

ROS & Gazebo

Novidades na robótica de código aberto

Louise Poubel

Brasil, 2018



Louise Poubel

<http://louise.world>

 @chapulinaBR



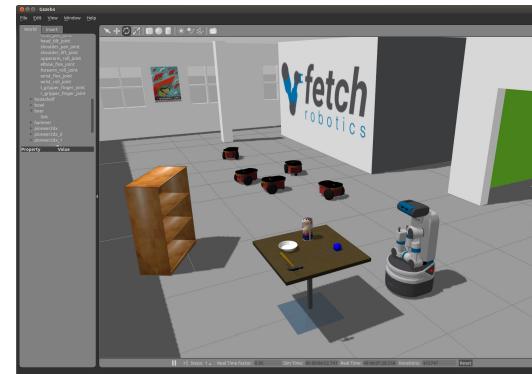
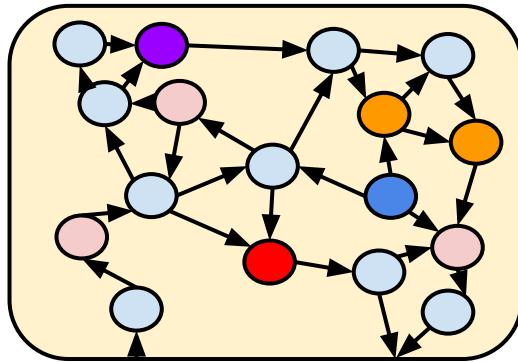
Open Robotics

Missão: "...apoiar o desenvolvimento, distribuição e adoção de software open source para uso em pesquisa, educação e produtos de robótica."



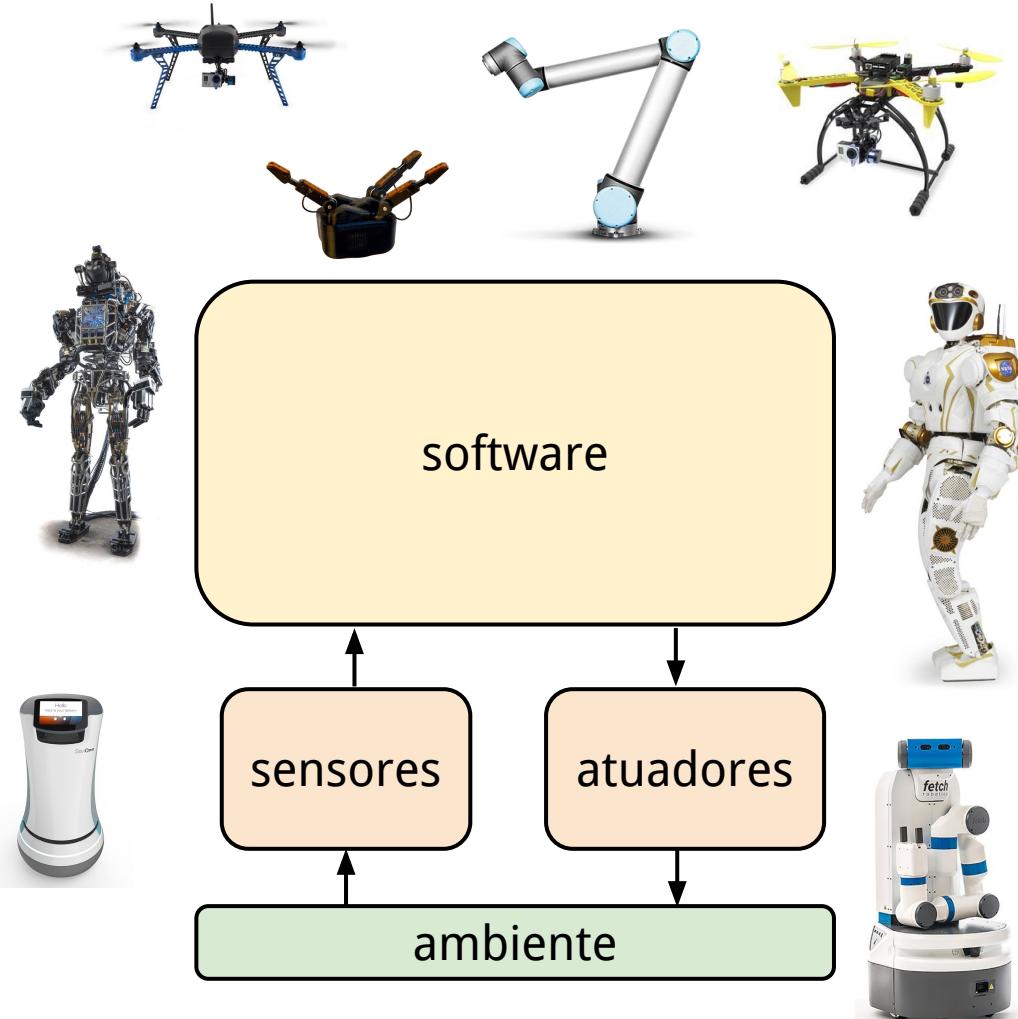
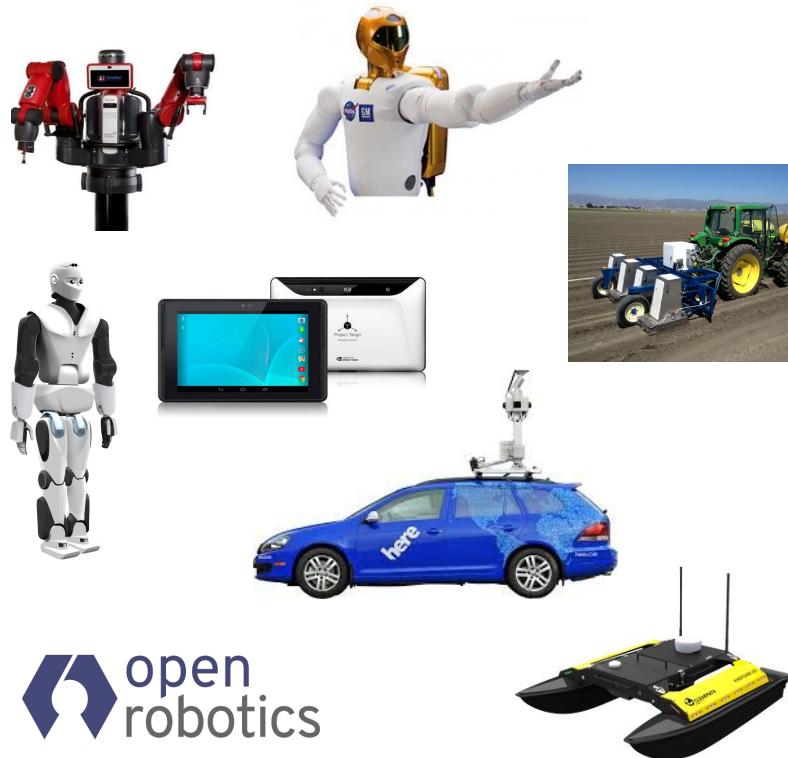
Open Robotics

Nós administramos, entre outros, dois grandes projetos:



O problema

Software de robótica é difícil



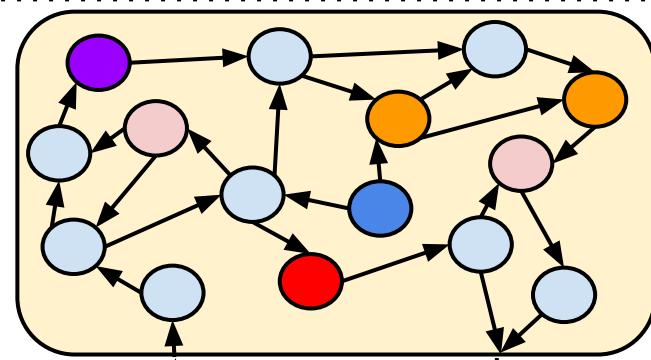
Nossa abordagem

Colaboração, modularidade e simulação

 ROS



GAZEBO



sensores

atuadores

ambiente

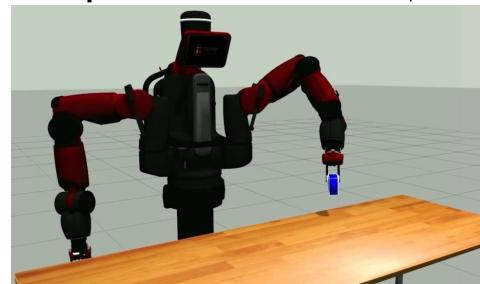
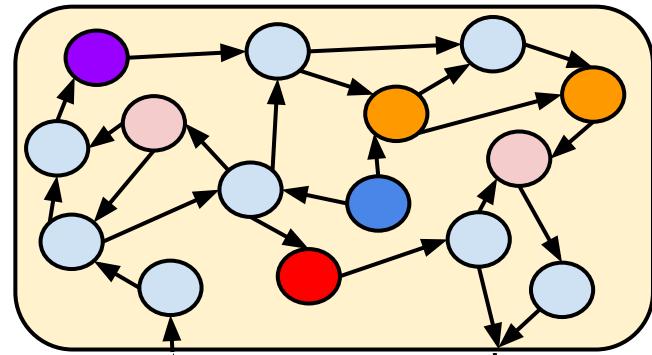
Simulação

Para testar e debugar

ROS



GAZEBO

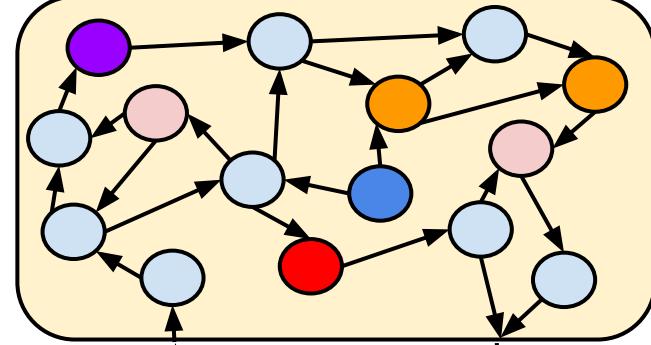


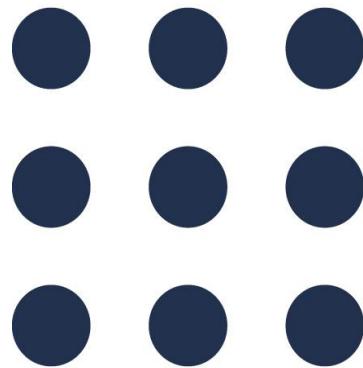
Implantação

Objetivo: software robusto, reutilizável e testado

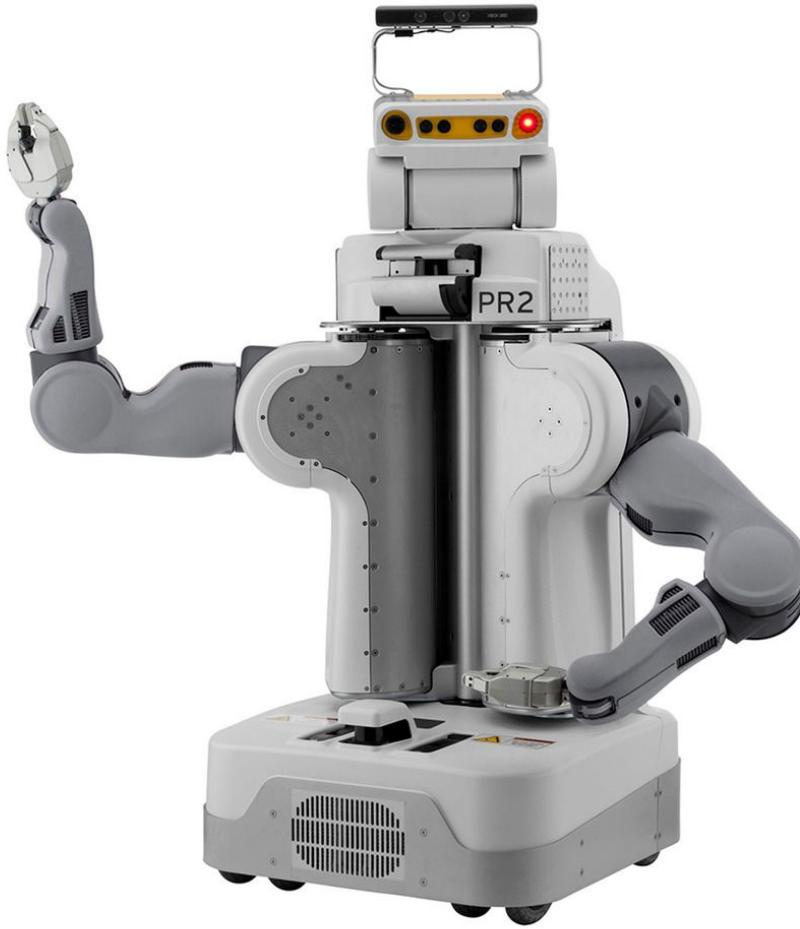


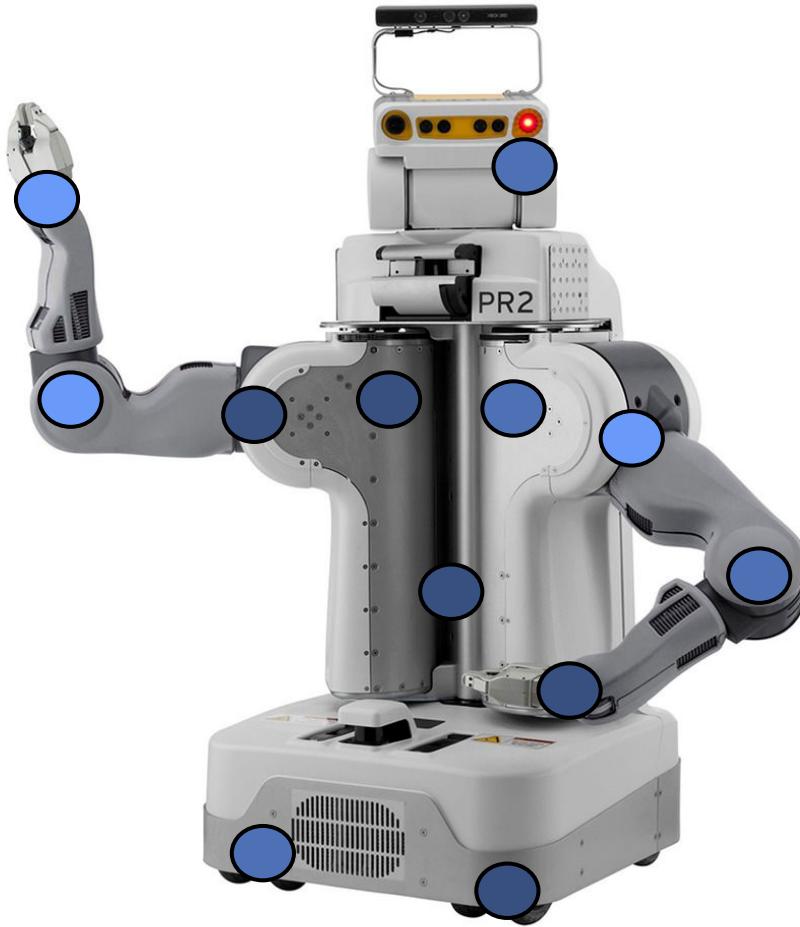
GAZEBO

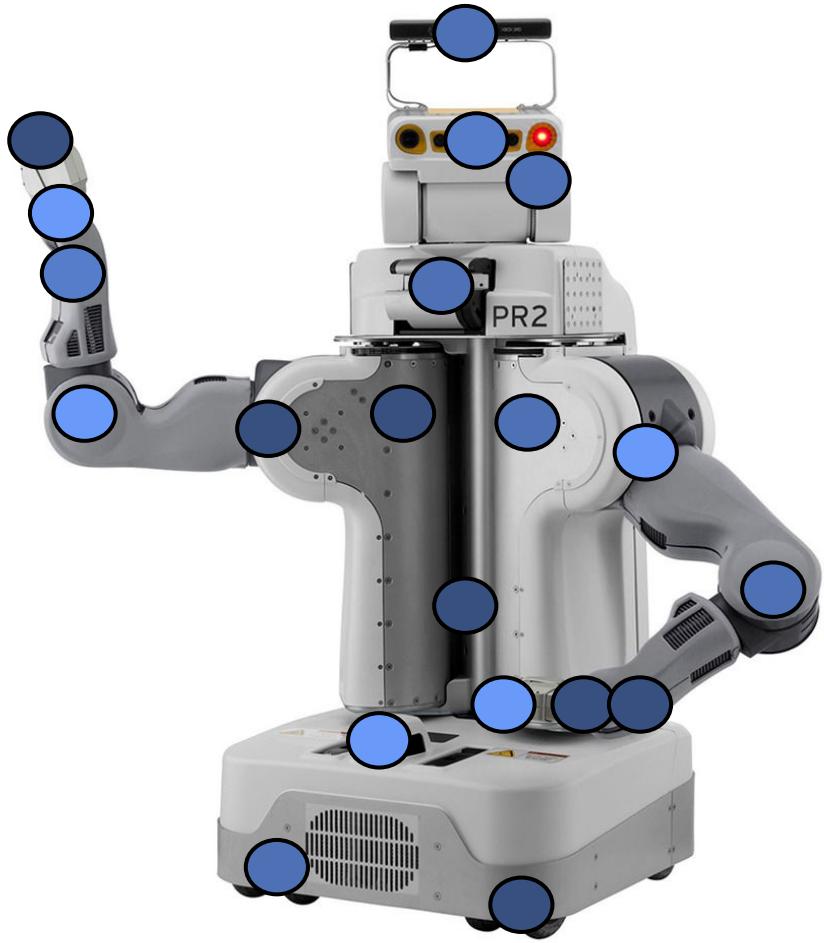


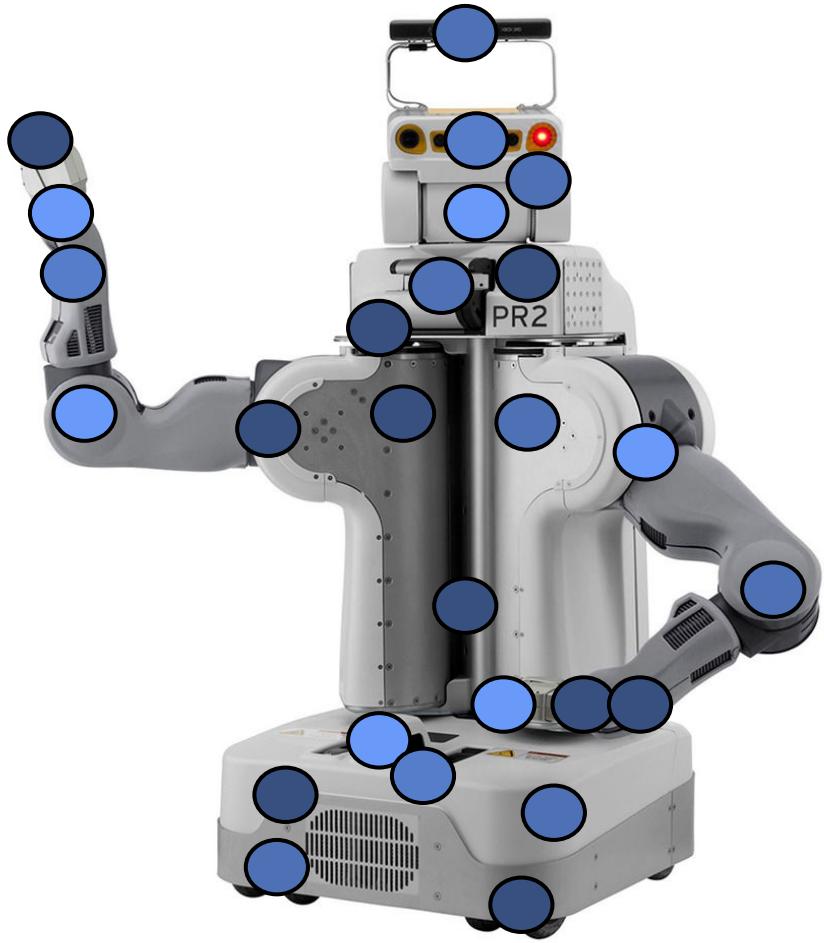


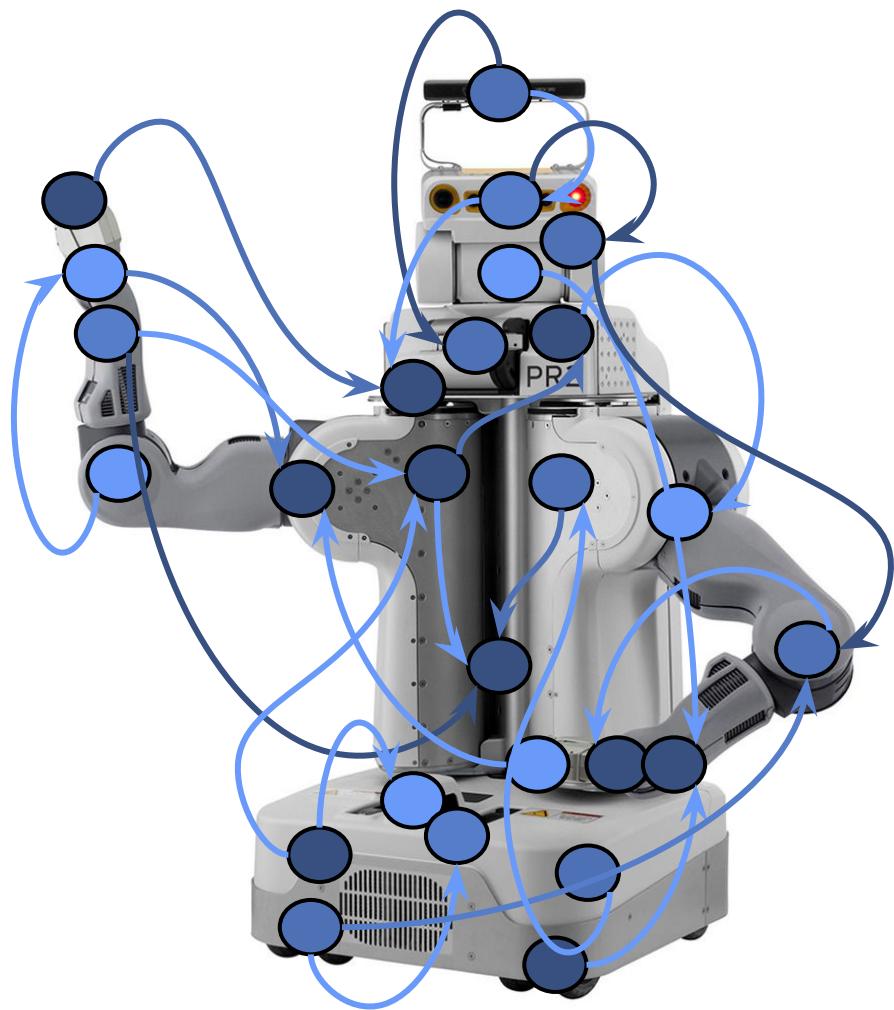
ROS

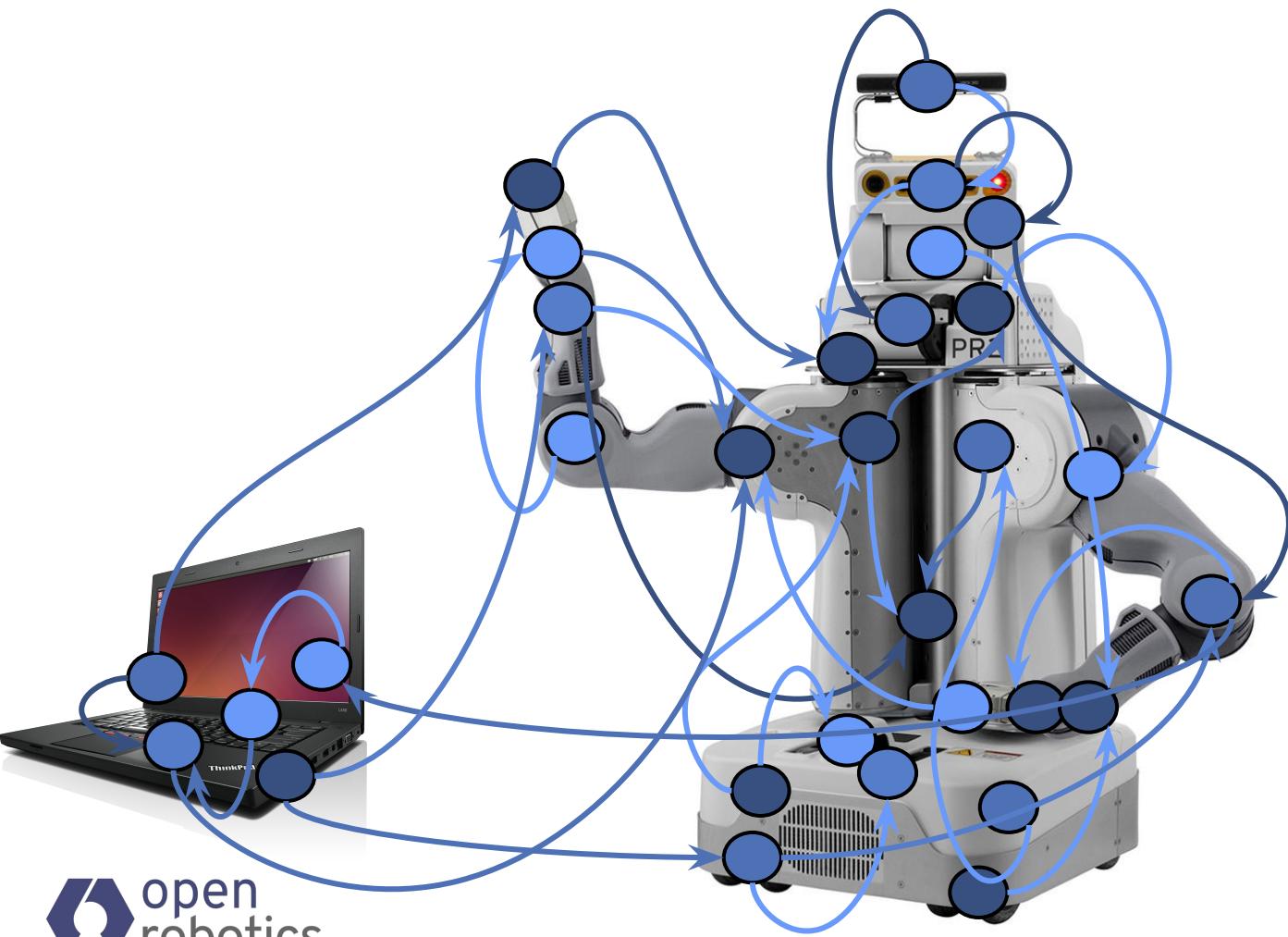




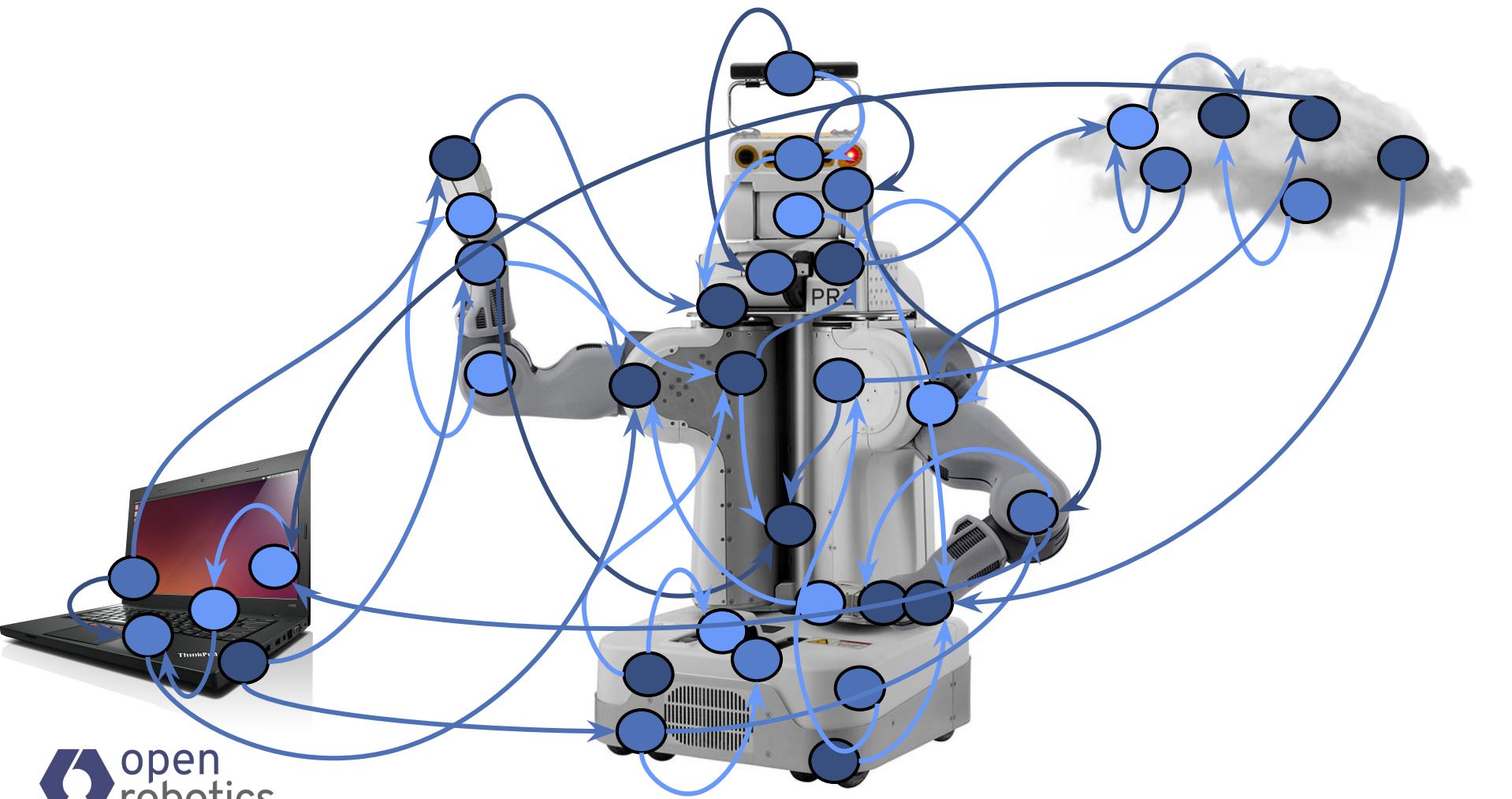




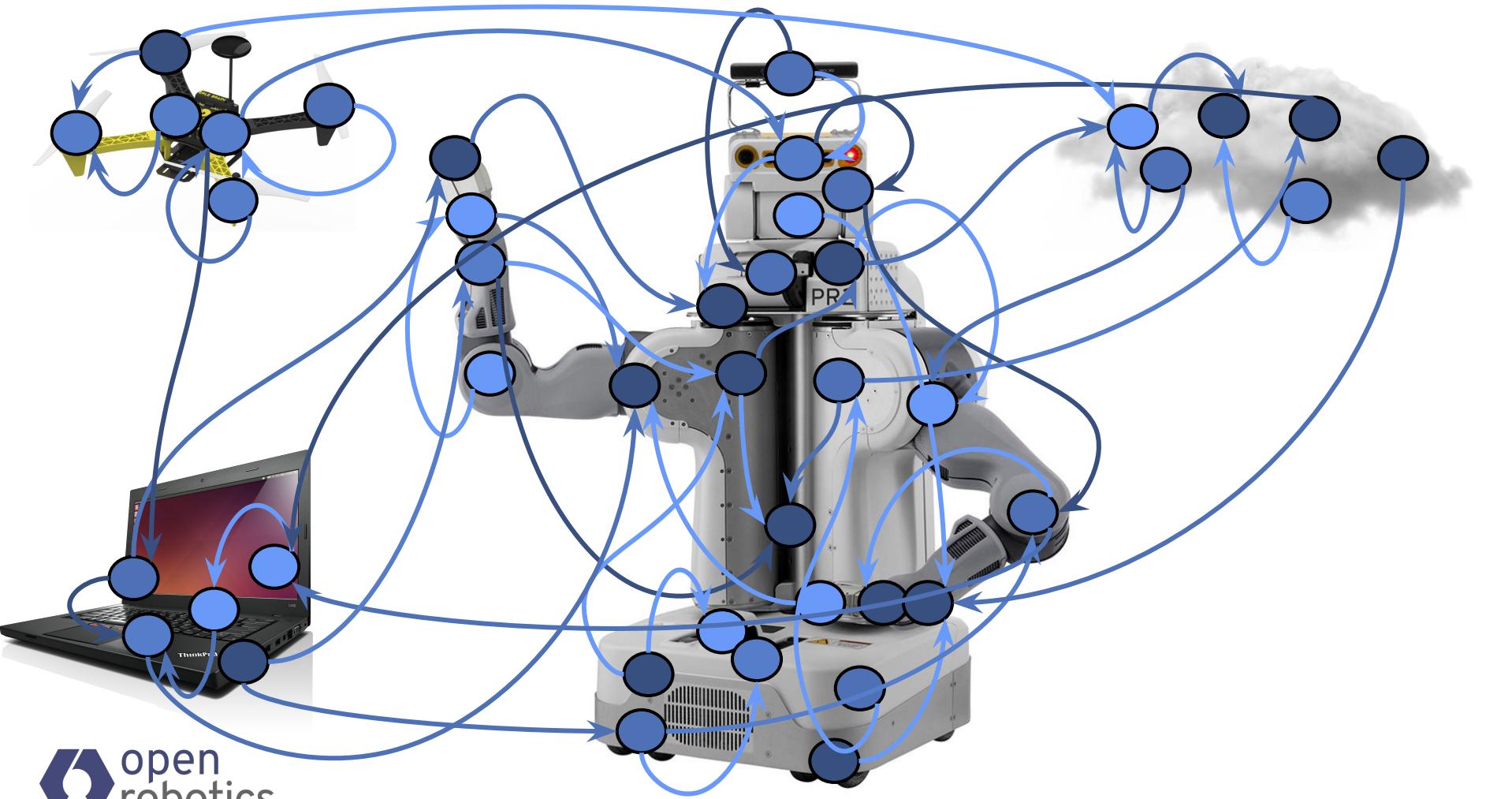


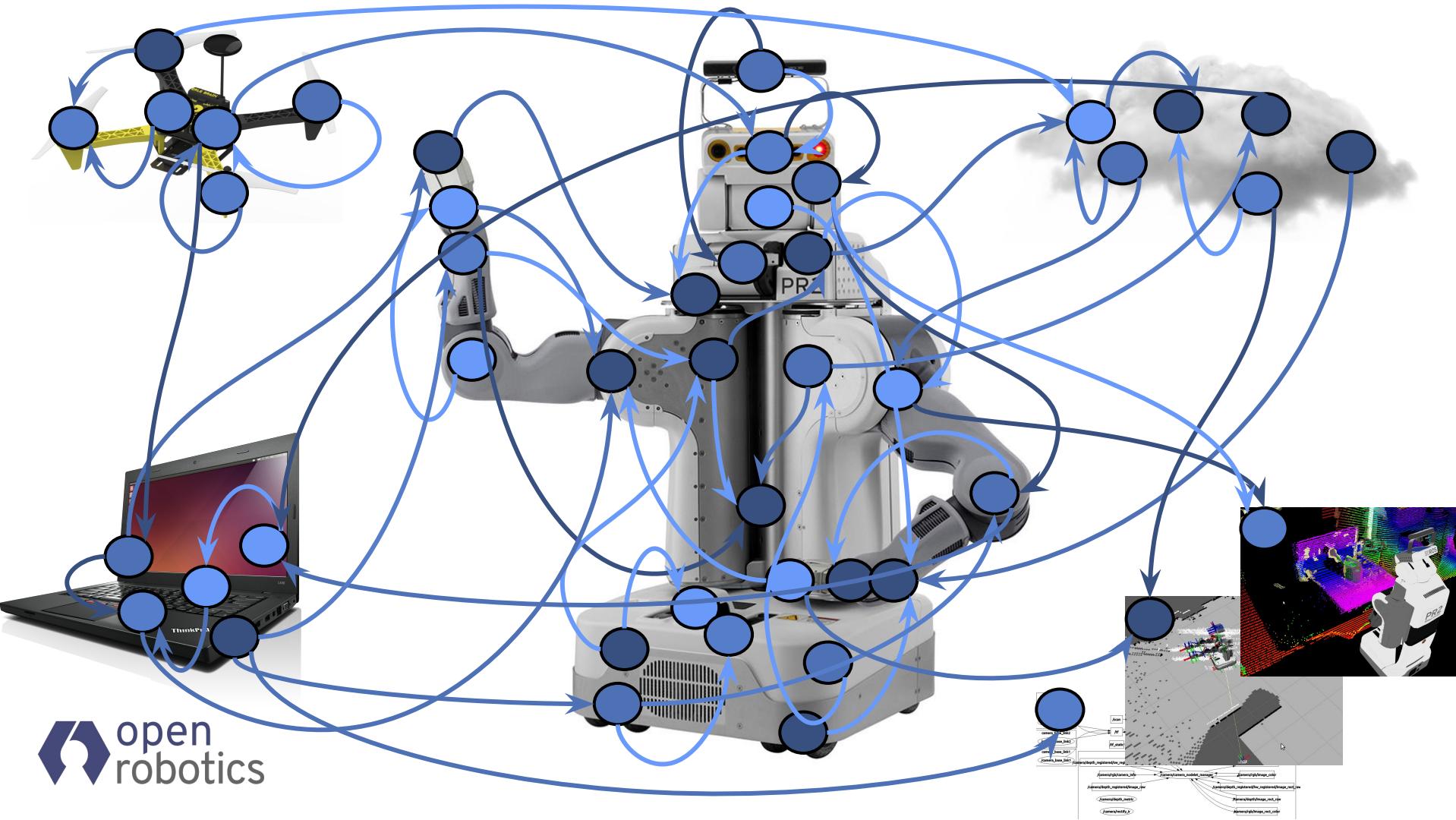


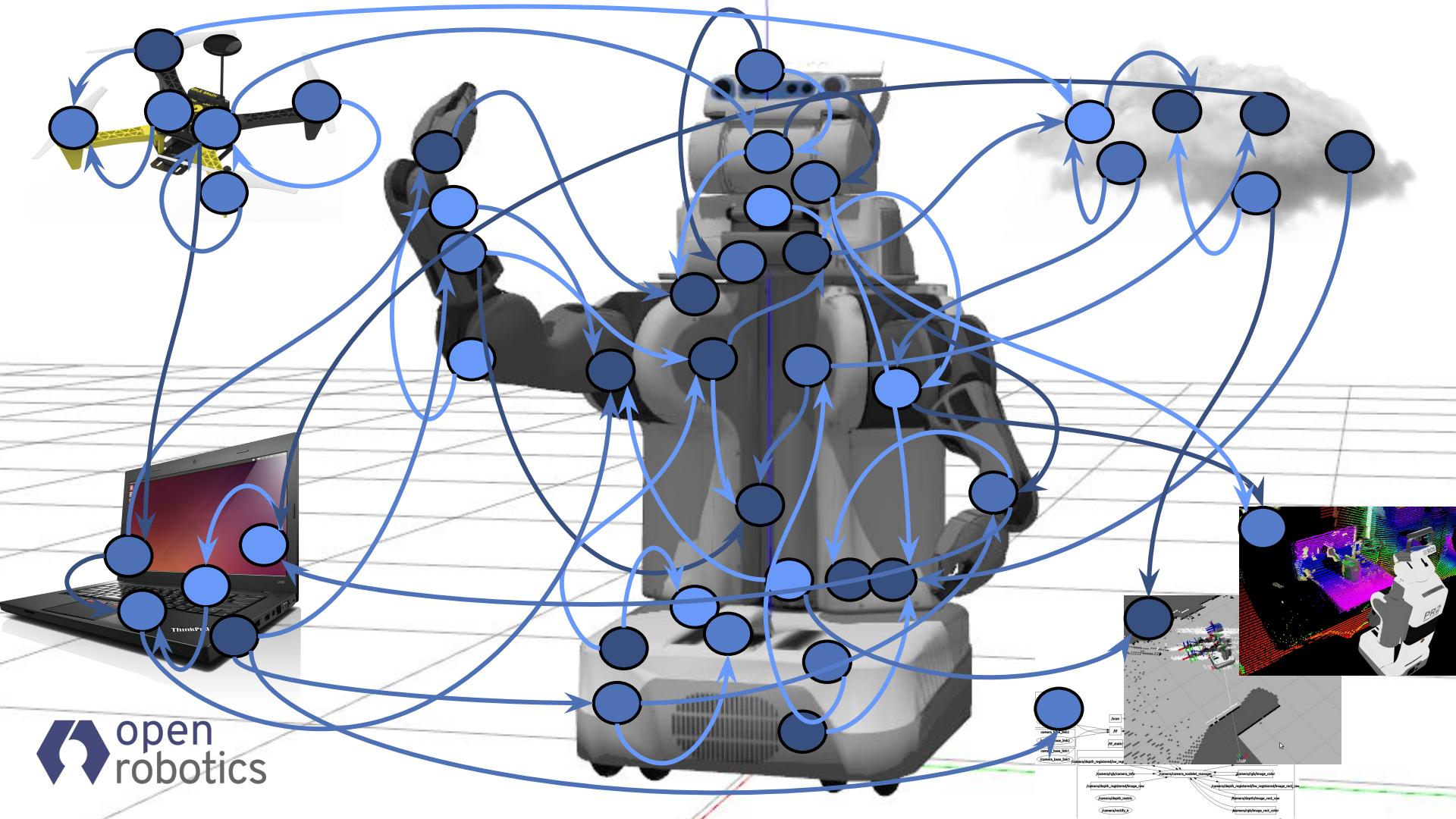
 open
robotics



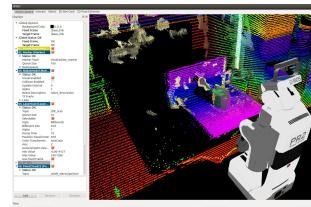
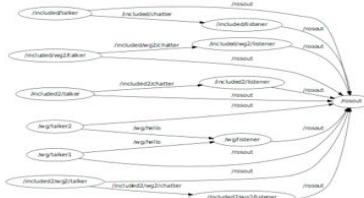
 open
robotics







Robot Operating System



Ferramentas

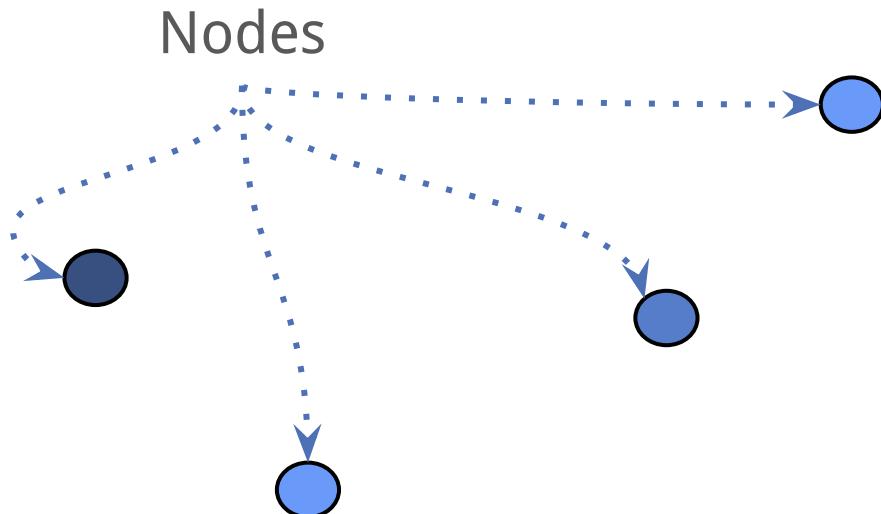
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Ecossistema

Terminologia

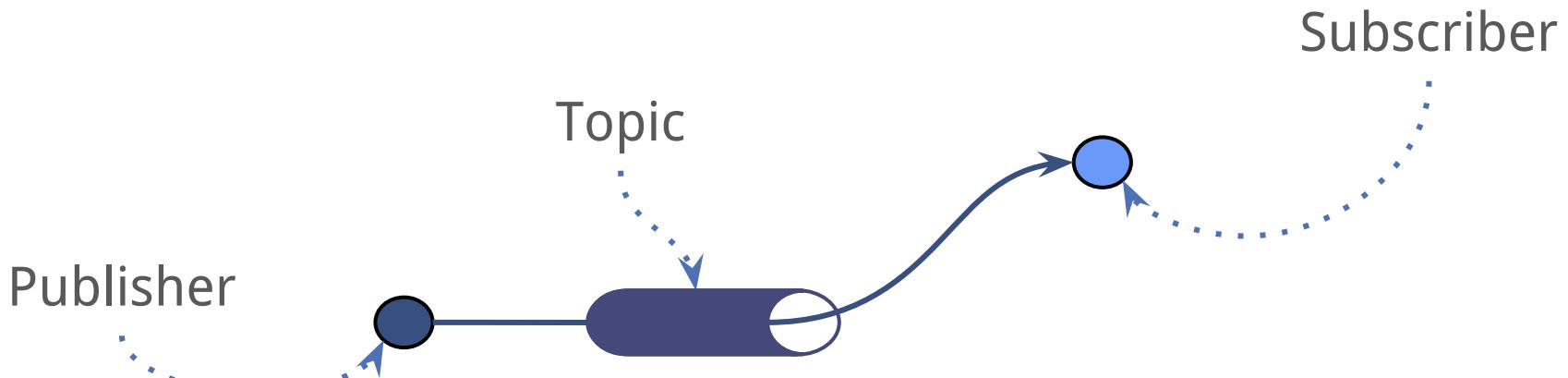
Nodes



- Uma função específica
- C++, python...
- `rosnode`

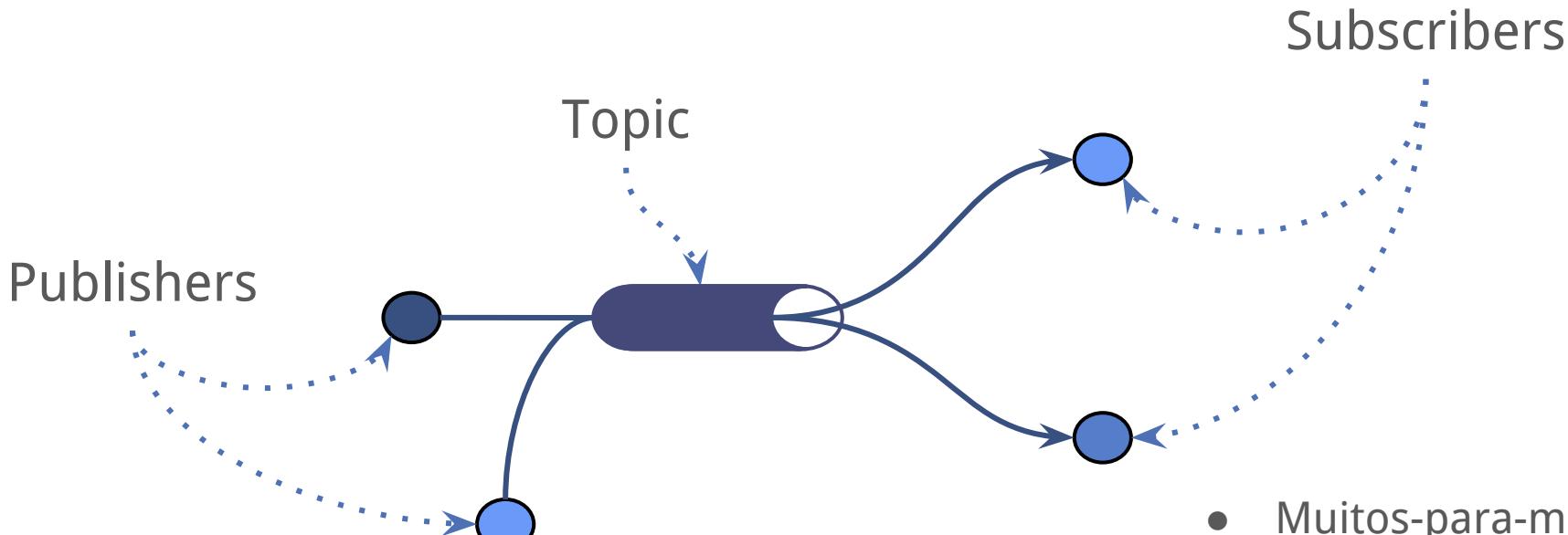
Terminologia

Pub / sub



Terminologia

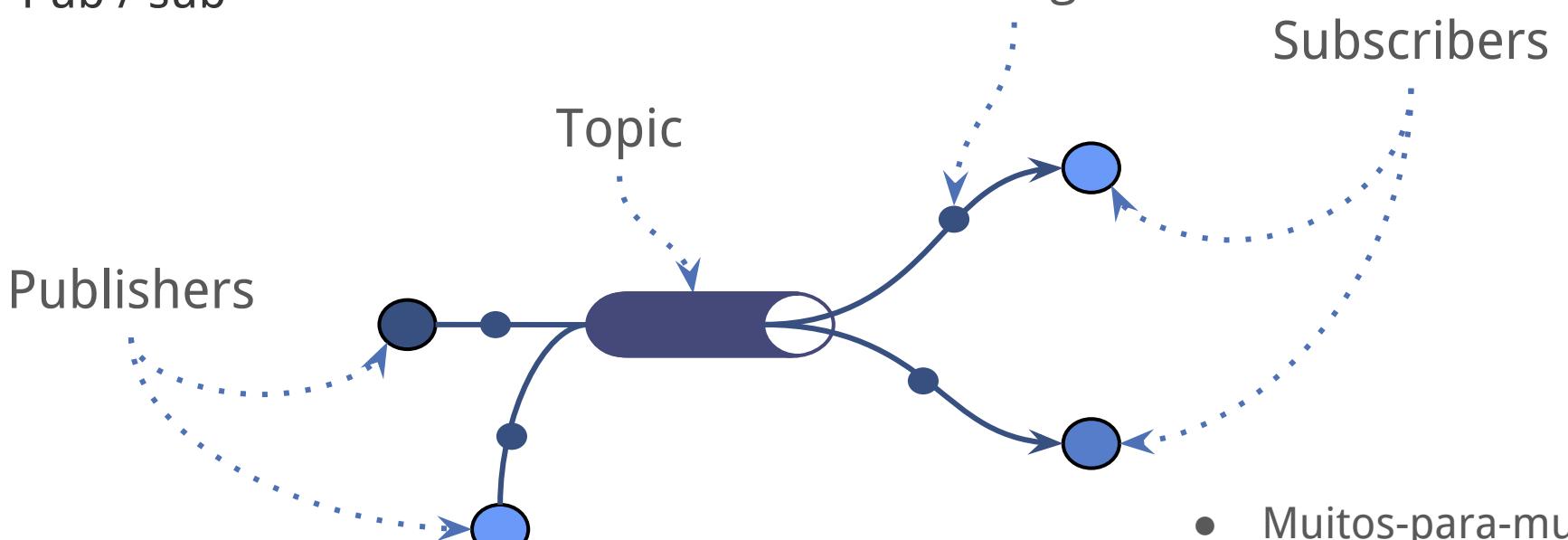
Pub / sub



- Muitos-para-muitos
- Assíncrono
- Unidirecional
- `rostopic`

Terminologia

Pub / sub



Publishers

Topic

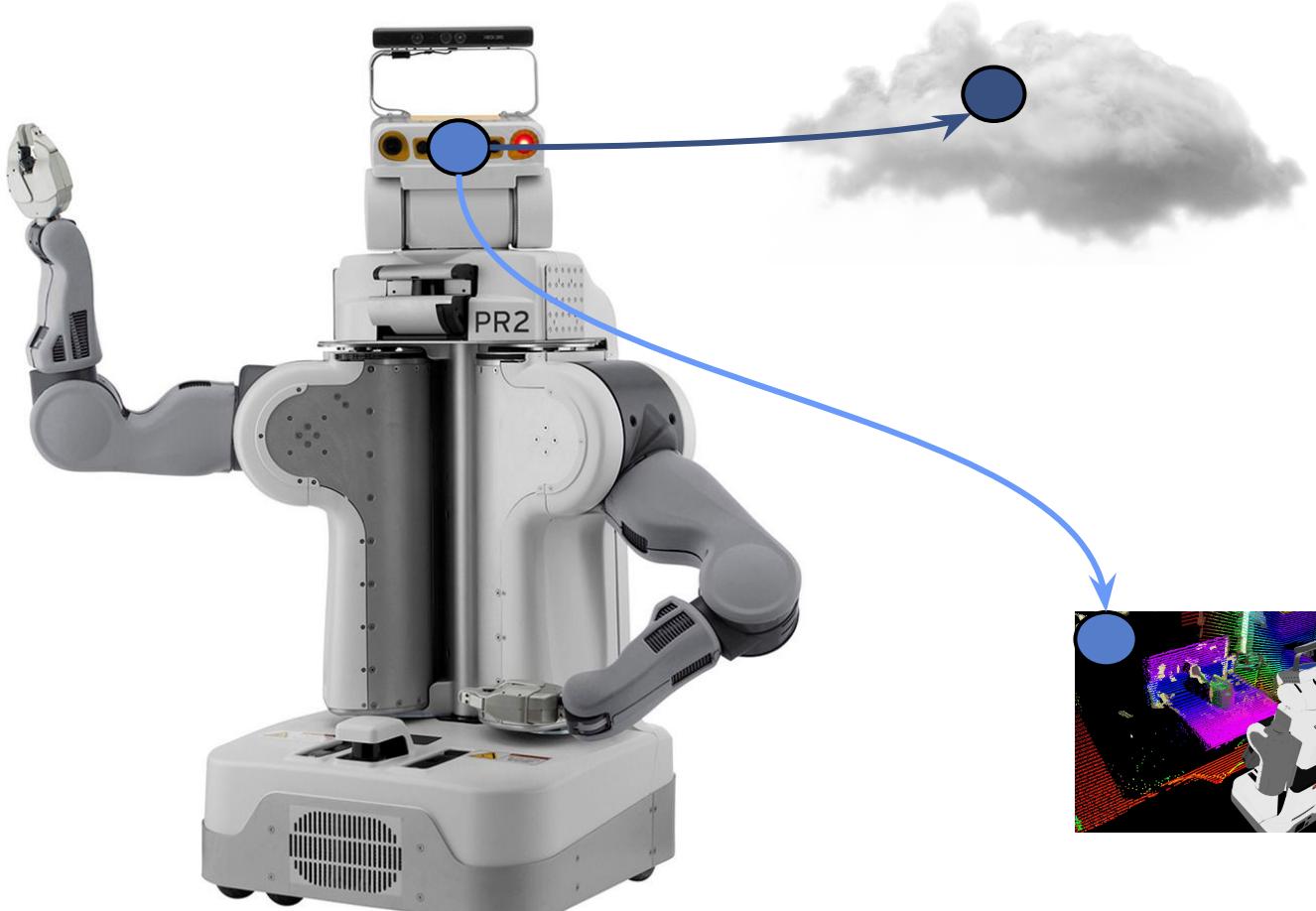
Messages

Subscribers

- Muitos-para-muitos
- Assíncrono
- Unidirecional
- `rostopic`

Terminologia

Pub / sub



Terminologia

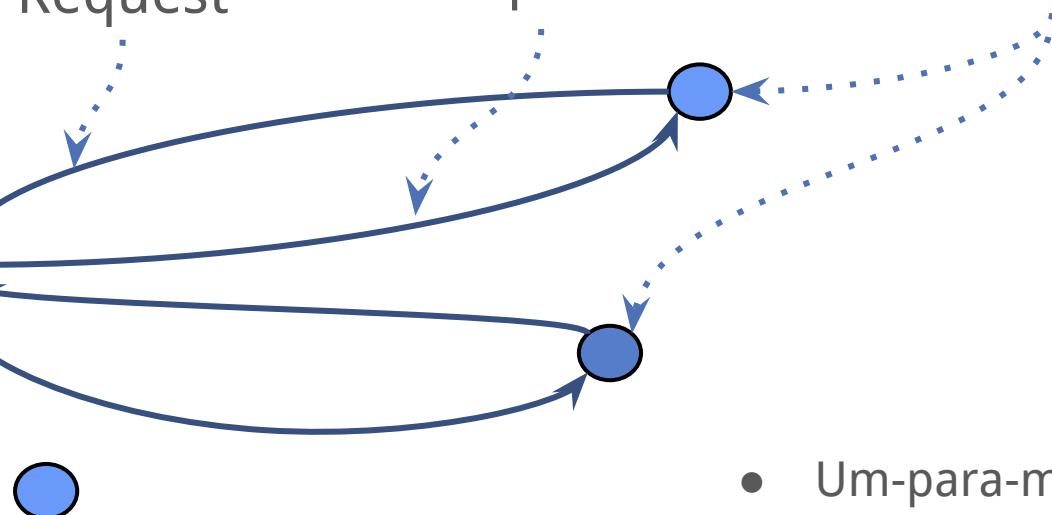
Services

Service server

Request

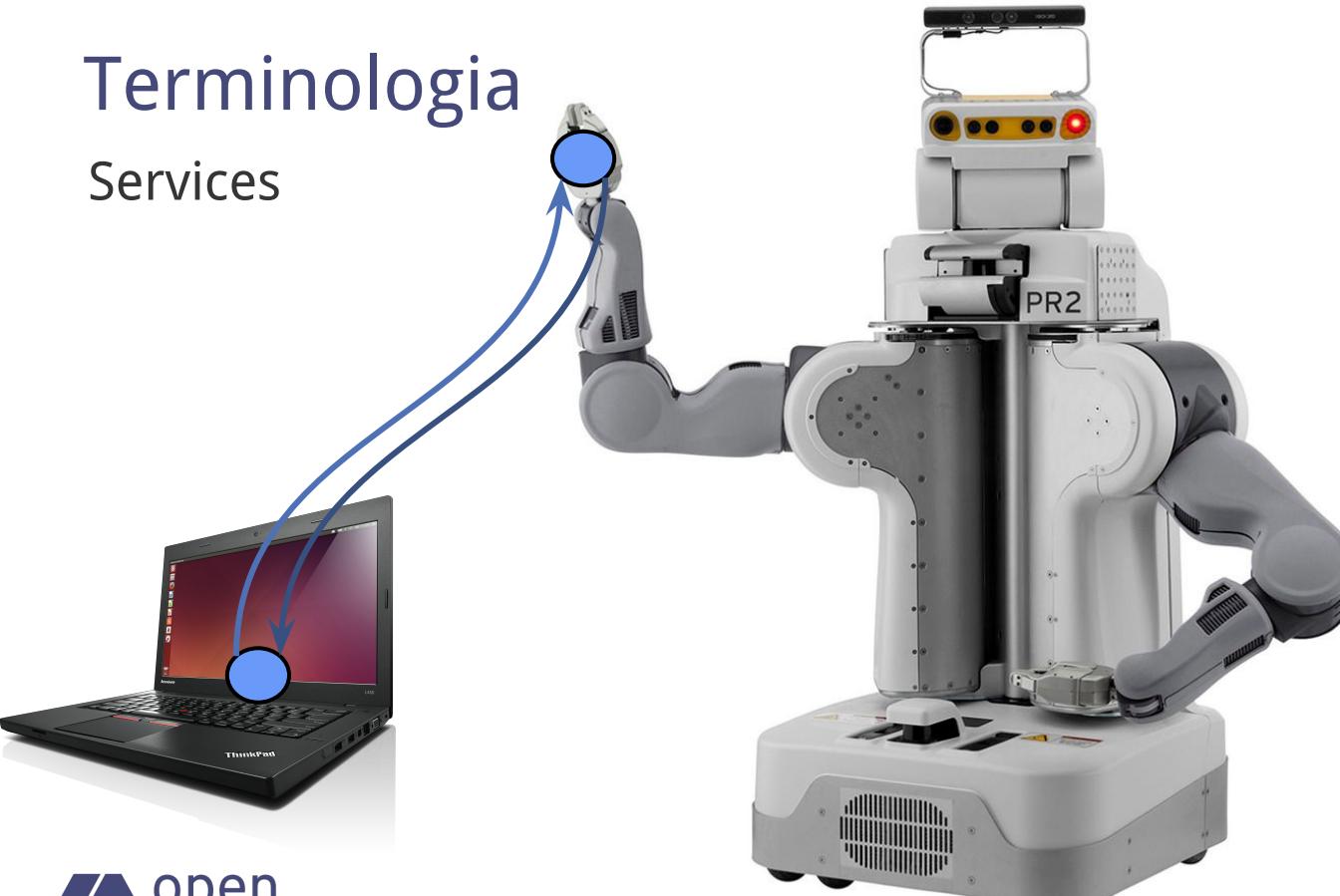
Response

Service clients



- Um-para-muitos
- Assíncrono ou síncrono
- Bidirecional
- `rosservice`

Terminologia Services



Terminologia

Actions

Action server

Action client

Goal

Cancel

Result

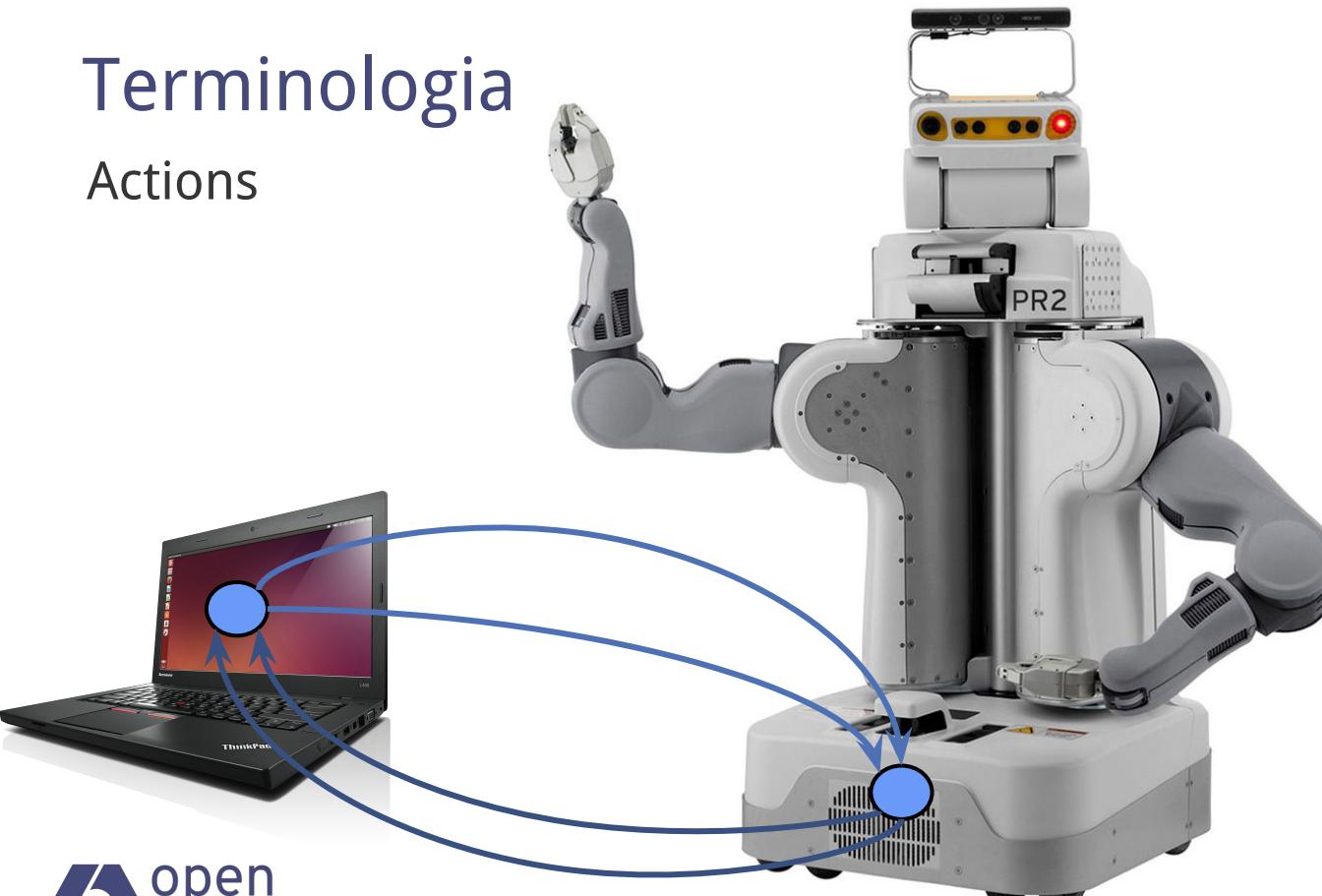
Feedback

Status

- Um-para-muitos
- Assíncrono ou síncrono
- Bidirecional
- Progressivo

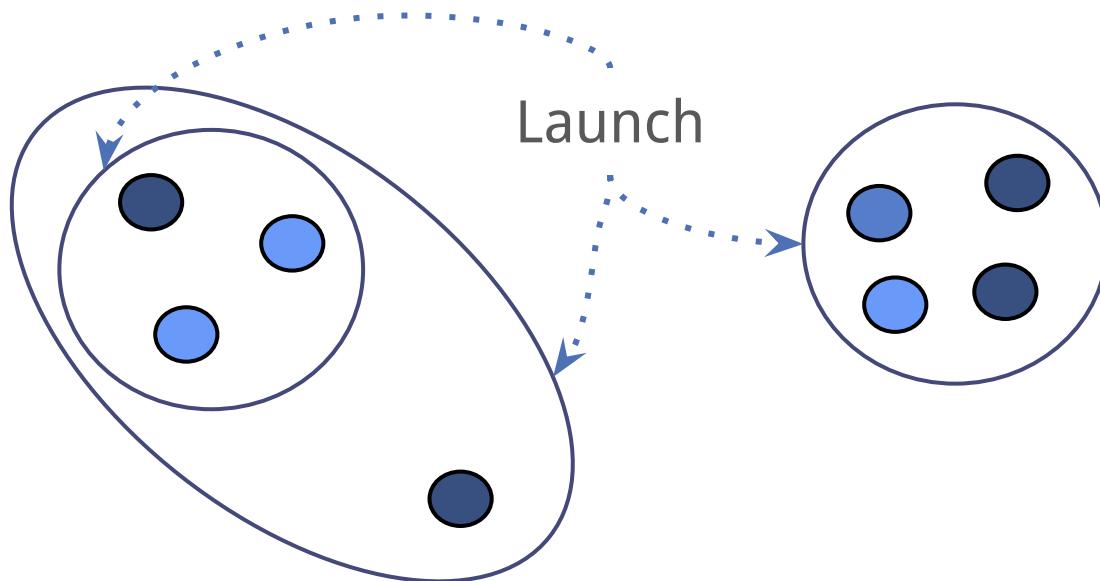
Terminologia

Actions



Terminologia

Launch



- Arquivo XML
- Inicia e configura nodes
- `roslaunch`

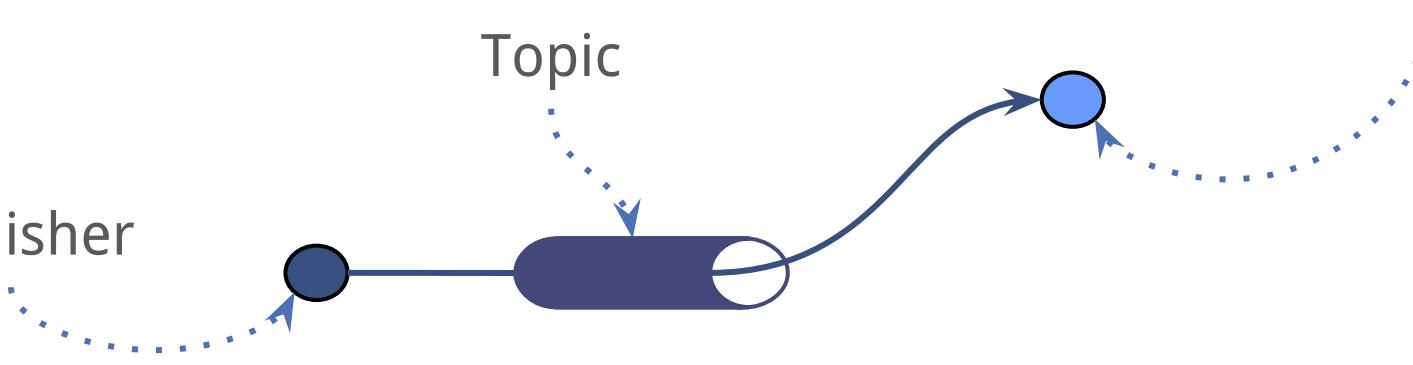
Terminologia

Master

Subscriber

Publisher

Topic



- Conecta nodes
- roscore

Terminologia

Master

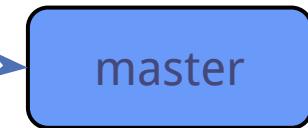
Subscriber

Publisher

Topic

advertise

subscribe



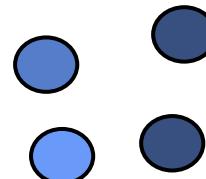
- Conecta nodes
- roscore

Terminologia

Catkin

Package

```
└── CMakeLists.txt
    └── launch
        └── competition.launch
    └── map
        ├── map.png
        └── map.yaml
    └── media
        ├── materials
        └── meshes
    └── models [39 entries exceeds
    └── msg
        ├── ActorNames.msg
        └── Score.msg
    package.xml
    └── src [24 entries exceeds fil
    └── srv
        ├── Drift.srv
        ├── DropOffGuest.srv
        ├── NewTask.srv
        ├── PickUpGuest.srv
        ├── RoomInfo.srv
        └── TaskInfo.srv
    worlds [43 entries exceeds
```



- Automatiza compilação
- “Workspace” estruturado
- Várias linguagens
- `catkin_make`

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• • • 2

ROS 2



Microcontroladores



Tempo real



Redes instáveis



Multi-robôs



Produtos

ROS 2

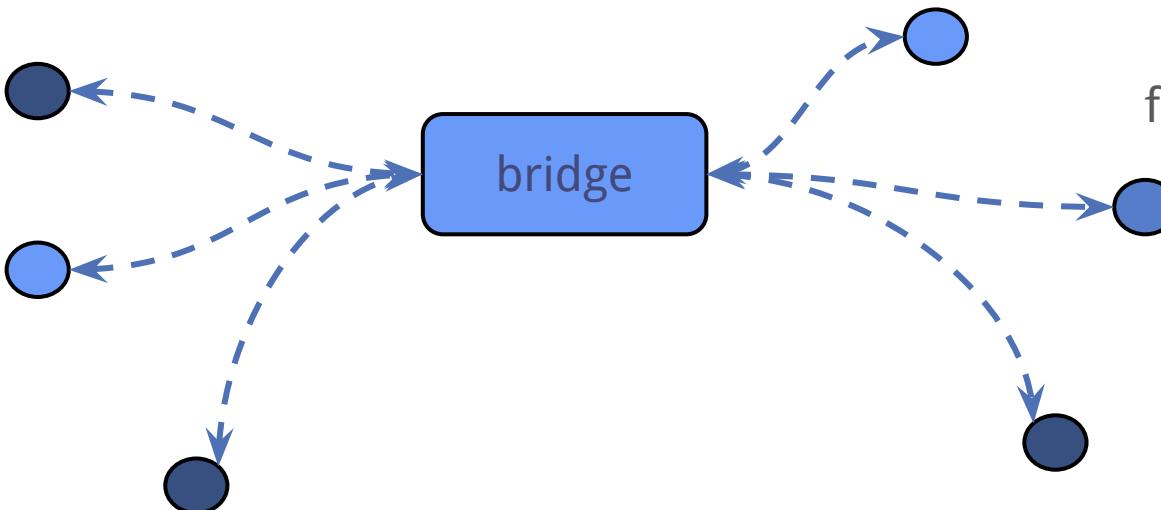
Ponte



Novas
funcionalidades



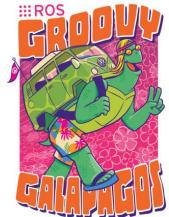
Ecossistema



Versões



:::Box Turtle

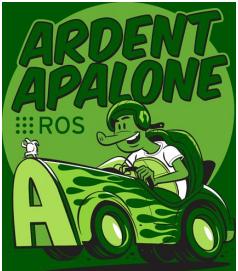


1



Melodic
Morenia
(maio 2018)

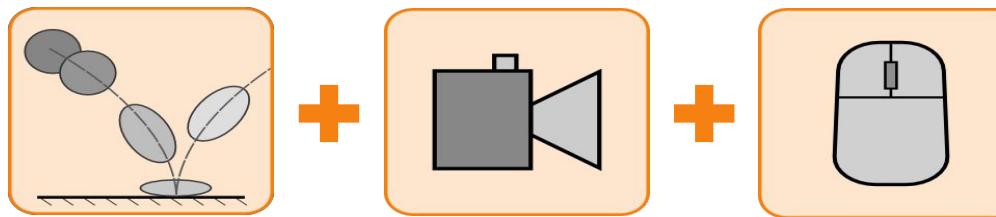
2





GAZEBO

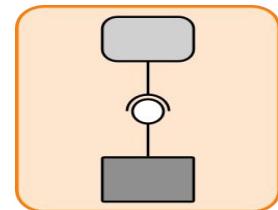
O que é



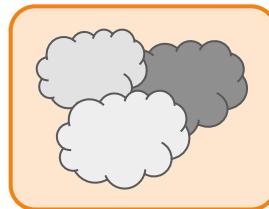
Física

Sensores

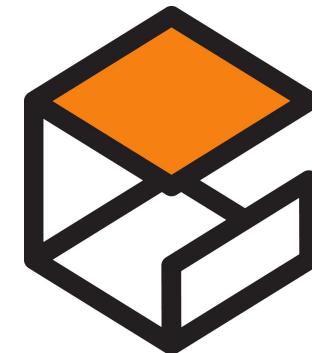
Interface
gráfica



Interfaces

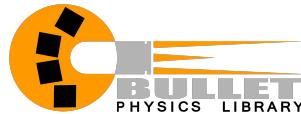


Nuvem



GAZEBO

Dependências



Ignition



Introspecção

Aplicação de Força / Torque

Plotagem

Marcadores visuais

Editor de modelos

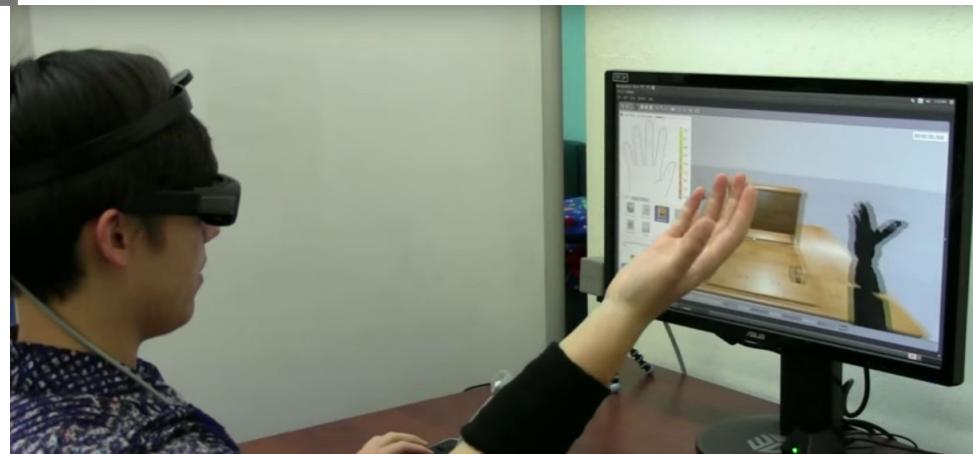
Editor de prédios

Integração com hardware



VR & controles

Captura de movimento
& óculos 3D



Nuvem



Simulações na nuvem



IgnitionFuel.org

Recursos online

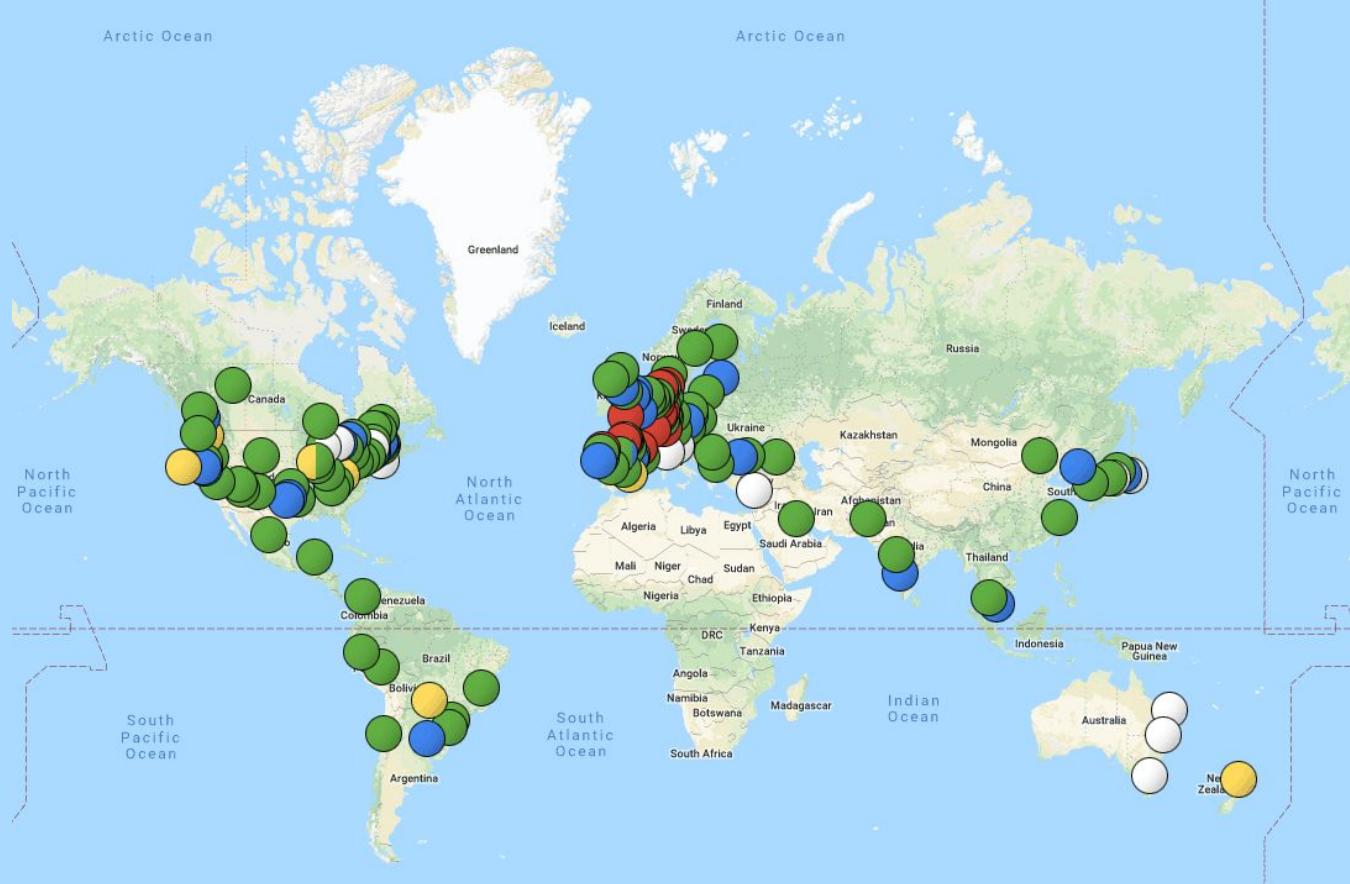


Interface web



Quem usa?

Em março de 2018



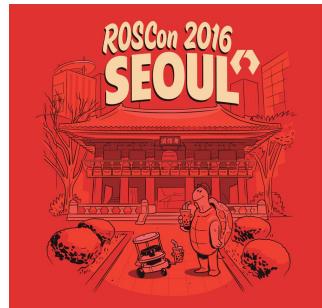
ROSCon



ROSCon 2012



**ROSCon
2013**



DARPA Robotics Challenge (2012-2015)

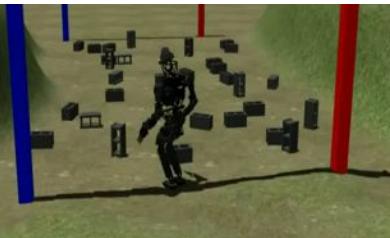
Dos 23 times nas finais:

18 times rodaram  ROS

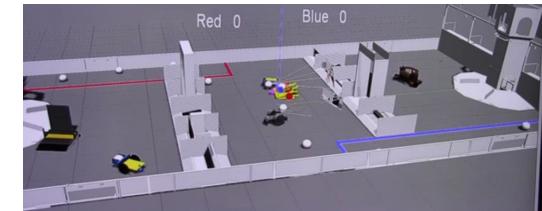
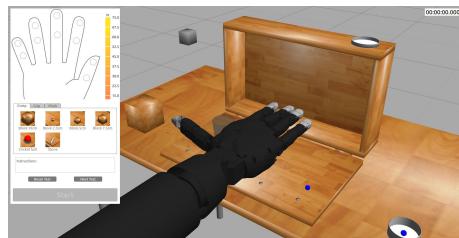
14 times usaram  GAZEBO



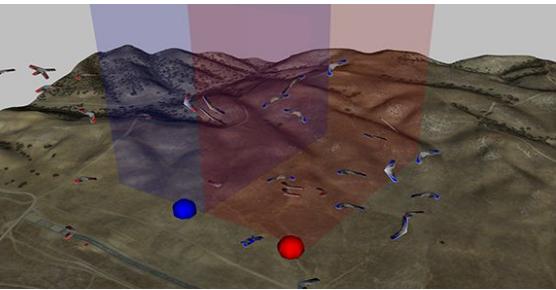
Projetos



HAPTIX



SASC



ARIAC



Obrigada!



PDF