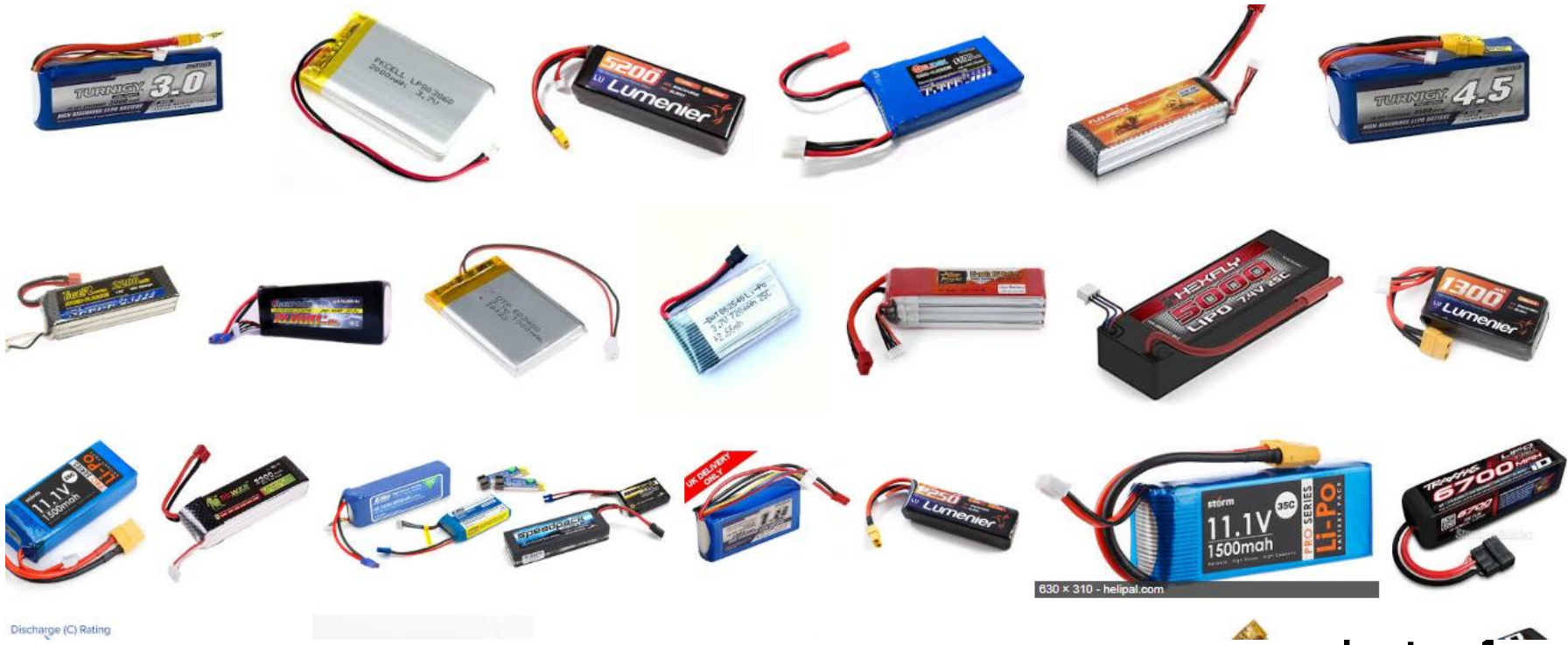
# Battery

- Lipo 12 V.
- Small work – 5V, 7V
- Depend on how much volts that DC motor will need?



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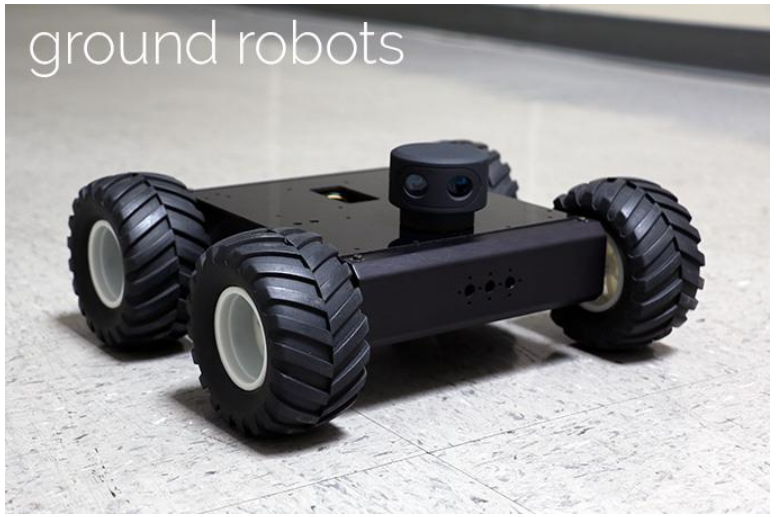
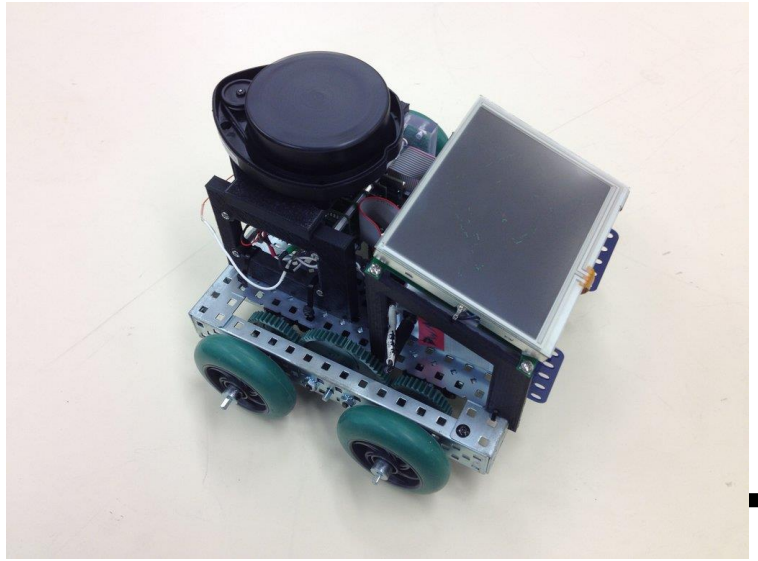
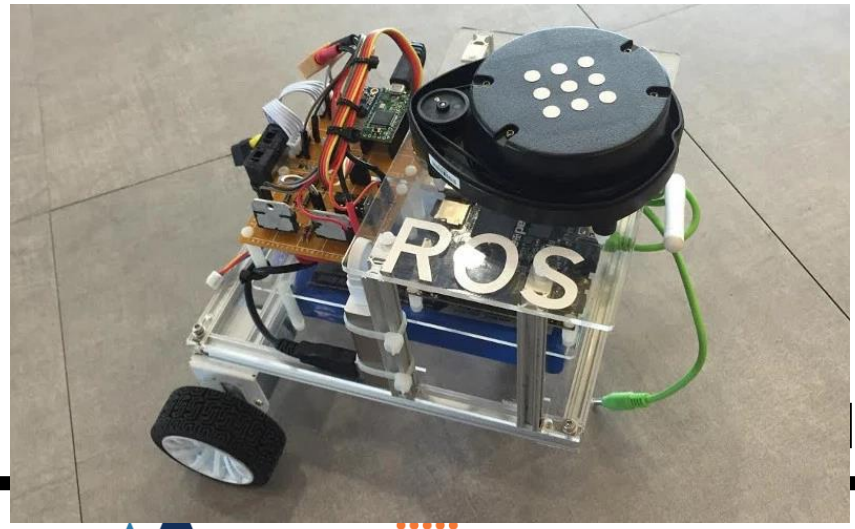
# Lidar

- Spreading the laser beam around so they can calculate and detect the distance of the environmental things, but it cannot detect glasses
- Some type has intensity to tell the quality of the reflecting light
- Important to ROS Navigation



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# Why we choose robot-car?

- 3d printing can be used
- Be able to make part by part and test in each step (not too hurry)
- Beware of accident while working
- Dealing with electrical need to be careful and Safety First




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# Thank you



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