A Helping Hand: Industrial Robotics, Knowledge and User-Oriented Services

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Motivation

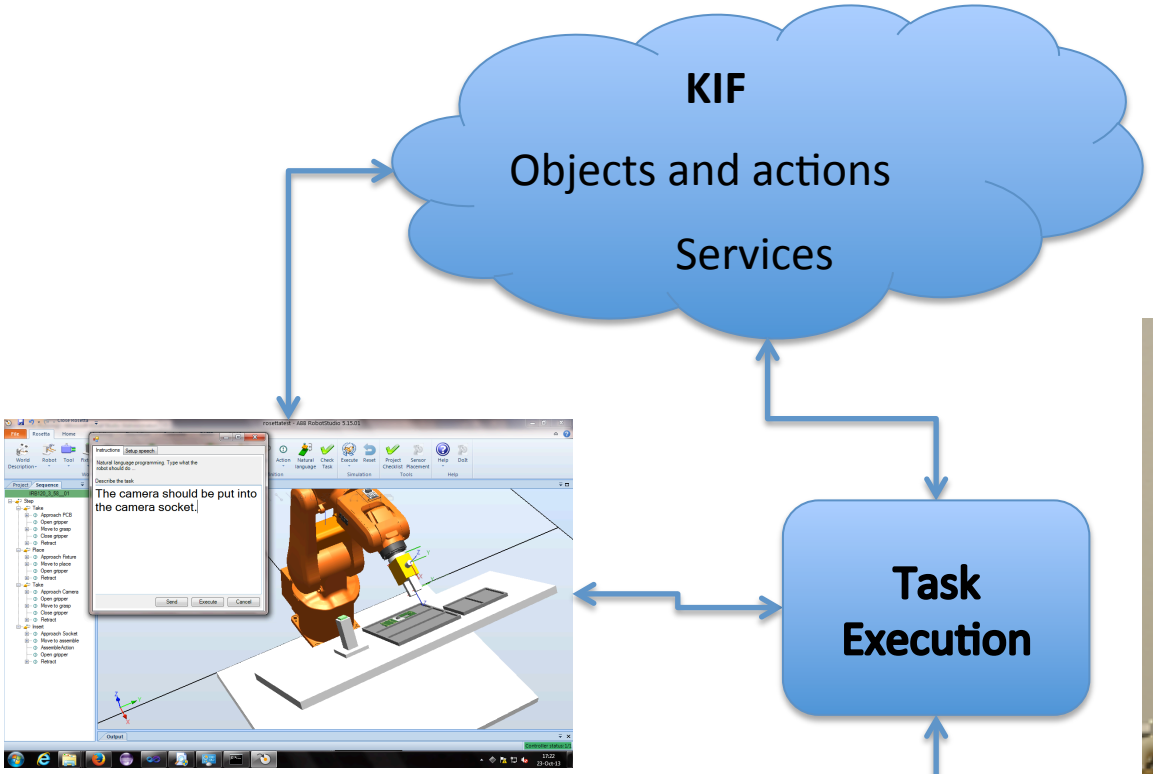
Why AI?

- User-friendliness
- Autonomy

What do we need?

- Device and process knowledge
- Several types of reasoning
- Communication/Interaction
- Mixed initiative

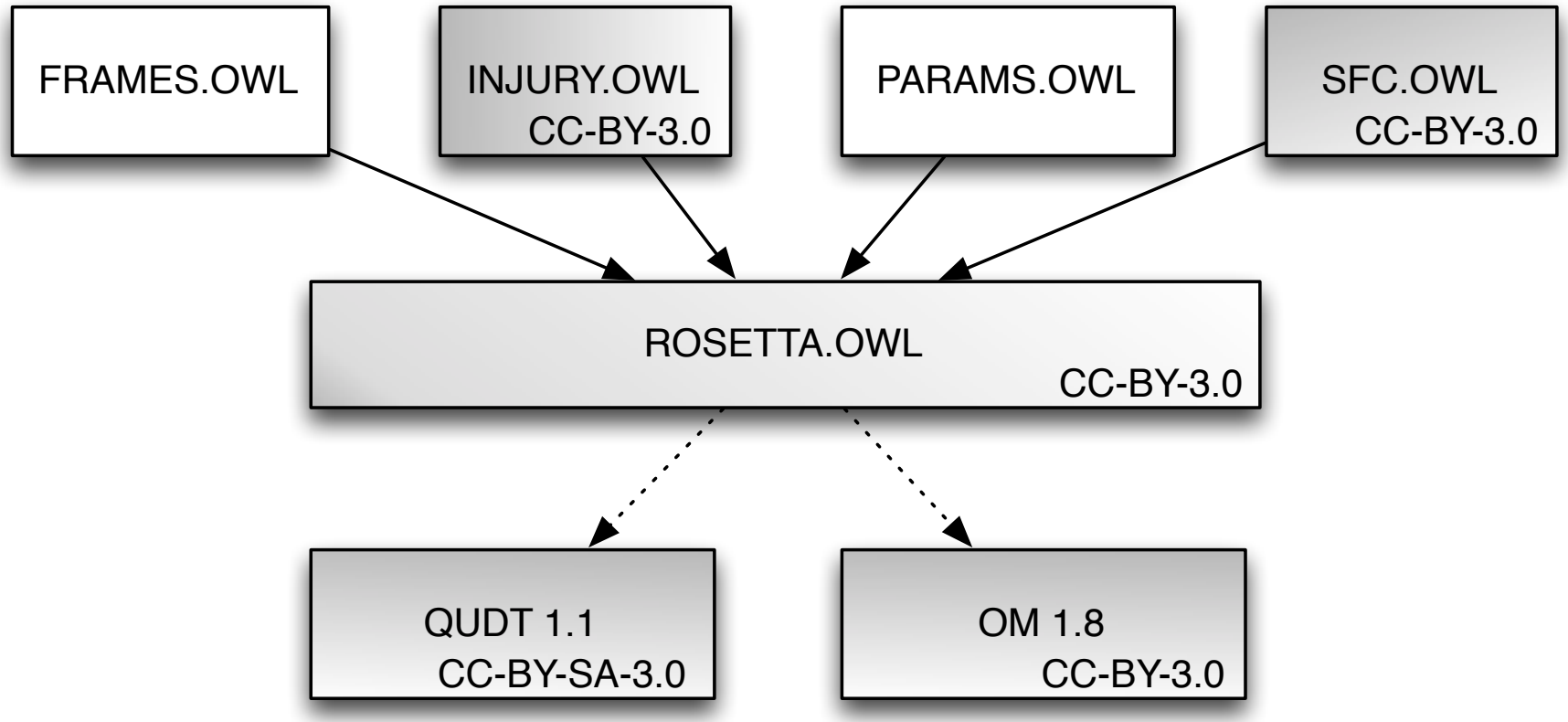
System Architecture



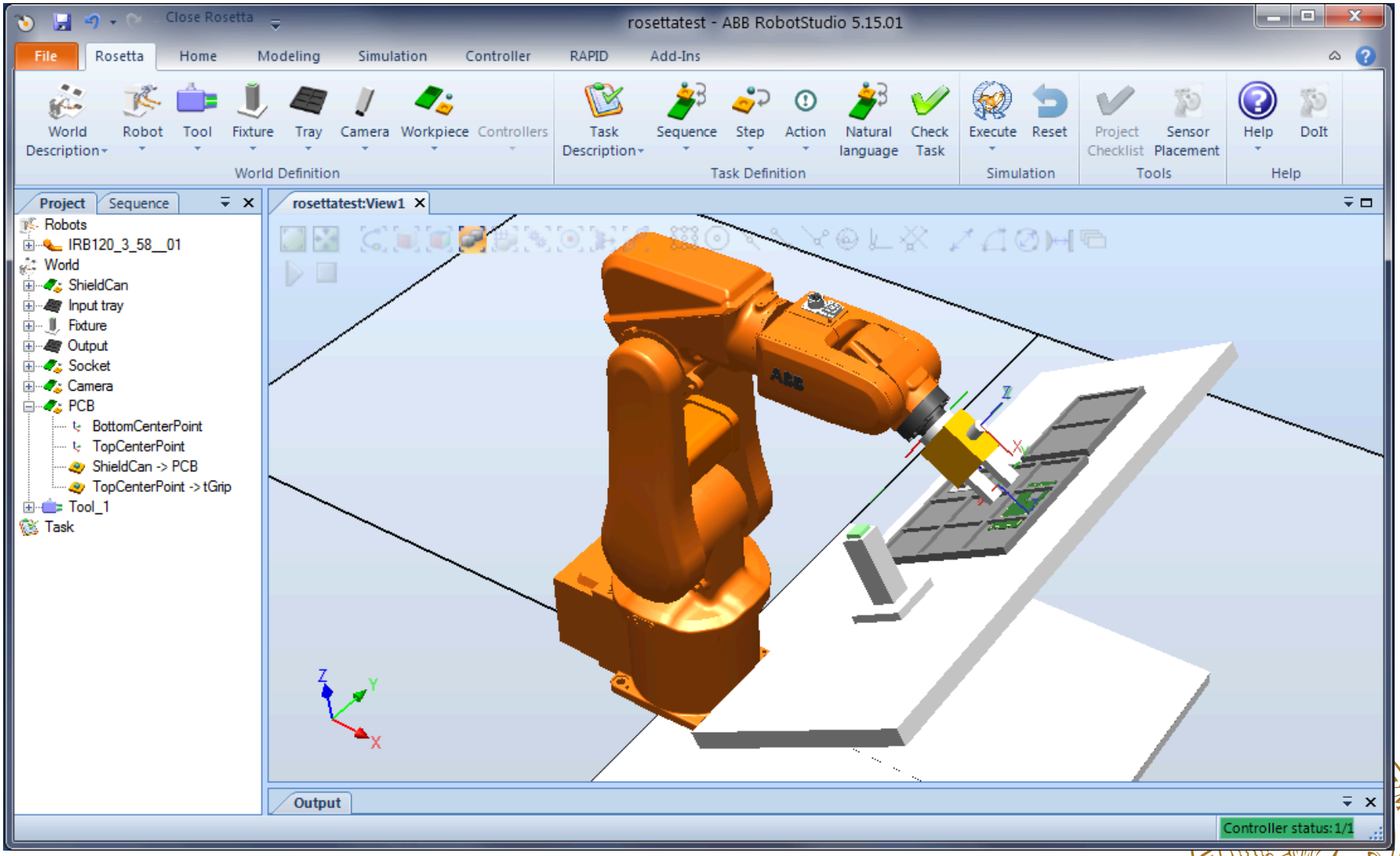
Engineering System

Robot system + Sensors

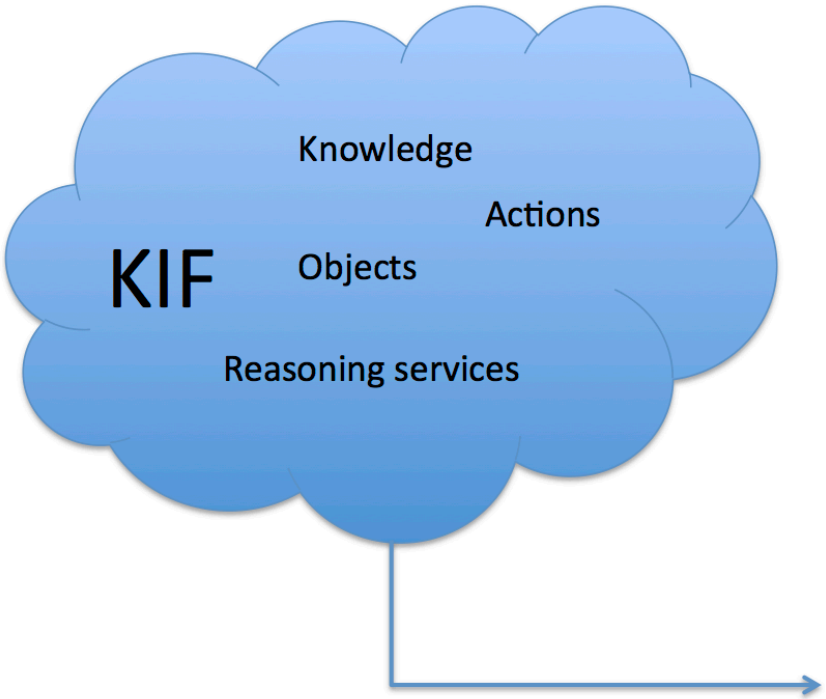
Knowledge in Ontologies



Engineering System



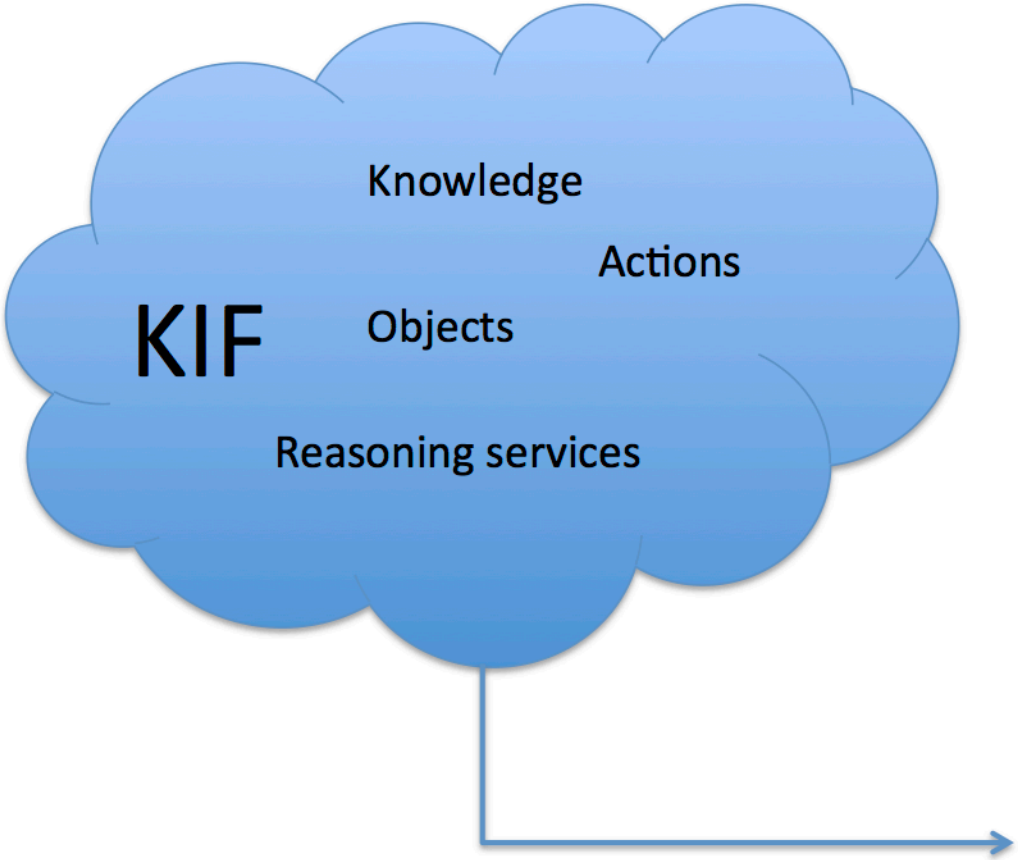
Skills

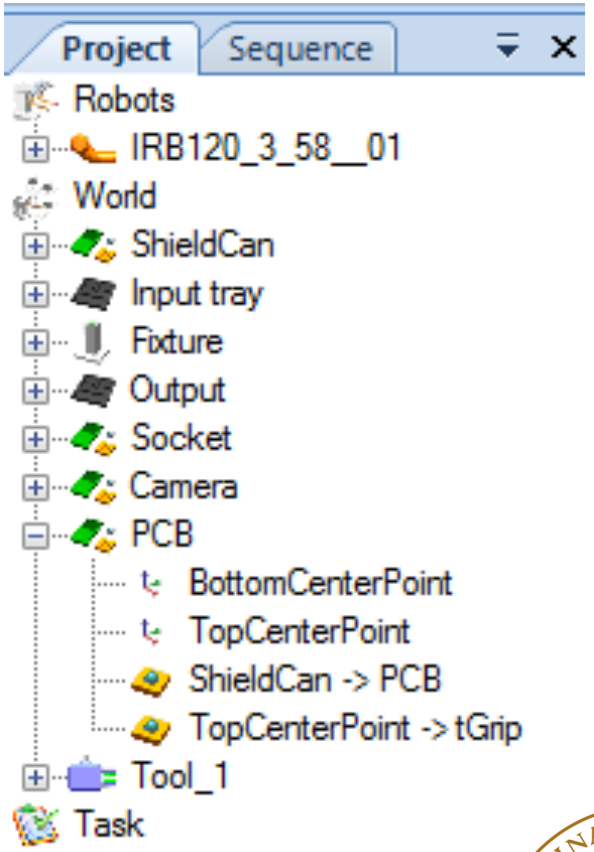


Skills

- Primitive and complex
- Types
- Parameters
- Labels
- Device requirements
- Pre– and postconditions

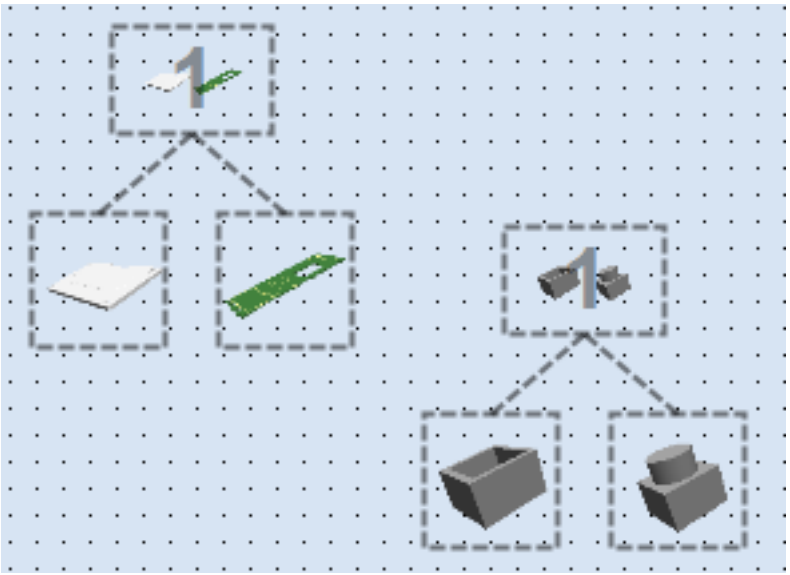
Objects in the Engineering System





Creating a Program Sequence

Assembly graph

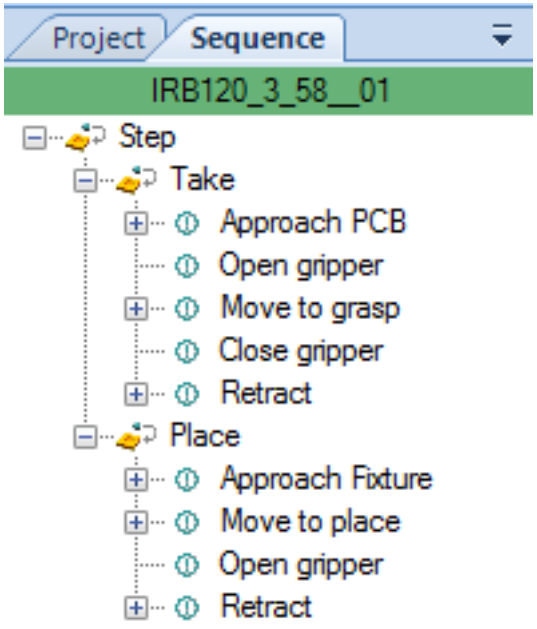


Drag-and-drop

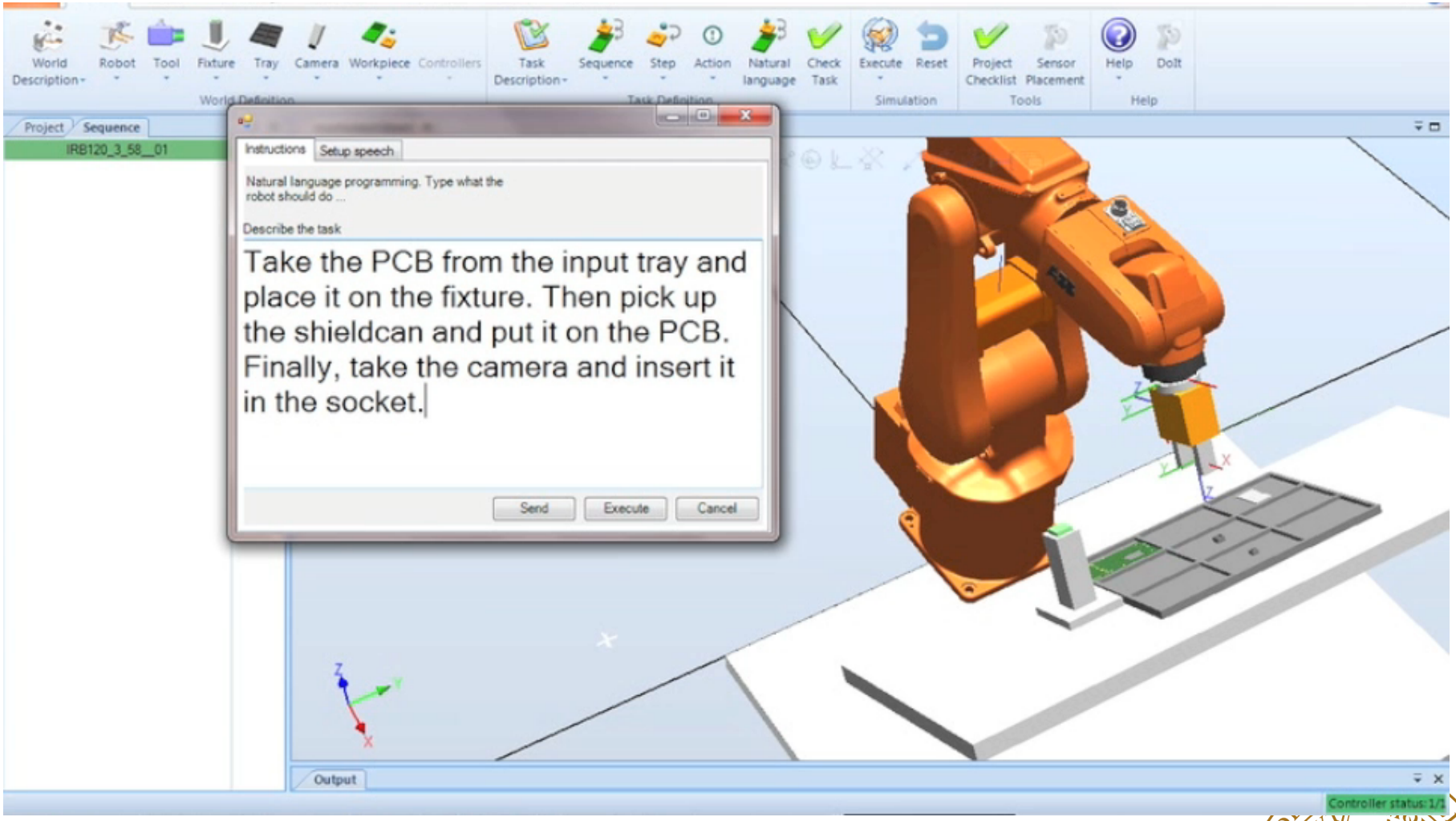
Action planning

Natural Language

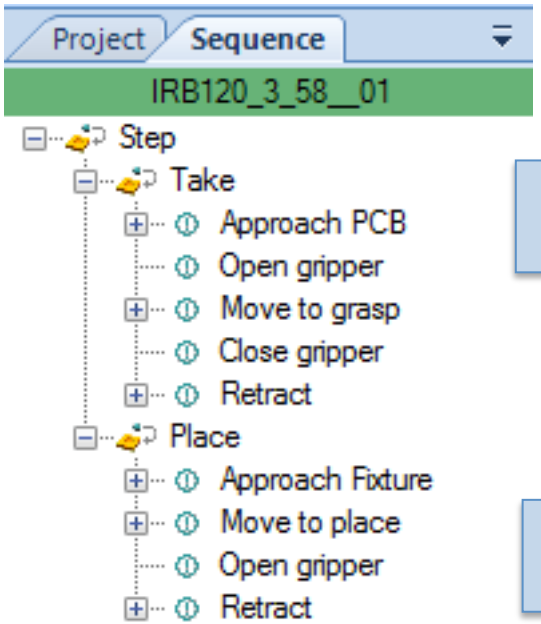
Action sequence



Natural Language Programming



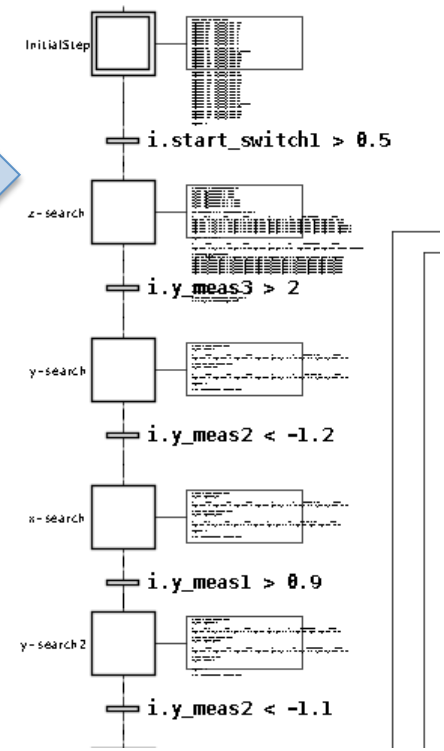
Code Generation



Native code

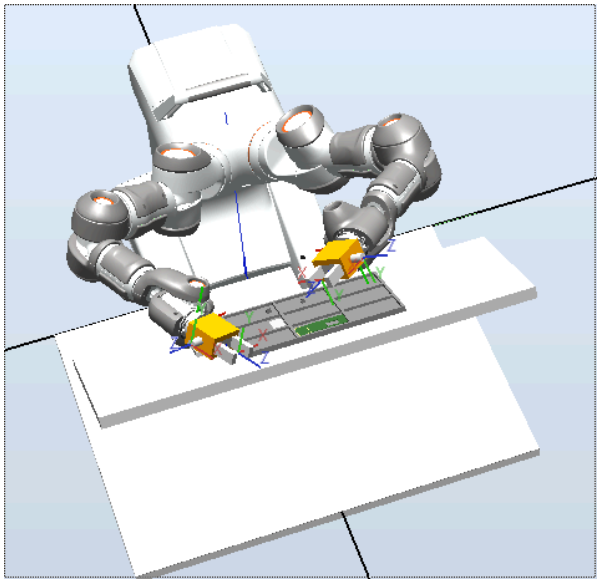
```
PROC RosettaPath0_Approach_PCB()
  MoveL RosettaTarget_3,v200,z50,tool0\WObj:=wobj0;

  ENDPROC
PROC RosettaPath1_Open_gripper()
IF DOutput(do1)=0 OR DOutput(do2)=1 THEN
  Reset do2;
  Set do1;
  WaitTime 0.5;
  ENDIF
```

Sensor controlled skills



Code generation for simulation and execution.

Platform Independence



Adaption and Execution

- Parameter learning [Stolt et al 2012].
- Error detection and classification [Di Lello et al, 2013].

Future Work

- Robust execution and error handling.
- Developing the natural language interaction.
- Knowledge acquisition.
- Mixed initiative dialogue systems.

Read our paper!