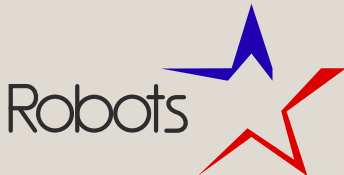


Free Software to Develop Free Robotics

A free (as in free speech) development stack with Ubuntu, ROS and Arduino



Gonzalo Bulnes Guilpain

4th Meetup Robots Chile

April, 2012

Free Software Licenses

- Definitions

- Interesting Effects and Side-effects

- Free Hardware

ROS and Arduino Free Dev Stack

- A Carrot and Development Stack

- How Our Example Works

- Learning and Getting Help

Free Software Licenses

Definitions

Interesting Effects and Side-effects

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What Free Software Licenses Are

Free Software Users have *four essential freedoms*:

Freedom 0 Run the program, for any purpose.

Freedom 1 Study how the program works, and change it as they wish.

Freedom 2 Redistribute copies.

Freedom 2 Distribute copies of their modified versions to others.

Who?

Google, Microsoft, Red Hat, Canonical, Nokia, Willow Garage...



How Free Software Licenses Work

Relying on **copyright** international rules

Restricting the software/hardware distributon

- If you won't modify it, use it as you want. (*libraries, others*)
- You are allowed to modify it. . .
 - Provided you respect some conditions.
 - These conditions protect your 4 *essential freedoms*.
 - Keep the copyright notices, add your own
 - Follow the license terms

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GNU GPL, CC BY-SA, New BSD License, GNU FDL. . .



Effects

For Authors

- Acknowledgment for their work (community)
- *Protection* (publicly available copyrighted code can't be stolen)

Consequences

- Developers do no longer sell their code, instead they sell their *ability* to write new code.
- High quality libraries available (*Qt*, *ROS*)
- *Cooperation*, incremental work, and **innovation** get boosted.



Side-effects

Products Perceived Value Evolution

1. Cool products
2. Agility: Products which match **now** the needs of their users
3. *Value-driven development*: develop *only* what users really value

Company Value

- Embracing change thanks to creative people
- Intrinsic motivation [3]

Video: Tom Preston Werner at StarTechConf 2011
<http://continuum.cl/videos/32646756>



One Word about Sustainability

“ If you don't make money from your work, you won't be able to commit it back to the upstream developers. ”

Make money the way you feel comfortable with, but try to do it.

FLOSH Proposals

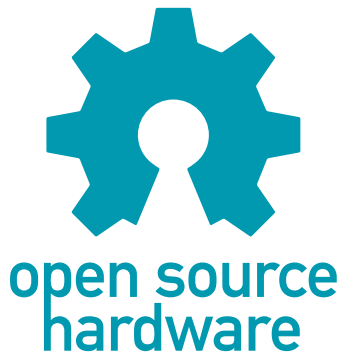
The same principles are now being applied to hardware.



FRIEZING



Protei
Open Source Sailing Drone



Free robotics standards are being defined now, it's a very great moment to contribute.
Be creative, share and ship your ideas!

“ The ones that win are the ones that ship. ”
— Mark Pilgrim [2]

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Aims

This How-to Aim

Install a complete enough free development stack to enjoy a great "FedEx day" with ROS.

The Carrot: System Overview



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How to Install the Development Stack

Ubuntu

- <http://www.ubuntu.com/download>
- Instructions are given on the official website for several configurations.

Arduino IDE

- Direct install from Ubuntu:

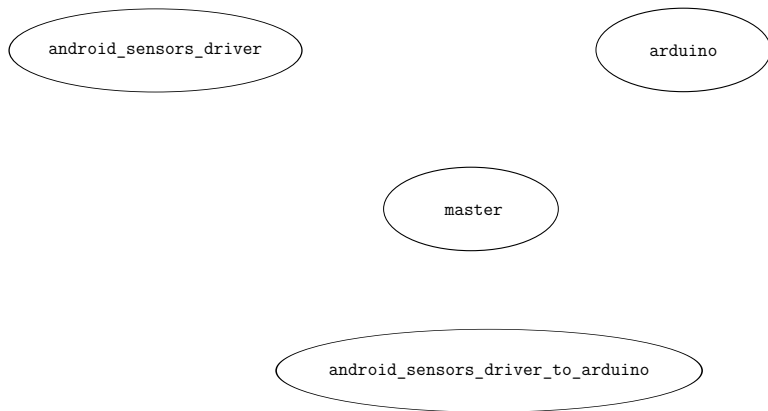
```
$ sudo apt-get install arduino
```

ROS

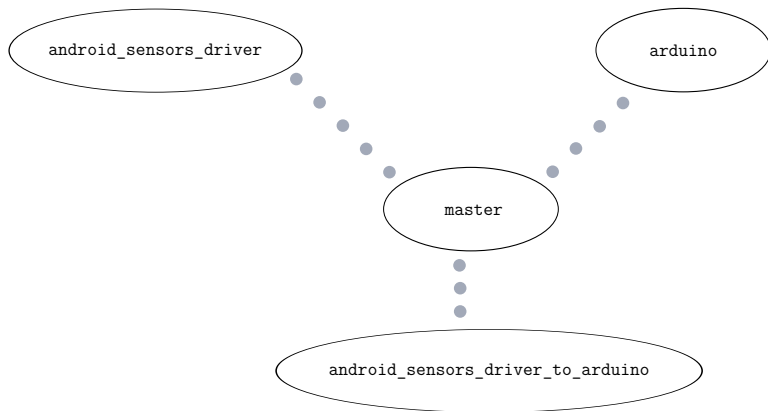
- Follow instructions from the ROS Wiki to install the `ros-electric-desktop-full` Ubuntu package



ROS Nodes and Communications



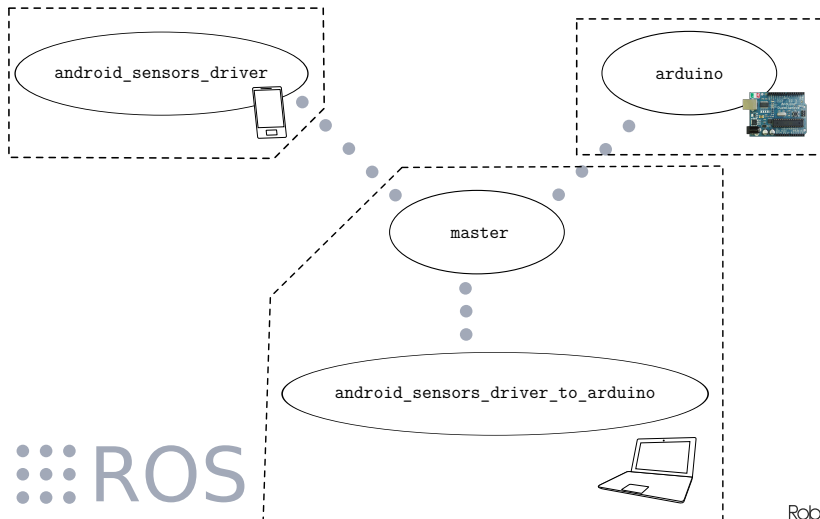
ROS Nodes and Communications



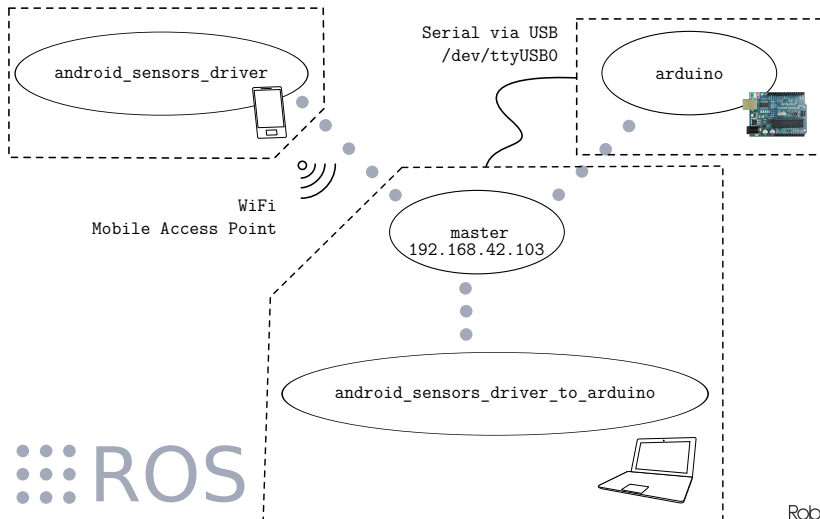
ROS



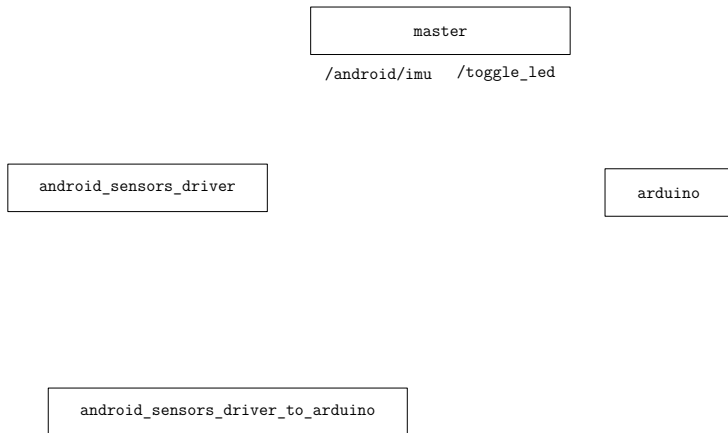
ROS Nodes and Communications



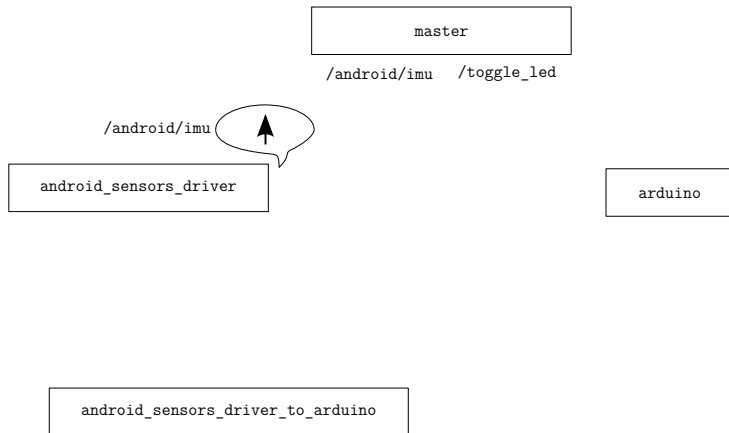
ROS Nodes and Communications



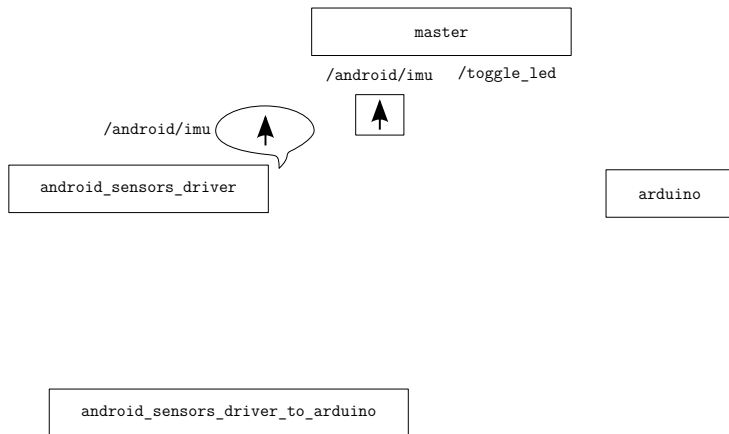
ROS Messages and Action



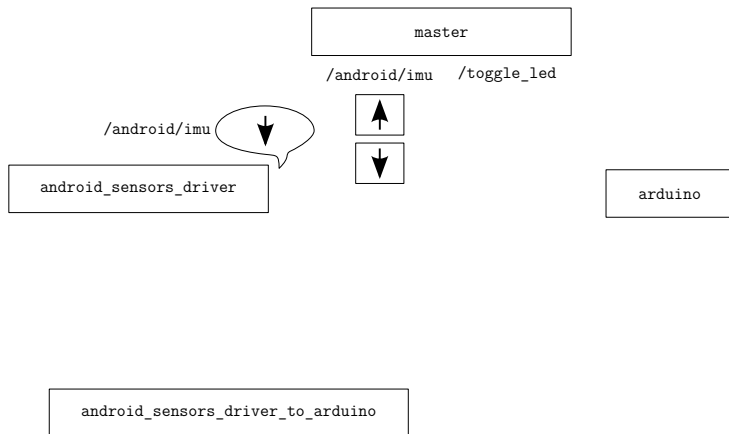
ROS Messages and Action



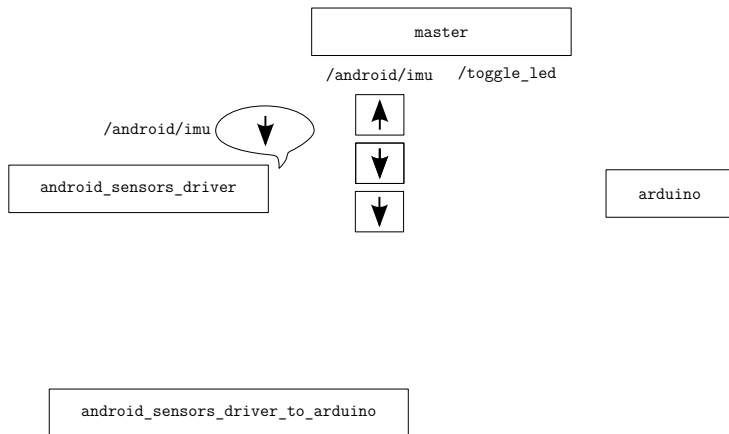
ROS Messages and Action



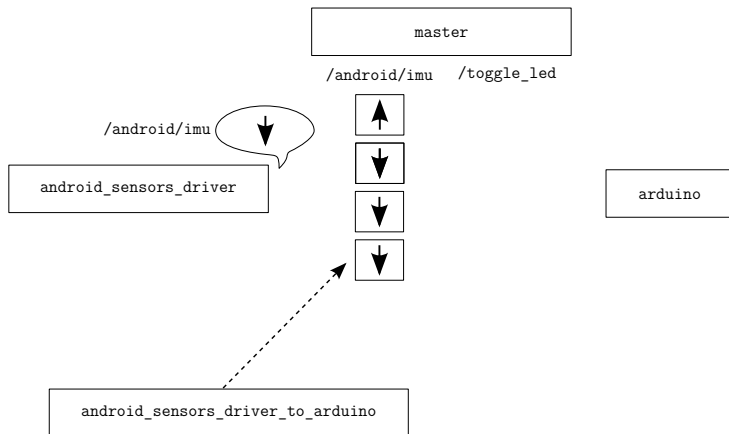
ROS Messages and Action



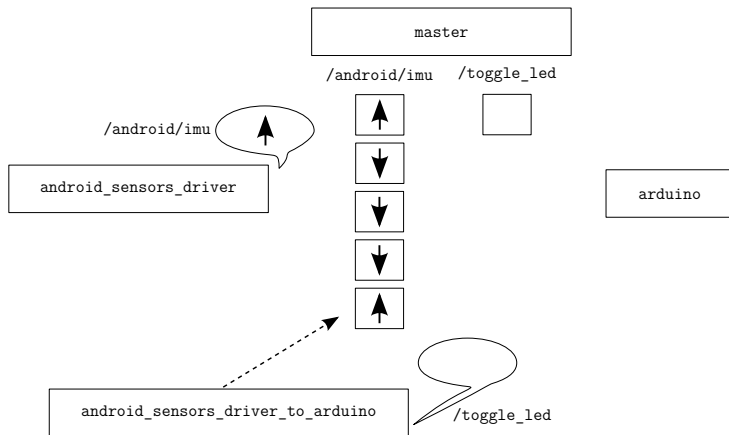
ROS Messages and Action



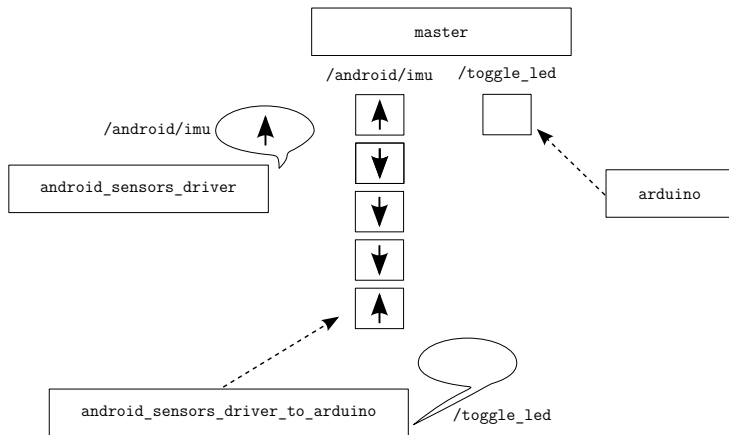
ROS Messages and Action



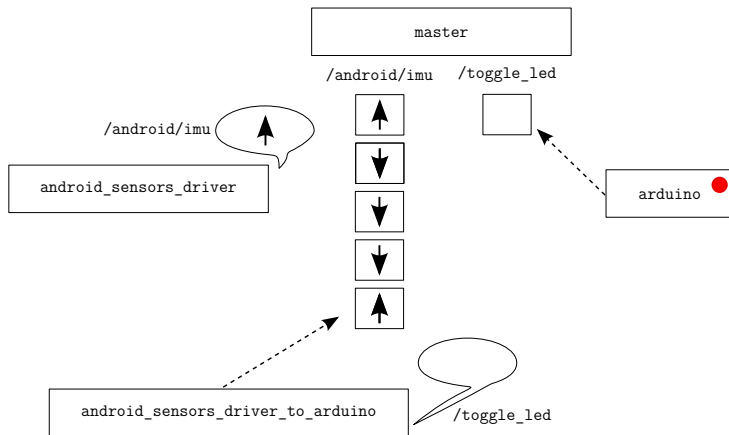
ROS Messages and Action



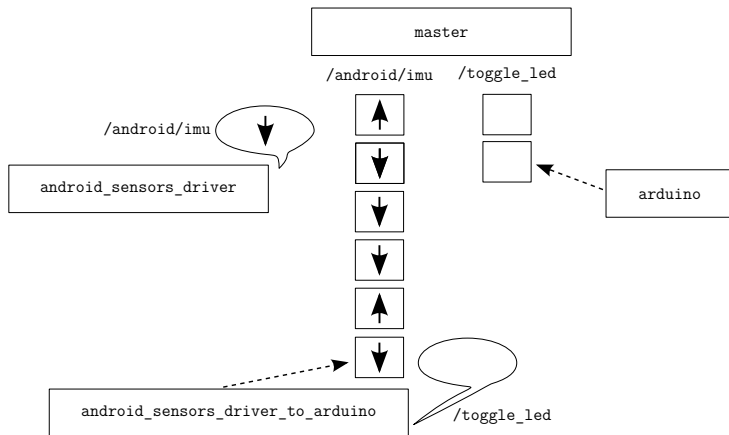
ROS Messages and Action



ROS Messages and Action



ROS Messages and Action



ROS Tutorials

- ROS Tutorials are very well organized
- First: **the code**
 - Straightforward usage description
 - The code can often be used **as-is**
- Then: **the code explained**
 - Detailed description of the code functionality
 - A great place to learn!



Our Example Tutorials

Master: just read the Getting Started tutorials

Arduino: `rosserial_arduino` (ROS library)
wiki/rosserial_arduino/Tutorials

Android: `arduino_sensors_driver` (ROS library)
wiki/android_sensors_driver/Tutorials

Android to Arduino: Subscriber and publisher (Python)
See `arduino_sensors_driver` tutorials.



Conclusion

- Free software is here, free **hardware** is rising.
- Free robotics tools are *state-of-the-art* and often cheap tools.
- You can use them while working with *modern working methods*.
- You can *learn* robotics using them.
- If you're entrepreneur, you can grow using free software and hardware while taking into account your developers' *intrinsic motivation*.



References



M. Pilgrim.

Dive into Python.

Apress, 2004.



M. Pilgrim.

HTML5: Up and Running.

O'Reilly Series. O'Reilly Media, 2010.



D.H. Pink.

Drive: The Surprising Truth about What Motivates Us.

Penguin Group USA, 2011.

This Document is Free

This document (also in Spanish), its sources, and the Beamer theme Santiago can all be found at:

<https://github.com/gonzalo-bulnes>



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Thank you for paying attention.