PROFACTOR®

Coordination control of a bin picking application

LEADING
INNOVATIONS

WWW.PROFACTOR.AT

Overview

- What is the problem?
- Object & Pose Recognition
- Process and Motion Planning
- IEC 61499 Application Overview
- Linear Axis Control (using generic IOs)
- Robot Communication (using „simpleModbus“ layer)
- Communication
  - Object & Pose Recognition
  - Process and Motion Planning
- Video

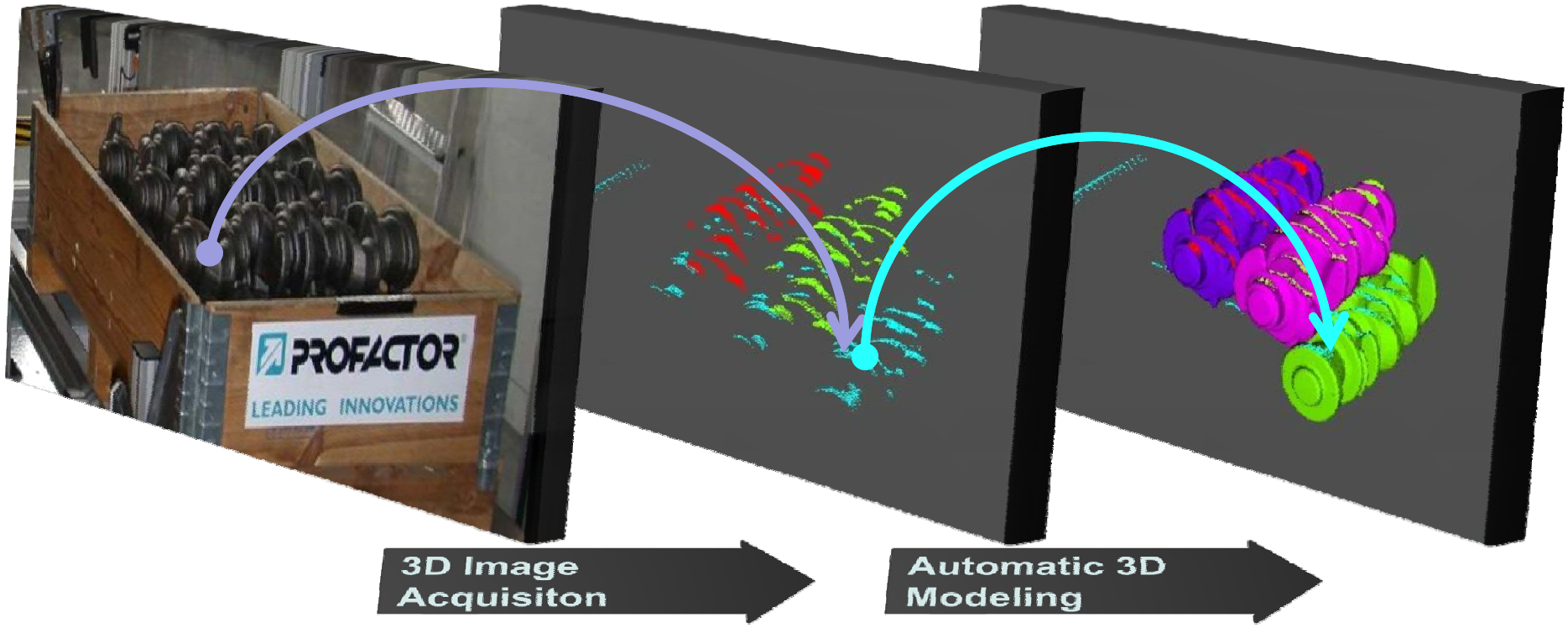
What is the problem? – Hands on examples

Feeding of work pieces within a process chain

Chaotic provision of parts

Ordered feeding to the subsequent process

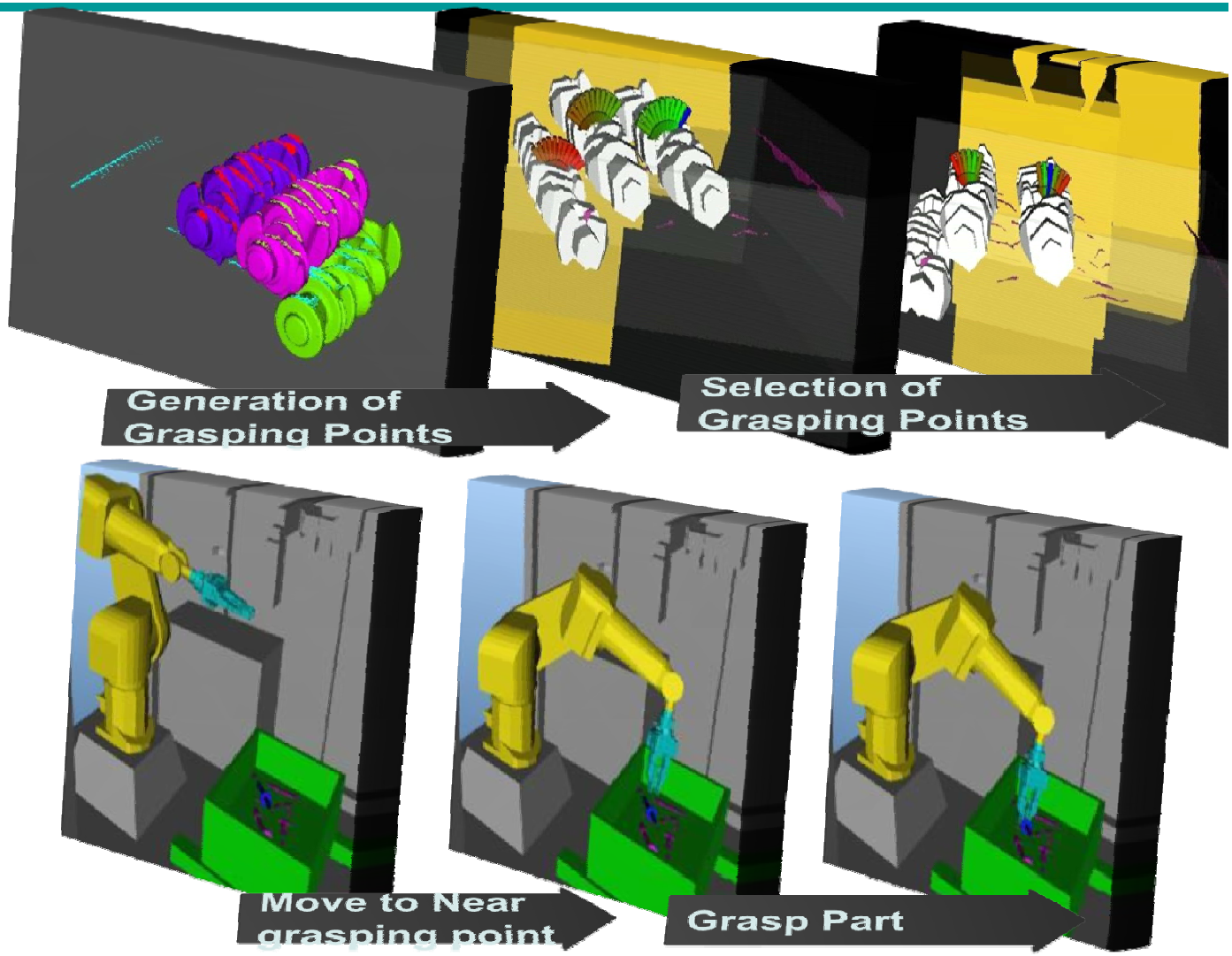
Object & Pose Recognition



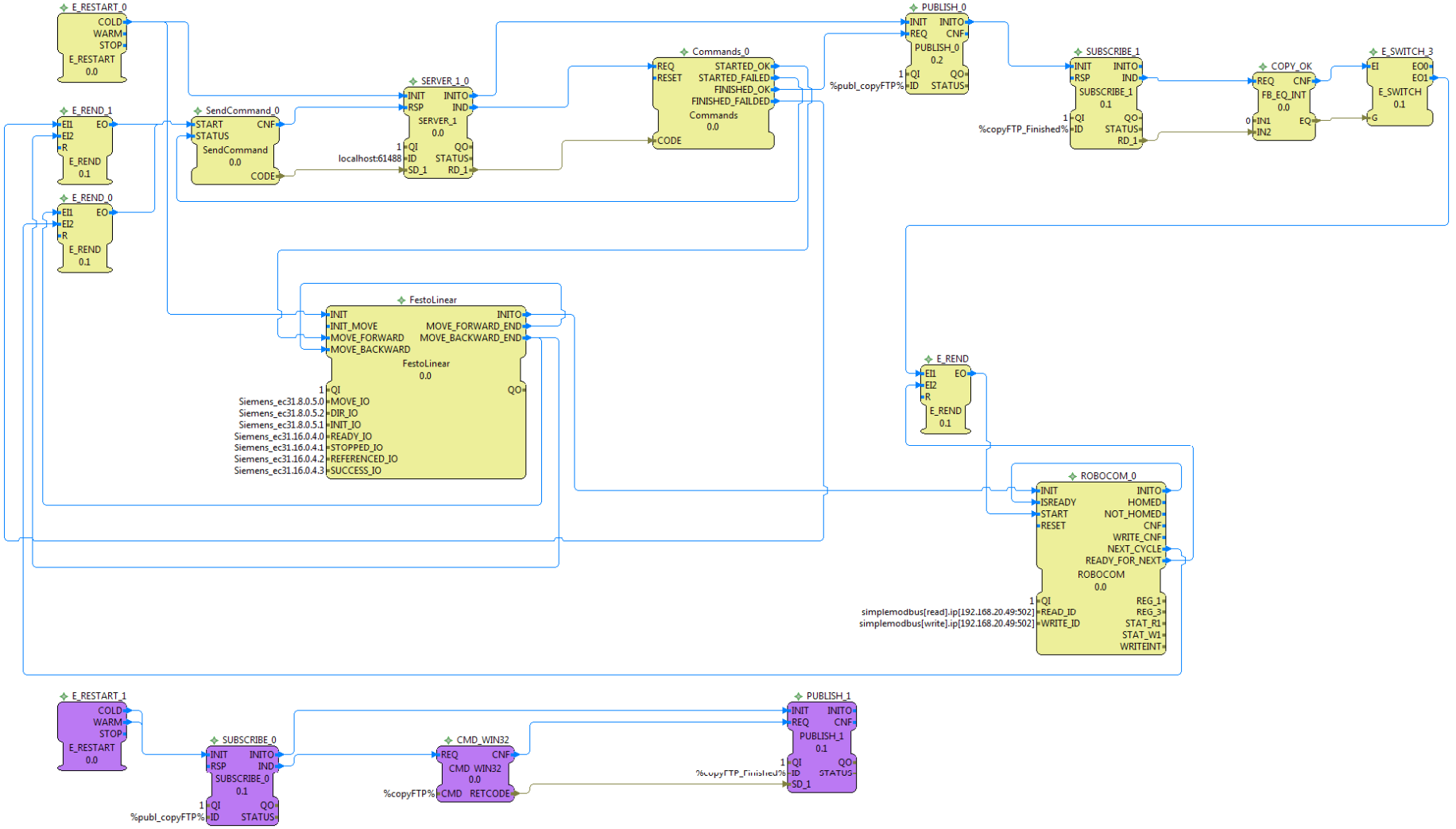
- High performance object recognition with feature based approach
  - ~1 sec for 3D scan, 1-4 sec OR for multiple objects

Process and Motion Planning

- Choose a grasping position
- Collision Free Motion Planning
- Motion Simulation

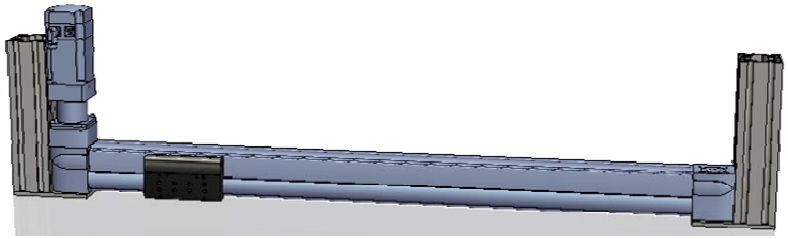


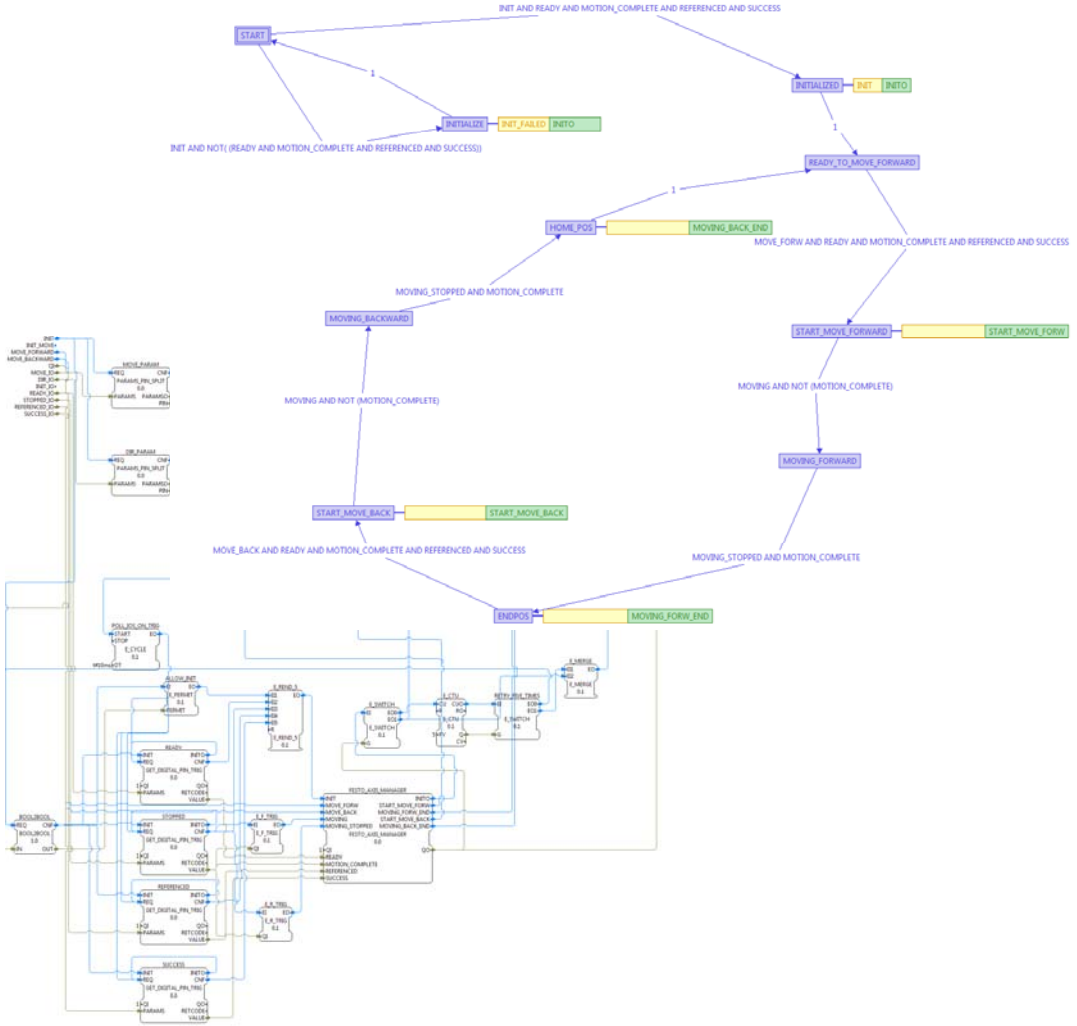
IEC 61499 Application



Linear Axis Control (using generic IOs)

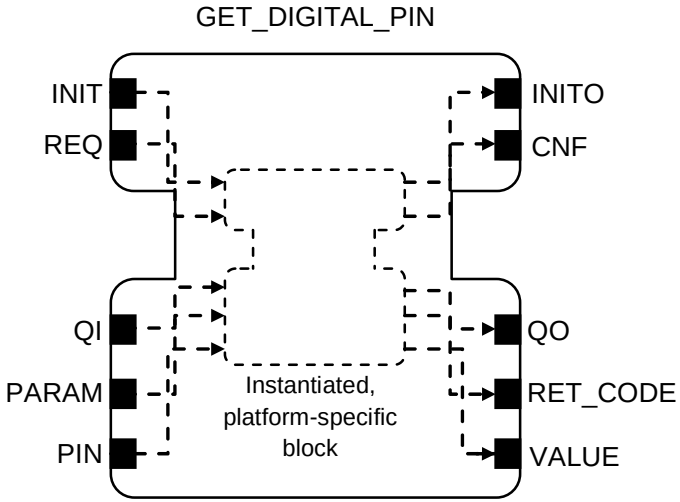
- Axis Manager
  - Statemachine
- Communication with Axis
  - Digital IO’s
- Platform Independent
  - Usage of generic IO’s
  - Tested against simulation
  - 100% code reuse





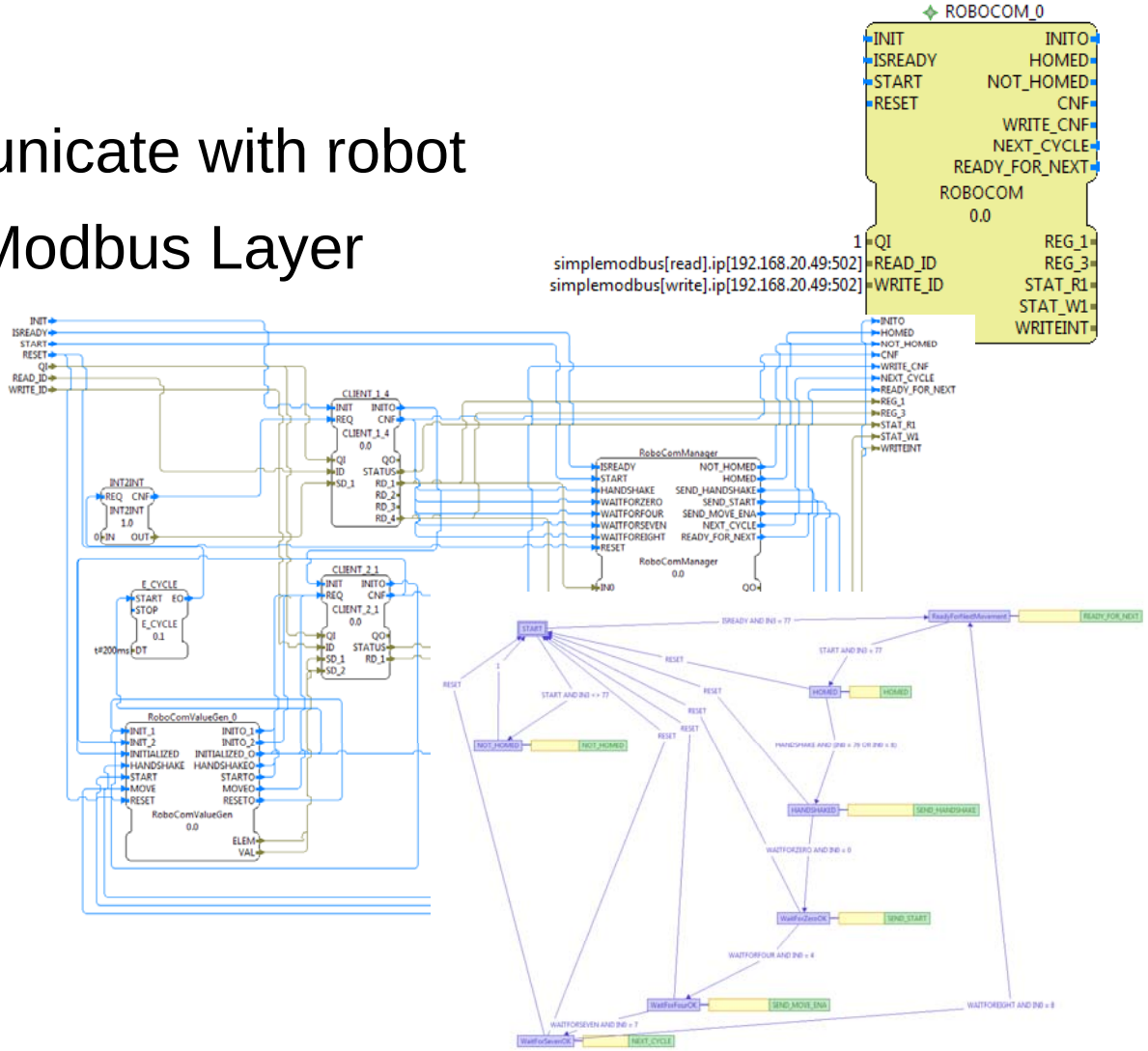
Linear Axis Control (using generic IOs)

- Generic IO FBs
  - One Interface for all supported platforms
  - Platform specific implementation has to be used
    - Platform specific function blocks which follows several rules
  - The generic block instantiates the appropriate platform specific function block
  - The CMake build-system used for FORTE makes it possible to completely automate this process

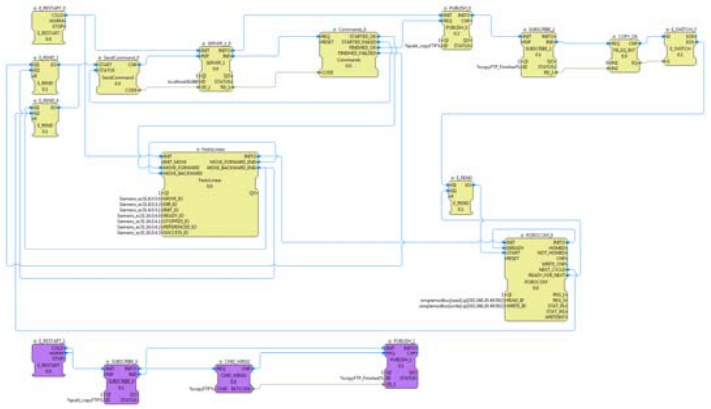


Robot Communication (using „simpleModbus“ layer)

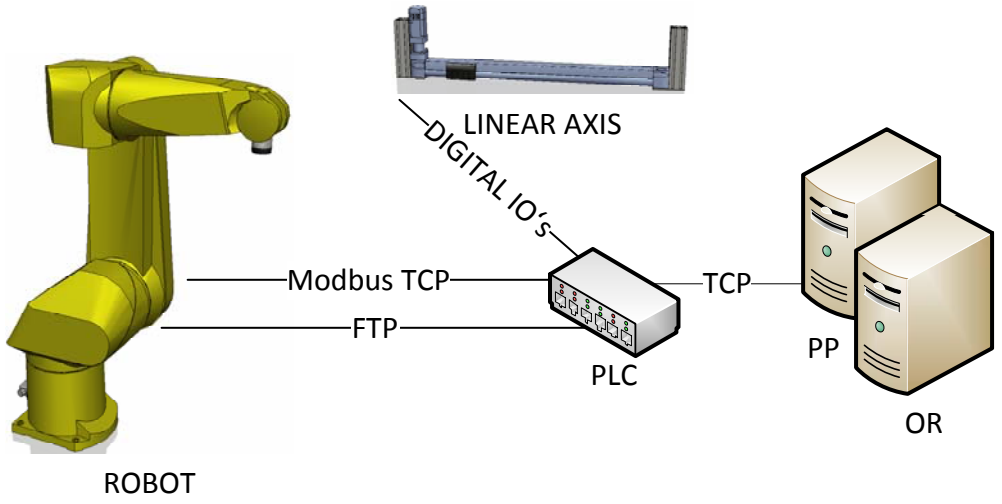
- Modbus TCP to communicate with robot
- Implemented a simpleModbus Layer
  - Modbus Master
  - read multiple registers
  - write multiple registers
- RoboComManager
  - Statemachine
    - Start Motion
    - Monitor Robot State
    - Wait for signal for next cycle



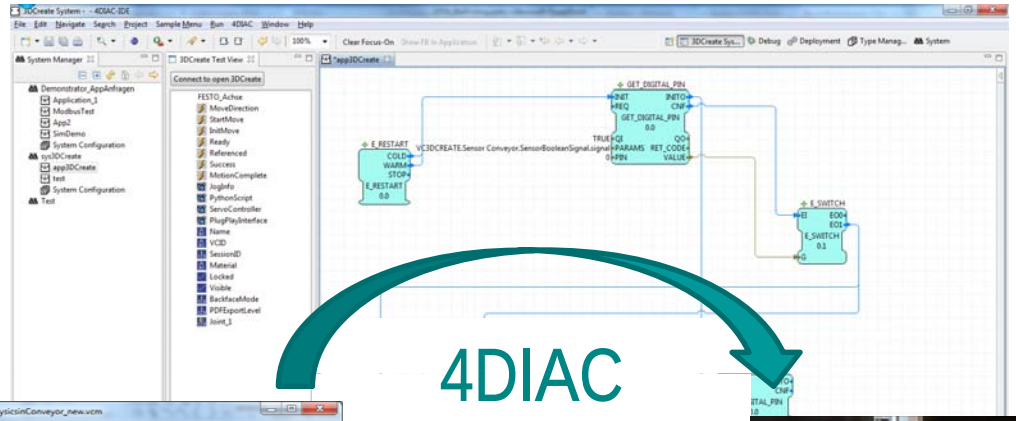
Communication - Object & Pose Recognition, Motion Planning



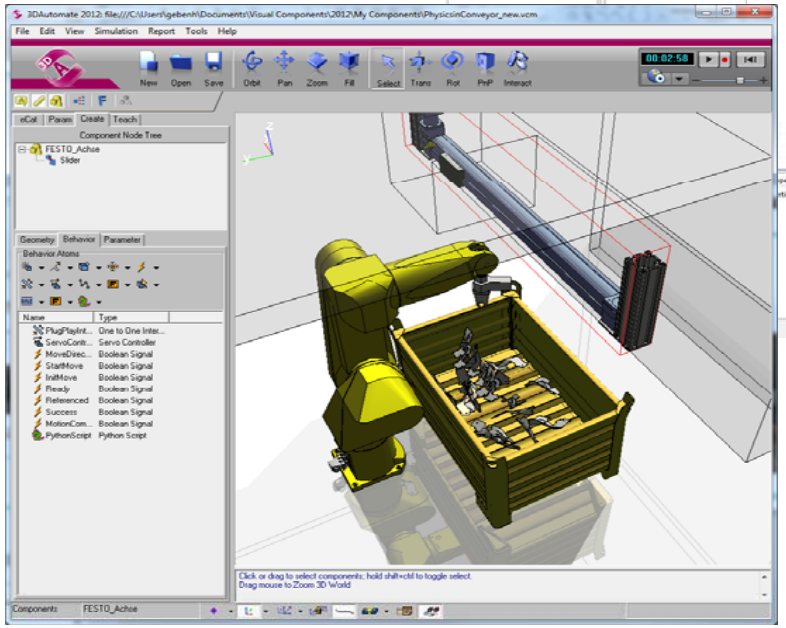
- Provision of Services
- Communication using TCP
- Defined Protocol
  - Start Object & Pose Recognition
  - Get Result of Object & Pose Recognition
  - Start Motion Planning
  - Get Result of Motion Planning
- Transfer Motion Planning Results to Robot



Soft-Commissioning® Approach



4DIAC
FAMUS



Video

- bin picking application example
  - sensor technology = laser triangulation
  - 3D object recognition
  - manipulation path planning
  - IEC 61499 coordination control

  - @see example YouTube-Video: http://www.youtube.com/user/profactorgroup#p/u/1/24iTdqDpK1A

Thanks for your attention!

Contact Speaker
Michael Hofmann
PROFACTOR GmbH
Im Stadtgut A2
4407 Steyr-Gleink, AUSTRIA
michael.hofmann@profactor.at
www.profactor.at