

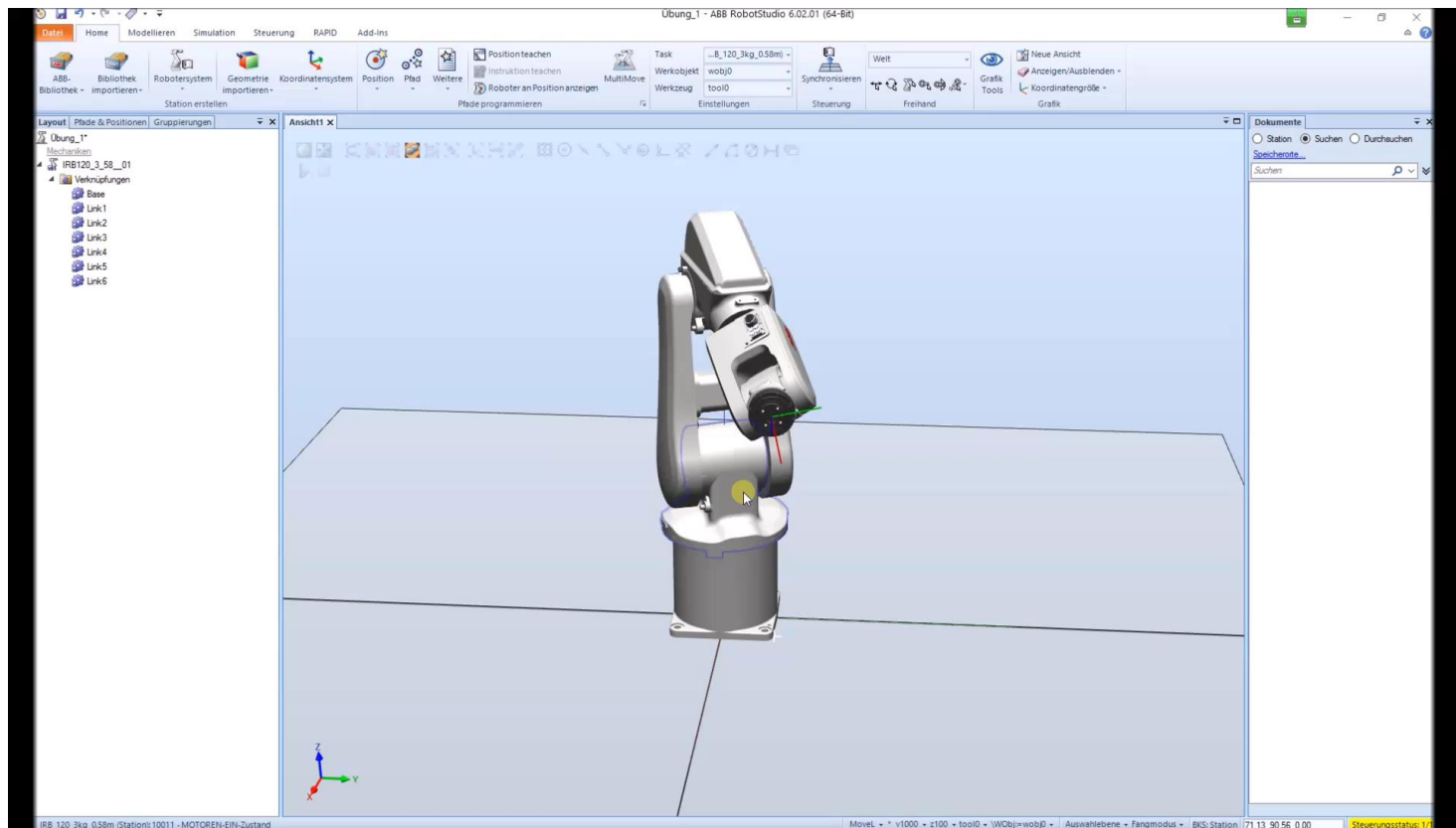
Verschließen einer Flasche mittels eines zweiarmigen Roboters



Agenda

1. Flexpendant und Grundbefehle
durch Alexander Henger
2. Projektvorstellung: Import und Bewegen der Greifer,
Main-Programm
durch Elisabeth Schreck
3. Finale Lösung der Problemstellung: Ausgänge und
Stationslogik
durch Ernest Maier

Video Bedienung des Roboters



Grundbefehle in der Programmierung

- MovJ
- MovL
- MovC
- Crobt()
- for
- If
- else
- etc.

Modul

Deklarationen

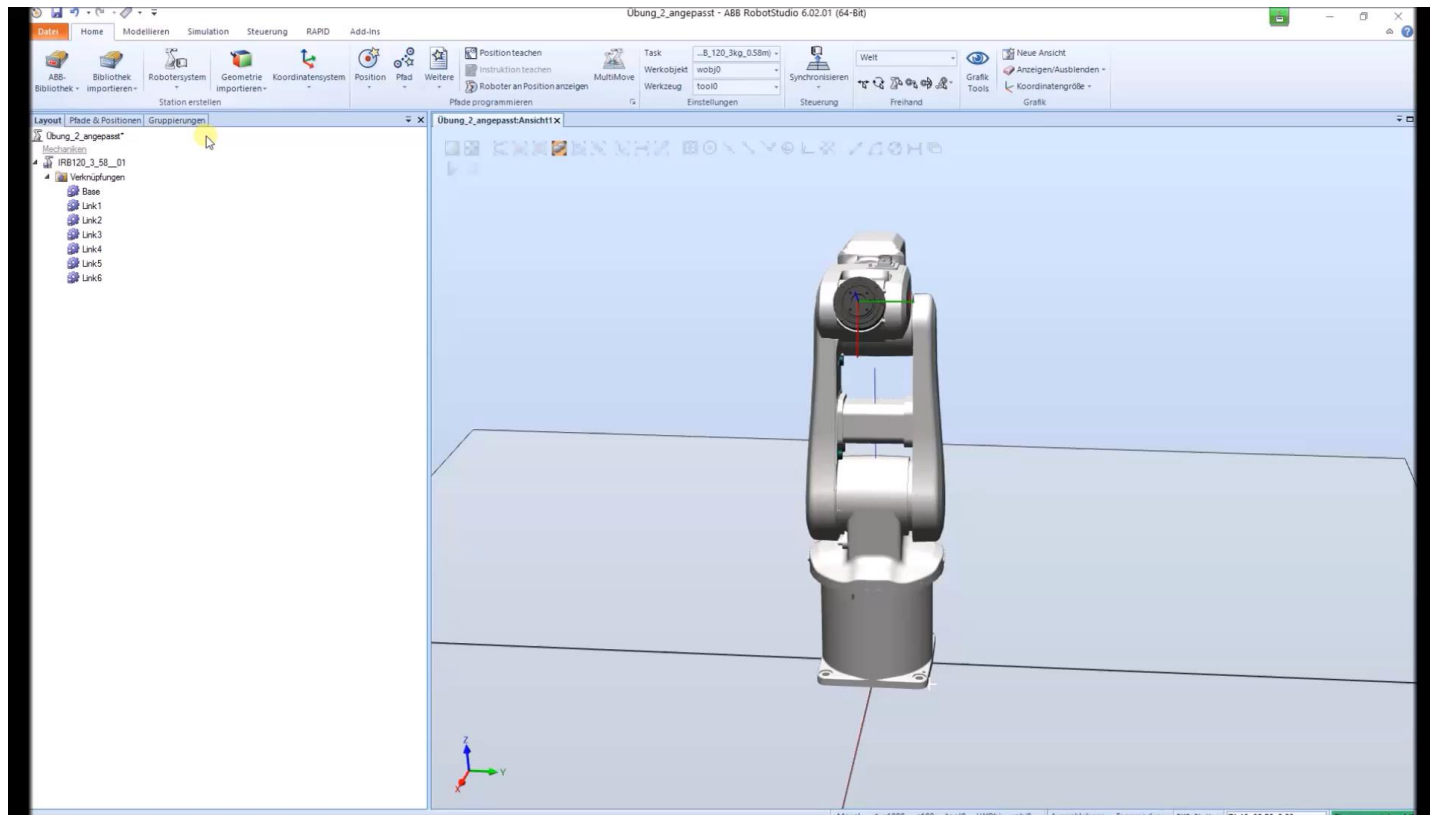
Routinen

```
MODULE WzBhf
! *****
! Robtargets
! *****
CONST robtarget pWzBhf11:=[[28.66,665.3,1603.09],[-0.5,0.5,0.5,0.5],[
CONST robtarget pWzBhf12:=[[-351.34,665.3,1603.09],[-0.5,0.5,0.5,0.5]
CONST robtarget pWzBhf21:=[[-635.31,458.66,1603.09],[0.707107,0,-0.70
CONST robtarget pWzBhf22:=[[-635.3,78.66,1603.09],[0.707107,0,-0.7071

PROC WzAblage11()
Begin:
  ConfJ\Off;
  ConfL\Off;
  MoveAbsJ jpBahnhof1,v5000,z20,ttFestteil\WObj:=wobj0;
  MoveJ Offs(pWzBhf11,0,-100,200),v3000,z20,ttFestteil\WObj:=wobj0;
  MoveL Offs(pWzBhf11,0,0,200),v3000,z10,ttFestteil\WObj:=wobj0;
  MoveL Offs(pWzBhf11,0,0,30),v3000,z5,ttFestteil\WObj:=wobj0;
  MoveL pWzBhf11,v200,fine,ttFestteil\WObj:=wobj0;
  WzLoesen;
  WaitTime 0.5;
  MoveL Offs(pWzBhf11,0,-30,0),v200,z5,ttFestteil\WObj:=wobj0;
  MoveL Offs(pWzBhf11,0,-100,0),v3000,z20,ttFestteil\WObj:=wobj0;
  MoveAbsJ jpBahnhof1,v5000,z20,ttFestteil\WObj:=wobj0;
  ConfJ\On;
  ConfL\On;
End:
ENDPROC

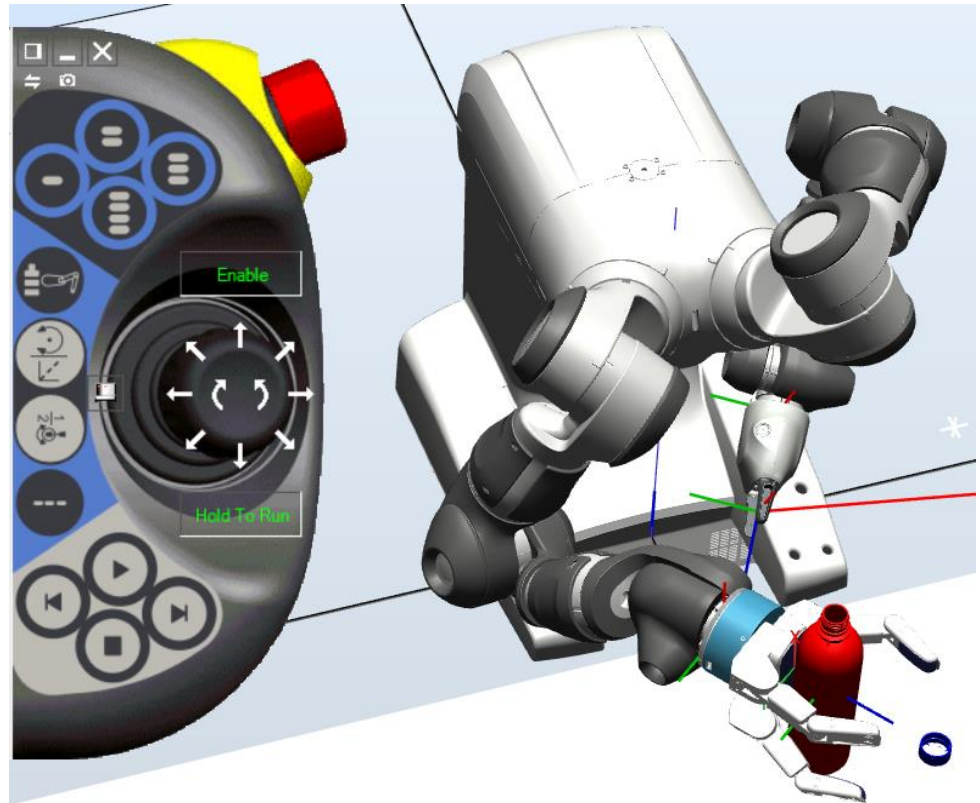
PROC WZFixieren()
Begin:
  SetDO doWzW_Auf1,0;
  SetDO doWzW_Zu1,1;
End:
ENDPROC
ENDMODULE
```

Video Programmierbeispiel

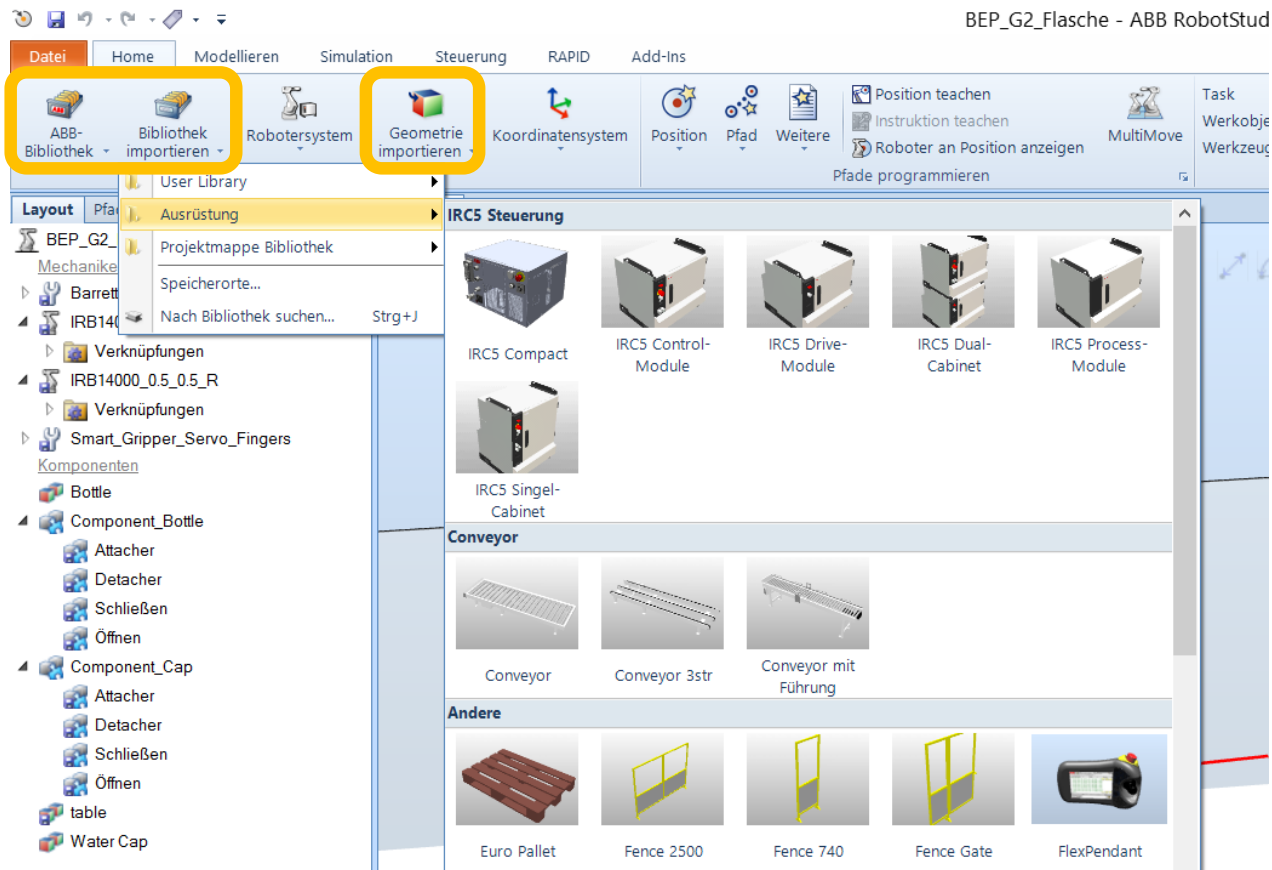


Vorstellung des Projekts

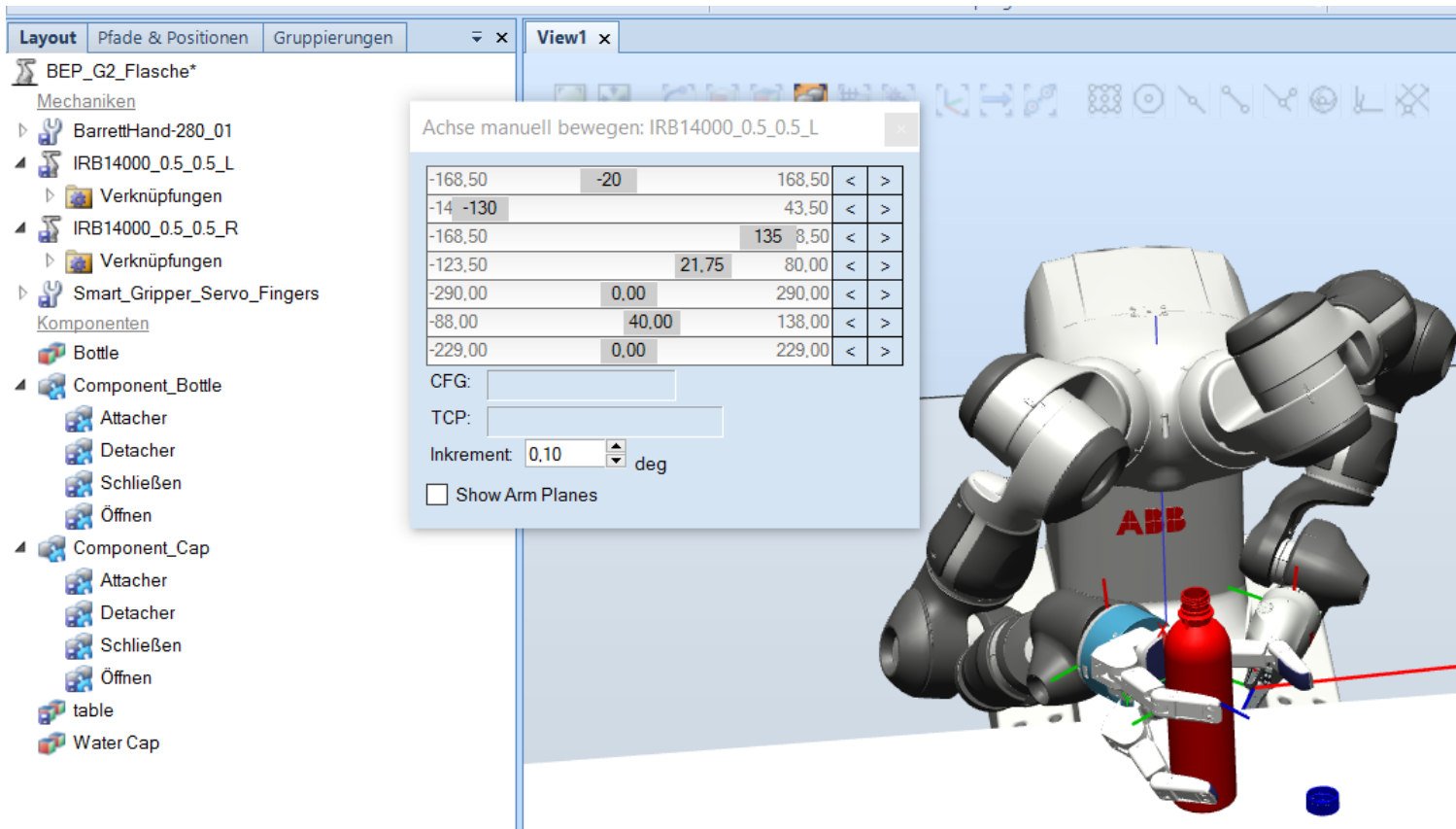
- Flasche wird mit dem Dreifingergreifer des rechten Arms angehoben
- mit der Greifzange des linken Arms wird die Flasche verschlossen



Import und ABB-Bibliothek



Bewegen der Greifer



Attacher/Detacher und Schließen/Öffnen

The screenshot displays the ABB RobotStudio software interface for a project named 'BEP_G2_Flasche - ABB Rot'. The main window shows a 3D model of a robot arm assembly. The left sidebar contains a tree view of the assembly structure, with 'Component_Bottle' and its sub-components 'Attacher', 'Detacher', 'Schließen', and 'Öffnen' highlighted. The 'Eigenschaften: Attacher' panel is open, showing the 'Parent' as 'IRB14000_05_05_R' and the 'Child' as 'Bottle'. The 'Offset (mm)' is set to -124.00, and the 'Orientation (deg)' is set to 94.00. The 'Signale' panel shows an 'Execute' button. The 'Eigenschaften: Schließen' panel is also open, showing the 'Mechanism' as 'BarrettHand-280_01' and the 'Duration (s)' as 1.0. The 'J1 (deg)' is set to 6.00, and the 'J2 (deg)' is set to 23.25. The 'Signale' panel shows 'GetCurrent', 'Execute', and 'Pause' buttons. The 'Schließen' button in the 'Signale' panel is highlighted with a yellow box.

Attacher

Eigenschaften: Attacher

Eigenschaften

Parent: IRB14000_05_05_R

Child: Bottle

Mount: ☒

Offset (mm): -124.00, 110.00

Orientation (deg): 94.00, 90.00, 0.00

Signale

Execute

Übernehmen Schließen

Schließen

Eigenschaften: Schließen

Eigenschaften

Mechanism: BarrettHand-280_01

Relative: ☐

Duration (s): 1.0

J1 (deg): 6.00~

J2 (deg): 23.25

J3 (deg): 91.10~

J4 (deg): 95.12~

J5 (deg): 87.75~

J6 (deg): 20.67

J7 (deg): 21.96

J8 (deg): 28.42

Signale

GetCurrent

Execute

Pause

Übernehmen Schließen

Programm

Steuerung Dateien View1 IRB_14000_0.5kg_0.5m (Station) x

Aktuelle Station

- IRB_14000_0.5kg_0.5m
 - HOME
 - Konfiguration
 - Ereignisprotokoll
 - E/A-System
 - RAPID
 - T_ROB_L (Programm 'NewProgramName')
 - Programmmodule
 - CalibData
 - MainModule
 - main
 - T_ROB_R (Programm 'NewProgramName')
 - Programmmodule
 - CalibData
 - MainModule
 - main

View1 T_ROB_L/MainModule T_ROB_R/MainModule* x

```
1  MODULE MainModule
2
3  CONST robtarget pBottle:=[385.77,-82.37,324.28],[0.250578
4  CONST robtarget pStart:=[250.33,-245.12,398.04],[0.087498
5  CONST robtarget p30:=[493.95,0,450],[0.0233687,-0.325422,
6  VAR robtarget p2;
7
8  PROC main()
9      SetDO DO_Hand_Auf, 0;
10     MoveJ pStart, v200, fine, tool0;
11     MoveJ pBottle, v200, fine, tool0;
12     WaitTime 1;
13     SetDO DO_Hand_Zu, 1;
14     WaitTime 1;
15     p2:=Offs(pBottle,0,0,200);
16     MoveJ p2, v200, fine, tool0;
17     SetDO DO_Hand_Zu, 0;
18     MoveJ pBottle, v200, fine, tool0;
19     SetDO DO_Hand_Auf, 1;
20
21  ENDPROC
22  ENDMODULE
```

Ausgänge der Steuerung definieren

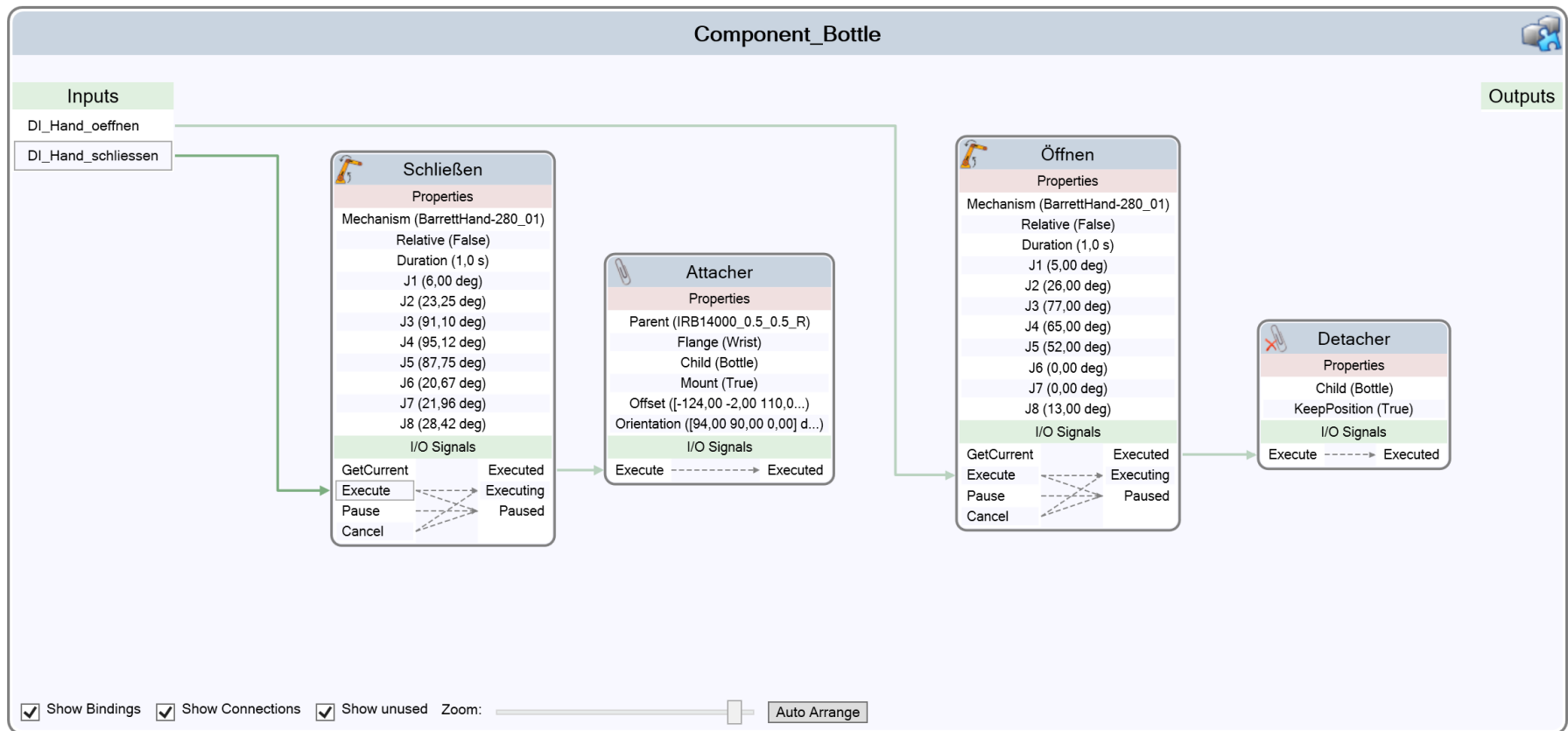
Controller View1 IRB_14000_0.5kg_0.5m (Station) X Configuration - I/O System X

Current Station

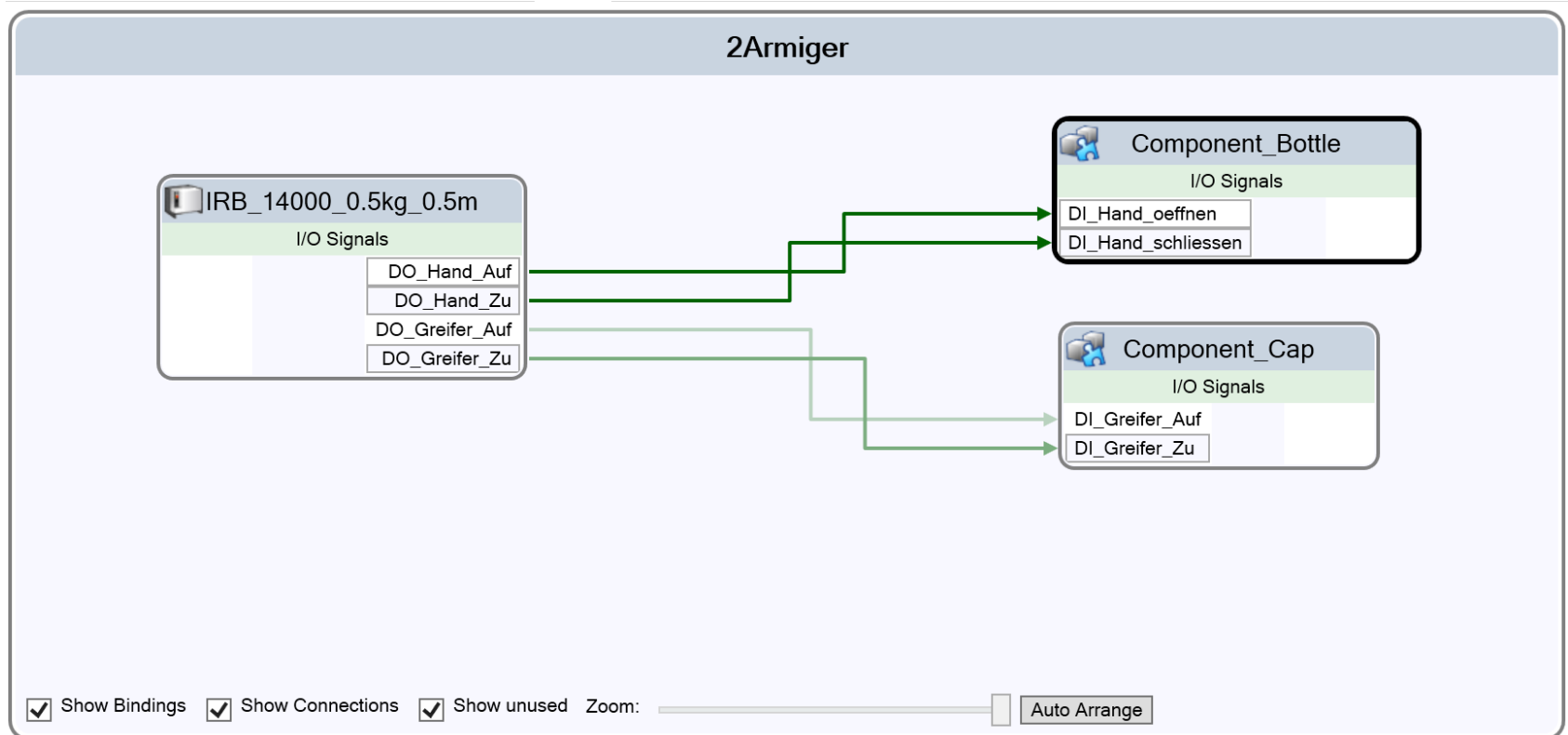
- IRB_14000_0.5kg_0.5m
 - HOME
 - Configuration
 - Communication
 - Controller
 - I/O System**
 - Man-machine communication
 - Motion
 - Event Log
 - I/O System
 - RAPID

Type	Name	Type of Signal	Assigned to Device	Signal Identification Label	Device Mapping
Access Level	AS1	Digital Input	PANEL	Automatic Stop chain(X5:11 to X5:6) and (X5:9 to X5:1)	13
Cross Connection	AS2	Digital Input	PANEL	Automatic Stop chain backup(X5:5 to X5:6) and (X5:3 to X5:1)	14
Device Trust Level	AUTO1	Digital Input	PANEL	Automatic Mode(X9:6)	5
DeviceNet Command	AUTO2	Digital Input	PANEL	Automatic Mode backup(X9:2)	6
DeviceNet Device	CH1	Digital Input	PANEL	Run Chain 1	22
DeviceNet Internal Device	CH2	Digital Input	PANEL	Run Chain 2	23
EtherNet/IP Command	custom_DI_0	Digital Input	D652_10		0
EtherNet/IP Device	custom_DI_1	Digital Input	D652_10		1
EtherNet/IP Internal Device	custom_DI_2	Digital Input	D652_10		2
Industrial Network	custom_DI_3	Digital Input	D652_10		3
Route	custom_DI_4	Digital Input	D652_10		4
Signal	custom_DI_5	Digital Input	D652_10		5
Signal Safe Level	custom_DI_6	Digital Input	D652_10		6
System Input	custom_DI_7	Digital Input	D652_10		7
System Output	custom_DO_0	Digital Output	D652_10		0
	custom_DO_1	Digital Output	D652_10		1
	custom_DO_2	Digital Output	D652_10		2
	custom_DO_3	Digital Output	D652_10		3
	custom_DO_4	Digital Output	D652_10		4
	custom_DO_5	Digital Output	D652_10		5
	custom_DO_6	Digital Output	D652_10		6
	custom_DO_7	Digital Output	D652_10		7
	DO_Greifer_Auf	Digital Output	D652_10		80
	DO_Greifer_Zu	Digital Output	D652_10		81
	DO_Hand_Auf	Digital Output	D652_10		90
	DO_Hand_Zu	Digital Output	D652_10		92
	DRV1BRAKE	Digital Output	DRV_1	Brake-release coil	2
	DRV1BRAKEFB	Digital Input	DRV_1	Brake Feedback(X3:6) at Contactor Board	11
	DRV1BRAKEOK	Digital Input	DRV_1	Brake Voltage OK	15

Smart Component



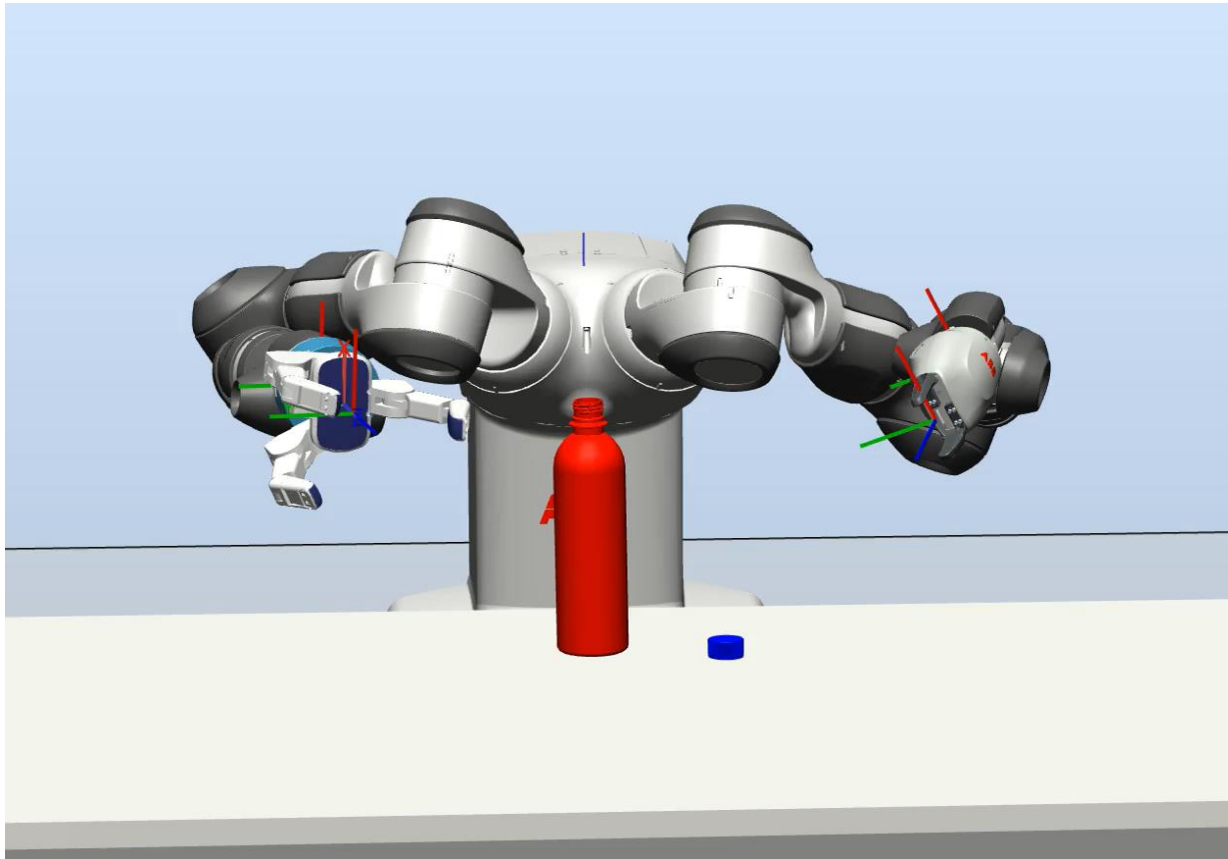
Station Logic



Auszug des Programms

```
9  PROC main()
10
11      SetDO DO_Cap_on_Bottle, 0;
12      Start;                                     ! Initialisiert das Programm
13      MoveJ pTisch, v500, fine, tool0;          ! Fährt zum Tisch (Deckel)
14      Greifen;                                  ! Nimmt den Deckel auf
15      MoveJ pStart, v500, z60, tool0;           ! Fährt in einem großen Radius am Start vorbei (Kollision wird vermieden)
16      MoveJ pZwischenpunkt, v500, fine, tool0; ! Zwischenpunkt ca. 20mm vom Flaschenhals entfernt
17      MoveJ pFlasche, v500, fine, tool0;        ! Aufsetzen des Deckels
18      MoveJ pFlascheDrehen1, v500, fine, tool0; ! Aufdrehen des Deckels
19      Loslassen;                                ! Loslassen des Deckels
20      SetDO DO_Cap_on_Bottle, 1;
21      Start;
22
23  ENDPROC
24
25  PROC Greifen()
26      SetDO DO_Greifer_Auf, 0;
27      SetDO DO_Greifer_Zu, 1;
28  ENDPROC
29
30  PROC Loslassen()
31      SetDO DO_Greifer_Auf, 1;
32      SetDO DO_Greifer_Zu, 0;
33  ENDPROC
34
```

Video Flasche zu schrauben





Vielen Dank für Ihre Aufmerksamkeit!