drag&bot

robot programming framework

drag&bot as a
software platform for
development of ROS-based
industrial applications

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ROBOTICS AWARD

TechFounders

STARTUPAUTOBAHN powered by PLUGANDPLAY
ARENA2036

eXIST Existenzgründungen aus der Wissenschaft

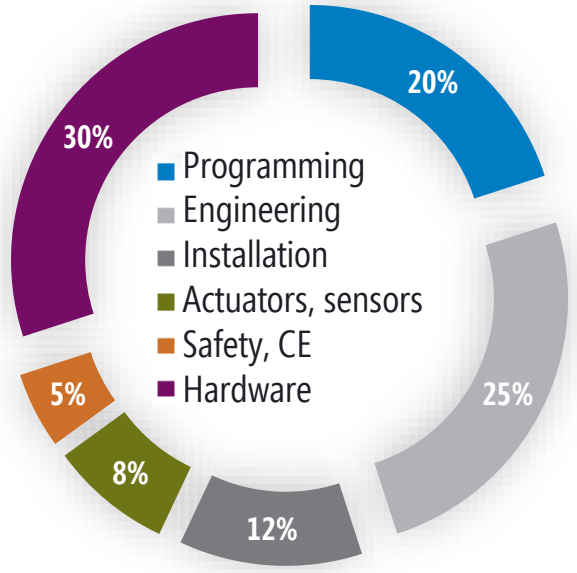
GRÜNDER WETTBEWERB DIGITALE INNOVATIONEN

drag&bot – Company & History

2008	2015	2016	2017-2018	2019
Beginning of research at Fraunhofer IPA	First business plan	First prototype Positive feedback	First customers and pilot projects	Financing by Speedinvest (VC) 10+ employees

Typical challenges for robotics R&D

Hardware & Expertise



Different robot hardware requires brand-specific know-how and is complex to configure and use.

Research

It takes a long time to set up a working robot system. This time is missing for “the real” R&D work.

Flexibility

For R&D rapid changeovers are required.

drag&bot

drag&bot is the software platform
for simple, graphical setup and programming of robot systems.

drag&bot enables manufacturing companies to flexibly and economically automate small lot sizes.

drag&bot pursues to be for ROS what Windows was for MS-DOS.

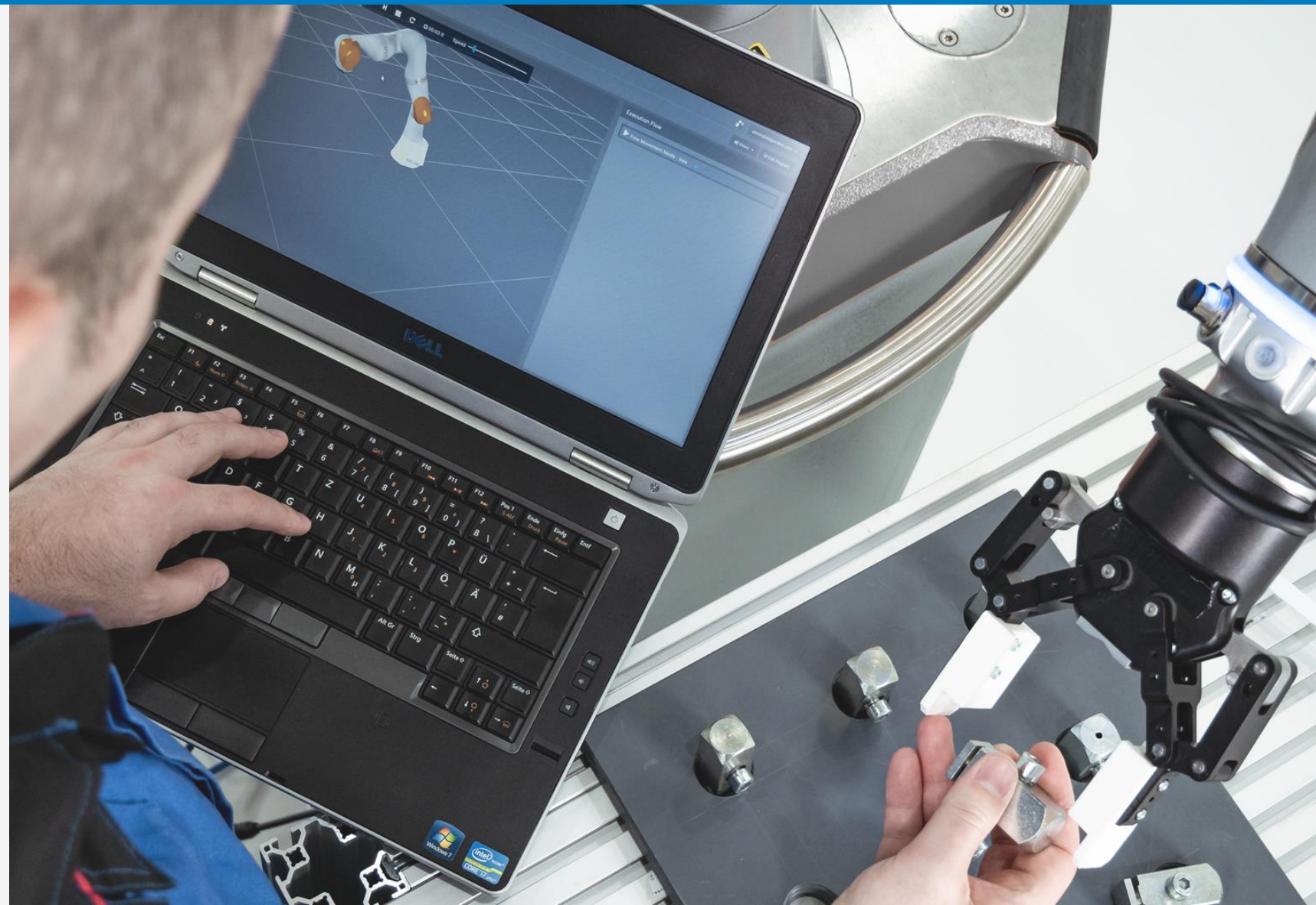
Main features of drag&bot

Intuitive HMI
Programming by drag&drop.
Experts are 5x faster.
Workers can use robots.

Uniform HMI
Same user interface for
different robots.

Plug&produce
One-click installation of compatible
hardware.

ROS-based
Extends ROS for graphical use.
Standard use of ROS is allowed.



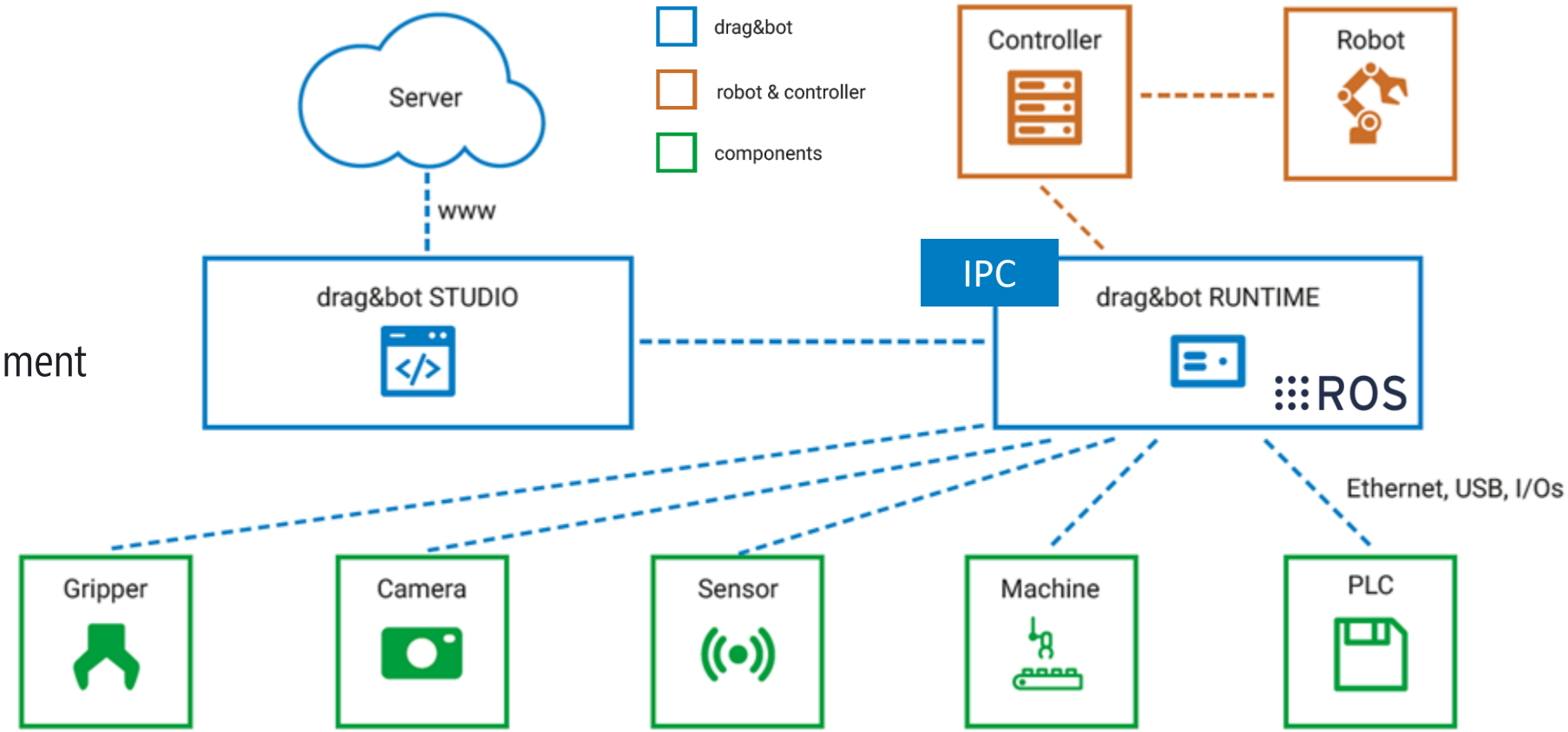
drag&bot system architecture – online (1)

drag&bot STUDIO: develop

- Website running on browser
- Intuitive
- Graphical

drag&bot RUNTIME: produce

- IPC-based execution environment
- ROS is running inside



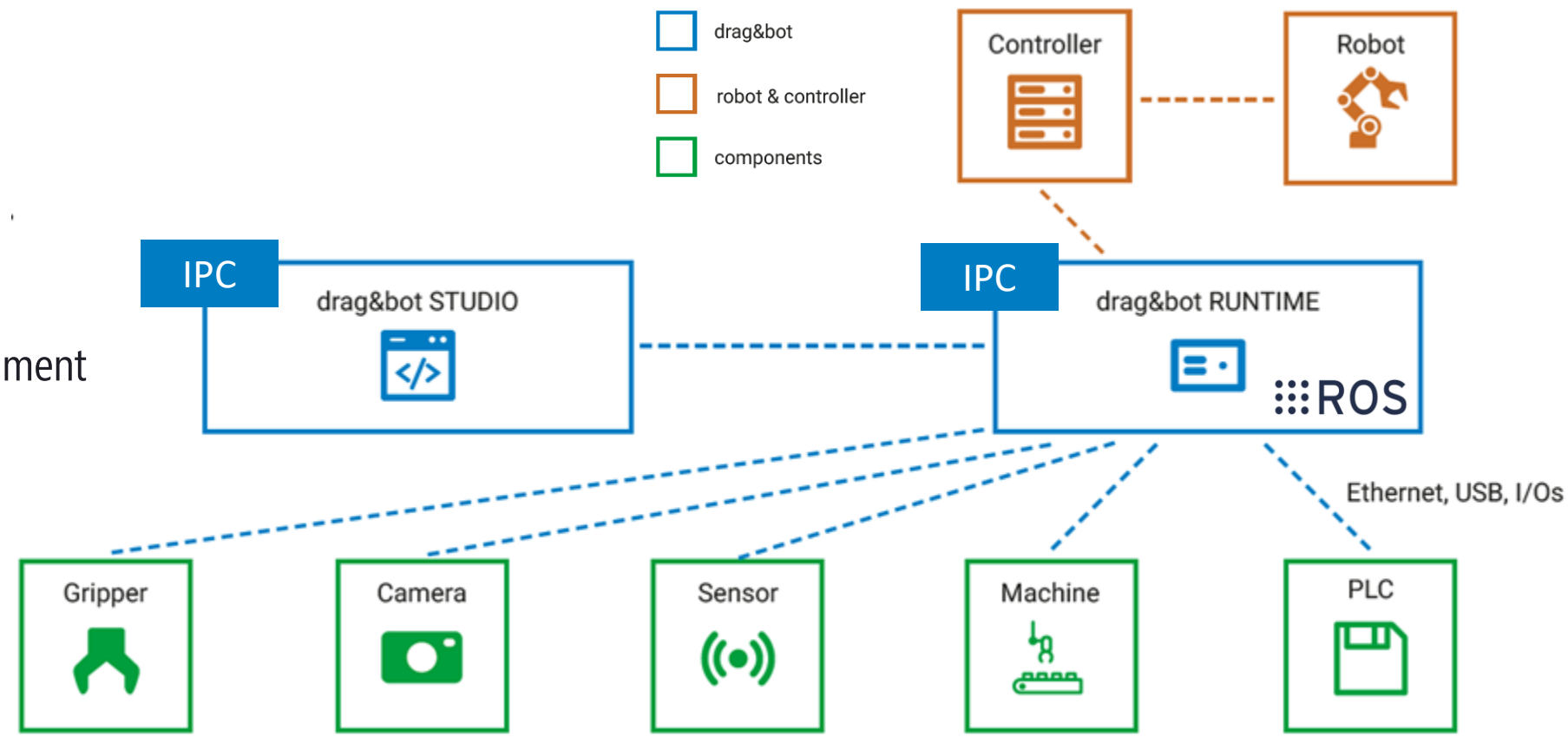
drag&bot system architecture – offline (2)

drag&bot STUDIO: develop

- Website running on browser
- Intuitive
- Graphical

drag&bot RUNTIME: produce

- IPC-based execution environment
- ROS is running inside



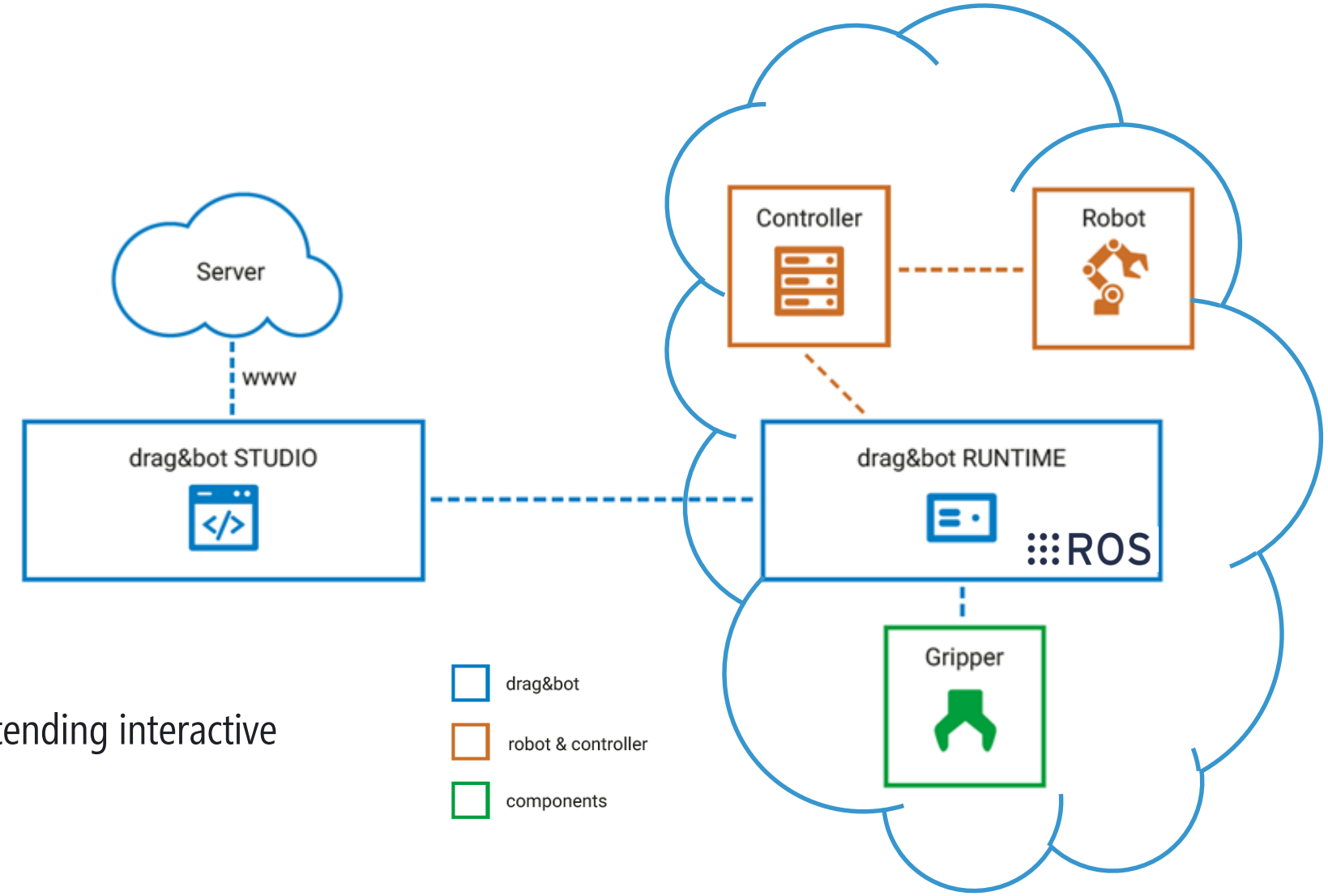
drag&bot system architecture – cloud sim (3)

drag&bot STUDIO: develop

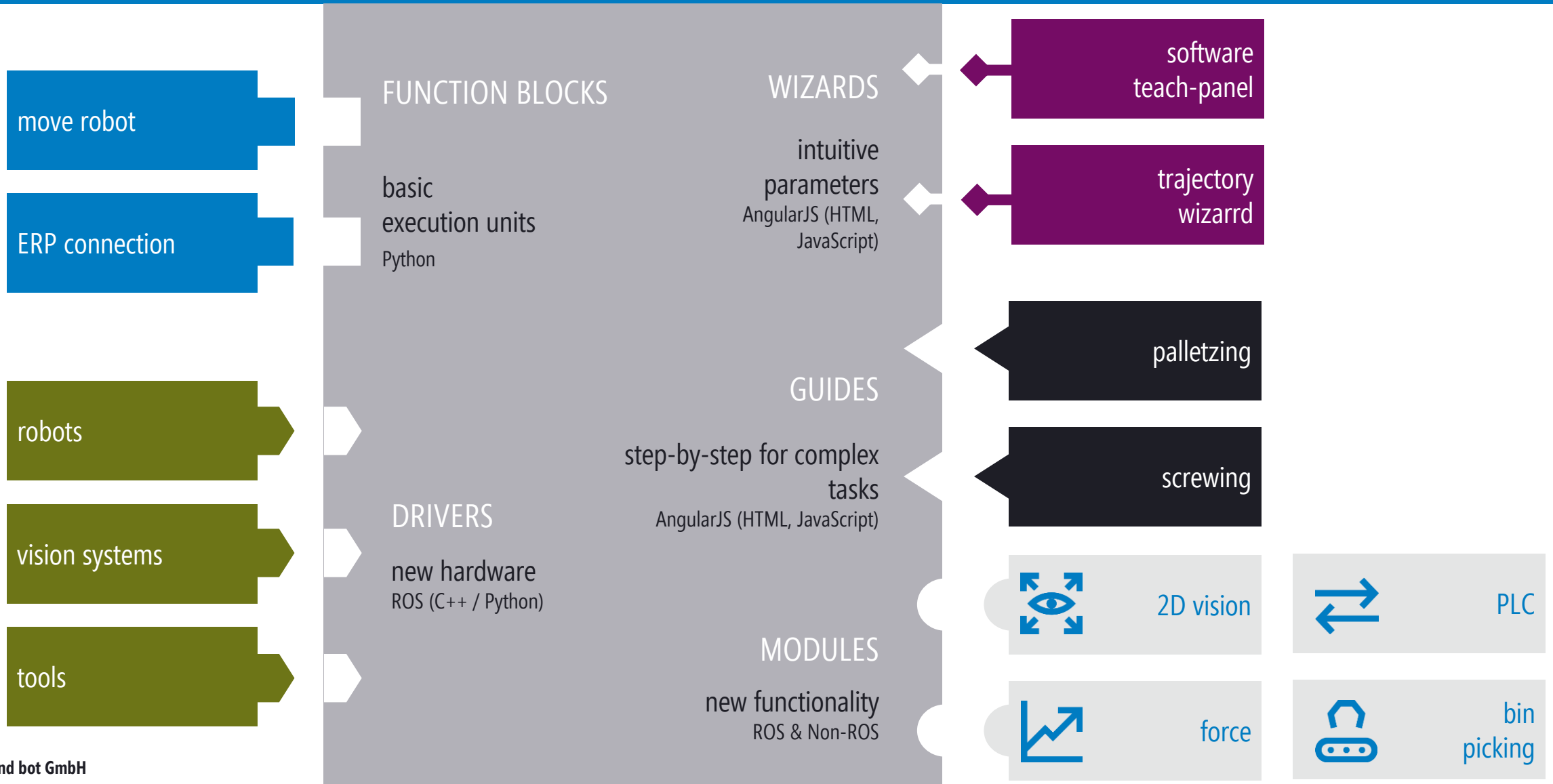
- Website running on browser
- Intuitive
- Graphical

drag&bot RUNTIME: produce

- ROS running inside on the cloud
- Includes a robot simulator with different URDF models and inverse kinematics
- Includes a gripper and a machine tending interactive environment

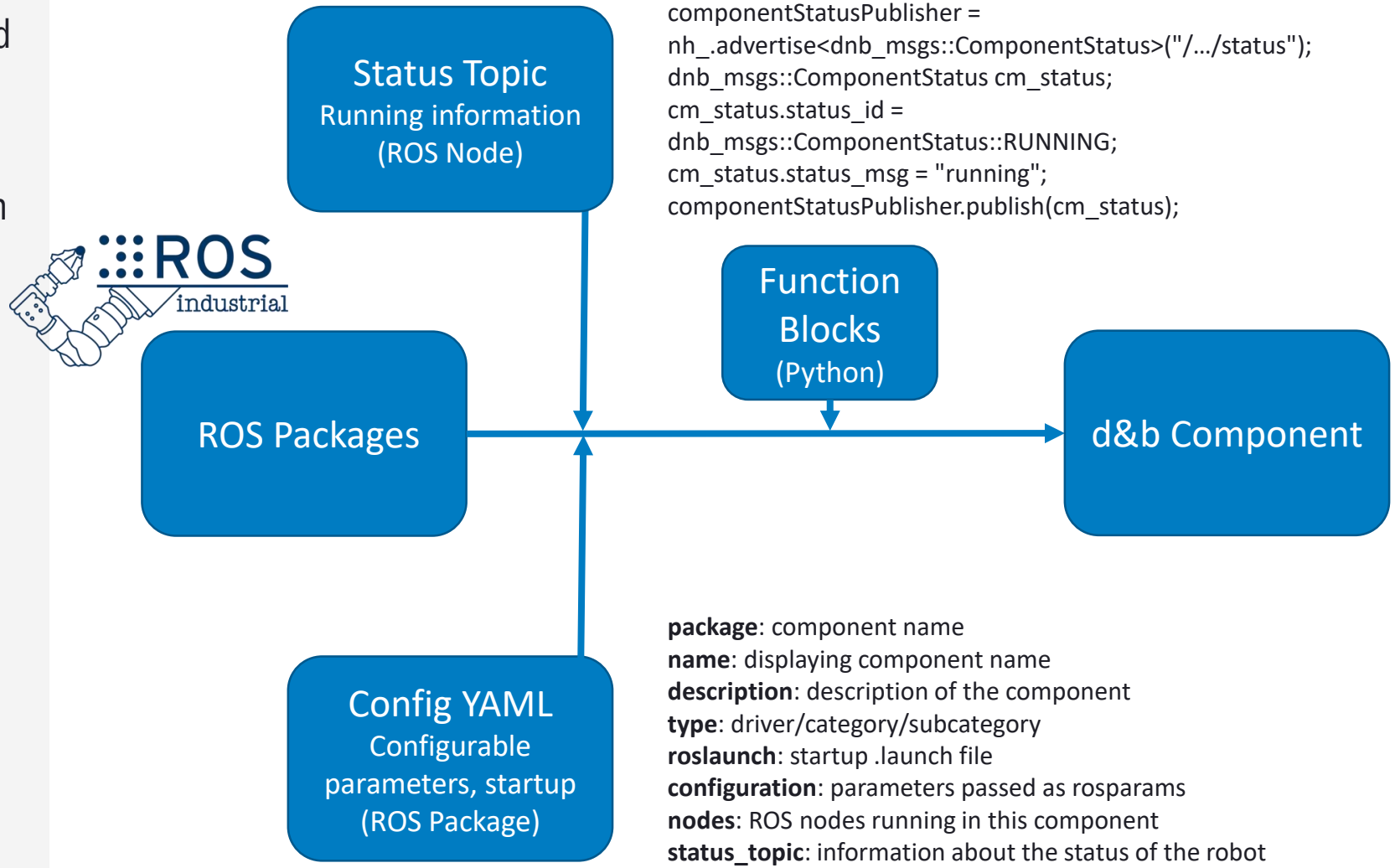


drag&bot is an open platform
Third parties can create extensions



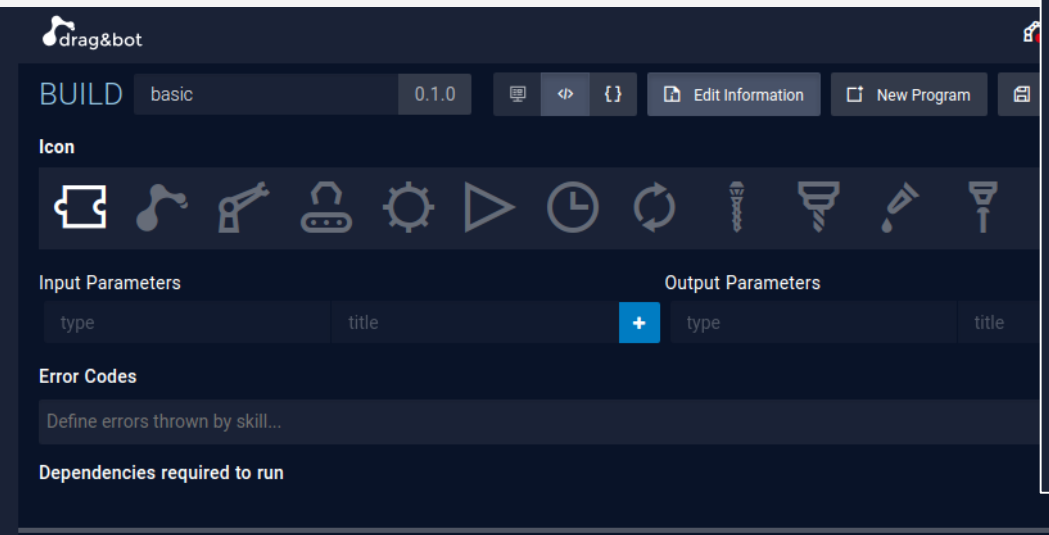
How to use your own ROS packages in d&b?

- Drivers & modules are based on ROS and can be developed in Python or C++.
- Drivers, modules and function blocks can be easily packaged together as d&b Components.
- Catkin overlay space /dnb_catkin_ws automatically loaded by drag&bot.
- The resulting Component can be graphically added and configured.



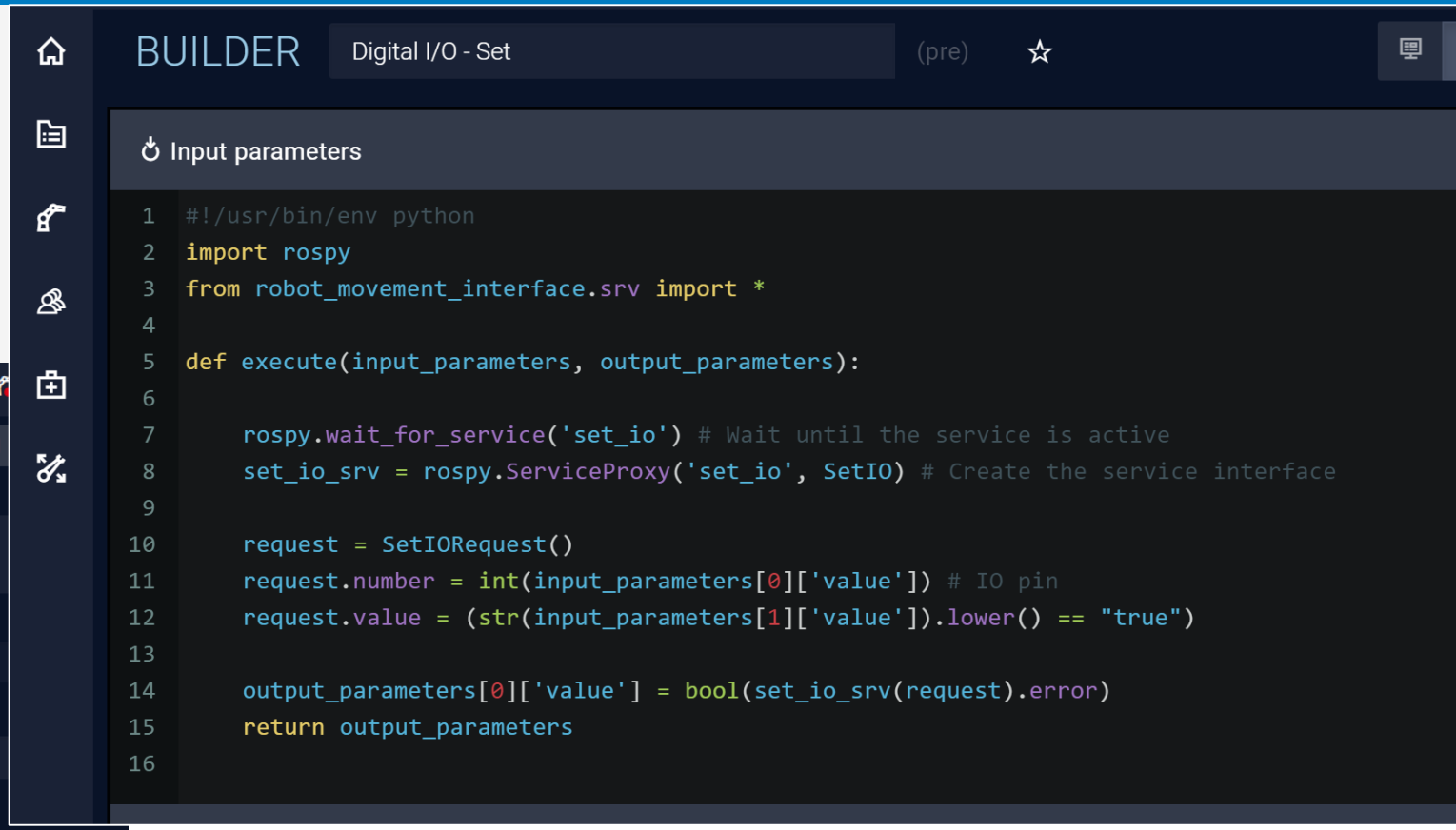
How to create associated Function Blocks?

- Defined structure for data formatting & exchange, exception handling
- Function blocks are based on Python and access drivers and modules




```python
# optional IMPORTS
# e.g import rospy

def execute(input_parameters, output_parameters):
    # RUNS ON BLOCK EXECUTION
    # do actions with hardware, software
    # produce outputs
    return output_parameters
```




```python
#!/usr/bin/env python
import rospy
from robot_movement_interface.srv import *

def execute(input_parameters, output_parameters):

    rospy.wait_for_service('set_io') # Wait until the service is active
    set_io_srv = rospy.ServiceProxy('set_io', SetIO) # Create the service interface

    request = SetIORequest()
    request.number = int(input_parameters[0]['value']) # IO pin
    request.value = (str(input_parameters[1]['value']).lower() == "true")

    output_parameters[0]['value'] = bool(set_io_srv(request).error)
    return output_parameters

```

Real example of Set IO Function Block

Example: Basler 2D Camera & Vision components

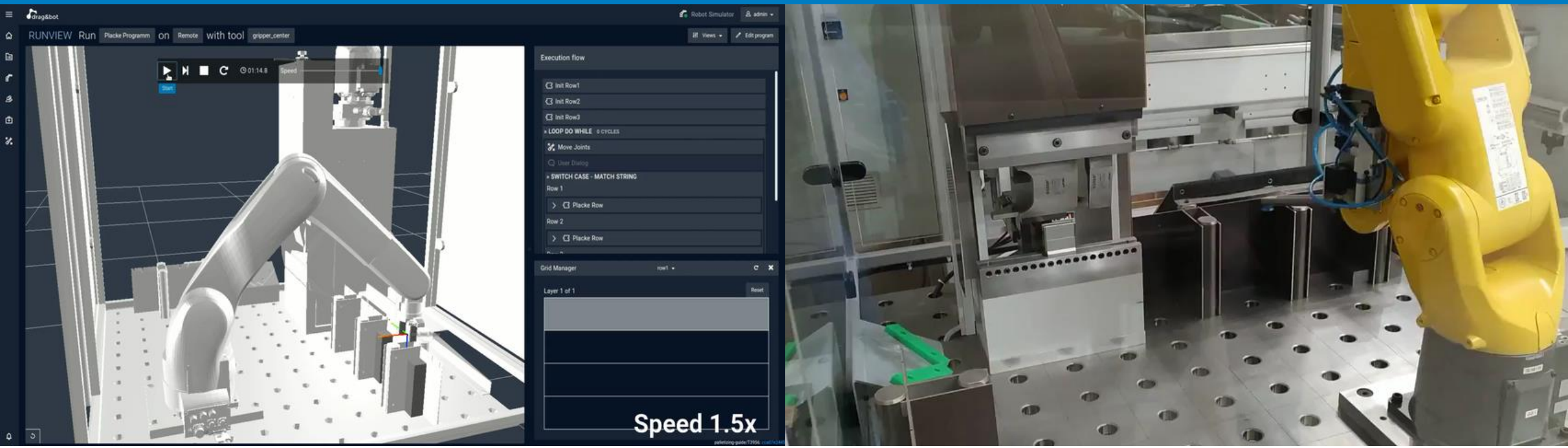
- ROS Nodes
  - Basler 2D camera driver
  - Extrinsic calibration module
  - Intrinsic calibration tool
- Component configuration
  - Connection IP, MTU
  - Intrinsic calibration ROS file
  - Active camera profile
- Function Blocks for pattern matching and object localization

Official ROS driver can be found: https://github.com/basler/pylon-ros-camera

Supported robots and components

Robots	Universal Robots	Denso	KUKA	Fanuc	ABB	Yaskawa	Mecademic	Epson	Stäubli (TBA)	Franka Panda (TBA)
Grippers	Zimmer	Schunk (WSG serie)	Robotiq	All pneumatic	All vacuum	All I/O, IO-Link controlled				
Cameras	Basler 2D cameras	Balluff Smart-Cams	Sick PIM60	many USB/GigE cameras						
Modules	2D / Vision	Force control	PLC	Bin Picking bp3™ Roboception						
Commu-nication	Siemens S7	IO-Link	Modbus TCP	TCP/IP						

What our customers say
Example: bending application – Placke GmbH



drag&bot allows to create ROS-based industrial applications with an easy interface for the user.

Users are able to use, configure and reprogram industrial cells.

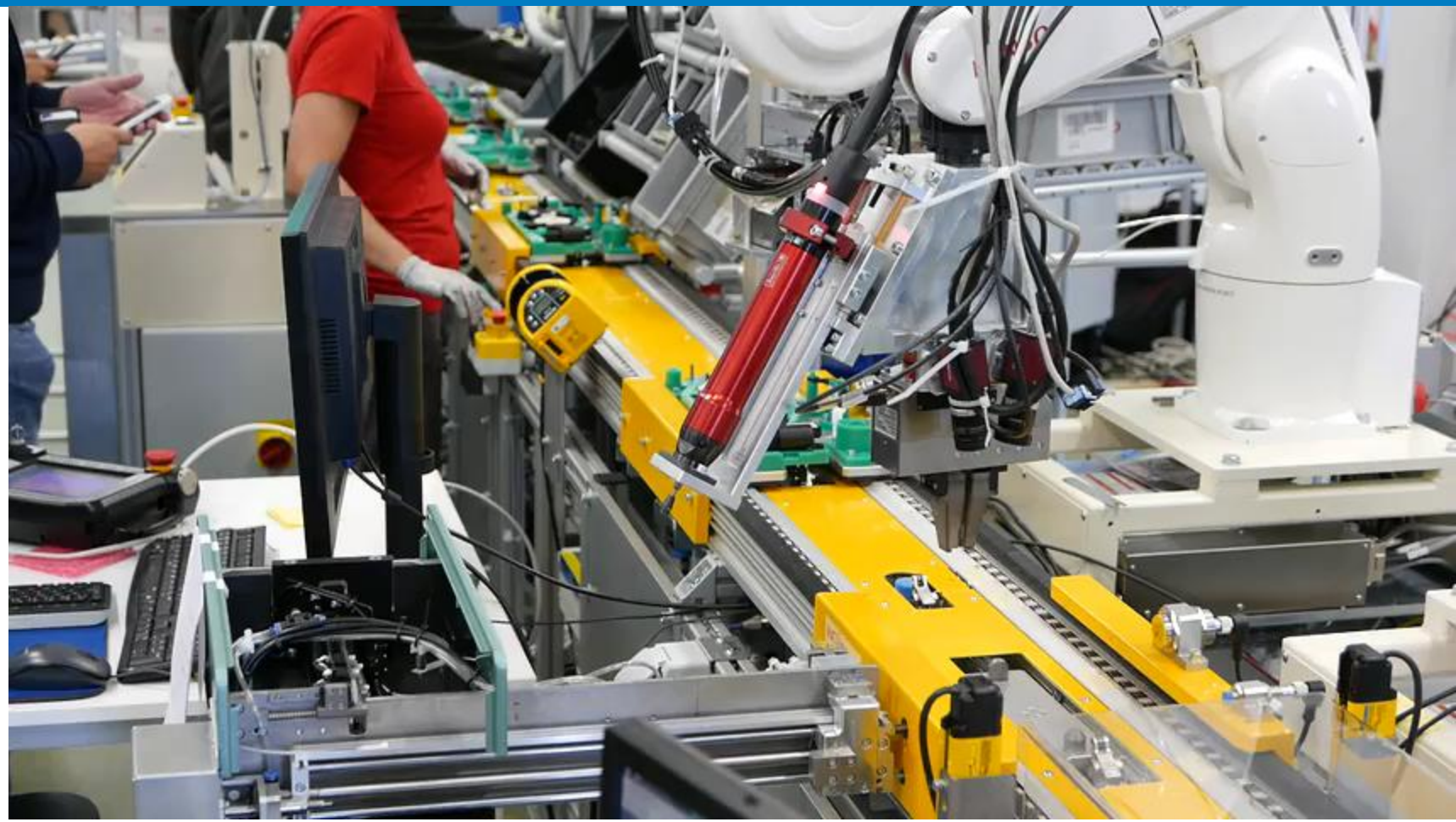
What our customers say
Example: automotive supplier

drag&bot controls two robots in a human-robot mixed assembly line.

The line runs 24/7.

Handling and screwing processes.

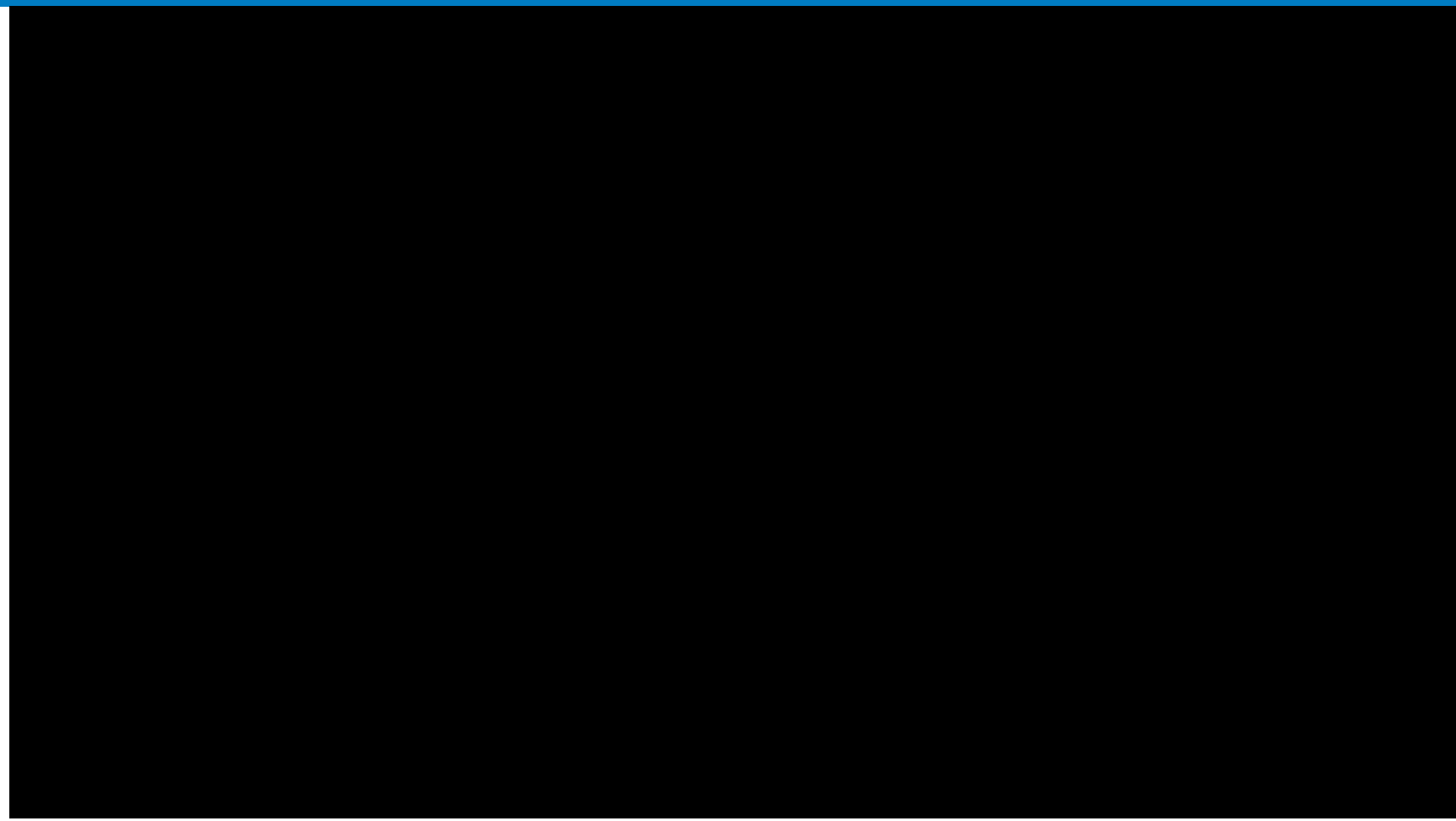
Thanks to drag&bot can the maintenance engineers adapt the robots to new product variants.



What our customers say
Example: fast prototyping – Atlas Copco

With drag&bot you can fast prototype new applications.

New hardware or software modules can be integrated in a couple of days or even hours.



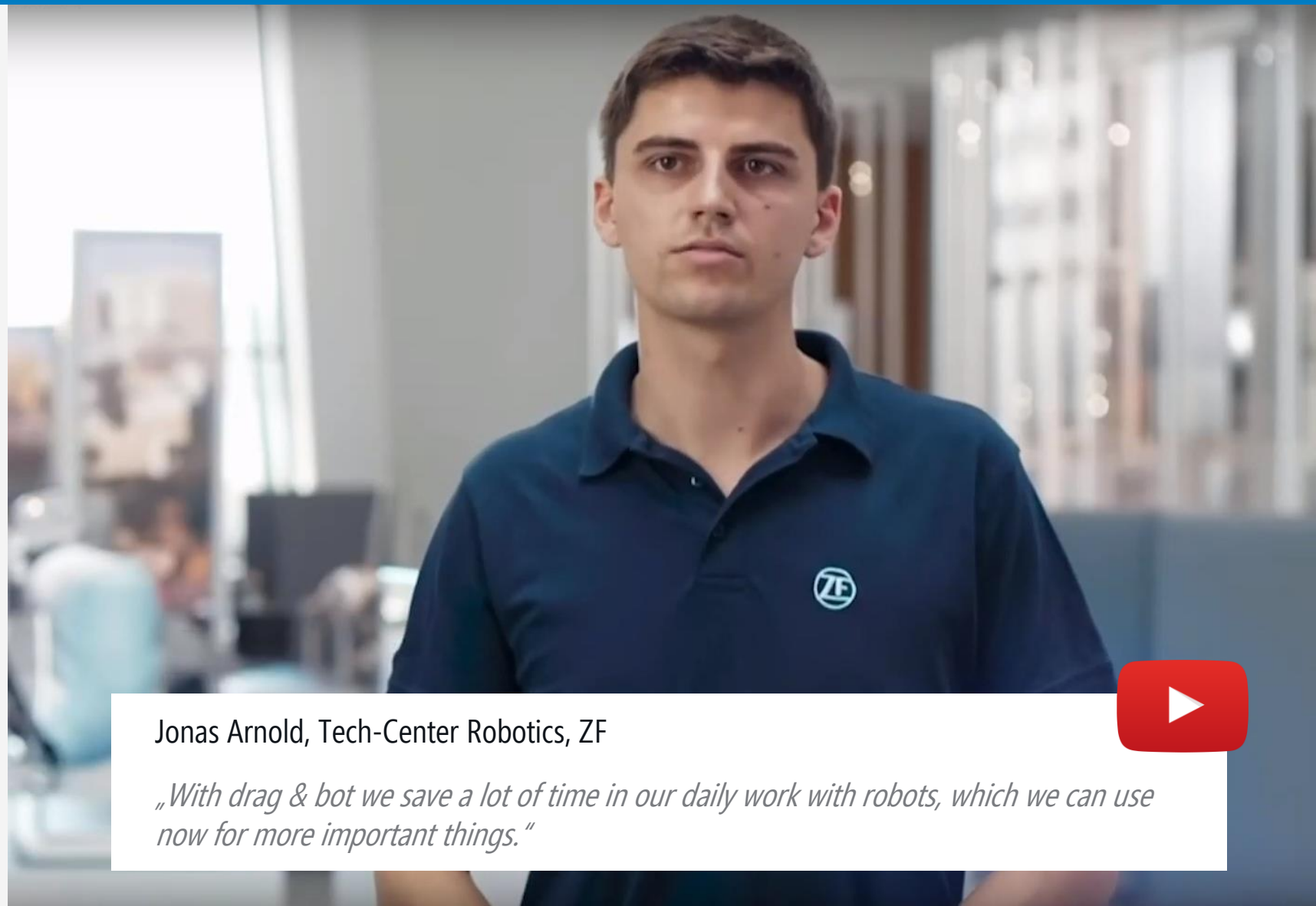
What our customers say
Example: ZF Friedrichshafen AG

Different robots can be flexible used by end-customers.

Standard hardware can be added by one click; Customers can extend the software themselves using Python.

Faster iterations to evaluate new applications of robotics, since the programming is much faster compared to the software of robot manufacturers.

Greater focus on application logic and manufacturing process rather than hardware integration and programming.



Jonas Arnold, Tech-Center Robotics, ZF

„With drag & bot we save a lot of time in our daily work with robots, which we can use now for more important things."

What our customers say
Example: Lernfabrik 4.0 Bietigheim-Bissingen

drag&bot

Create your own robot program
With drag&bot learning factories
are able to develop new robot programs.

Lessons with robots
Handling technology can
be taught live on the robot.

Skilled work / project teams
Students can develop small and simple applications with the software.

Tasks that are fun
With the simulation environment, simple robot controls are also possible for students without previous knowledge.

https://www.lernfabrik-bietigheim.de/

Jochen Vohwinkel, Teacher

„drag & bot makes the operation of our KUKA Ilwa really easy - so we can integrate the robot even better into our lessons in the future."

LEHREN. LERNEN. LEBEN.
Berufliches Schulzentrum
Bietigheim-Bissingen

drag&bot enables research organizations to work more agile and flexible with robots

drag&bot

Focus on your research question

Avoid complex hardware integration and focus on the work that matters.

Extendable for your specific needs

Extend the software in Python/C++. Write your own ROS Nodes.

Do-It-Yourself automation

Use robots quickly without extensive training.

Flexible modification

Use one robot for different tasks with fast changes.

drag&bot Starter Package

drag&bot at Mecademic booth
at ATX Toronto and New York 2019

Watch video:

drag&bot Starter Package

- drag&bot license (either floating or for one robot)
- Service package for first year: updates, support
- Ready-to-use industrial PC
- Online training session

Available add-on modules

- SDK for developers
- 2D vision
- Siemens PLC communication
- Force control (for some robots)

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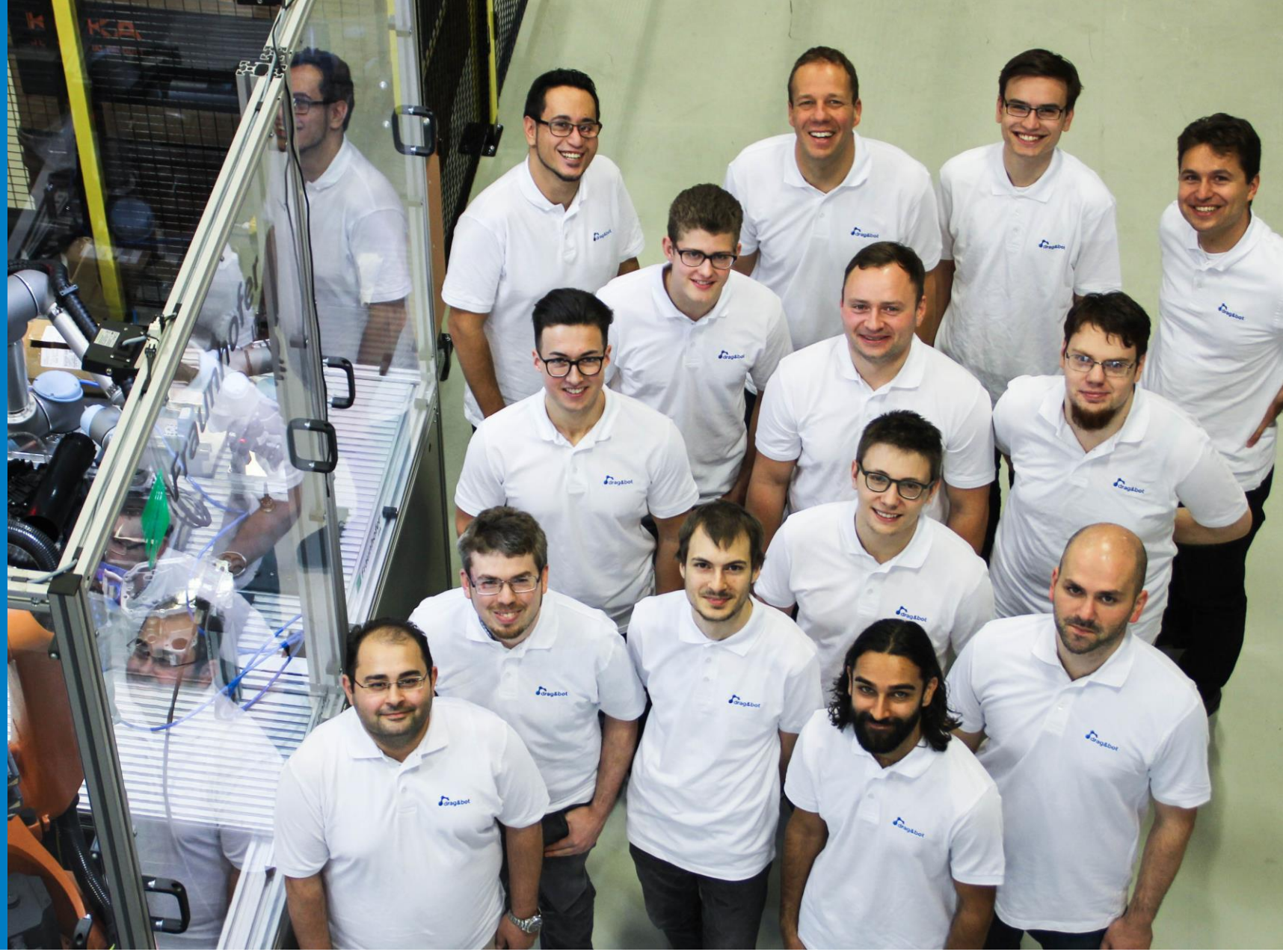
Interested?
Talk to us!



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