



# HOLOLENS UND SMARTE 3D SENSORIK

**SICK**  
Sensor Intelligence.

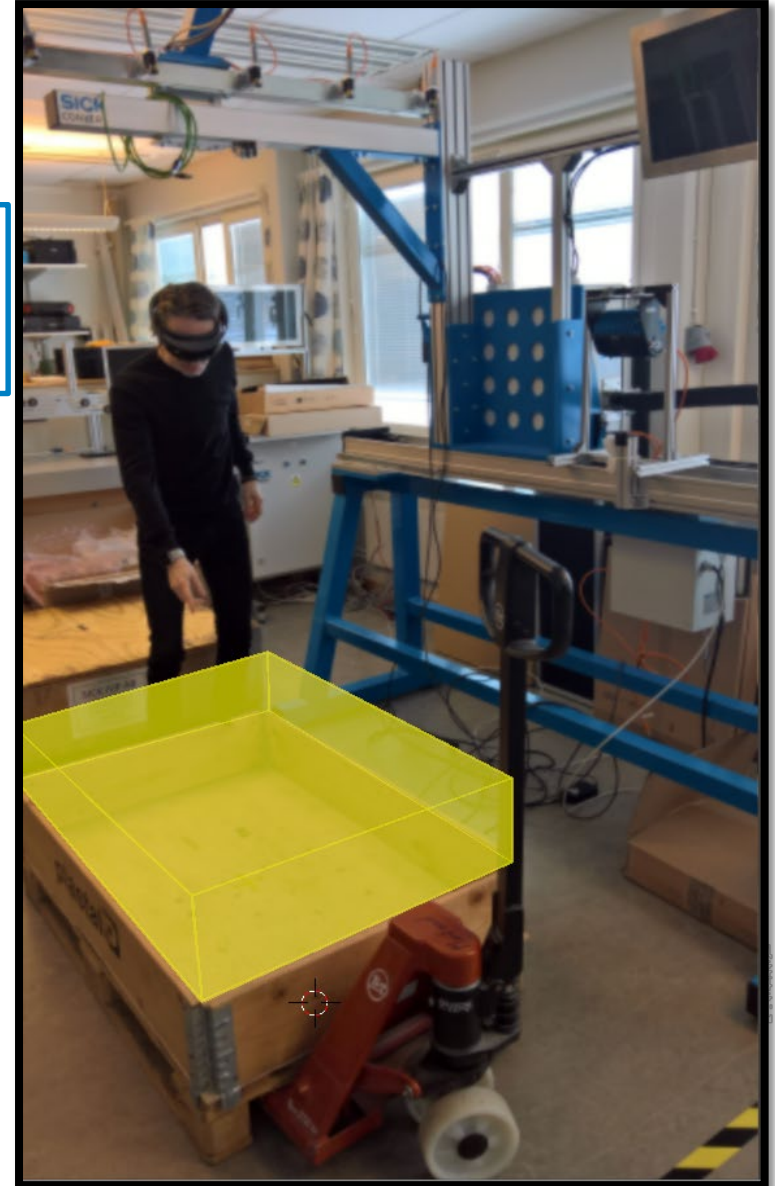
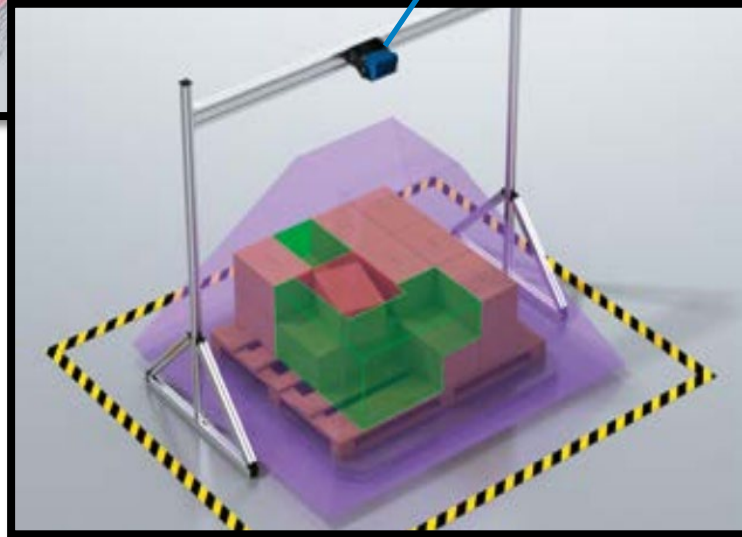
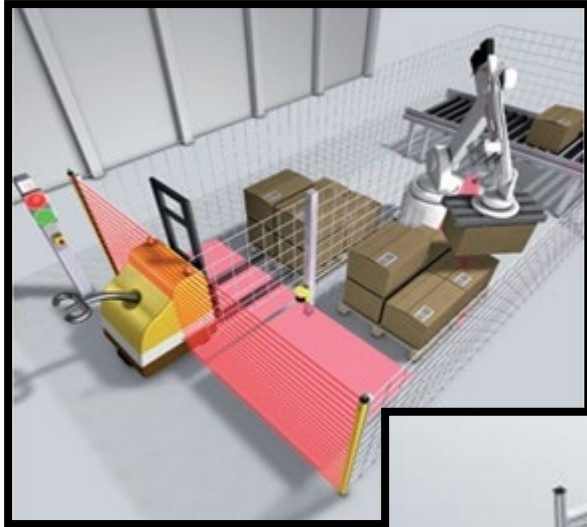
Uwe Hahne

GBC09 BU05 3D Compact Systems

VAR<sup>2</sup> 2017 - Realität erweitern

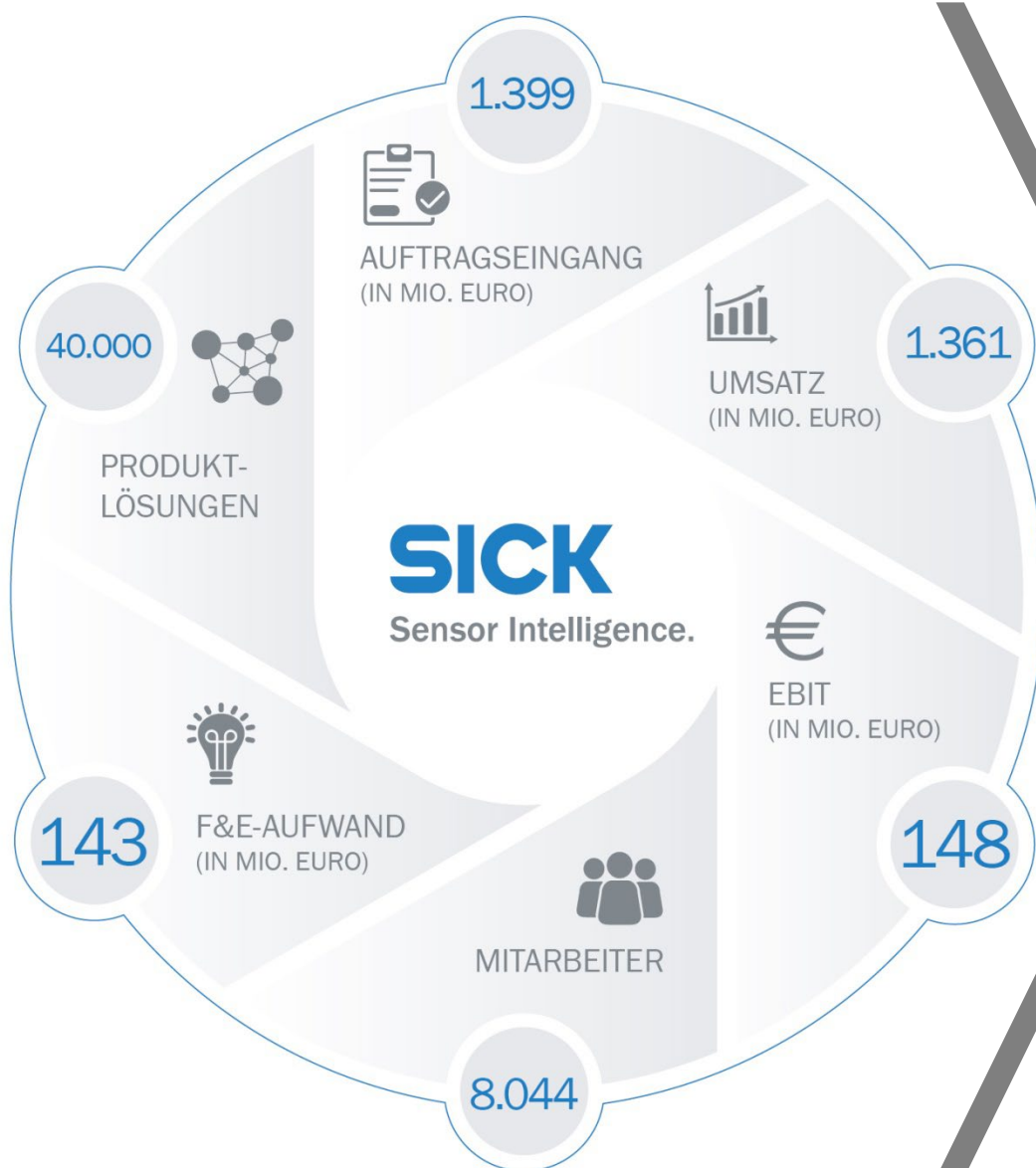
# MOTIVATION

## VON DER 3D APPLIKATION ZUR 3D INBETRIEBNAHME



# 3D APPLIKATIONEN UND 3D SENSOREN





SICK – weltweit einer der führenden Hersteller von Sensoren und Sensorlösungen für industrielle Anwendungen

# BREITES PRODUKTSPEKTRUM + ERFAHRUNG + EXPERTISE = EFFIZIENTE LÖSUNGEN FÜR SIE



- Analysenlösungen
- Automatisierungs-Lichtgitter
- Distanzsensoren
- Encoder
- Fluidsensorik
- Gasanalysatoren
- Identifikationslösungen
- Lichttaster und Lichtschranken

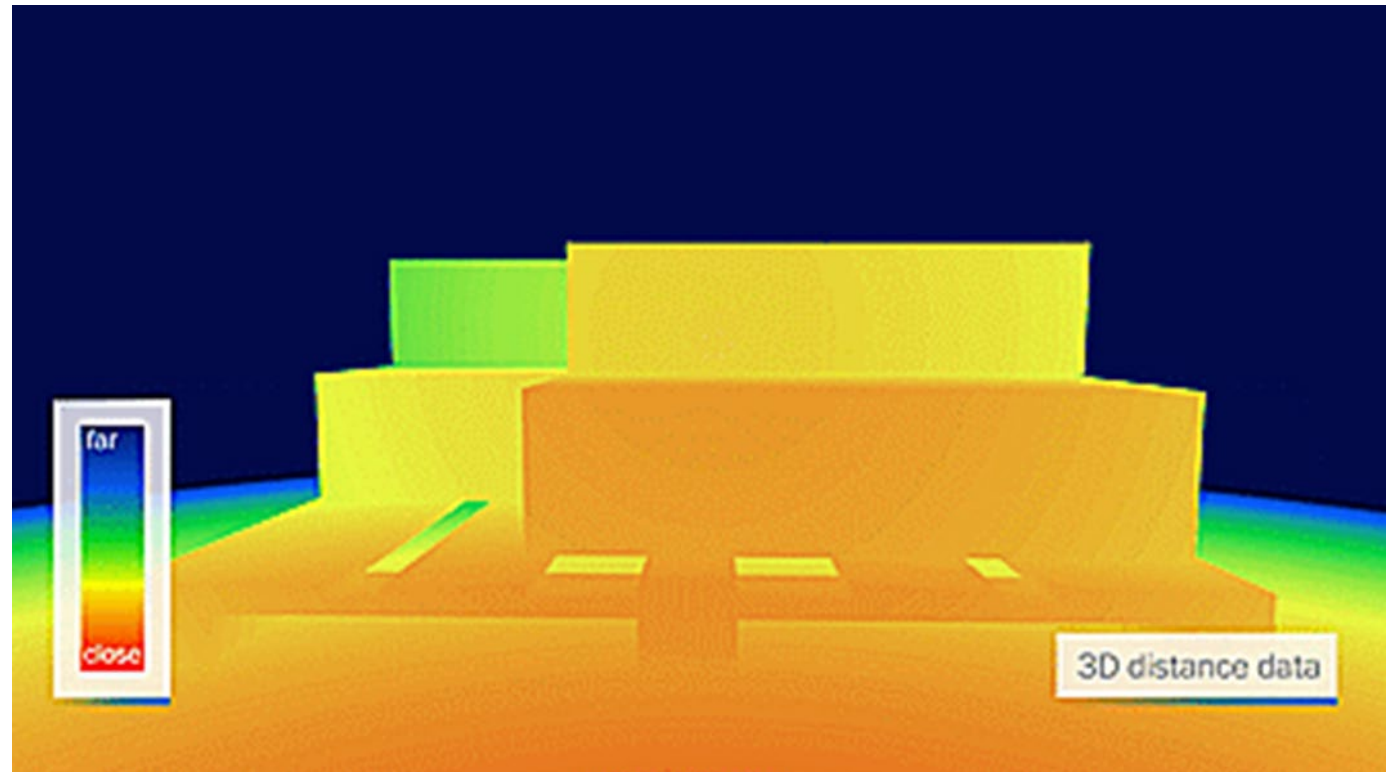
- Magnetische Zylindersensoren
- Mess- und Detektionslösungen
- Motor-Feedback-Systeme
- Näherungssensoren
- Optoelektronische Schutzeinrichtungen
- Registration Sensors
- sens:Control – sichere Steuerungslösungen

- Sicherheitsschalter
- Sicherheits-Software
- Staubmessgeräte
- Systemlösungen
- Ultraschall-Gasdurchflussmessgeräte
- Verkehrssensoren
- **Vision**

# TECHNOLOGIE

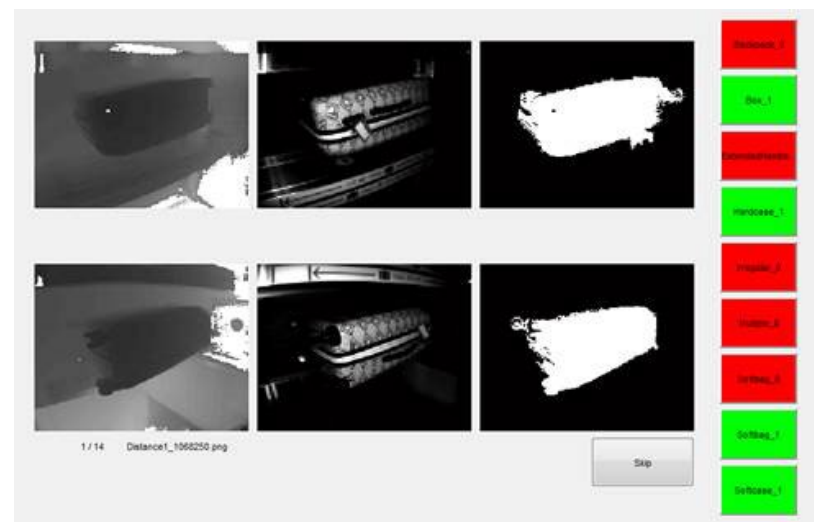
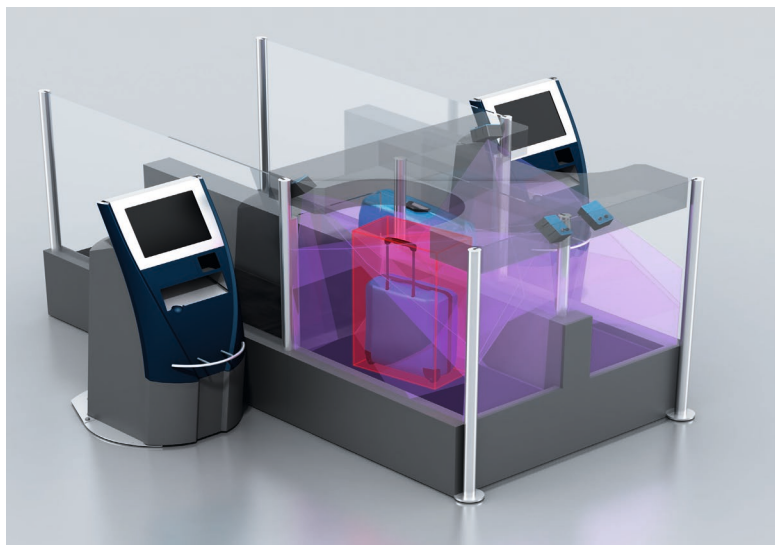
## SICK VISIONARY-T 3D SNAPSHOT

- Grundprinzip: “3D Time-of-Flight” bedeutet, dass die Lichtlaufzeit eines Signals von der Kamera in die Szene ermittelt wird um daraus für jedes Pixel einen Distanzwert zu berechnen.



# APPLIKATIONSBEISPIEL

## SELF BAG DROP (ANWESENHEITSKONTROLLE, KLASSIFIZIERUNG)



# APPLIKATIONSBEISPIEL

## SERVICEROBOTIK IN DER PFLEGE (ZUKUNFTSKONZEPT)



Care-O-bot 4

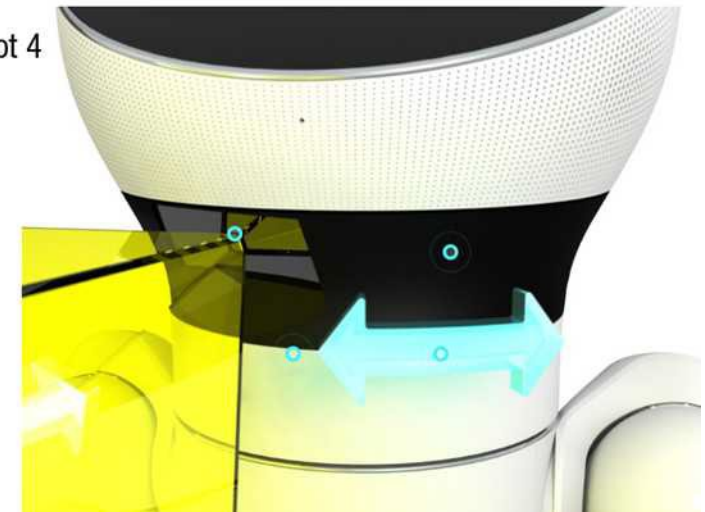
Configure your own Care-O-bot 4  
Discover the full potential



Sensor ring configuration

- None
- Standard (1xKinect)  
Single, rotatable low-cost 3D sensor
- Industrial 3D Sensor  
Rotatable 3D-TOF snapshot sensor
- Custom  
Compose your own sensor configuration

Home Configurator Information History Contact



Source: [www.care-o-bot-4.de](http://www.care-o-bot-4.de)

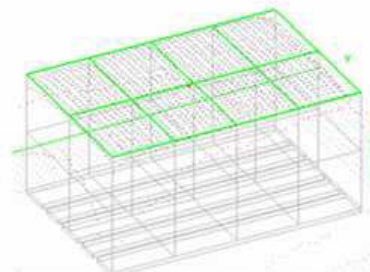


### Use of 3D-Sensors for the automatic de-palletize

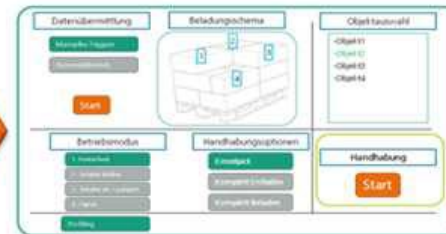
#### Basic idea of 3D- Contour check



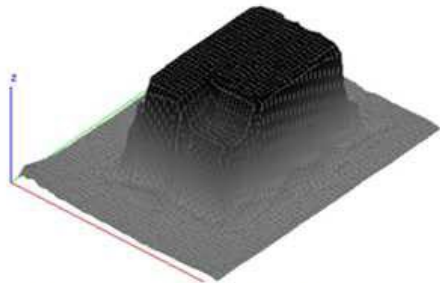
Pallet for de-palletizing



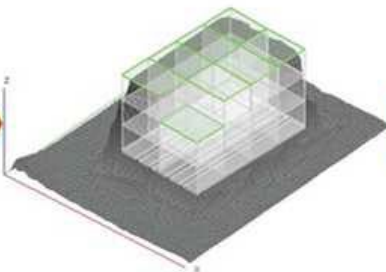
Read out of the loading position



Selection of the gripping technology



Acquisition of the point cloud



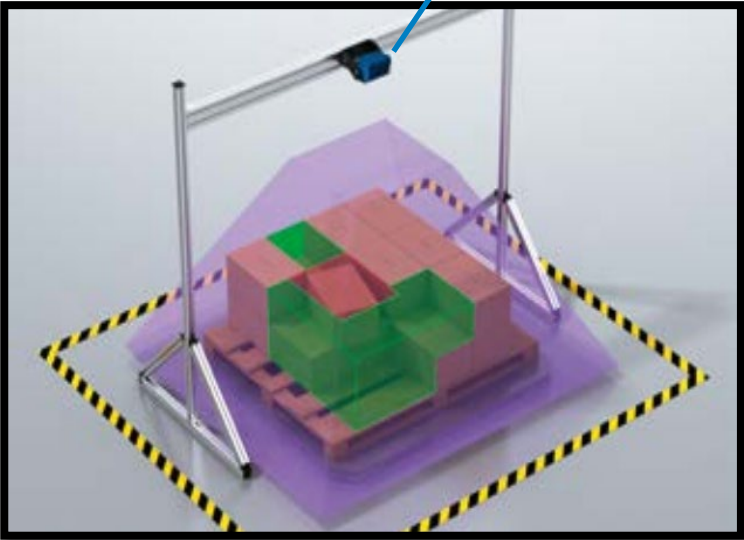
Comparison/ Fitting of the point cloud



Quick grab of the desired objects

# KONFIGURATION IN 2D





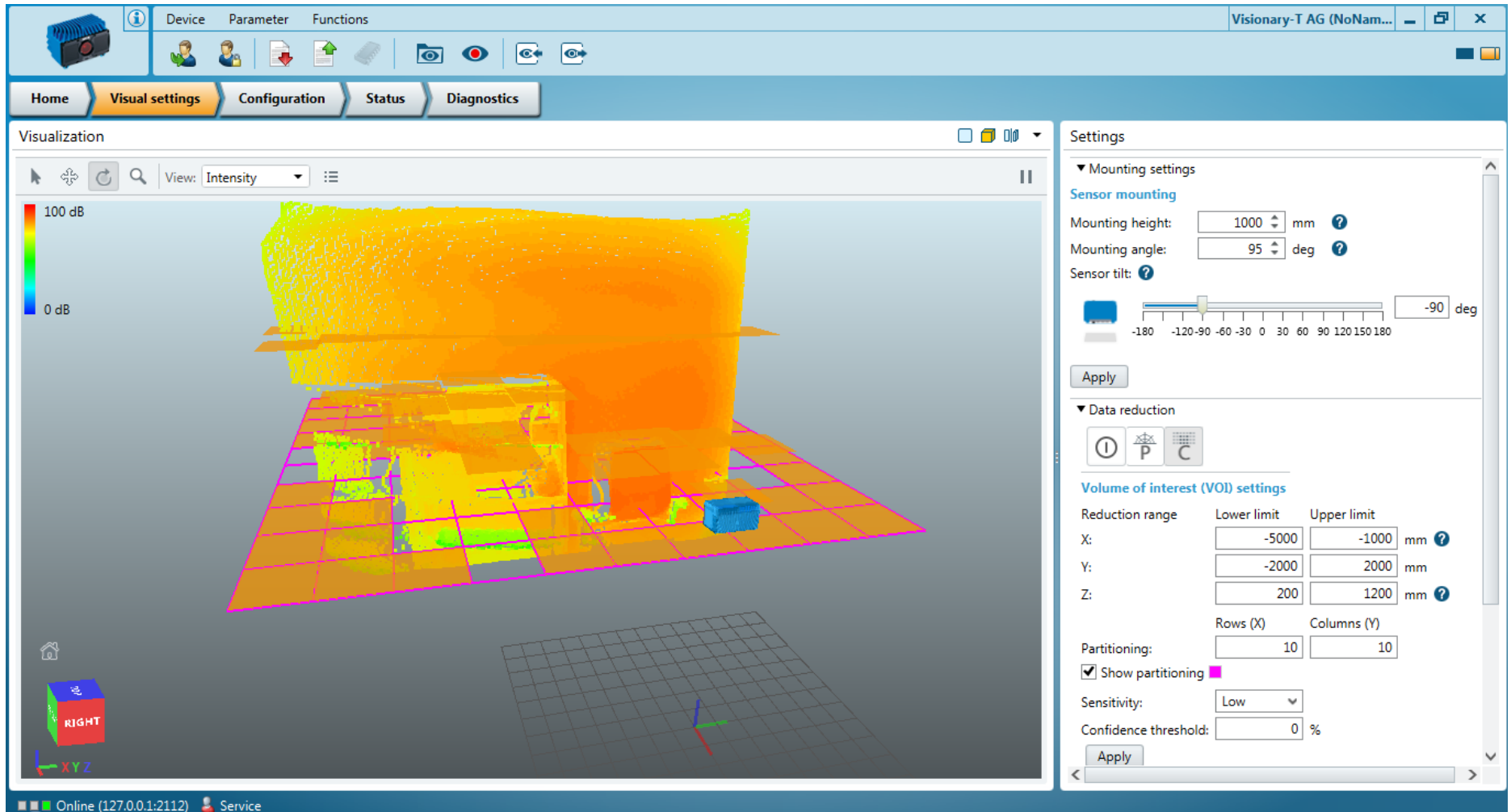
SOPAS ENGINEERING TOOL

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# VISIONARY-T MANUELLE EINSTELLUNG

The screenshot displays the SICK Visionary-T AG software interface. At the top, there is a menu bar with 'Device', 'Parameter', and 'Functions'. Below it is a toolbar with various icons. The main window has a navigation bar with 'Home', 'Visual settings', 'Configuration', 'Status', and 'Diagnostics'. The 'Visual settings' tab is active, showing a 3D visualization of a sensor's field of view. The visualization area includes a color scale from 0 dB (blue) to 100 dB (red) and a 'View: Intensity' dropdown. The 3D scene shows a large yellow and orange rectangular volume representing the sensor's range, with a small blue cube in the foreground. A coordinate system with 'RIGHT' and 'XYZ' axes is visible in the bottom left. On the right side, the 'Settings' panel is open, showing 'Mounting settings' with 'Sensor position' (X: 0 mm, Y: 0 mm, Z: 1000 mm) and 'Sensor Orientation' (X: 90 degrees, Y: -90 degrees, Z: 0 degrees). Below this are 'Data reduction' options (I, P, C) and expandable sections for 'Preprocessing', 'Frame rate reduction', 'Data filter settings', and 'Time-Of-Flight settings'. The bottom status bar shows 'Online (127.0.0.1:2112)' and 'Service'.

The screenshot displays the VISIONARY-T software interface. The main window shows a 3D visualization of a point cloud in Intensity mode, with a color scale from 0 dB (blue) to 100 dB (red). The interface includes a top menu bar with 'Device', 'Parameter', and 'Functions', and a navigation bar with 'Home', 'Visual settings', 'Configuration', 'Status', and 'Diagnostics'. The 'Visual settings' panel is active, showing 'Mounting settings' and 'Sensor position' options. Two callout boxes provide visual explanations: 'Sensor position' shows a sensor on a grid with axes X, Y, Z and dimensions a, b, and text: 'Set the sensor position in the scene, the position is relative to the scene axis.' 'Sensor Orientation' shows a sensor with local axes X, Y, Z and text: 'Set the sensor orientation, the rotation is around the local camera axis.' The bottom status bar shows 'Online (127.0.0.1:2112)' and 'Service'.



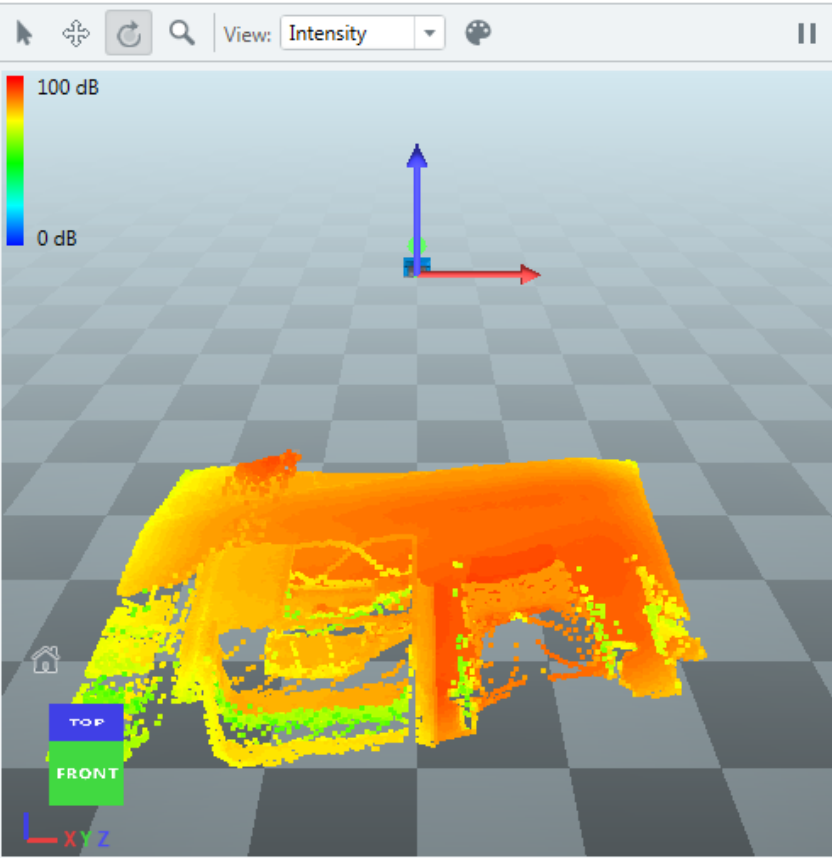
The screenshot displays the SICK Visionary-T AG software interface. The main window is titled "Visualization" and shows a 3D point cloud of a rectangular object. A color scale on the left indicates intensity from 0 dB (blue) to 100 dB (red). The object is rendered in yellow and orange. A red grid is overlaid on the base of the object. A small blue cube is visible on the grid. The interface includes a top menu bar with "Device", "Parameter", and "Functions" tabs. Below the menu bar are navigation tabs: "Home", "Visual settings", "Configuration", "Status", and "Diagnostics". The "Visual settings" tab is active. On the right side, there is a "Settings" panel with the following sections:

- Mounting settings**
  - Sensor mounting**
    - Mounting height: 1000 mm
    - Mounting angle: 95 deg
    - Sensor tilt: -90 deg
- Data reduction**
  - Volume of interest (VOI) settings
    - Reduction range
      - X: Lower limit -5000 mm, Upper limit -1000 mm
      - Y: Lower limit -2000 mm, Upper limit 2000 mm
      - Z: Lower limit 200 mm, Upper limit 1200 mm
    - Partitioning: Rows (X) 10, Columns (Y) 10
    - Show partitioning
    - Sensitivity: Low
    - Confidence threshold: 0 %

Detection wizard

1 Mounting settings    2 TOF settings    3 Detection area    4 Detection range    5 Group cells    6 Result

View: Intensity



In this step you set the virtual scene to match your physical scene. Use the position and orientation tools below to adjust the mounting of the virtual camera.

**Sensor position editor**

Use the controls below to fine adjust the position of the virtual camera.

X: 0 mm  
Y: 0 mm  
Z: 3000 mm

**Sensor orientation editor**

Use the controls below to fine adjust the orientation of the virtual camera.

R: [Left Arrow] [Right Arrow]  
G: [Left Arrow] [Right Arrow]  
B: [Left Arrow] [Right Arrow]

Reset to default

< Back    Next >    Cancel

# VISIONARY-T DT

## DIREKTE MANIPULATION

Detection wizard

1 Mounting settings    2 TOF settings    3 Detection area    4 Detection range    5 Group cells    6 Result

View: Intensity

100 dB  
0 dB

TOP  
FRONT  
XYZ

In this step you set the virtual scene to match your physical scene. Use the position and orientation tools below to adjust the mounting of the virtual camera.

Sensor position editor

Use the controls below to fine adjust the position of the virtual camera.

X: 0 mm  
Y: 0 mm  
Z: 3000 mm

Sensor orientation editor

Use the controls below to fine adjust the orientation of the virtual camera.

R: [Left Arrow] [Right Arrow]  
G: [Left Arrow] [Right Arrow]  
B: [Left Arrow] [Right Arrow]

Reset to default

< Back    Next >    Cancel



# VISIONARY-T DT

## DIREKTE MANIPULATION

Detection wizard

1 Mounting settings    2 TOF settings    3 Detection area    4 Detection range    5 Group cells    6 Result

View: Intensity

100 dB  
0 dB

TOP  
FRONT  
XYZ

In this step you set the virtual scene to match your physical scene. Use the position and orientation tools below to adjust the mounting of the virtual camera.

Sensor position editor

Use the controls below to fine adjust the position of the virtual camera.

X: 0 mm  
Y: 0 mm  
Z: 3000 mm

Sensor orientation editor

Use the controls below to fine adjust the orientation of the virtual camera.

R: [Left Arrow] [Right Arrow]  
G: [Left Arrow] [Right Arrow]  
B: [Left Arrow] [Right Arrow]

Reset to default

< Back    Next >    Cancel

# VISIONARY-T DT

## DIREKTE MANIPULATION

Detection wizard

1 Mounting settings    2 TOF settings    3 Detection area    4 Detection range    5 Group cells    6 Result

View: Intensity

100 dB  
0 dB

In this step you set the virtual scene to match your physical scene. Use the position and orientation tools below to adjust the mounting of the virtual camera.

Sensor position editor

Use the controls below to fine adjust the position of the virtual camera.

X: 0 mm  
Y: 0 mm  
Z: 2000 mm

Sensor orientation editor

Use the controls below to fine adjust the orientation of the virtual camera.

R: [Left Arrow] [Right Arrow]  
G: [Left Arrow] [Right Arrow]  
B: [Left Arrow] [Right Arrow]

Reset to default

< Back    Next >    Cancel

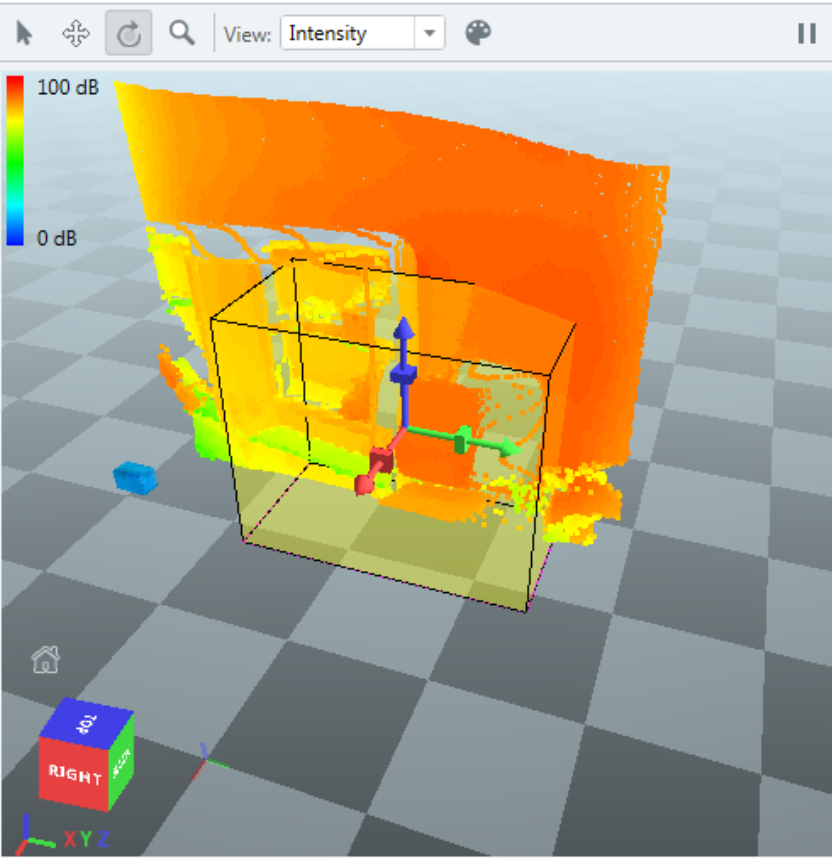
# VISIONARY-T DT

## DIREKTE KONFIGURATION

Detection wizard

1 Mounting settings   2 TOF settings   3 **Detection area**   4 Detection range   5 Group cells   6 Result

View: Intensity



In this step you set the region and precision that you want your detection to work on.

**Volume of interest**

Set the volume of interest (VOI) for the data (object) that you want to observe, either move and resize the box in the 3D viewer or use the numeric input below.

	Lower limit	Upper limit	
X:	-2258	-1247	mm
Y:	-405	1536	mm
Z:	540	2150	mm

**Partitioning**

The precision is set by defining the amount of cells to work with.  
Currently each cell is 1011 x 1941 mm

Rows (X):

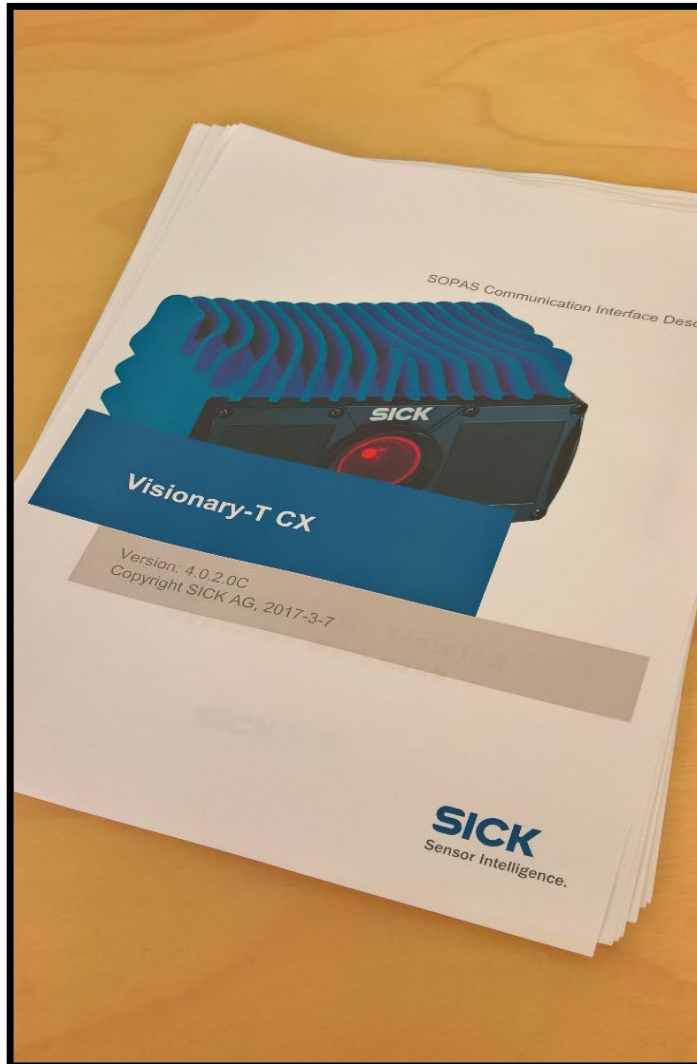
Columns (Y):

< Back   Next >   Cancel

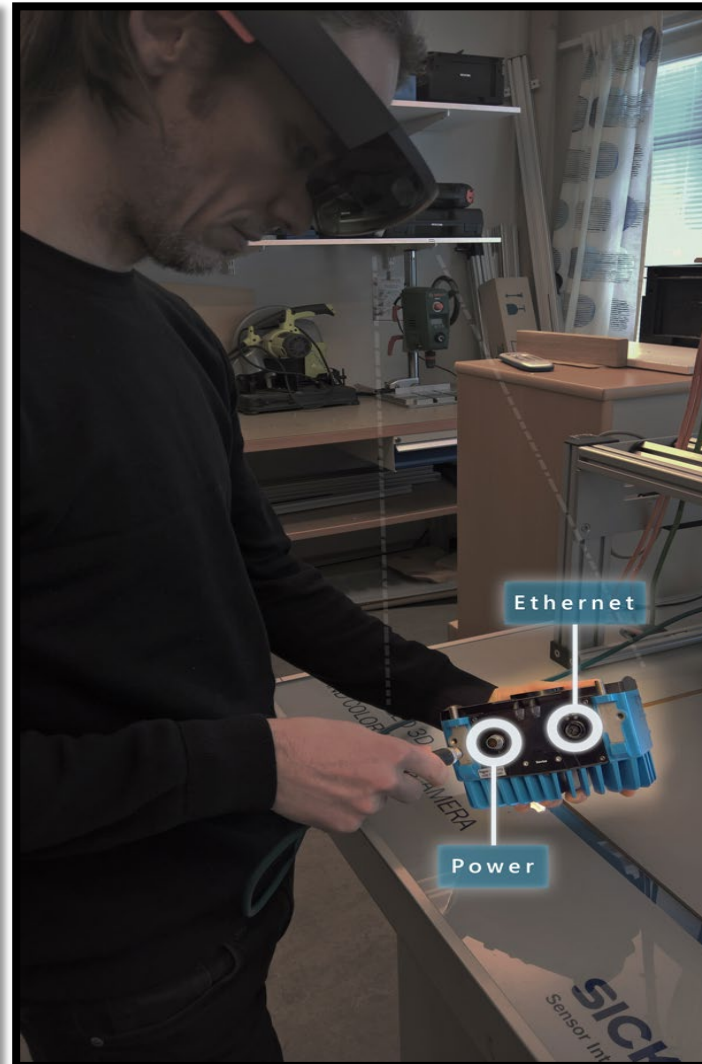
# DIE ZUKUNFT IN 3D



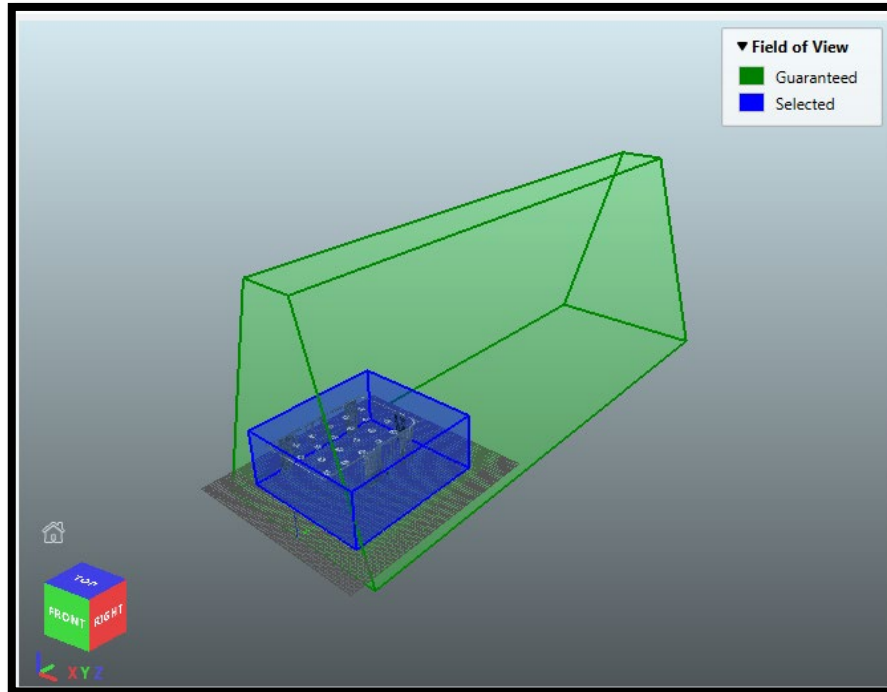
Herkömmliches Handbuch:



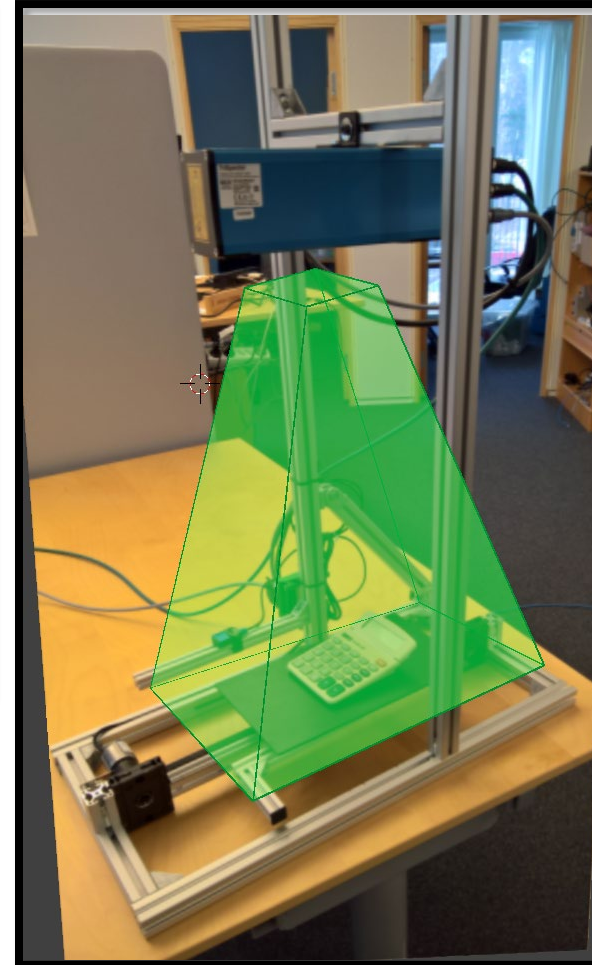
HoloLens:



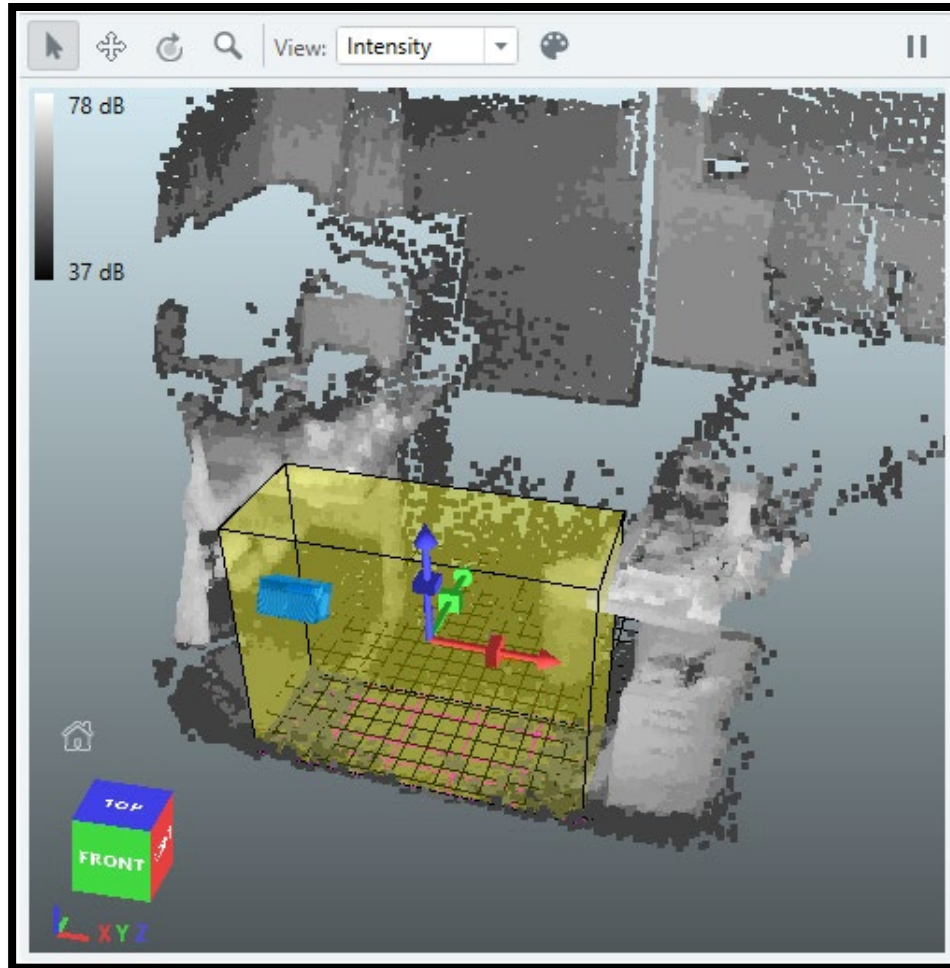
### Herkömmliche Visualisierung



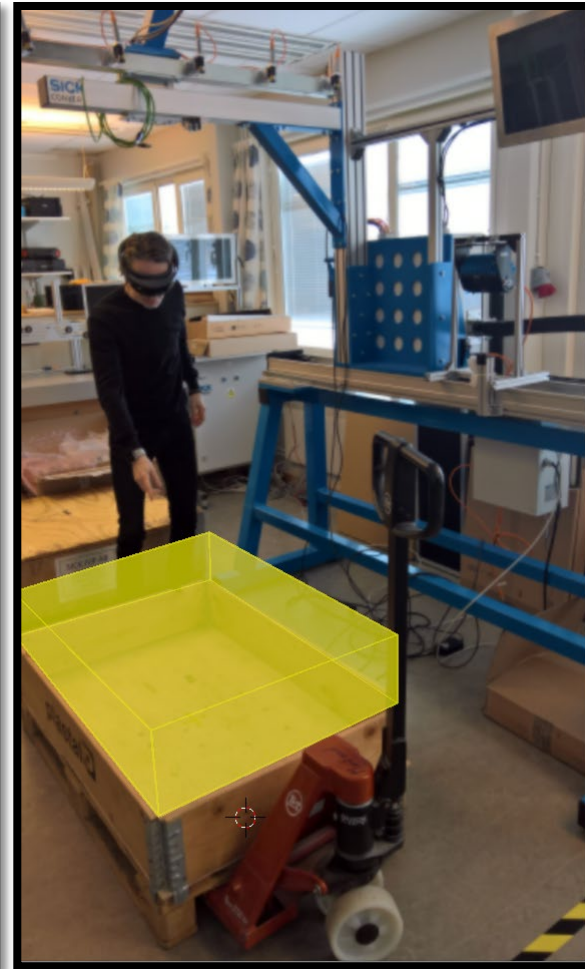
### HoloLens:



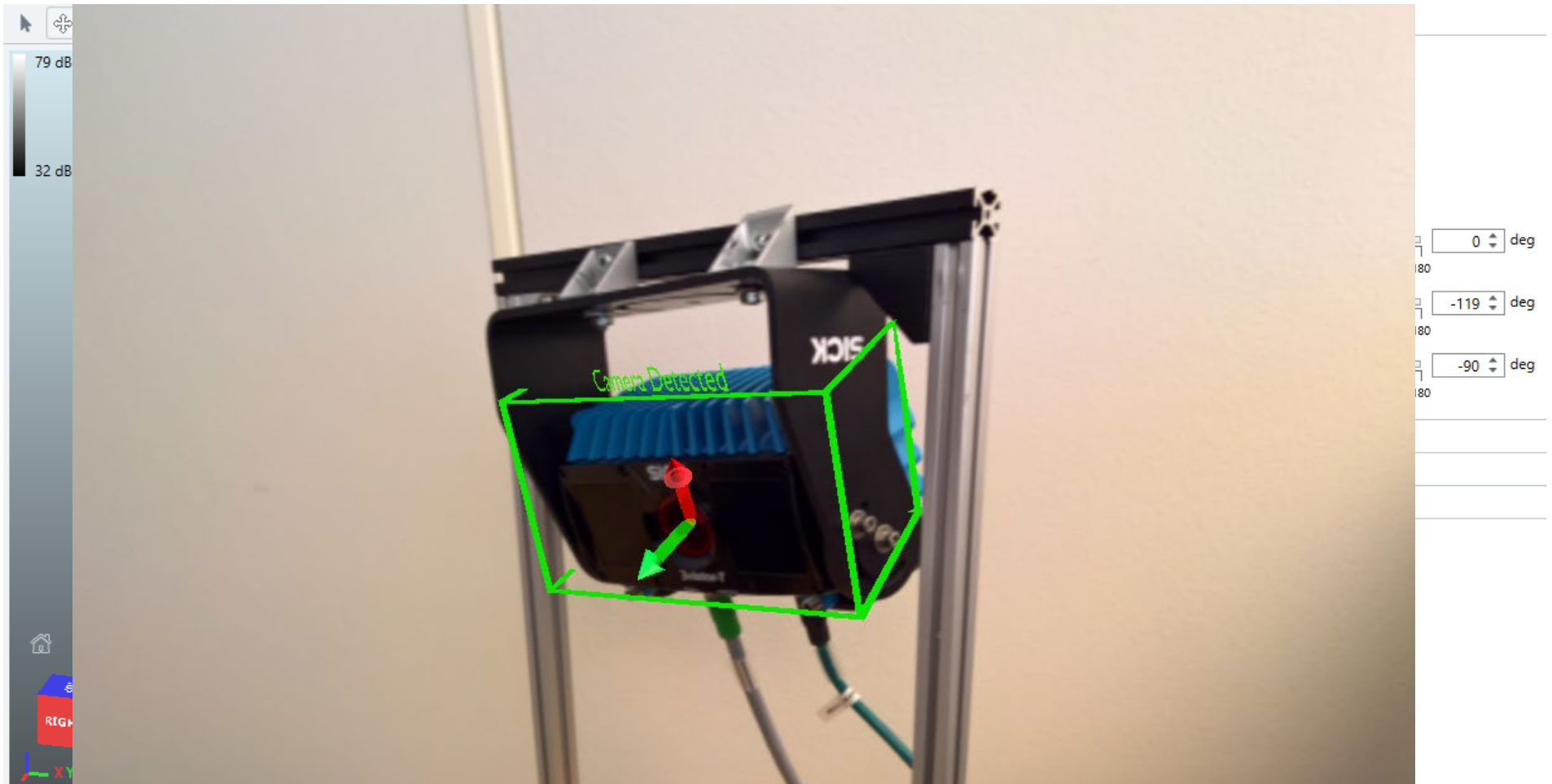
Herkömmliche Visualisierung



HoloLens:



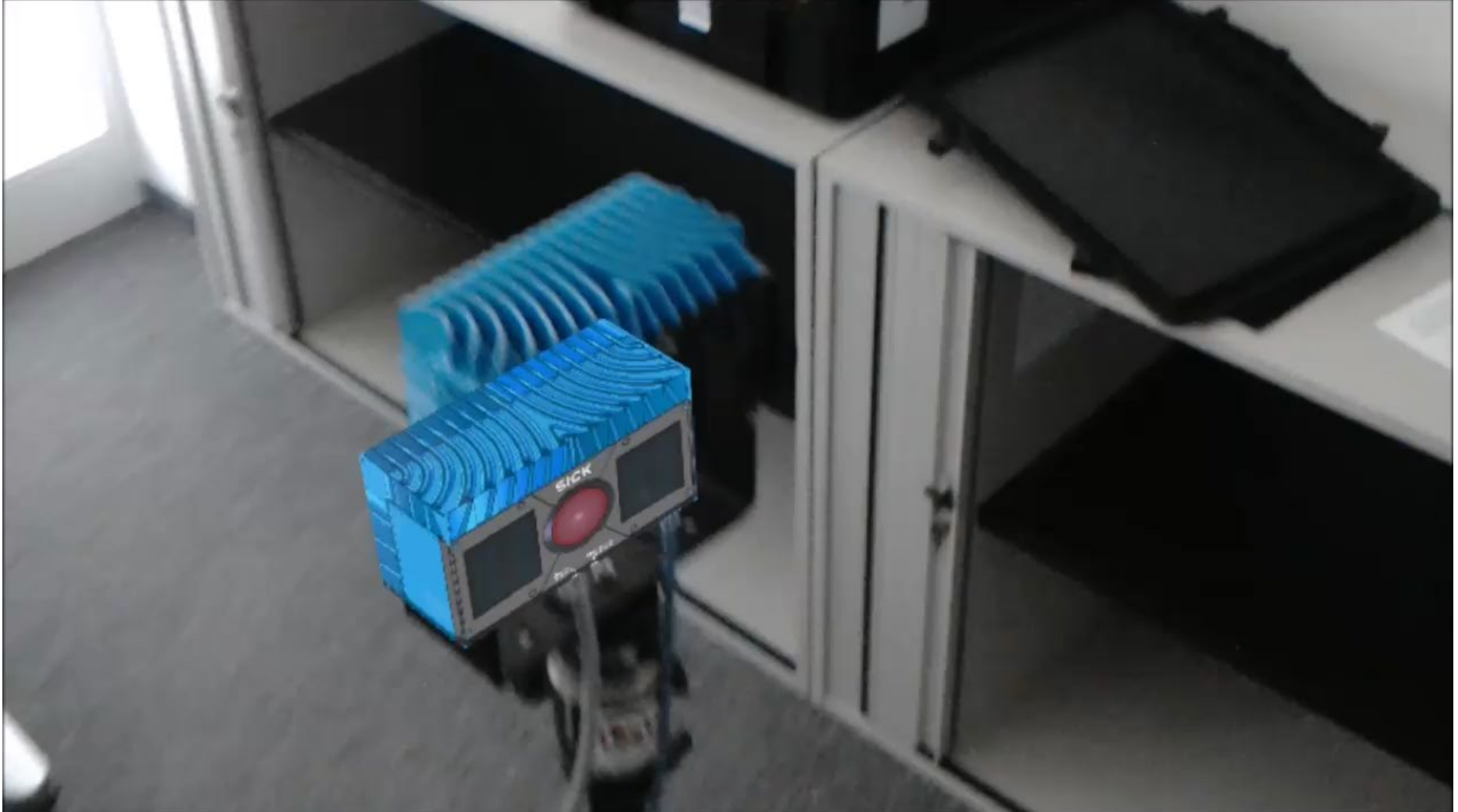
Herausforderung: Abgleich zwischen virtueller Szene und der Realität





# HOLOLENS & SMARTE 3D SENSORIK

## BEISPIEL INTERAKTIVE MONTAGEEINSTELLUNG



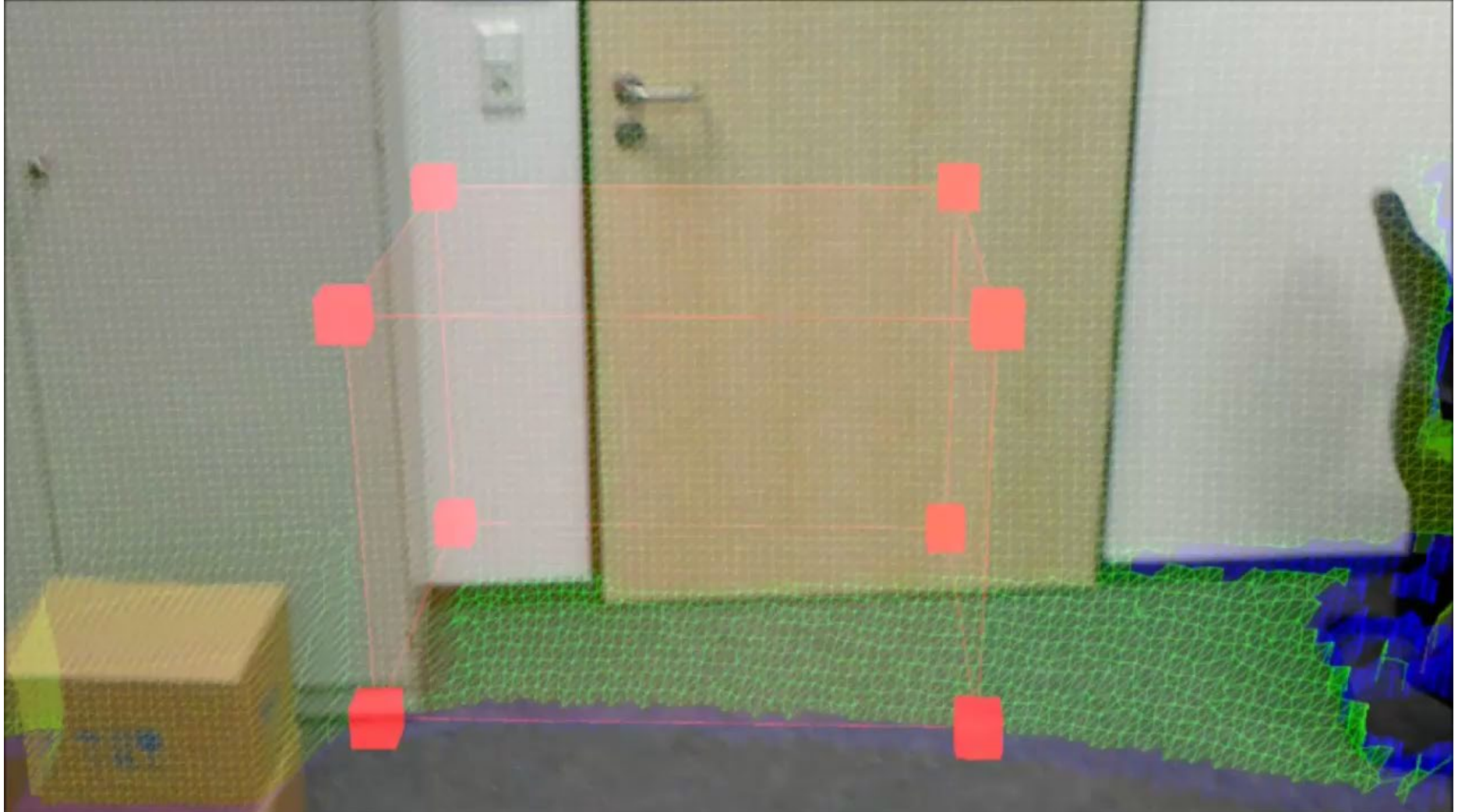
# HOLOLENS & SMARTE 3D SENSORIK

## BEISPIEL AUTOMATISCHE MONTAGEERKENNUNG

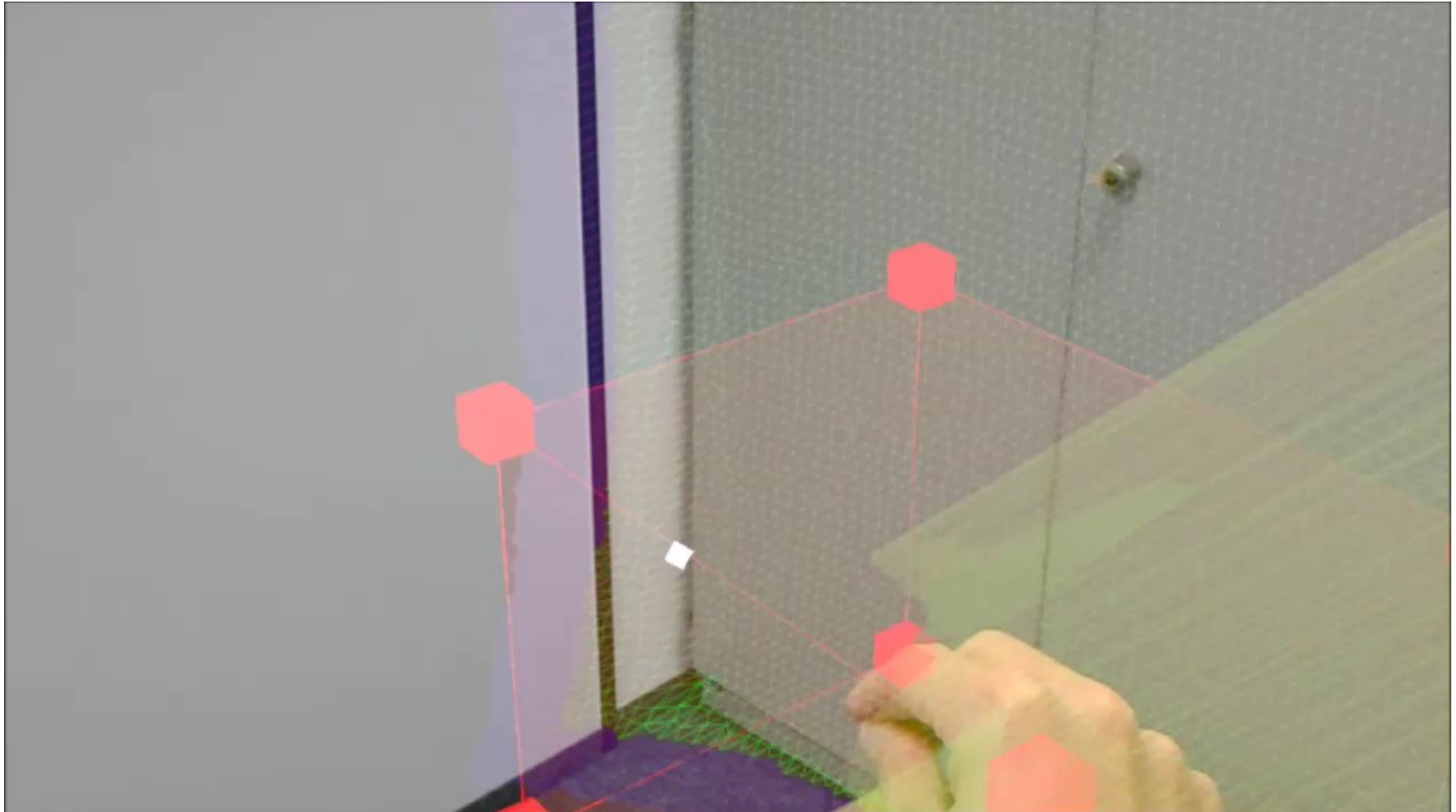


# HOLOLENS ALS EINGABEGERÄT

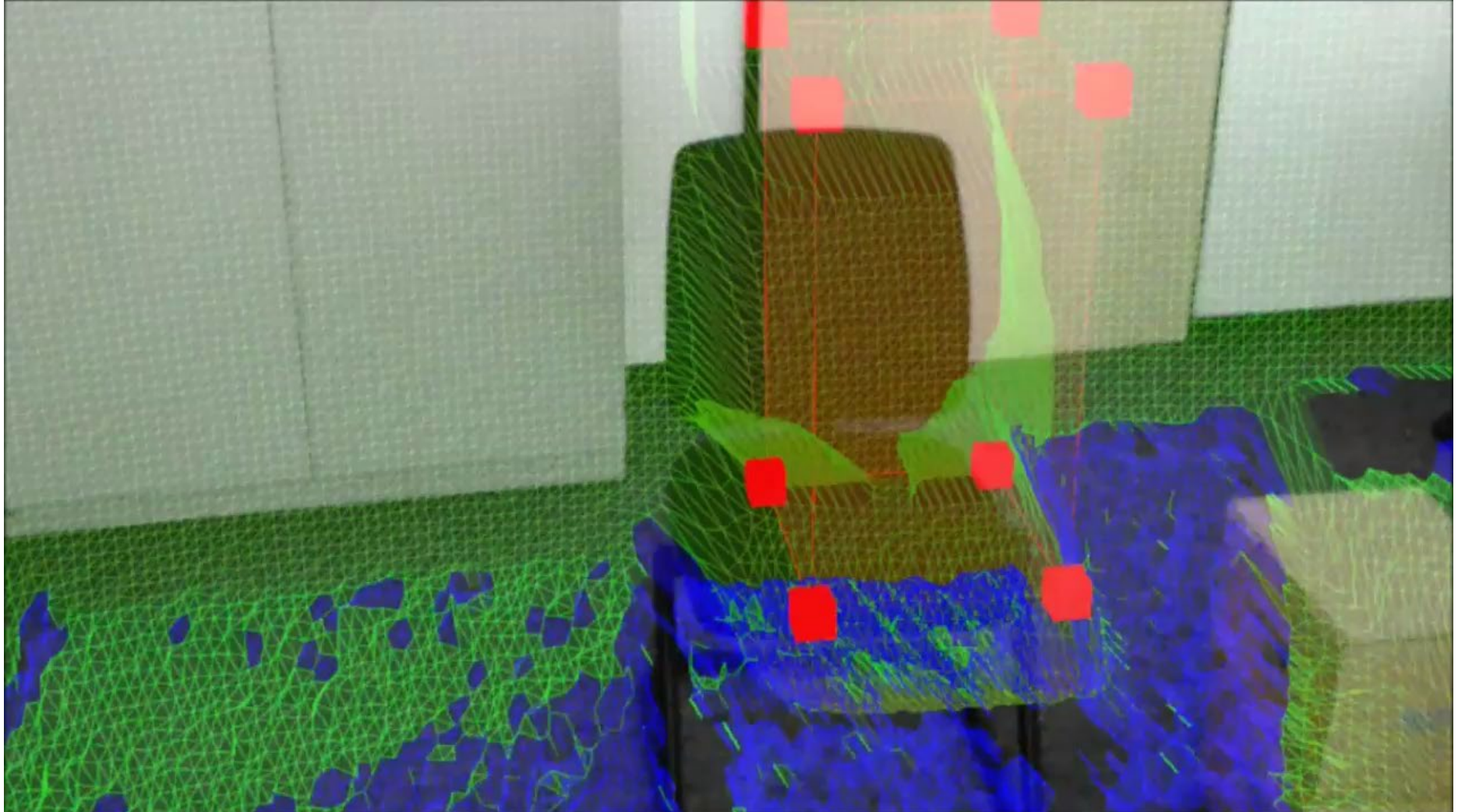
## POSITIONIERUNG DES ARBEITSBEREICHS



# HOLOLENS ALS EINGABEGERÄT ANPASSUNG DES ARBEITSBEREICHS

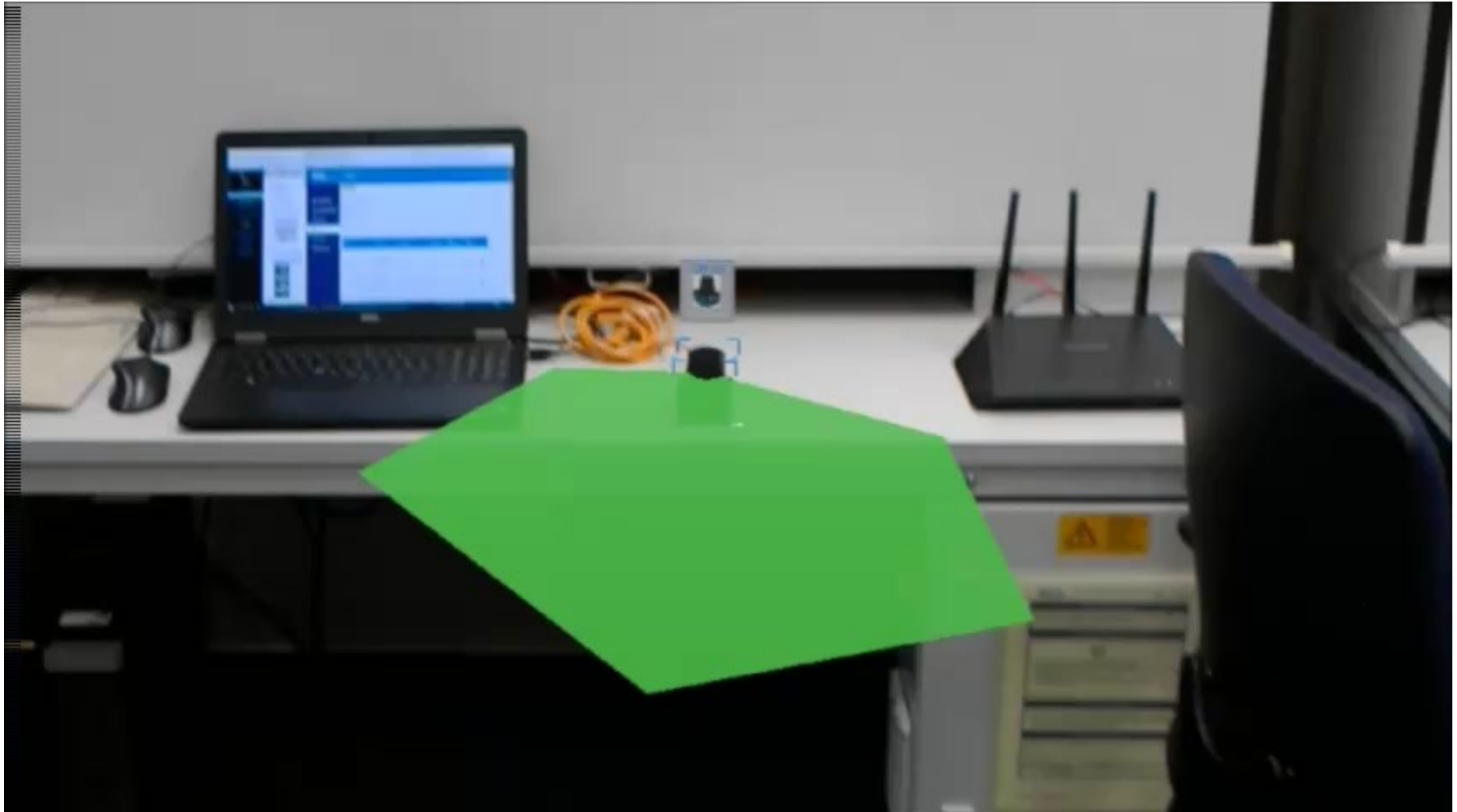


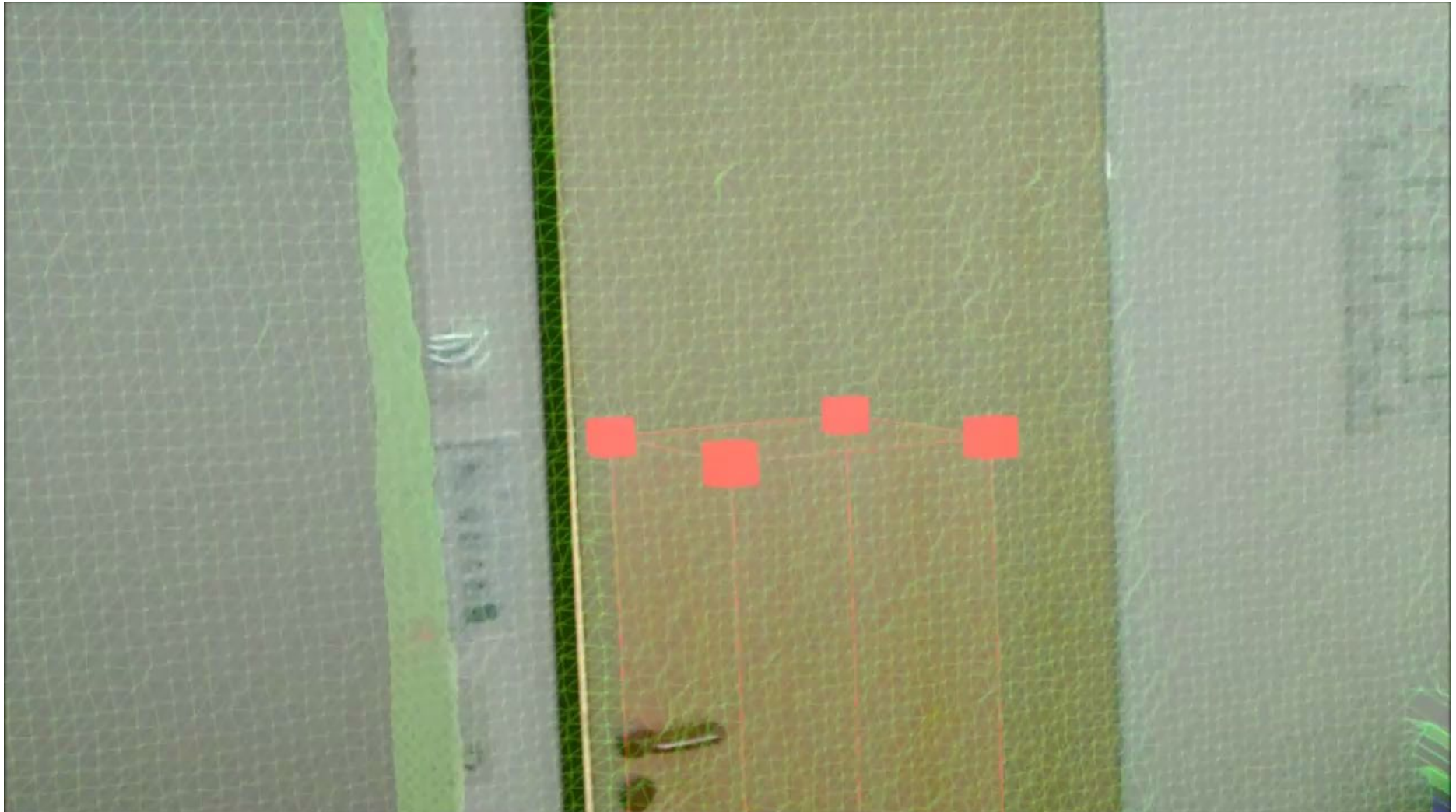
# HOLOLENS ALS AUSGABEGERÄT TESTEN DER KONFIGURATION



# HOLOLENS & SMARTE 3D SENSORIK

## TESTEN DER KONFIGURATION



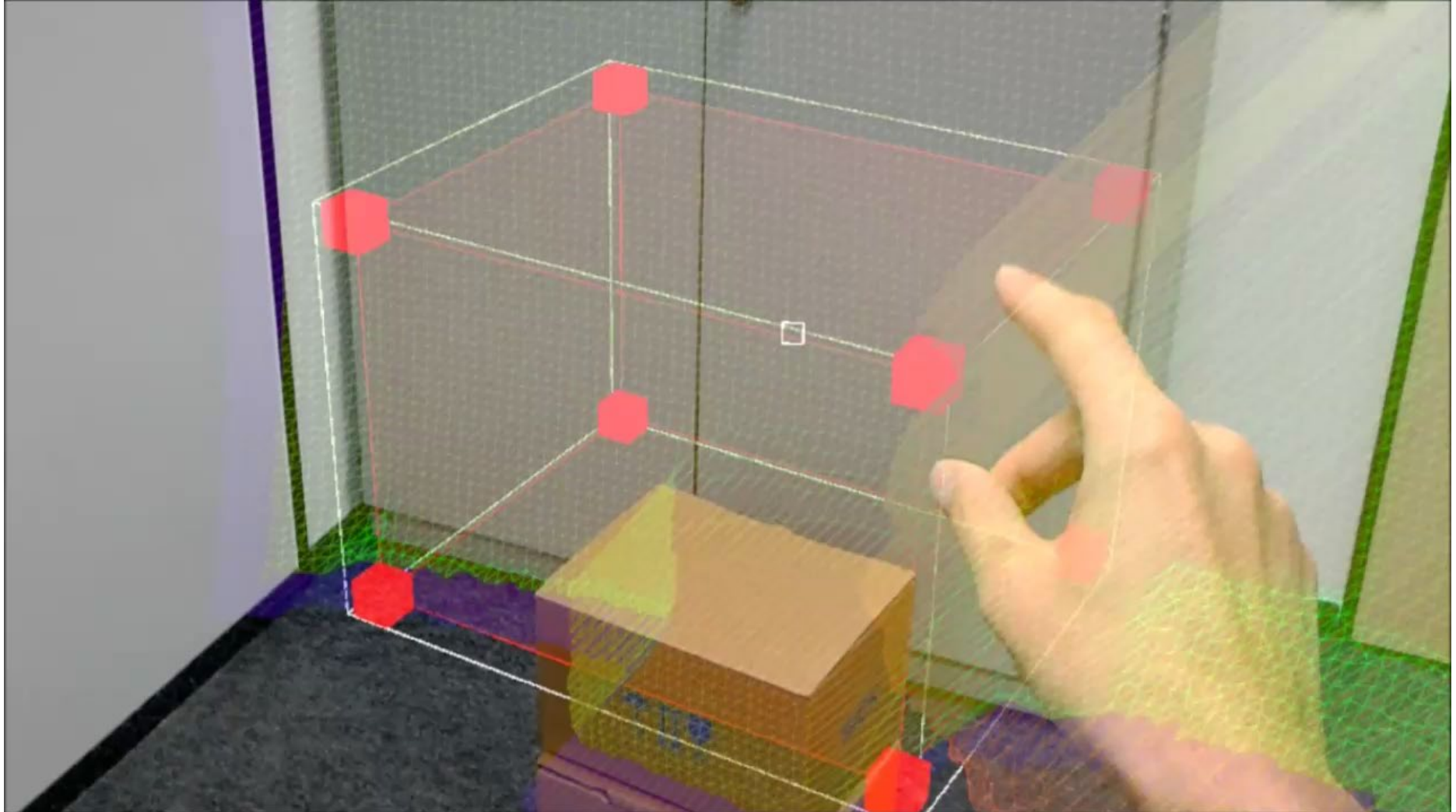


# HERAUSFORDERUNGEN

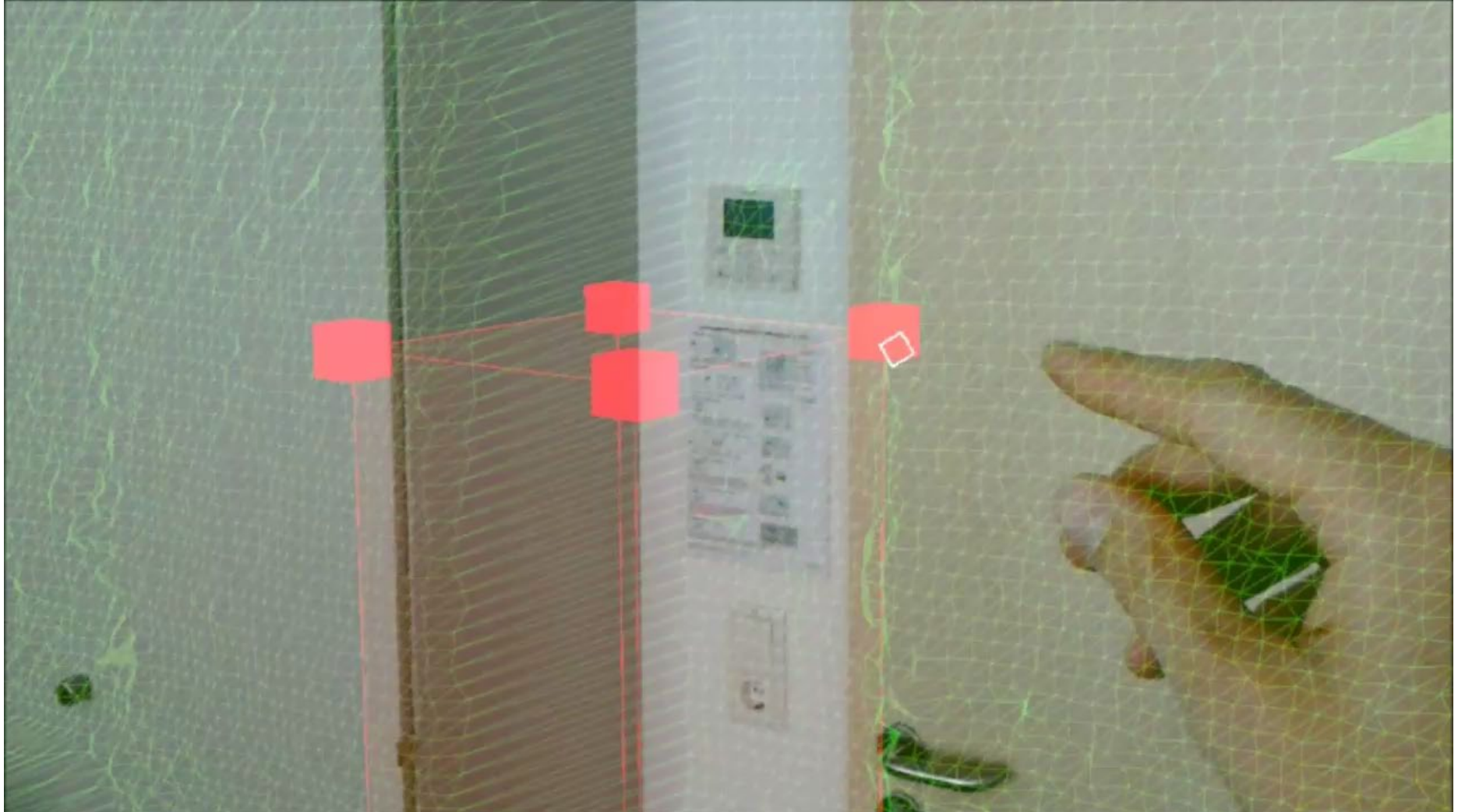




# ARBEITEN MIT DER HOLOLENS HERAUSFORDERUNGEN

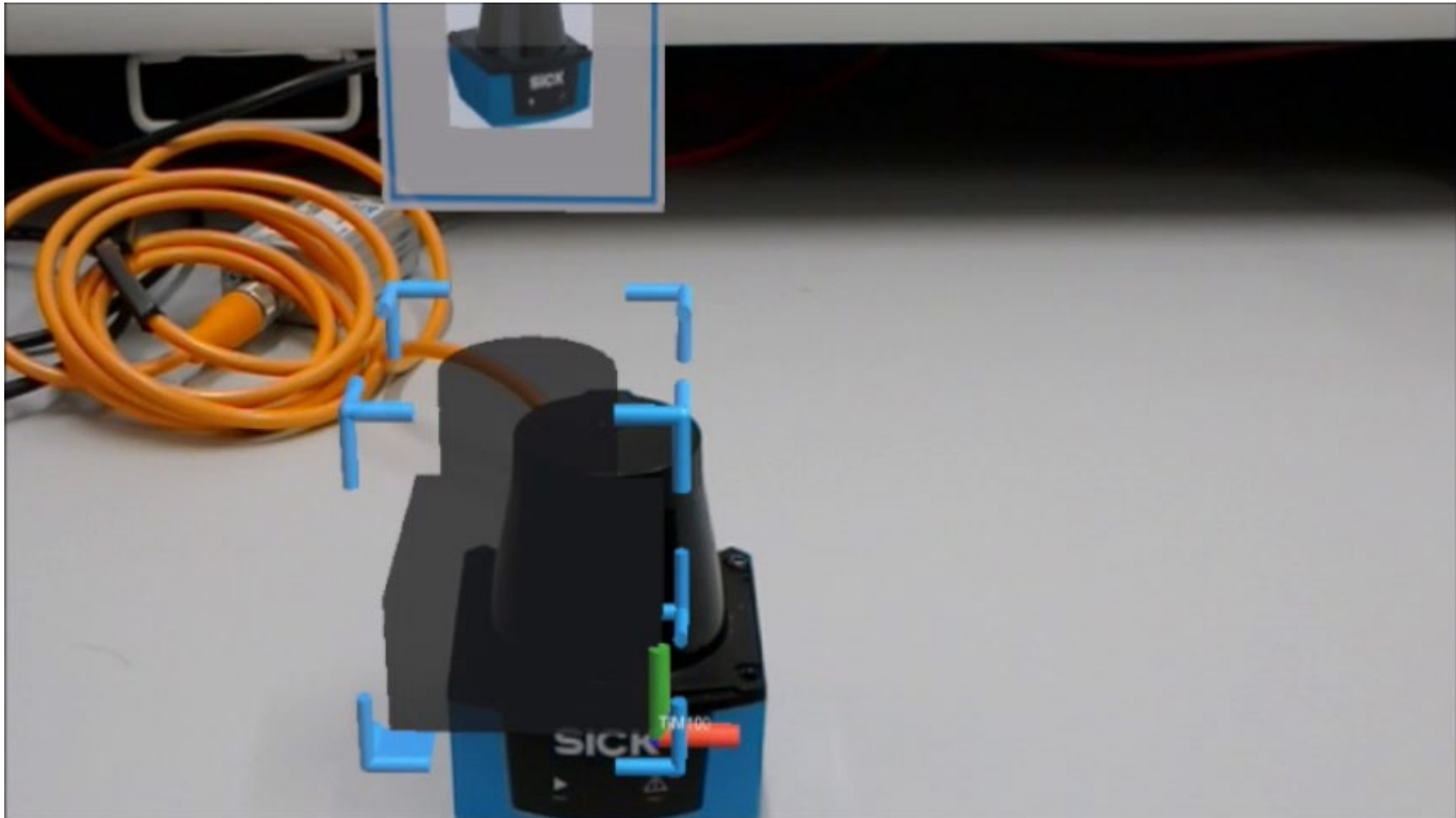


# ARBEITEN MIT DER HOLOLENS HERAUSFORDERUNGEN



# ARBEITEN MIT DER HOLOLENS

## HERAUSFORDERUNG AUTOMATISCHE MONTAGEERKENNUNG



SCHLUSS

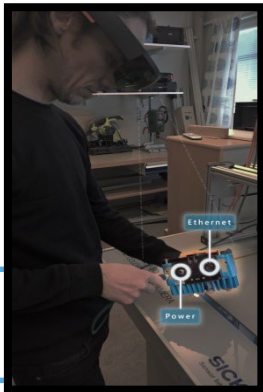
**SICK**  
Sensor Intelligence.



SICK bietet heute **3D Sensoren** an, die **3D Applikationen** lösen können.



Die Inbetriebnahme und Konfiguration in 3D ist eine **mentale Herausforderung**.



Wir sind **offen** für AR/VR Lösungen und unsere ersten Gehversuche lieferten **vierversprechende Ergebnisse**.

DANK AN MEINE KOLLEGEN:

ISABELL JANSSON  
JOHAN FALK  
MARCEL HAMPF

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GBC09 BU05 3D Compact Systems

VAR<sup>2</sup> 2017 - Realität erweitern

4. Fachkonferenz zu VR/AR-Technologien in Anwendung und  
Forschung

**SICK**  
Sensor Intelligence.