MODULAR SOFTWARE PLATFORM FOR MOBILE ROBOTICS

A MOBILE ROBOTICS BOOSTER

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Modular software platform for mobile robotics

That’s us

Robert Bosch GmbH
- Highly automated driving activities
- Intralogistics robots
- Autonomous shuttle
- Vacuum cleaning and lawn moving robots

Bosch Engineering GmbH
- Robotics project development in cleaning, off-road, intralogistics
- Platform software development

Milad Geravand
- Started with ROS in 2010

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DO YOU REMEMBER YOUR FIRST SET UP OF A MOBILE ROBOT?
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Robotics development approach?

- 2010, as a master student at Sapienza University of Rome
- Started with development of object recognition and classification software for mobile robots in indoor environment!

DIAGRAM:
- Design basic architecture → Integrate components → Find SW modules and try to integrate them → Things do not fit → Change components/modules/architecture
- Receive tons of errors → Spend months/years to debug them and make them robust → Wow: first prototype → Ohh: something is not working
Main challenges

- Every use case is highly variant.

- Software is super complex: More than 30 SW components to run a use-case specific mobile robot.

- Deployment and integration of software without any structural procedure. Many just do it somehow!

- ROS doesn’t spread into final products like it should. Not trusted for series, self made solutions instead of ROS.

- Huge step from prototyping to series. Almost had to start from zero.

(Source: Interviews with about 100 companies in the market of mobile robotics)
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Shopping list of a robotic starter

- Robotics **hardware platform**
  - Sensors and other **hardware**
    - **Interfaces** to hardware
    - Software **functions**
    - Software tool for **integration and deployment**
    - Human interfaces and **operating tools**
  - Development support to build up a complete system
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Our focus in the market of **professional mobile robotics**

Focus on **series level** right from the beginning

Software platform to realize **fast and reliable** use-cases

Part of the robotics network

**Bringing the markets solutions into real use cases**

One face robotics partner to customers, **speaking their language**
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Features offered by our modular software platform

- **Mature architecture** for the SW system, fulfilling modularity
- **Reliability testing and rating for every module**
- **Deployment of automatically generated binaries or Yocto image**
- **Integration tool: easy to set-up a system by a few clicks!**
- **Update concept: newest version of all modules with one click!**
- **Structural SW configuration and project version management**

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Our set up

Central control unit

Software image

- Basic layer: e.g. ETH port
- Yocto layer: OS
- Middle-ware layer: ROS (2)
- HW interface layer: sensors or actuators
- Functional software: use-case specific
- Customer software

Machine

- Com
- HMI
- Drive

HW connection

Use-case

Hardware connection

Customer

Functions

Interface

Requirements

Sensor selection

Sensors

- Yocto
- Drive
- Interface

Software image

Basic layer: e.g. ETH port

Yocto layer: OS

Middle-ware layer: ROS (2)

HW interface layer: sensors or actuators

Functional software: use-case specific

Customer software
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Short demo
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Today's status: few examples

Full automation of a professional cleaning machine

Technology platform for automated off-road
- Automotive control unit as robotics control unit
- Transfer of full automation kit to outdoor

Cross detection for a farm tractor

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Be part of it – speak to us

- You want to **improve** the speed of your professional mobile robotics development for your specific use case

- You want to **integrate** your reliable robotics solutions within our platform to promote them to others

- You want to **learn more** about our technical concept
TOGETHER WE MAKE MOBILE ROBOTICS DEVELOPMENT FAST AND RELIABLE
THANK YOU

Contact
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