ROS BIZ

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WHO AM I?

YUJINROBOT INNOVATION

Daniel Stonier

Yujin Robot Innovation Team Leader.

Embedded/Control Engineer
Algorithms Monkey
Software Architect

B Science., B Electrical Engineering, Phd. Mathematics.

ROBOTICS BACKGROUND

1. **University**
   - Studied robotics/AI in math and engineering
   - PhD in Dynamical Systems
   - Postdoc at KAIST in a robotics lab
2. **Yujin Developer**
   - Control Engineer
   - Vision SLAM in Yujin cleaning robots
   - Required to deploy robotic software across a variety robots
     - Found ROS 0.4 (2008)
   - Transitioned the company to ROS (2010))
3. **ROS Expert**
   - Contributed many patches for early ROS (0.x.y)
   - Design sessions for core ROS components
   - ROS software package maintainer
   - Turtlebot 2 Project Lead - the ROS reference robot
   - Collaborated with international ROS teams
   - Annual speaker at ROSCon conferences
   - Regular contact with the ROS directors

GLUE

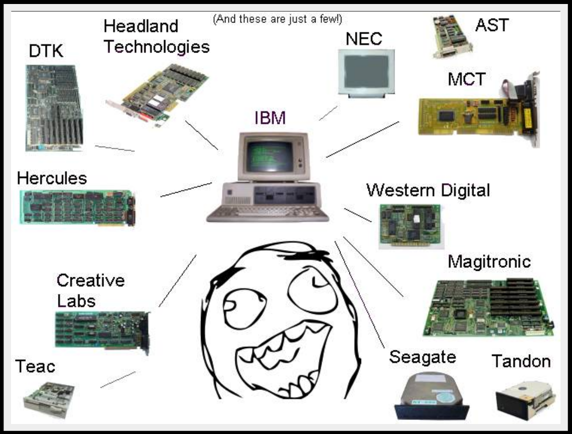
What is glue all about?

1. Stick stuff together to quickly assemble assorted things.
2. Stick stuff together to make something big.
3. Stick somebody else's stuff together to leave everyone else for dead.

SOME KINDS OF GLUE

IBM COMPATIBLE PC

For computer hardware.



WINDOWS OS

For software applications.

THE WEB & HTML

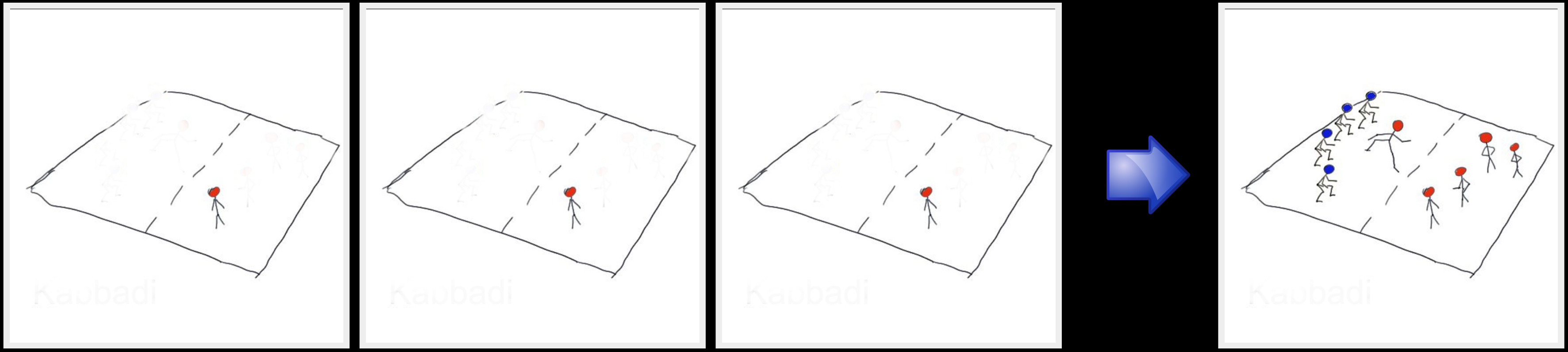
For connecting businesses.

OTHERS

- Web 2.0 & Cloud - software independent of platform.
- iOS/Android - pc explosion in the hand
- IOT - still trying to find the glue....

WHAT IS THE EFFECT OF THE GLUE?

From everyone on their own playing field



To just one playing field....GAME ON!

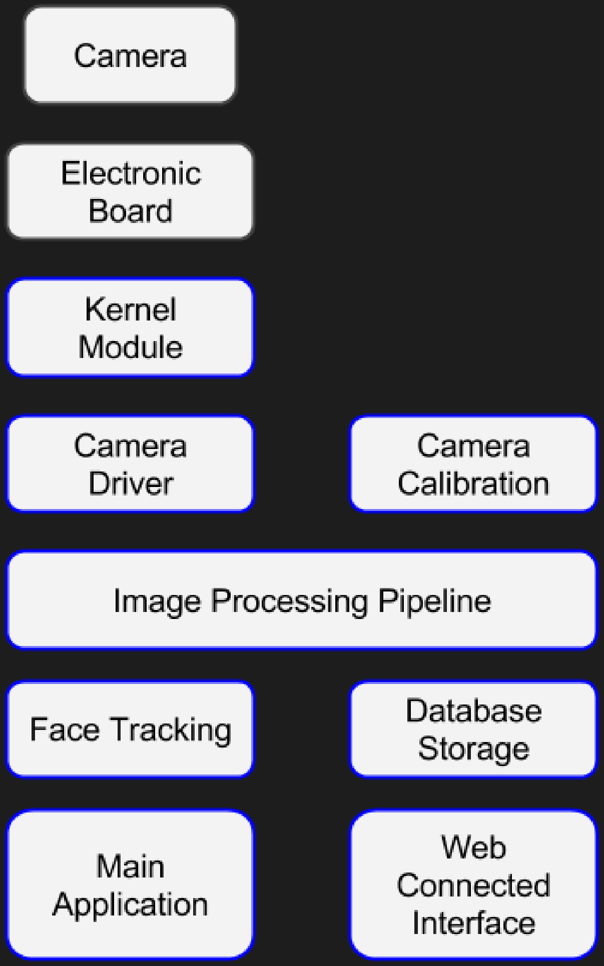
ENTER ROBOTICS

- Until now, only industrial and cleaning robots
  - relatively simple
  - no glue needed
- Finally, a convergence of great technologies!
  - Sensing : cheap cameras (phones), 3d sensors (gaming)
  - CPU : embedded power (phones)
  - Software : a growing ecosystem of freely available software
  - Batteries : investments accelerating dev. (phones/cars)

Robotics applications are getting interesting

but complicated

THE ROBOTICS PROBLEM



Camera

Electronic Board

Kernel Module

Camera Driver

Camera Calibration

Image Processing Pipeline

Face Tracking

Database Storage

Main Application

Web Connected Interface

Too much expertise needed

Too much development needed

This is only 5-10% of the picture for a *single* robot

What if these all talk to each other in different ways?

What if they are all built/packaged differently?

THE ROBOTICS PROBLEM

Can't do it on your own

Can't buy in to vendors each doing their own thing

Thats why we need the glue...

WHAT IS ROS?

It is a glue for robotics software and hardware

- One of many robot glues that emerged in the 2000's
  - ROS, MS Robotics Studio, OROCOS, MOOS, OPROS...
- 2007 - emerged from Stanford.
- 2008 - migrated to Willow Garage.
- 2012 - migrated to the Open Source Robotics Foundation.
- Not owned by a company.
- Not dependent on a university and it's funding imperatives.

WHAT IS ROS TECHNICALLY?

- Ecosystem
  - Alot of tools for packaging
  - 4000+ publicly hosted software packages
  - 4 million package downloads a year
  - Extensive community support for users
  - 40+% growth every year for five years
- Plumbing
  - Distributed Computing Middleware
  - Internal and External Communication Libraries
- Tools
  - Monitoring, debugging, visualisation
- Capabilities
  - Drivers
  - Algorithms
  - Frameworks (navigation, manipulation, ...)

HOW DOES IT STACK UP?

Compared to others (e.g. OPROS, MSRDS...)

- Crazy growth rate 40+%, must be doing something right
- Not perfect software, but does all the other things right
  - Easy access to using/contributing to robotics sw.
  - Great developer tools
  - Doesn't force big changes to your existing dev patterns
  - Backed it up with the world's most sophisticated robot.
- Doesn't try to be the tool for every job

No insidious marketing or soft support from government

Made a high priority to do all the unsexy things that help a robotics engineer do their job

WHERE HAS ROS BEEN (ROS 1.0)?

Designed to be flexible, but guided by the PR2 use case.

Robot for Research and Innovation

PR2 is a robotics research and development platform that lets you innovate right out of the box. No more building hardware and software from scratch.

WHERE HAS ROS BEEN (ROS 1.0)?

Designed to be flexible, but guided by the PR2 use case.

- Primarily Single robot
- Massive computational resources on board
- Real time requirements met in a custom manner
- Excellent network connectivity
- Applications in research
- Maximum flexibility
  - nothing prescribed or proscribed
  - e.g., “we don’t wrap your main()”.

WHERE IS ROS GOING (ROS 2.0)?

- Targeting companies
- Other platform connectivity
  - Web, embedded, multi-robot
- Upgrade communications & distributed paradigm.
- Shifting to DDS middleware
  - Communicate with the big boys - NASA, Military, Auto

ROS & YUJIN

We use ROS for:

- Rapid prototyping and development
- A build environment to manage complexity
  - even if the project is not using ROS.
- As a desired criteria for new recruits
  - shorter learning curves.
- A way to collaborate with other companies
  - on tools & frameworks
  - and build our differentiators inside these
- Packaging software
- Visualisation and debugging tools
- Access to the Ros community
  - priveleged priority on fixes & features we need.
  - a network of people to lean on for expertise.

It accelerates what we do.

But its not our only accelerator.

MESSAGES

Is ROS a differentiator?

No, look elsewhere for differentiators.

It does infer that time is not wasted on non-differentiators.

Doing it all yourself is too slow.

MESSAGES

The future of OSRF is not yet certain...

Stable funding for the next few years (DARPA)

Incredible growth rate

Should give it a chance for long term strategy to emerge.

ANTI-MESSAGES

All these people talking fanatically about ROS, OPROS...

They should be thinking more about about their product/differentiators.

Q&A

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