

Design of an intuitive and responsive remote control interface for robots

The Universal Robot Controller

Master Thesis Presentation by La Spada Luca

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ÉCOLE POLYTECHNIQUE
FÉDÉRALE DE LAUSANNE



Outline

Introduction

Architecture

Results

Conclusion

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Motivation

- Remote-controllers

- Non-autonomous robots and fully autonomous robots
- Lack of evolutions

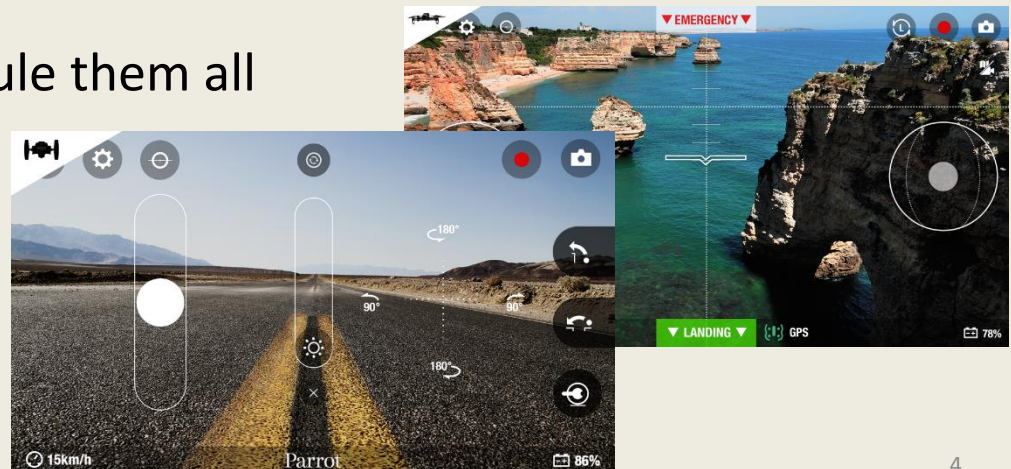


- Ascertainment

- Almost each robot has its dedicated remote-controller
- Majority of people possess a mobile device (smartphone, tablet, etc.)

- One remote-controller to rule them all

- Custom GUIs for each robot
- Access to sensors data



Goal

- Developing a **versatile** remote-controller application
 - Run on various mobile devices
 - Compatible with various robots
 - Represent the same information differently
- Providing a framework to design GUIs
 - Targeting B2B
 - Reusability of components
 - Several layouts for the same robot
 - Intuitive & Responsive



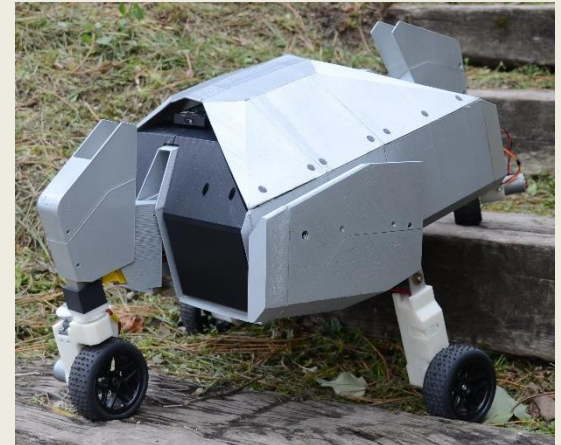
Proof of concept



AmphiBot III
by BioRob



Absolem
by Bluebotics



ROVéo Mini
by Rovenso

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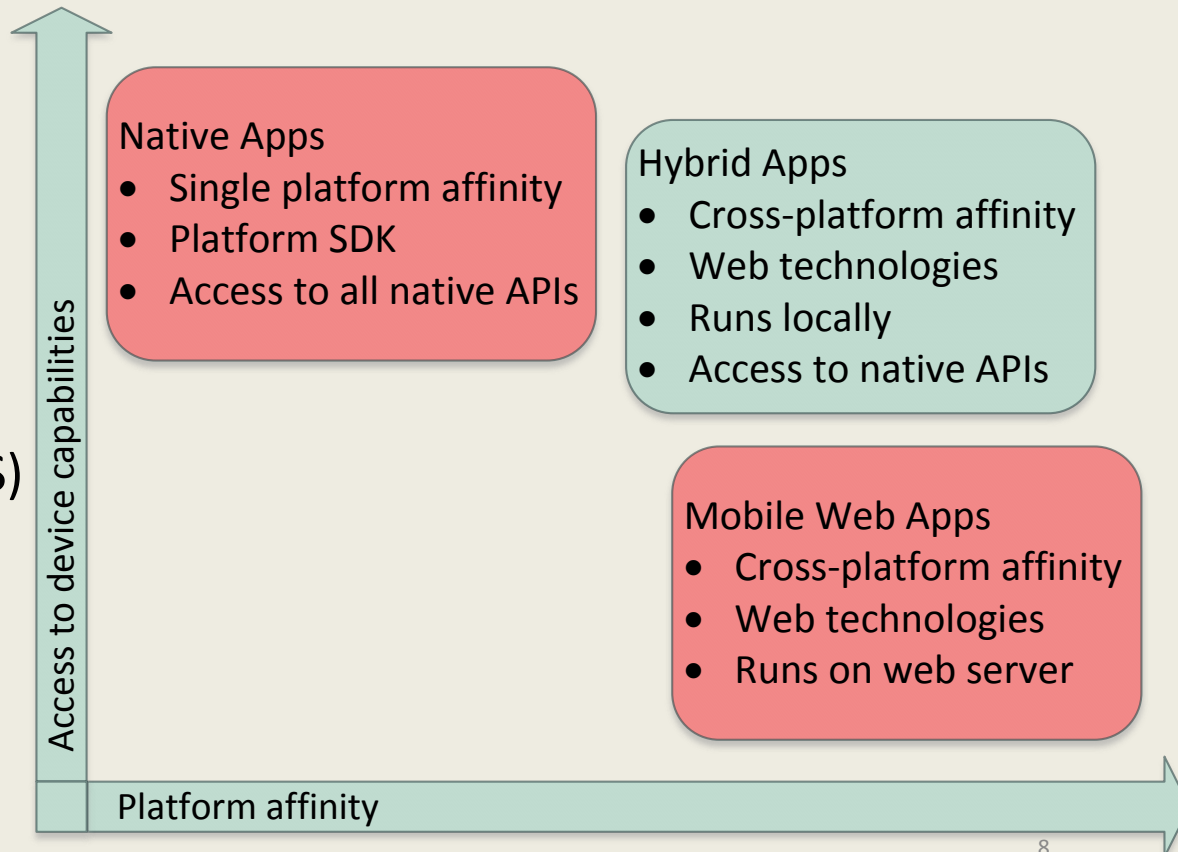
Conclusion

Choices

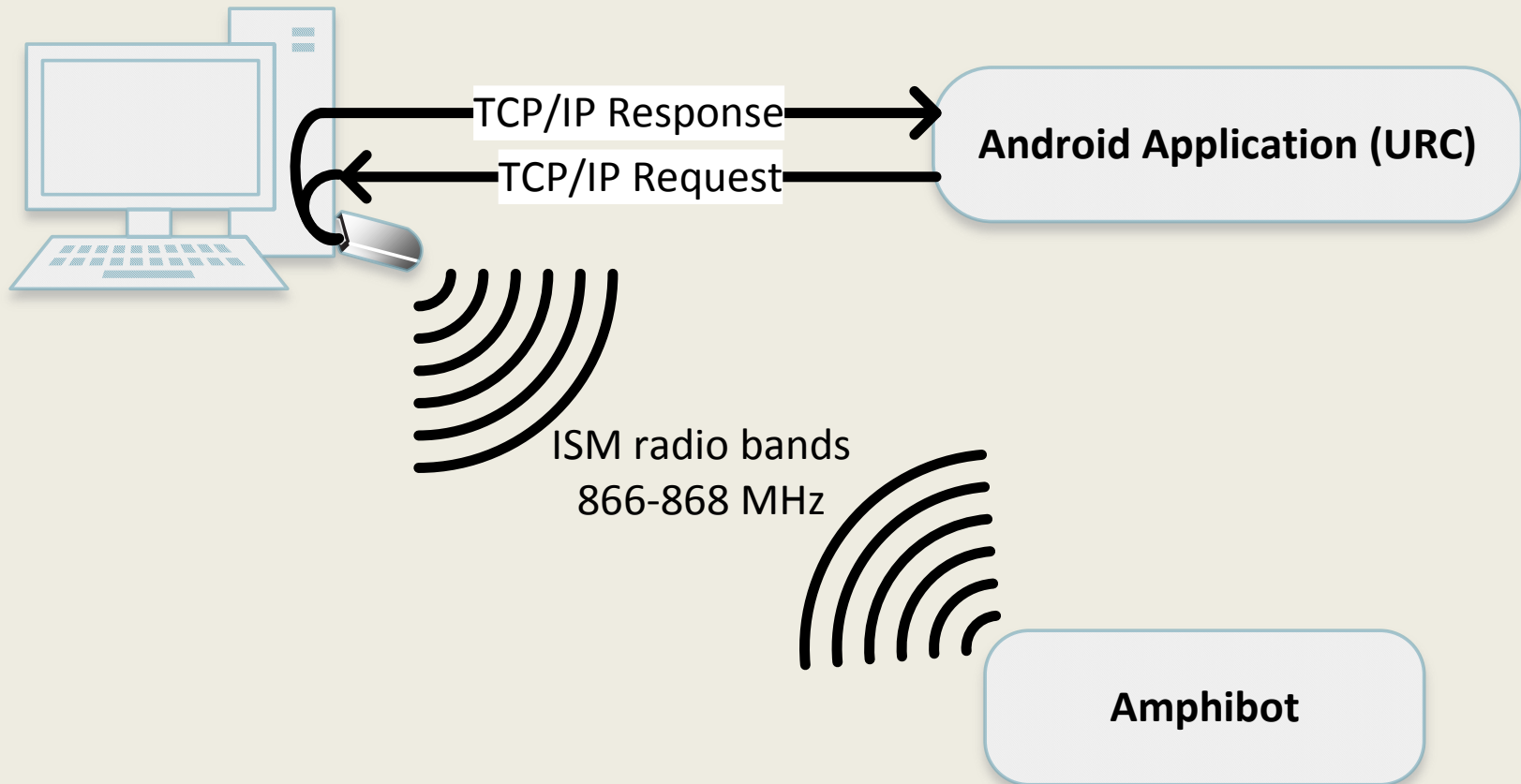
- Android
 - Reduce the complexity by supporting one OS
 - 80% of the market share worldwide

- Hybrid Apps
 - External: Native App
 - Internal: Web App

- Web technologies (JavaScript, HTML5, CSS)
 - Multi-platform
 - Flexibility
 - Intuitive & Responsive

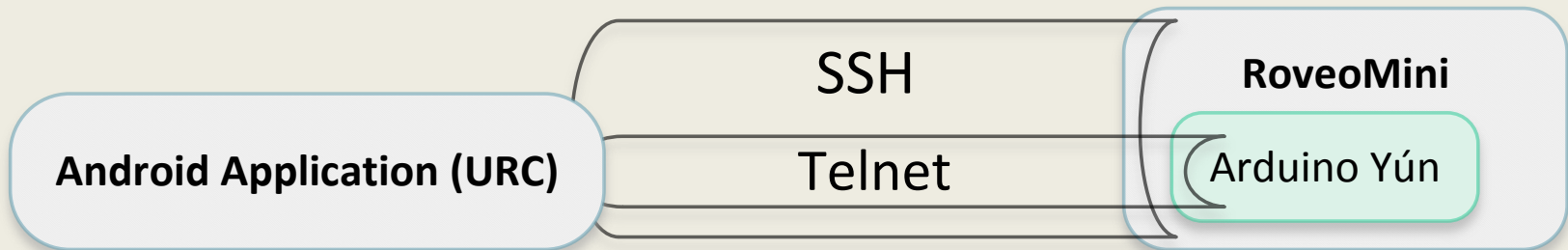


Communications Protocol AmphiBot III

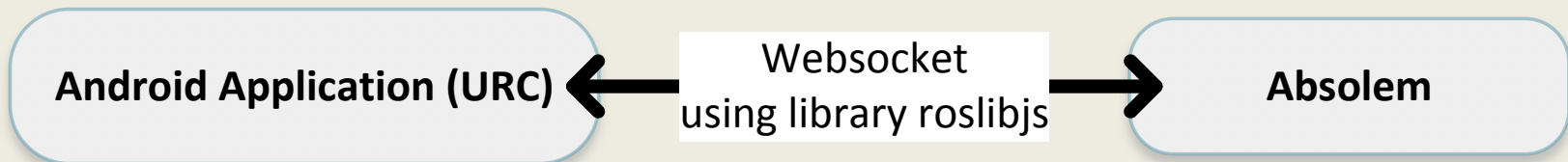


Communications Protocol

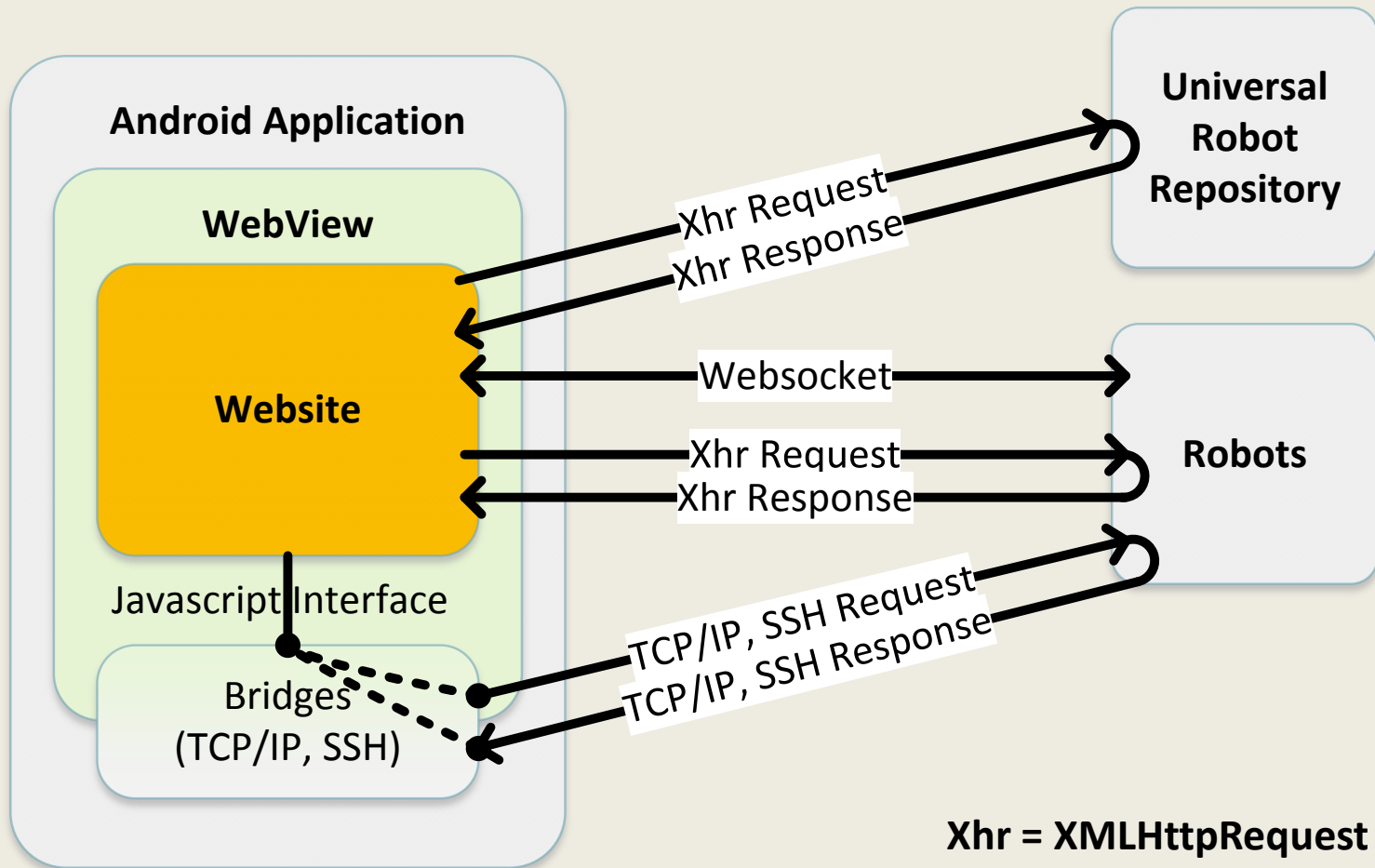
ROVéo Mini



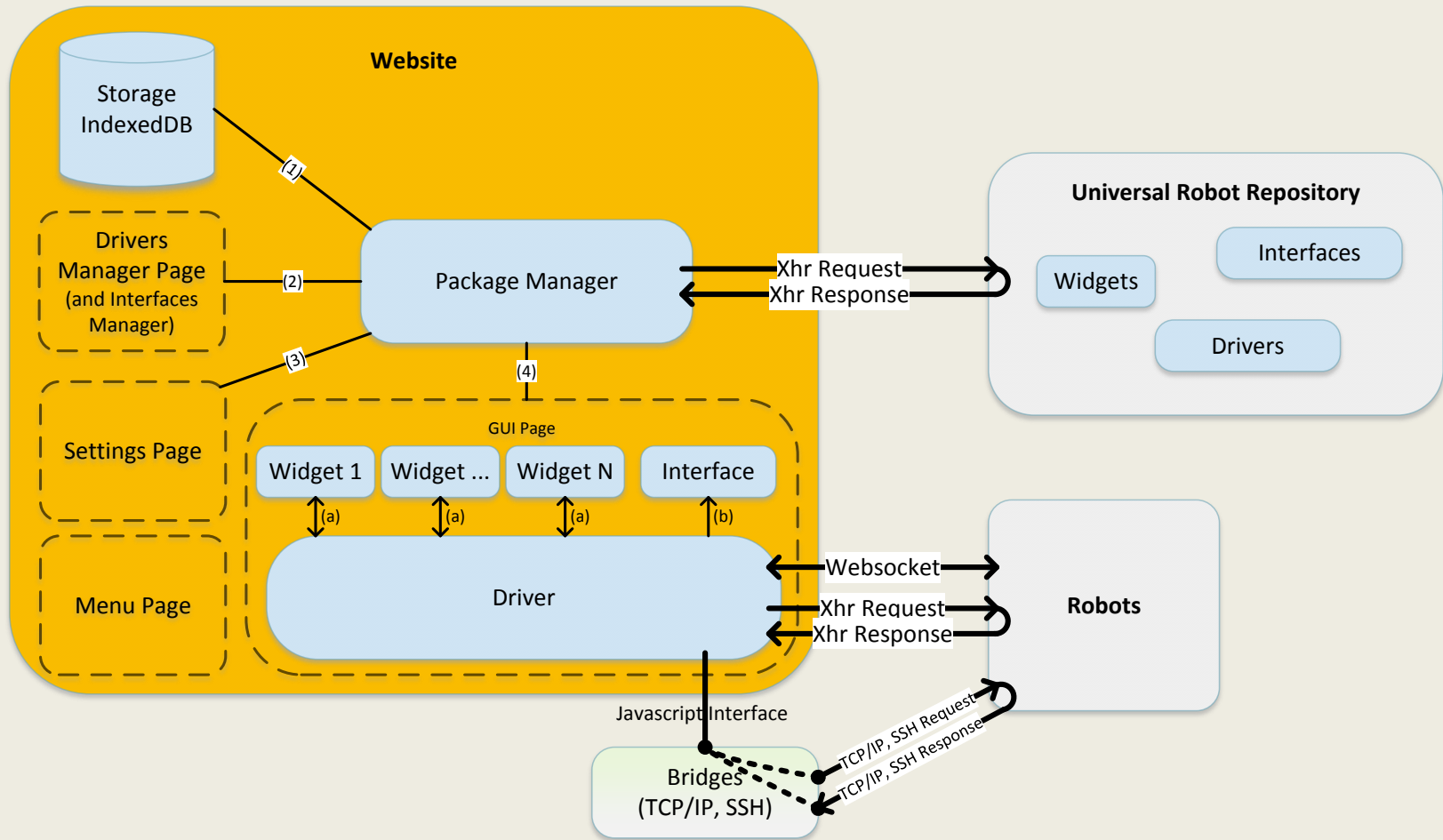
Communications Protocol Absolem



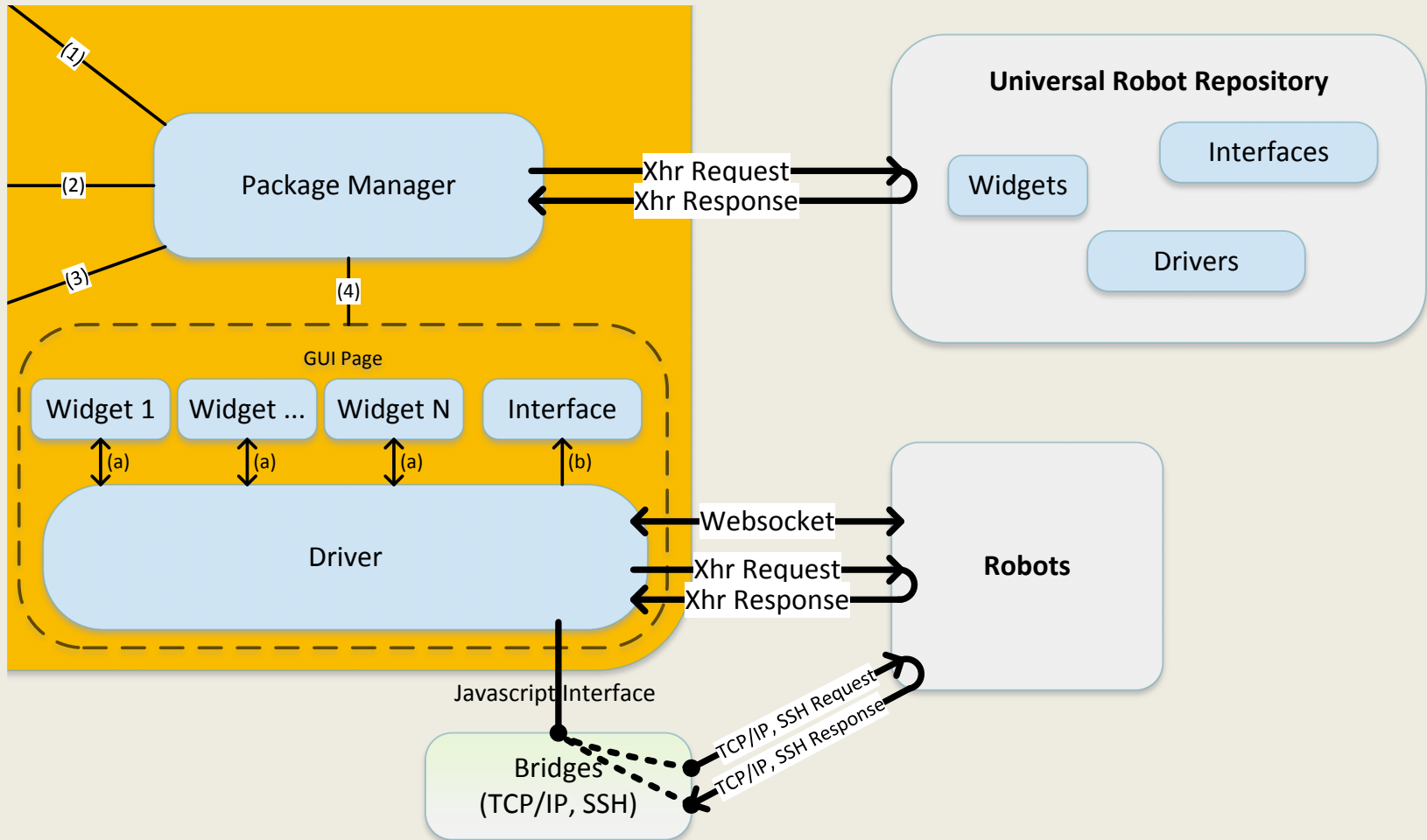
External



Internal



Internal



Internal Menu

Universal Robot Controller

[Connect](#)[Settings](#)[Driver Manager](#)

Current Settings

Robot ip and port:

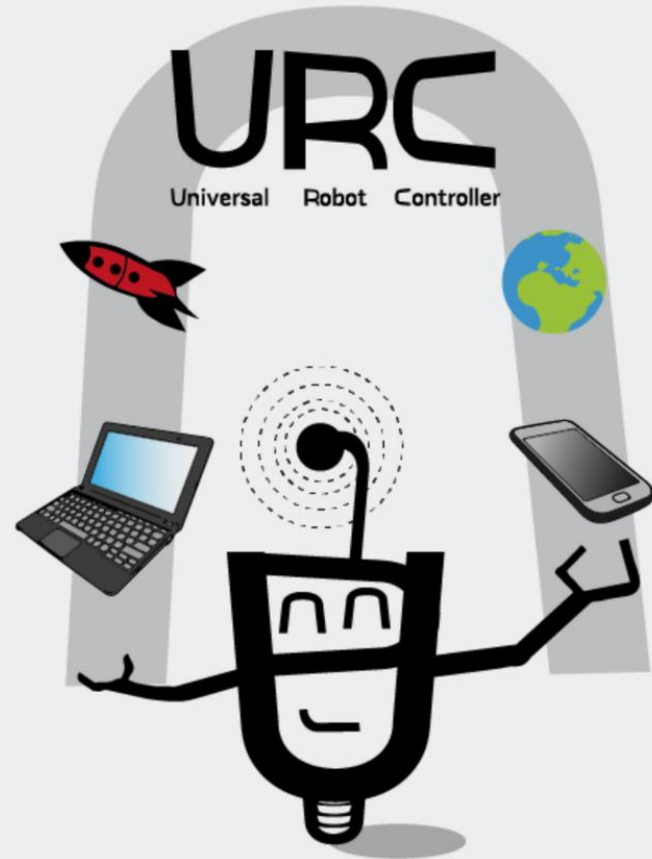
Driver:

Interface:

Set the robot ip in settings..Set the robot port in settings.

Choose a driver in settings.

Choose an interface in settings.



Internal Driver Manager

Drivers Manager

[Connect](#)

Available Drivers at myLocal

puppet:

An example of an awesome driver

[Download](#)**amphibot:**

A nice driver for amphibot

[Download](#)**dummy:**

A nice driver for local testing without robot

[Download](#)**nifti:**

A nice driver for nifti

[Download](#)**roveomini:**

A nice driver for roveomini

[Download](#)

Installed Drivers

dummy from myLocal:

A nice driver for local testing without robot

[Manager Interface](#)[Delete](#)

Internal Settings

Settings

Choose your active driver:



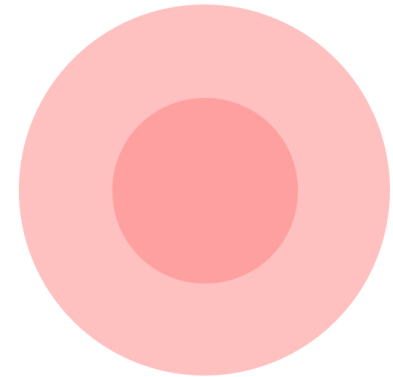
Choose the interface associated with the chosen driver:



Set the IP and port of your robot:

Internal GUI

I injected the draft gui for roveomini !!!!



Outline

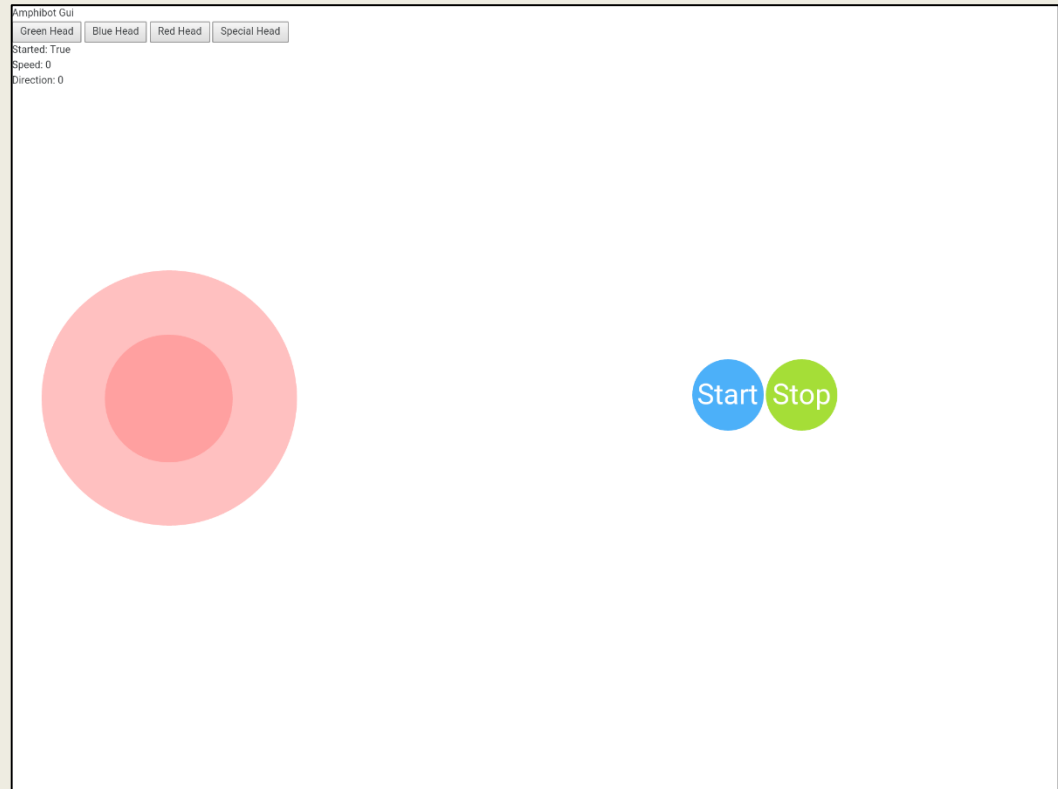
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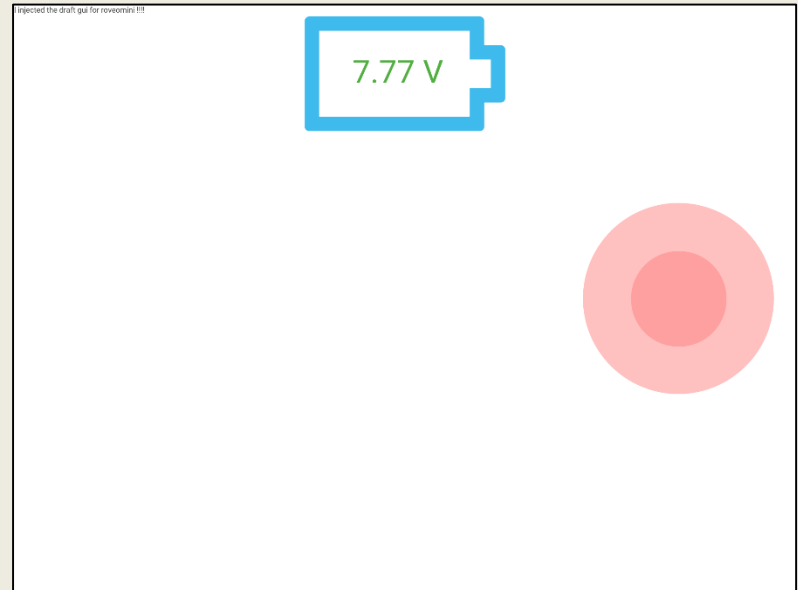
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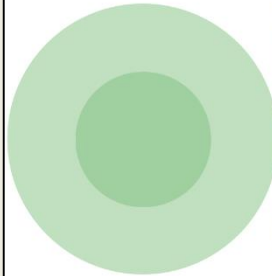
AmphiBot III



ROVéo Mini

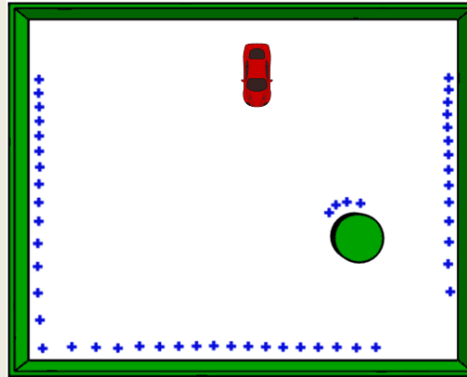
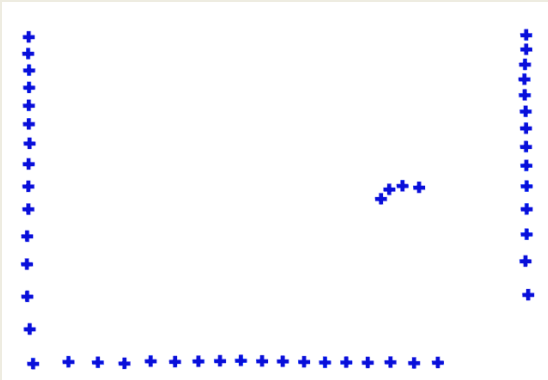


Absolem (1)



Absolem (2)

- Laser range finder



Absolem (3)

- Mobile device motion sensor



URC in action

Universal Robot Controller

[Connect](#)[Settings](#)[Drivers Manager](#)

Current Settings

Robot ip and port:

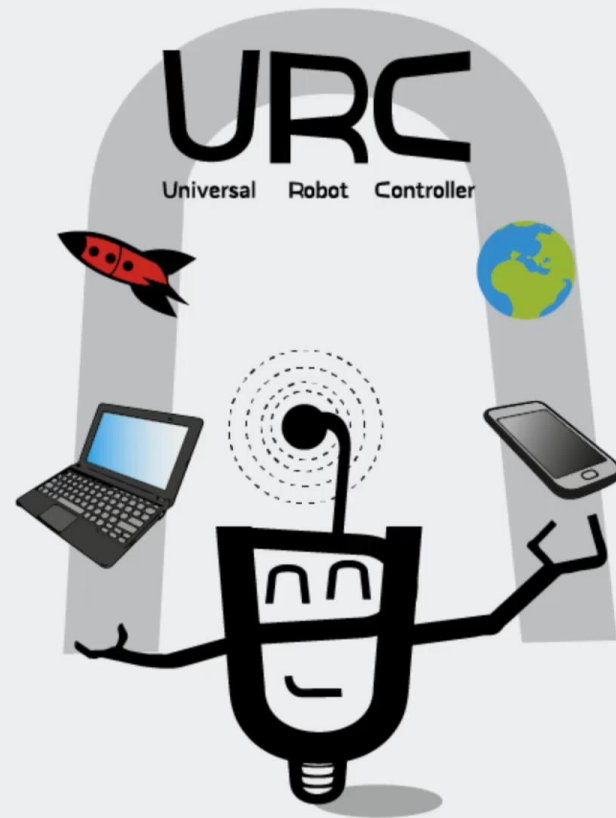
Driver:

Interface:

Set the robot ip in settings.:Set the robot port in settings.

Choose a driver in settings.

Choose an interface in settings.



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Now

- Control a wide variety of robots
- Reusability widgets
 - Use existing JavaScript component
- Several interfaces for a robot
 - Debug
 - Consumer
 - Adaptability & Accessibility
- Easily portable to other support (iOS, Windows Phone, PC)

Improvement

- Create an UDP bridge
- Improve *settings* webpage
- Universal Robot Repository is a proof of concept