




Überblick im Boden

Unterstützung beim Baggern durch Laserprojektion

- 1 Problem
- 2 Aufbau
- 3 Projektion
- 4 Kalibrierung

hessenschau  Video & Podcast  Wetter  Verkehr 

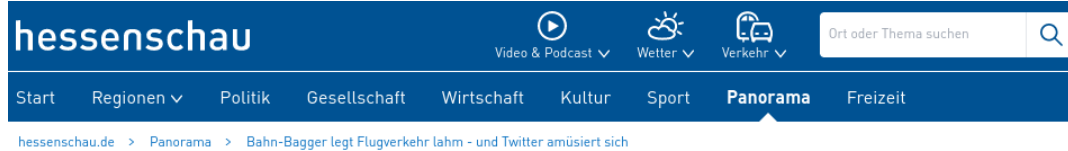
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"Mitbewerber den Saft abgedreht"

Bahn-Bagger legt Flugverkehr lahm - und Twitter amüsiert sich

[1]



"Mitbewerber den Saft abgedreht"

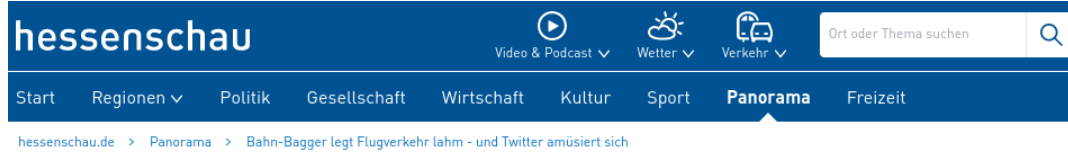
Bahn-Bagger legt Flugverkehr lahm - und Twitter amüsiert sich

[1]

200 Beschädigungen von Gasleitungen im Hamburger Gasnetz pro Jahr [2]



[2]



"Mitbewerber den Saft abgedreht"

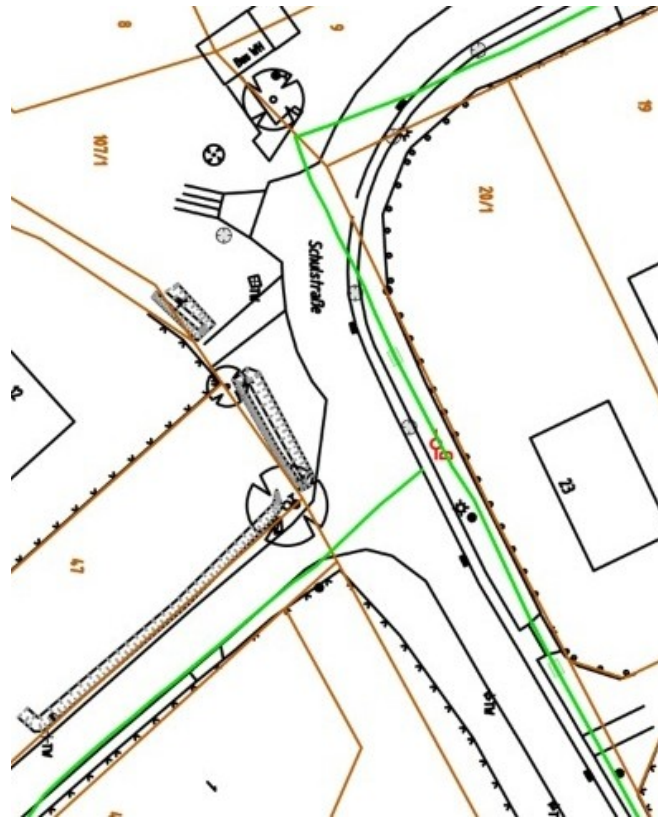
Bahn-Bagger legt Flugverkehr lahm - und Twitter amüsiert sich

[1]

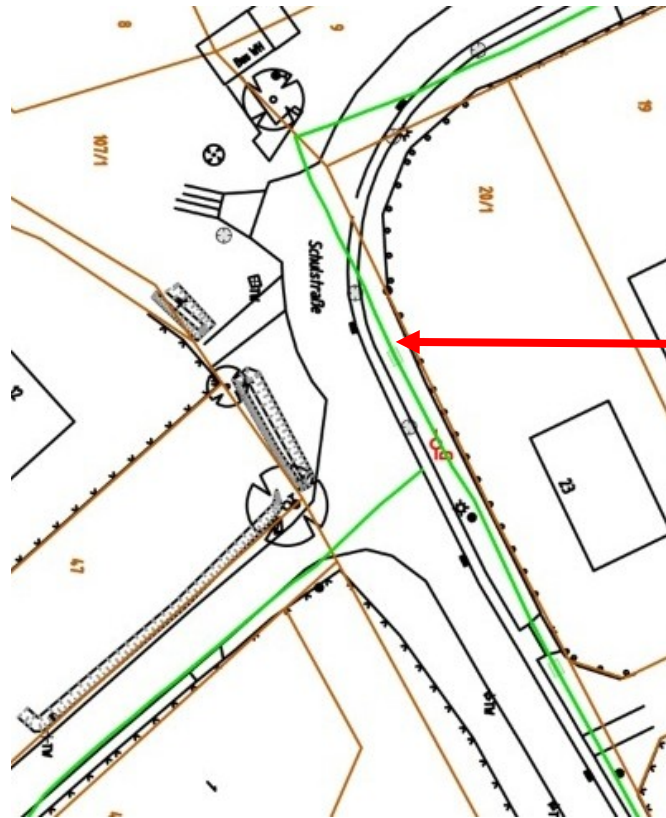
 500 Mio. Euro Schaden pro Jahr [2]

200 Beschädigungen von Gasleitungen im Hamburger Gasnetz pro Jahr [2]





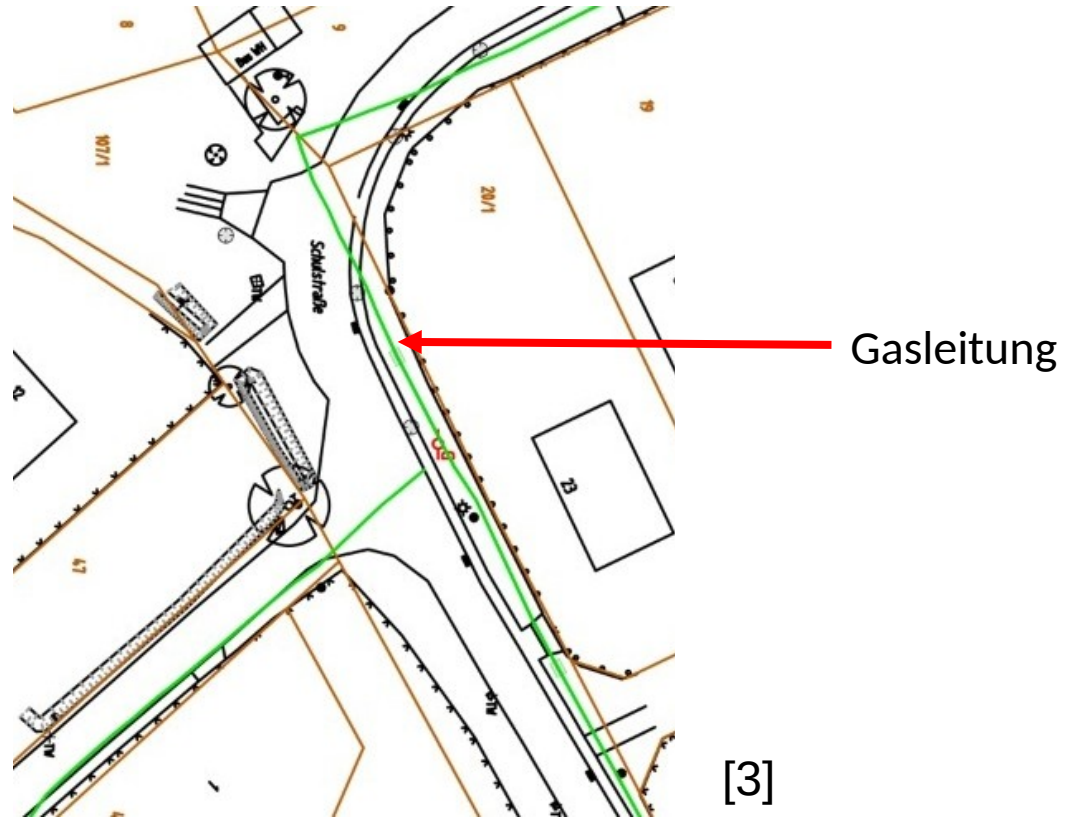
[3]



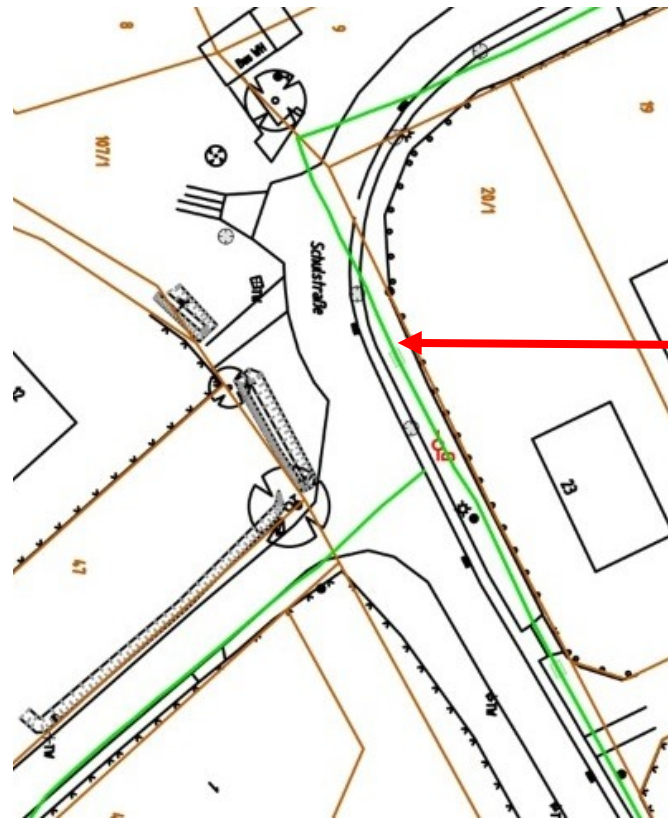
Gasleitung

[3]

- Visuelle Markierung durch Farbe und Klebestreifen

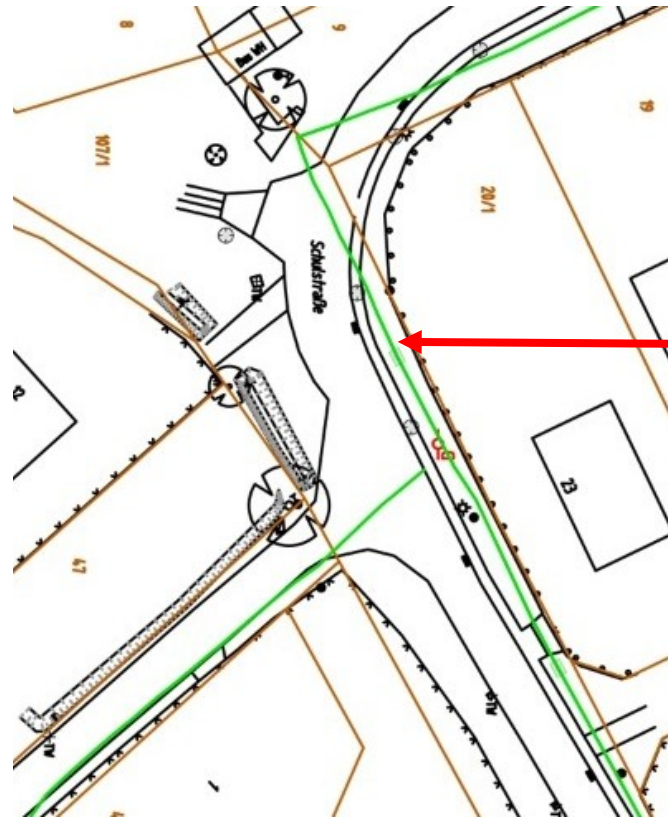


- Visuelle Markierung durch Farbe und Klebestreifen
- Falsche Lagepläne



[3]

- Visuelle Markierung durch Farbe und Klebestreifen
- Falsche Lagepläne
- Keine Lagepläne

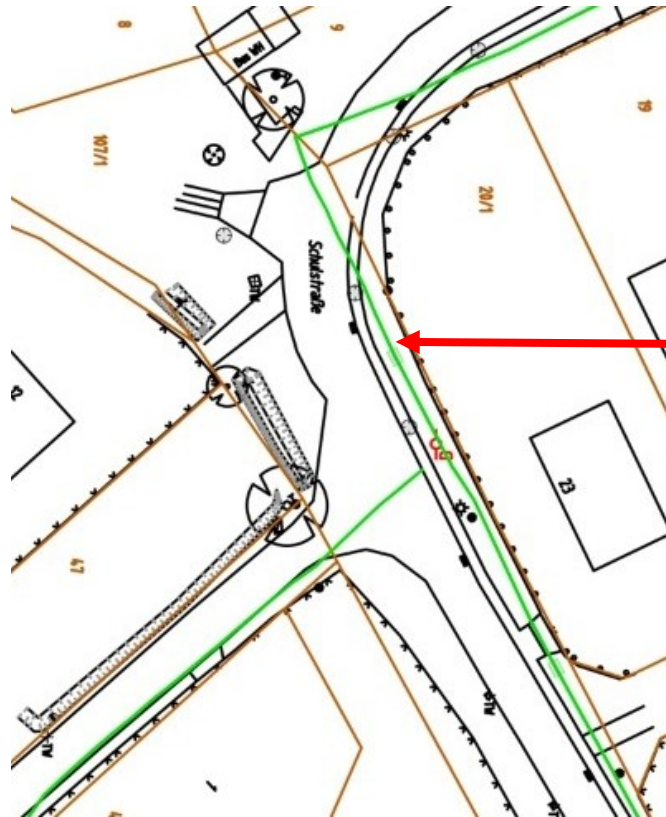


Gasleitung

[3]

- Visuelle Markierung durch Farbe und Klebestreifen
- Falsche Lagepläne
- Keine Lagepläne

Bei mehr als der Hälfte dieser Schäden lag kein Lageplan auf der Baustelle vor. [2]



Gasleitung

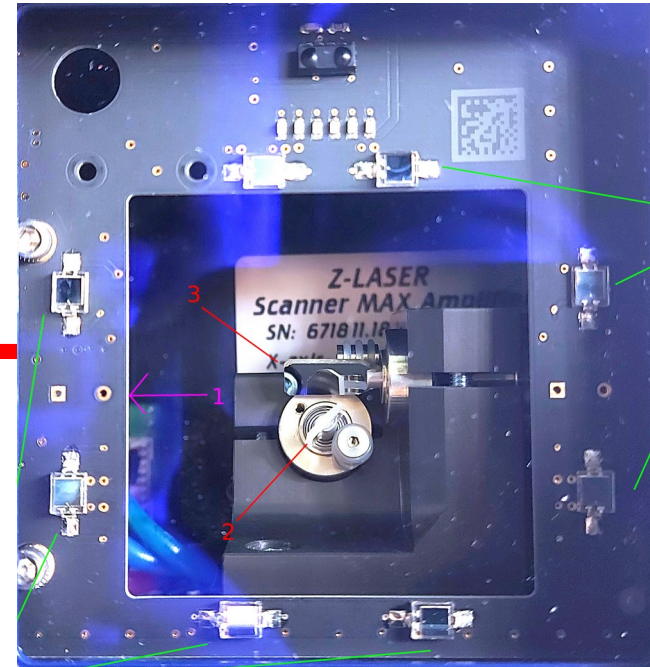
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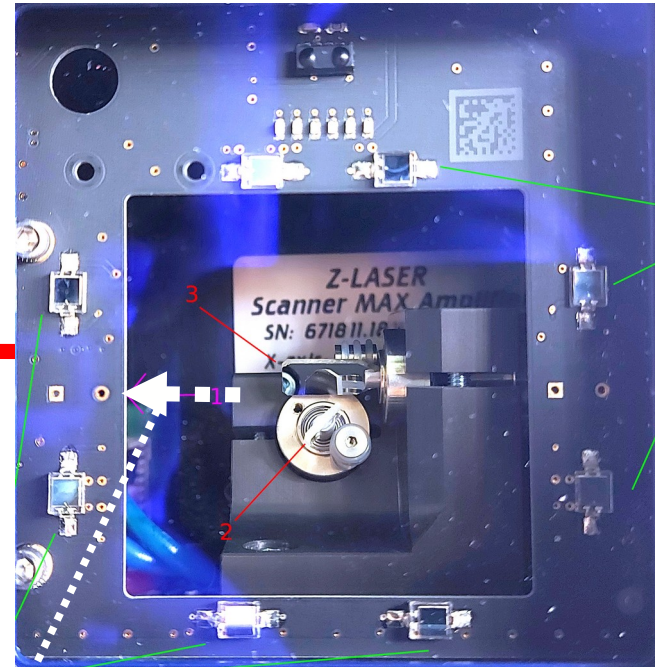






Was tun?

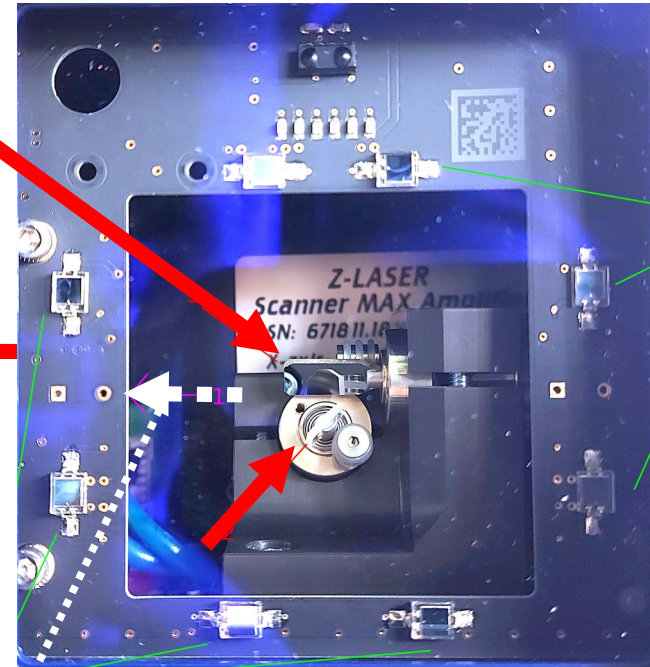




Lichtquelle



Spiegel

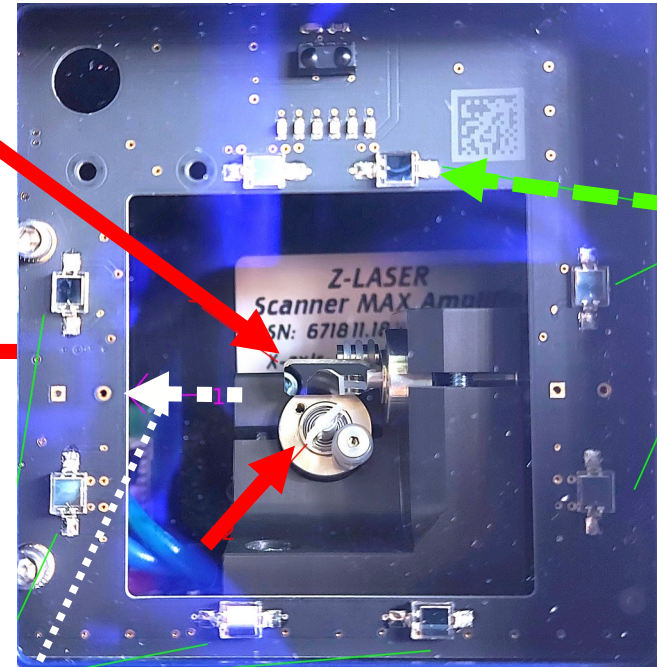


Lichtquelle

Was tun?



Spiegel



Sensor

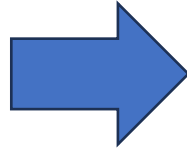
Lichtquelle





Start und
Endpunkt
für eine
Linie





- Wo ist der Bagger ?

- Wo ist der Bagger ?
- Sichtbar machen der Pläne ?

- Wo ist der Bagger ?
- Sichtbar machen der Pläne ?
- Blickpunkt vom Baggerfahren?



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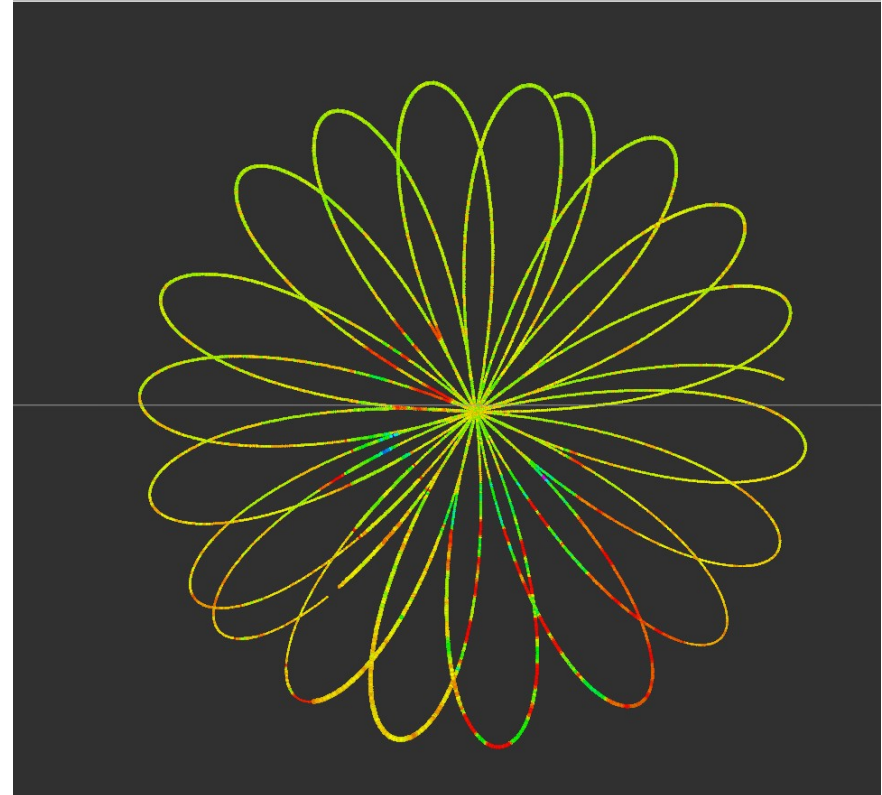
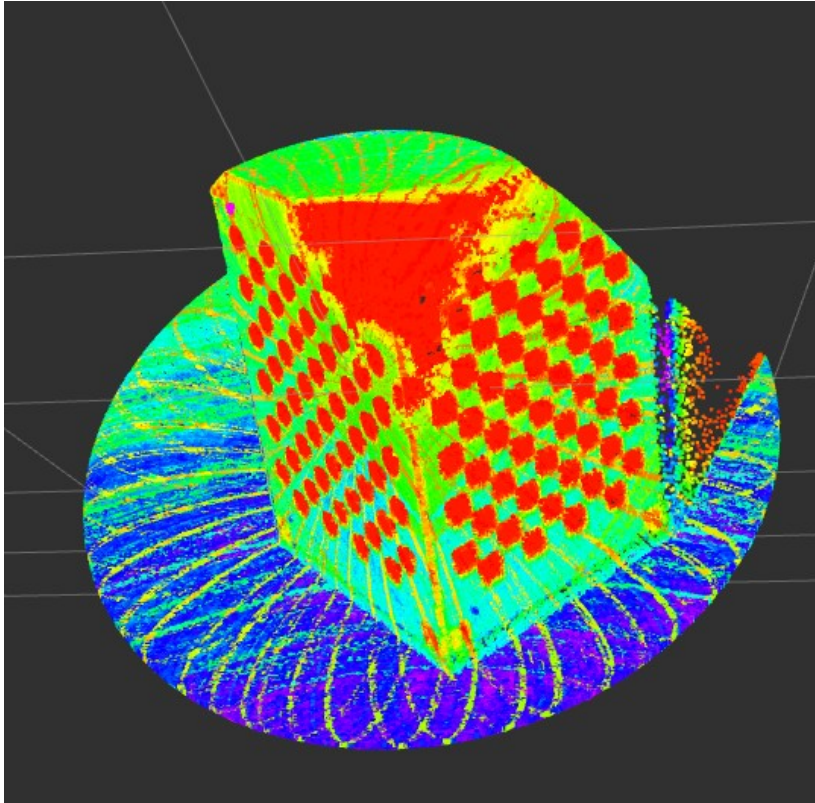
Livox Mid 40

[4]



Livox Mid 40

[4]





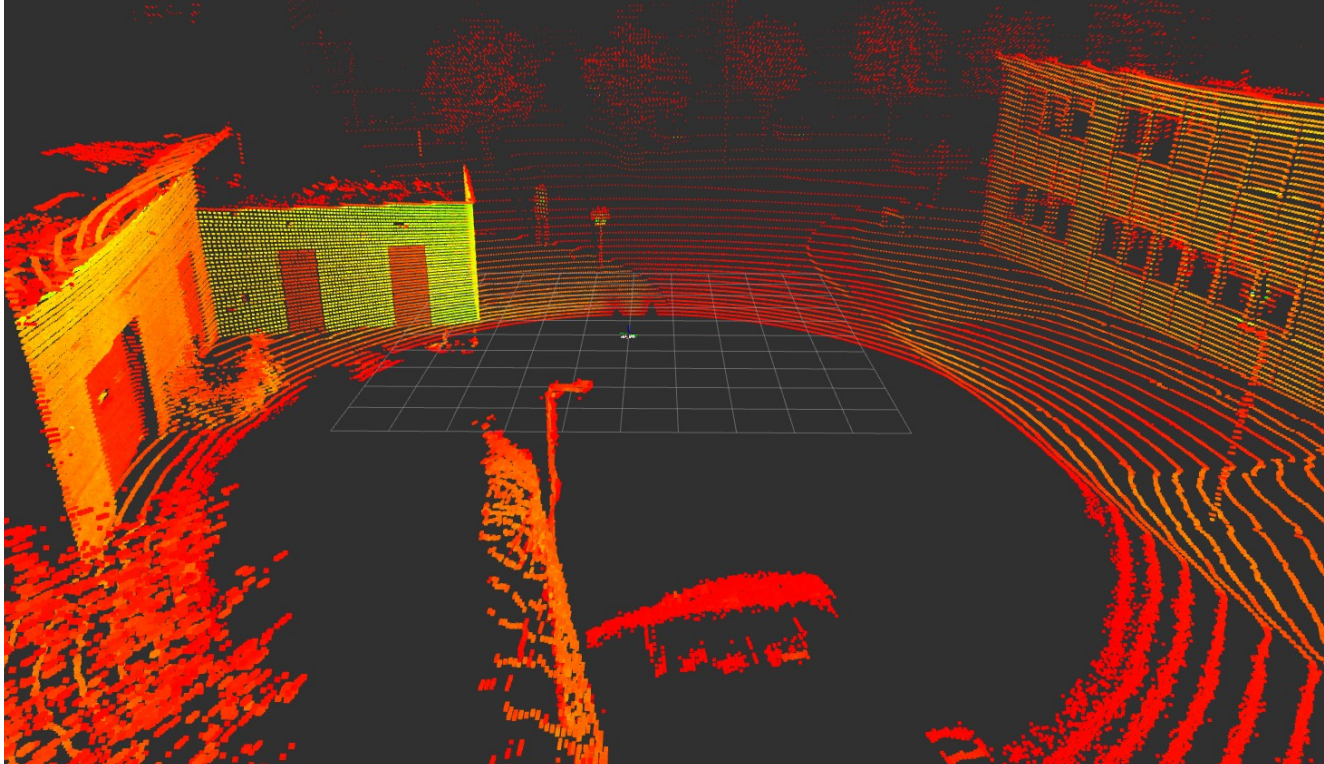
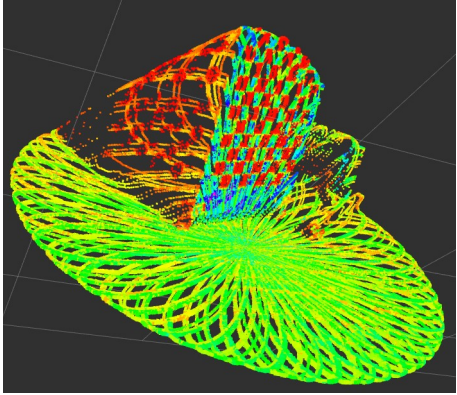
[5]

Ouster OS1-64



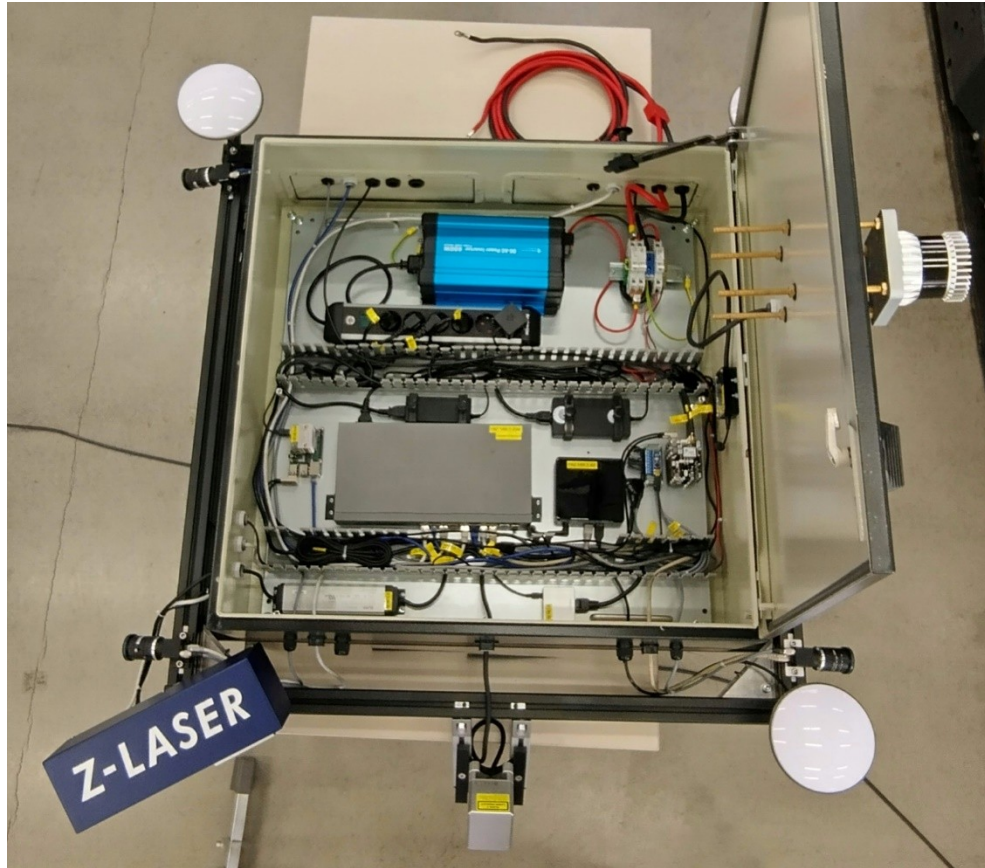
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Ouster OS1-64

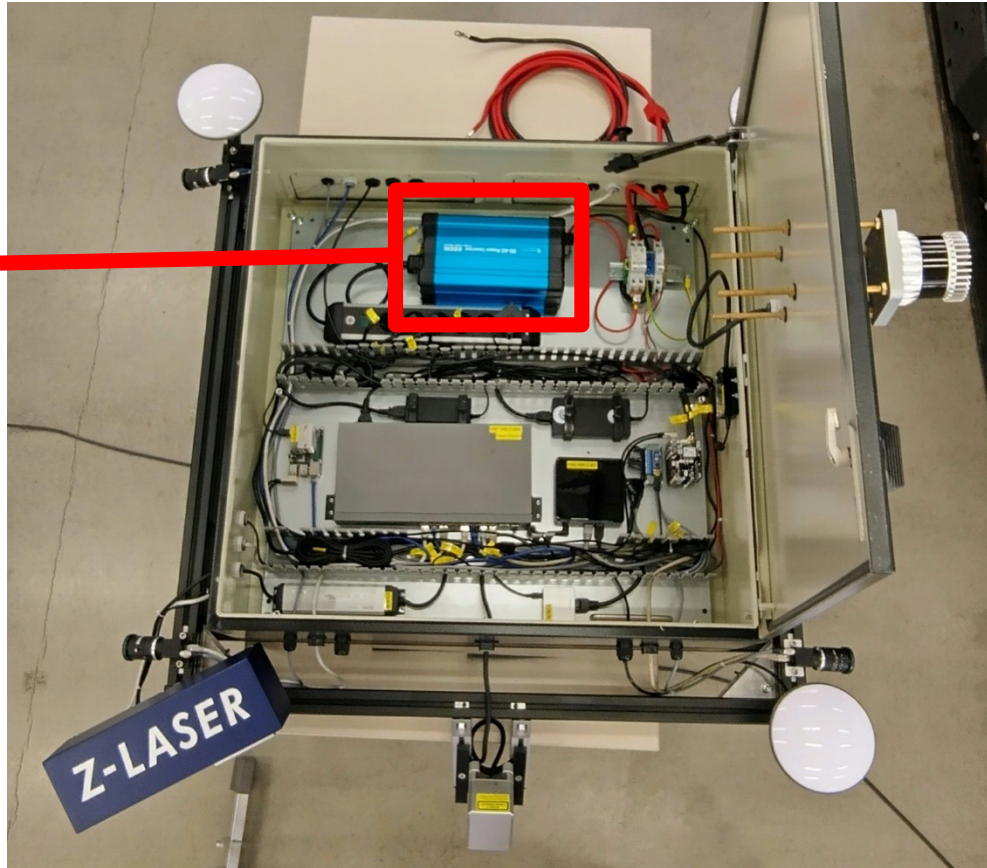


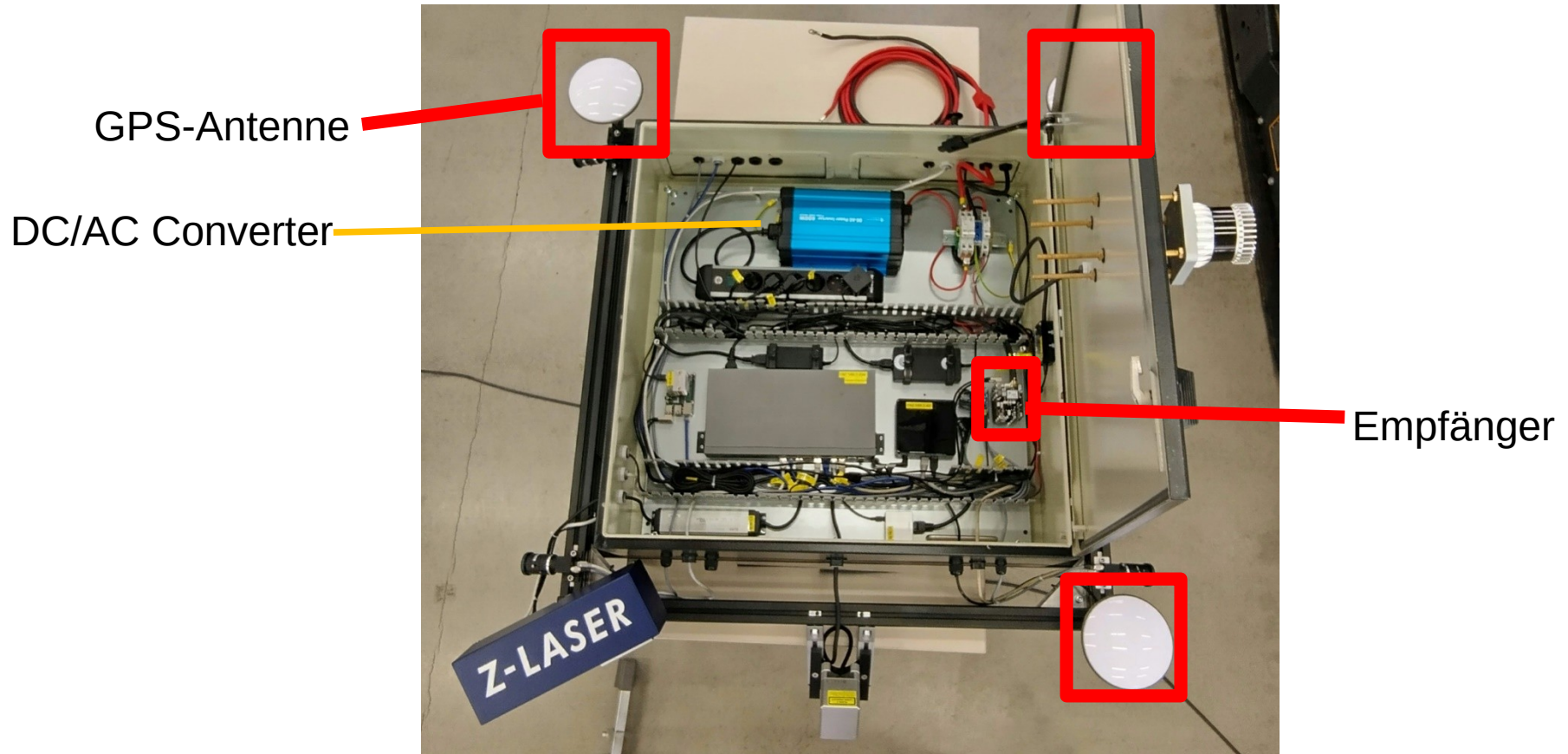


Blackfly S GigE

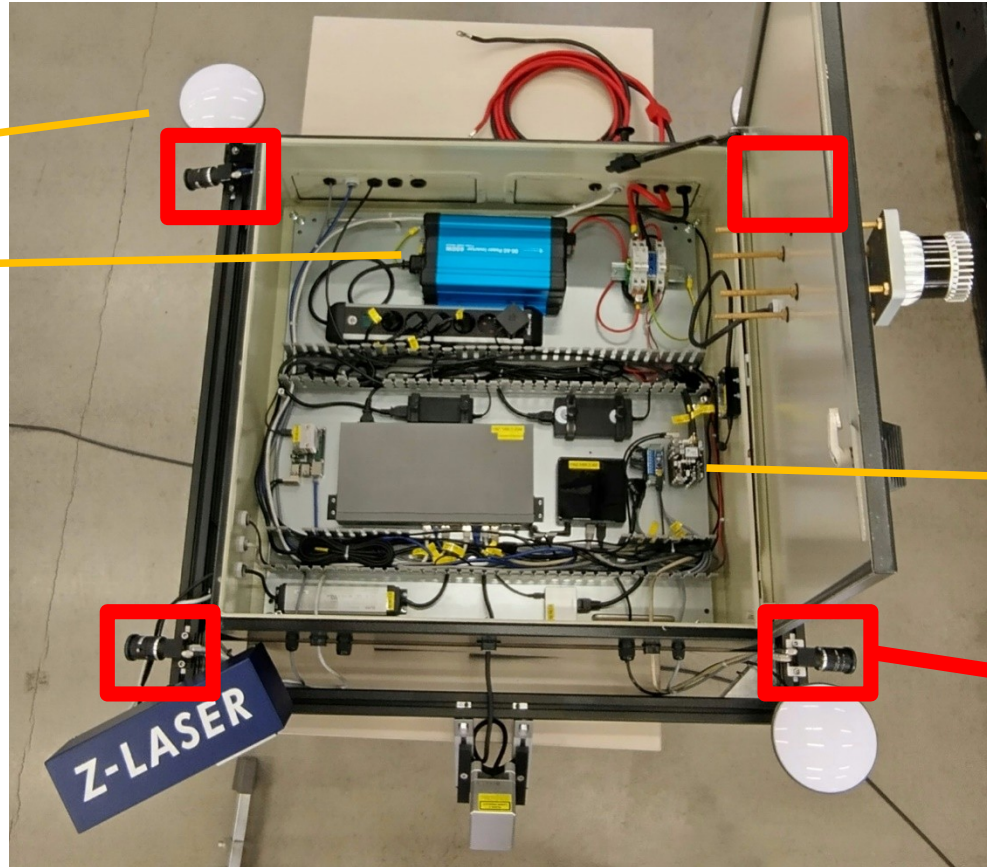


DC/AC Converter



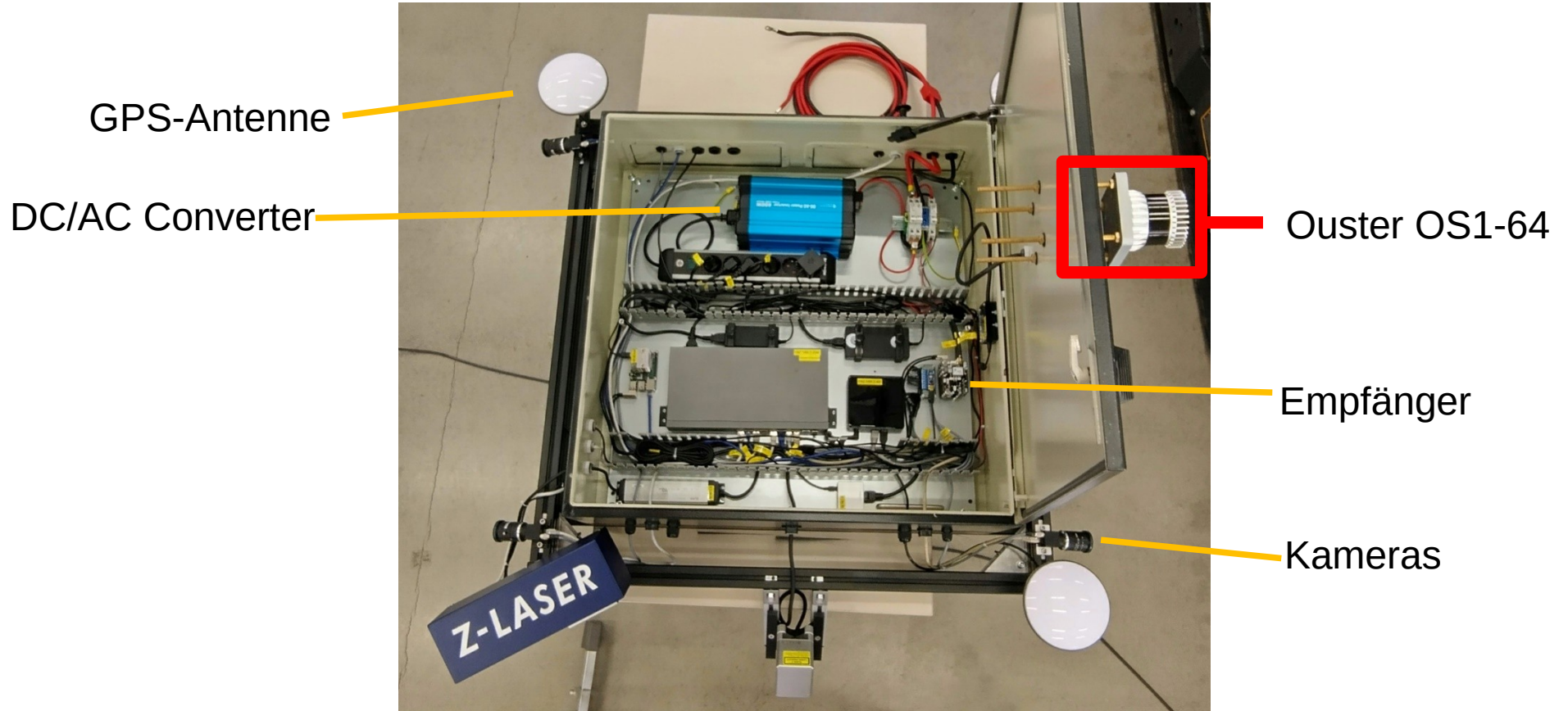


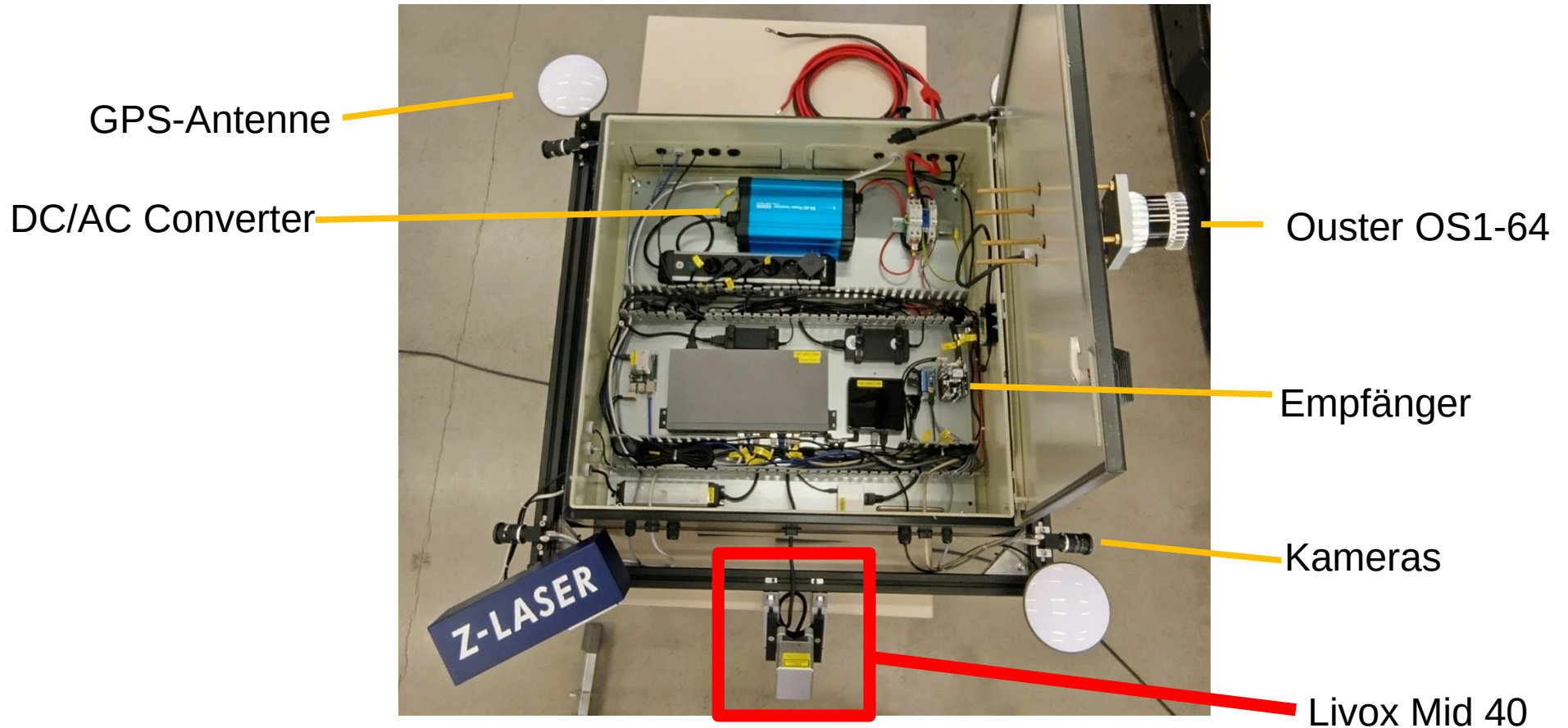
GPS-Antenne
DC/AC Converter

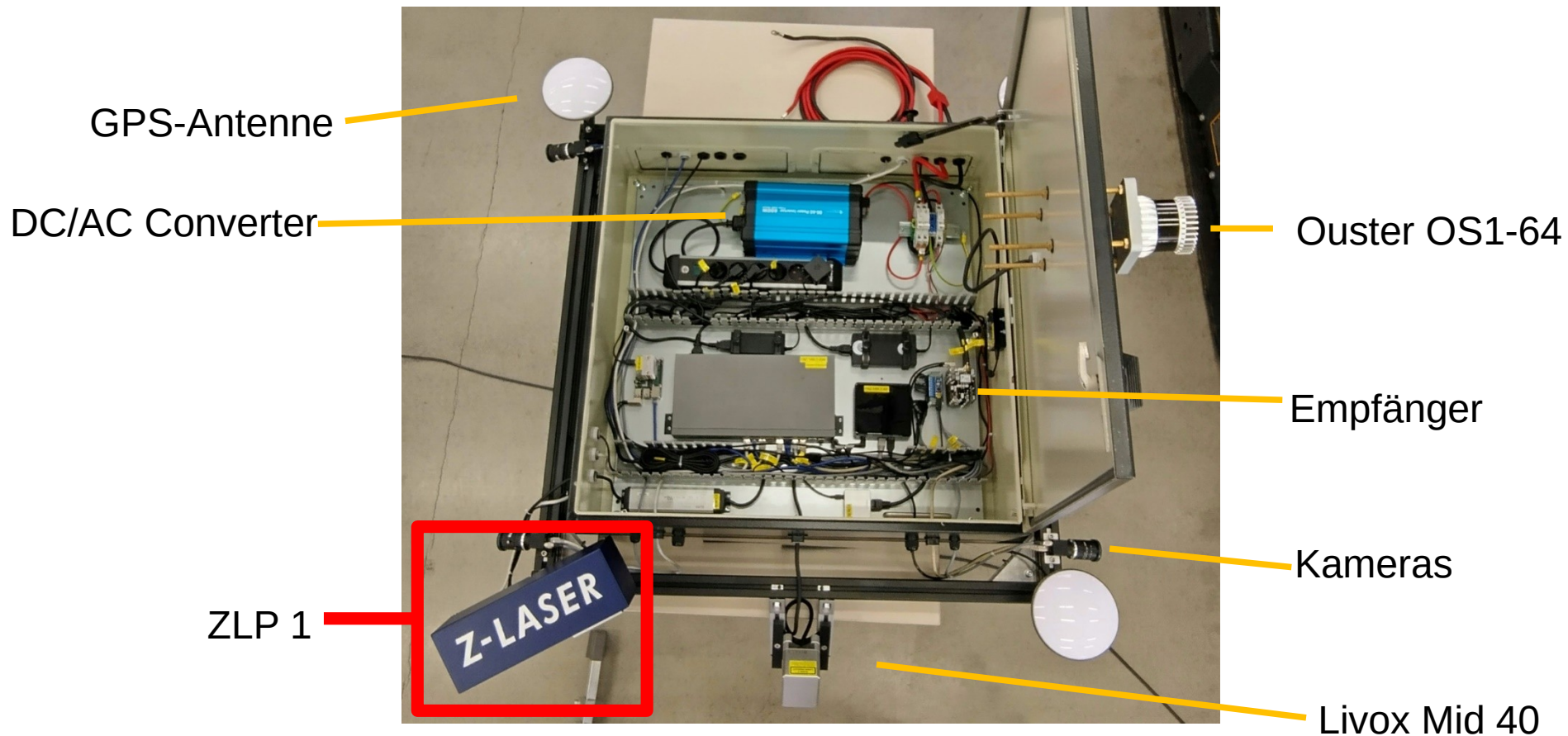


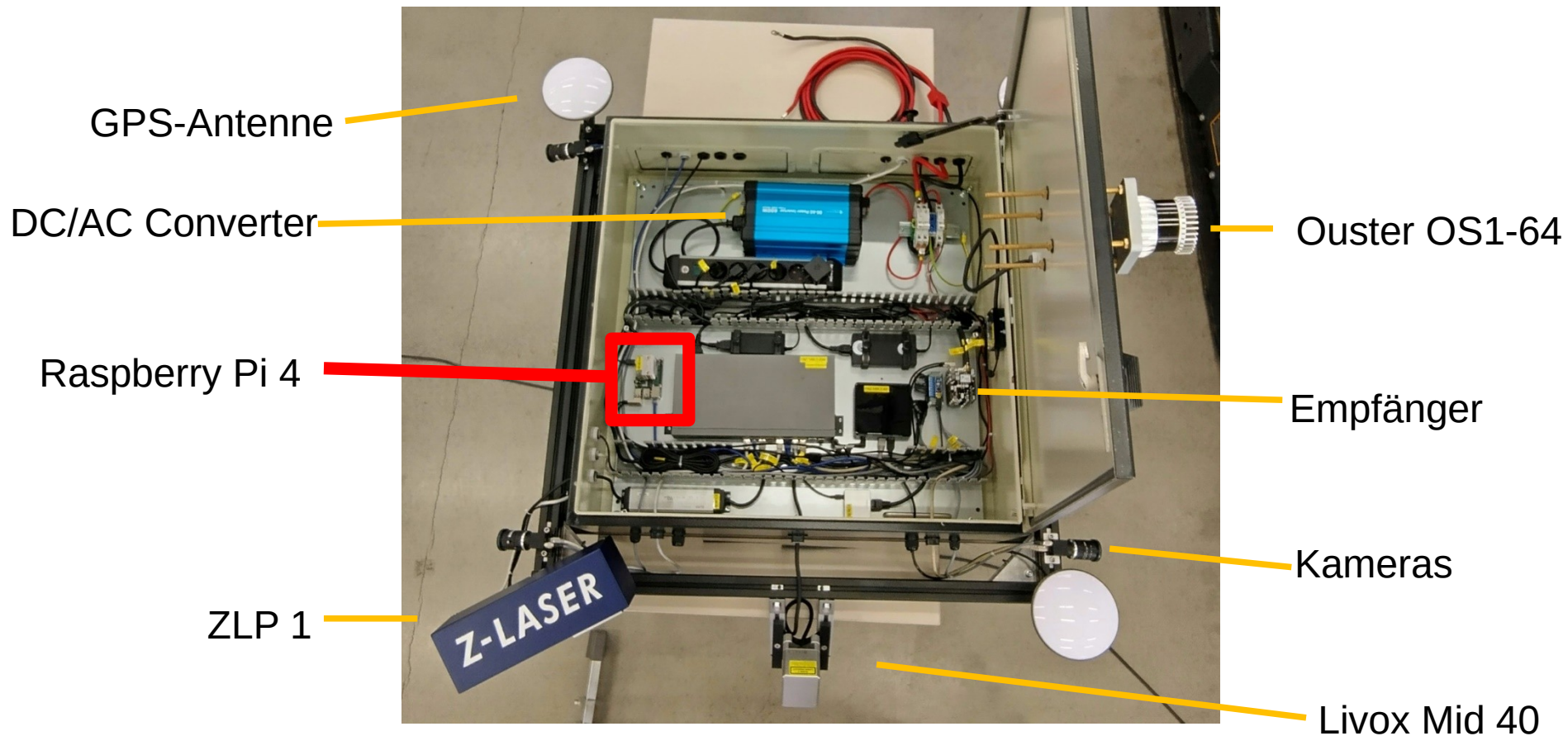
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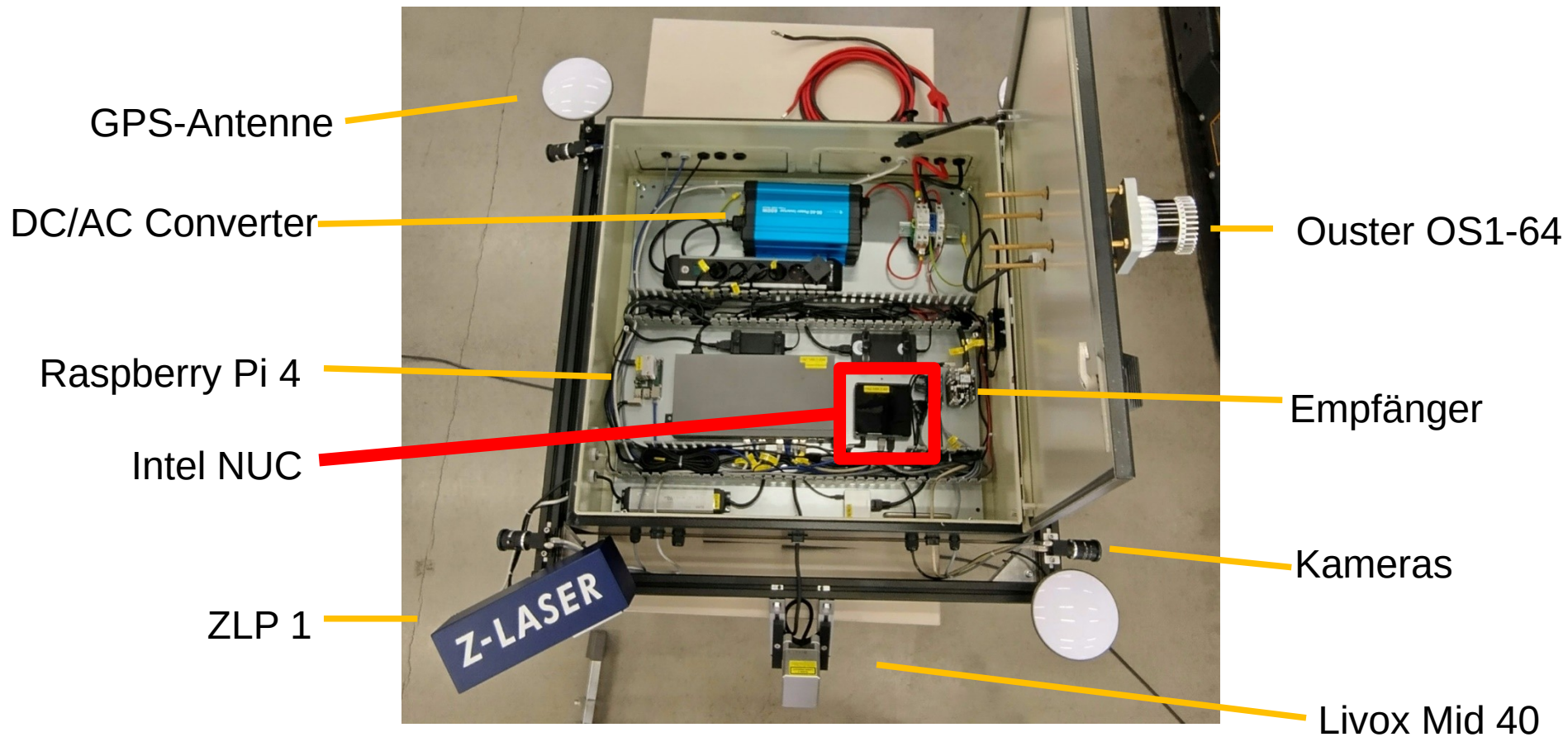
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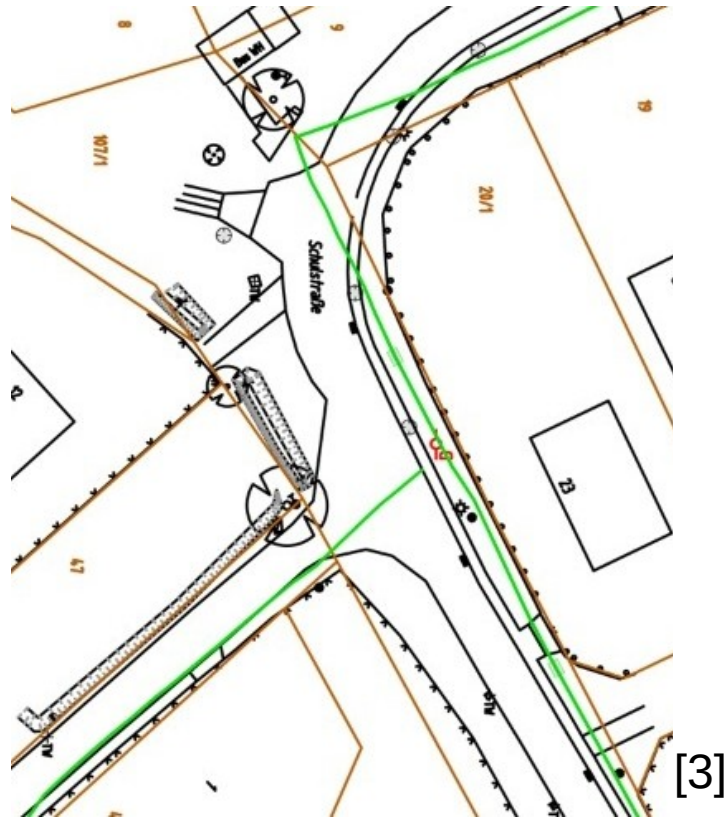




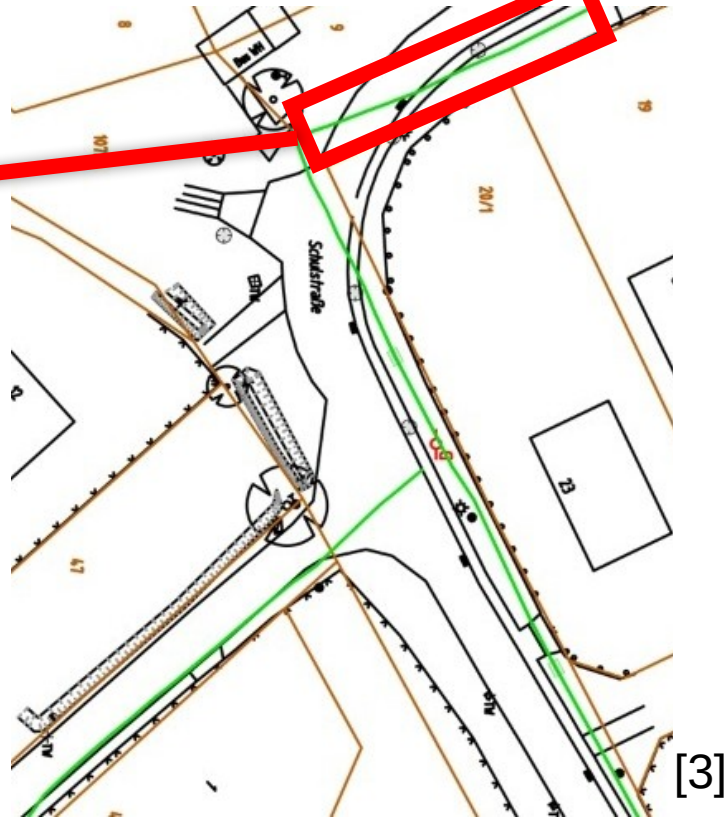


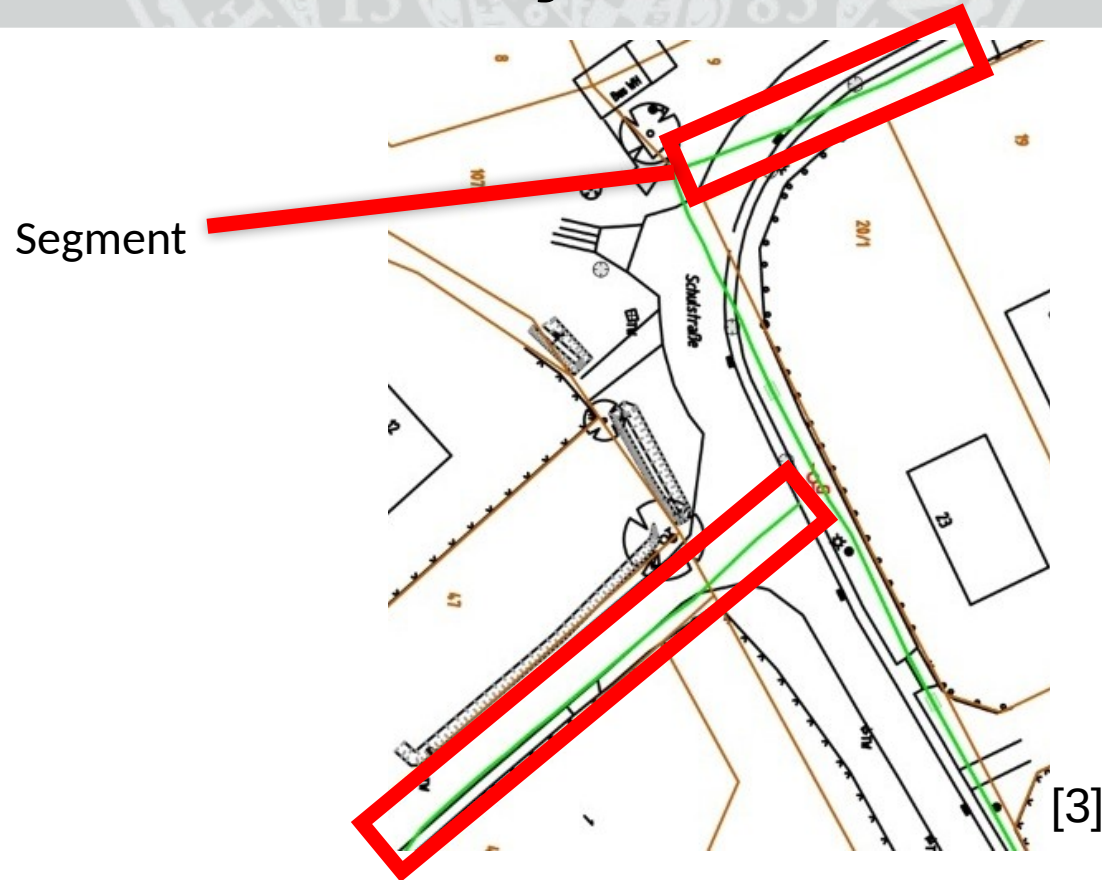


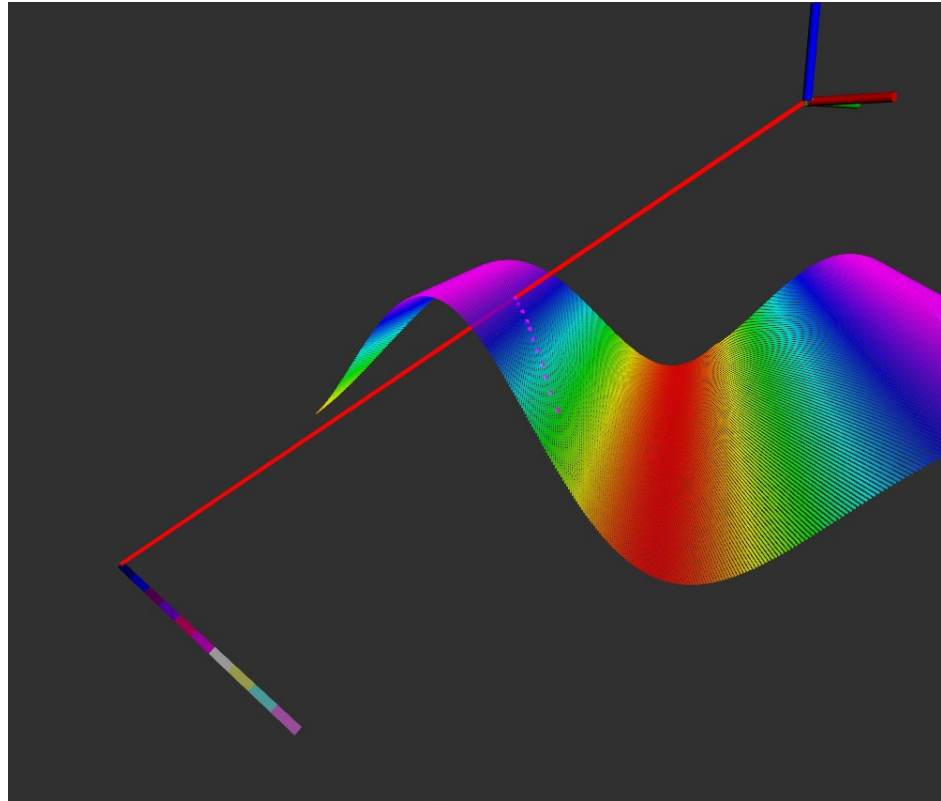


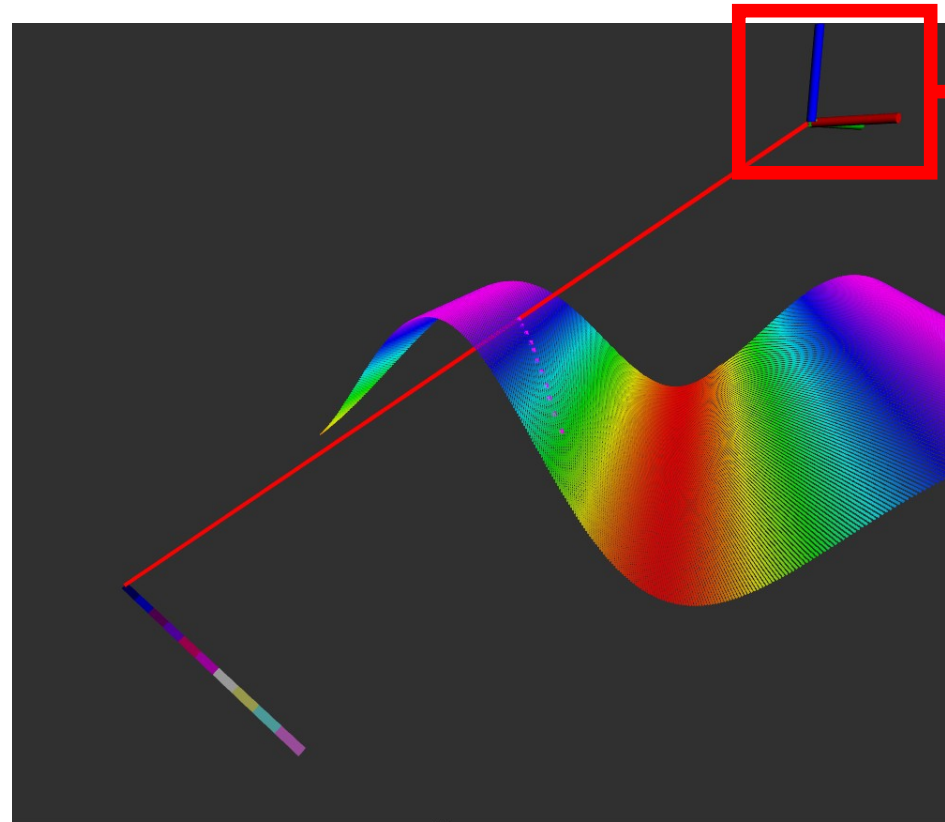


Segment

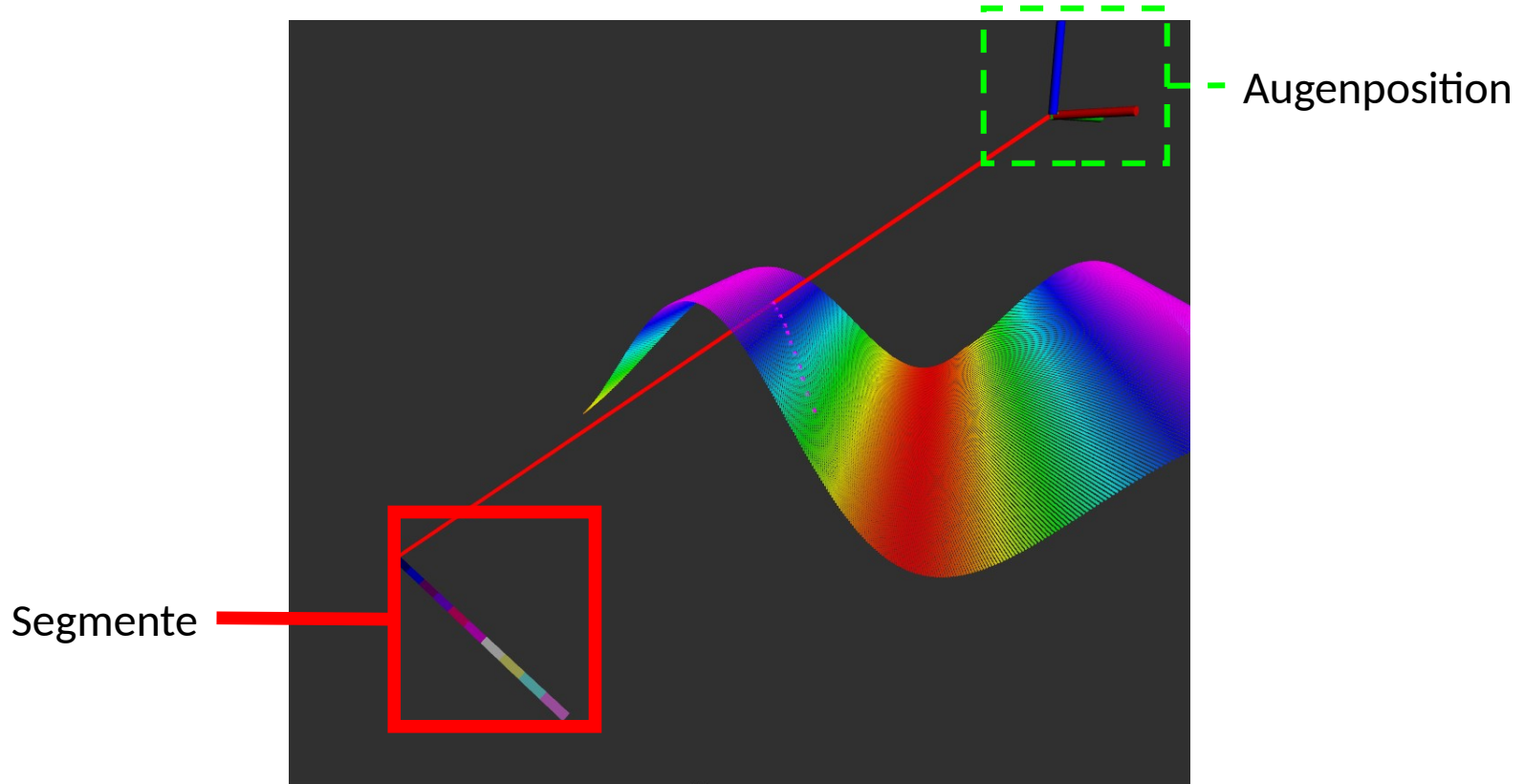


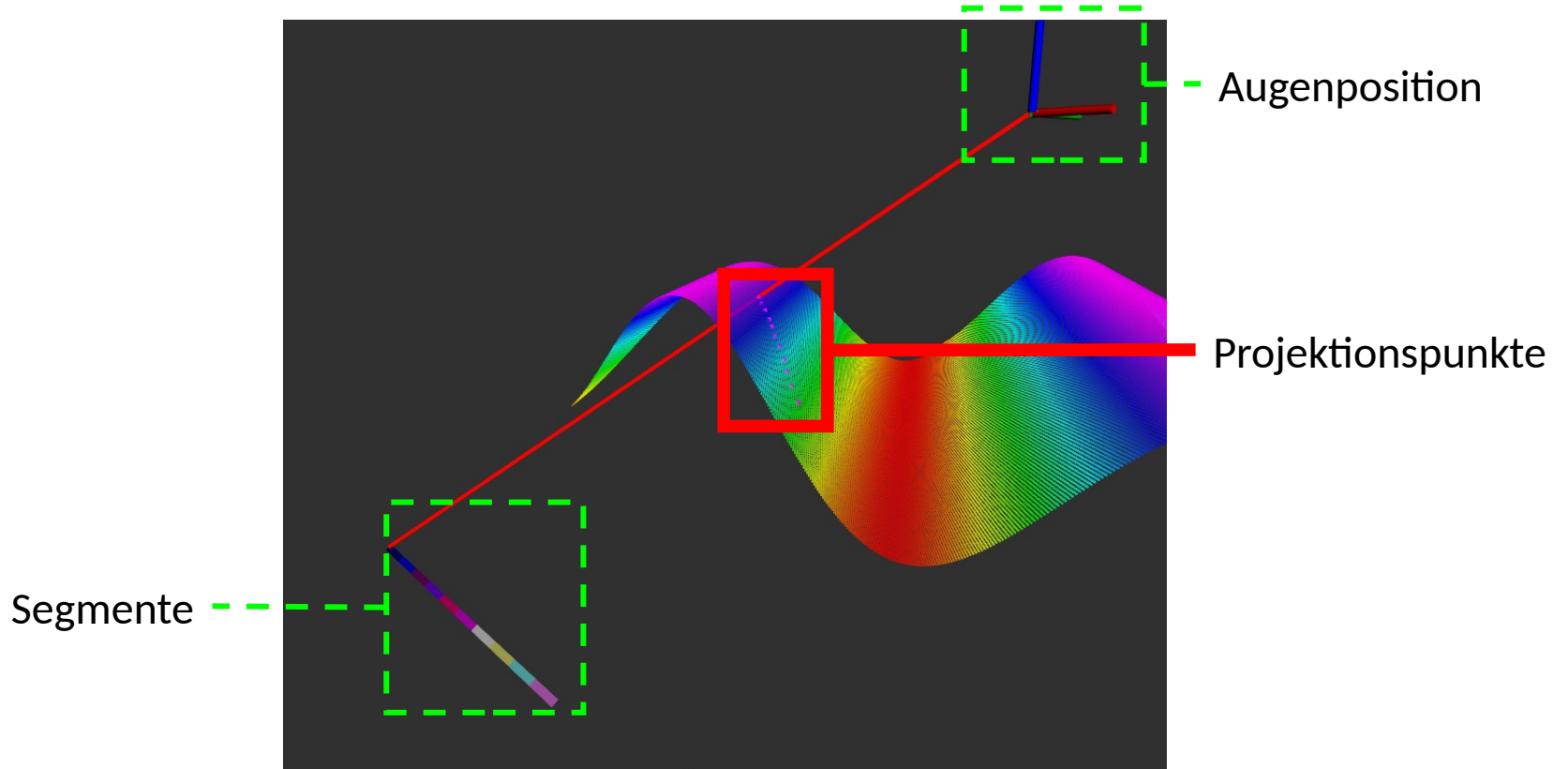


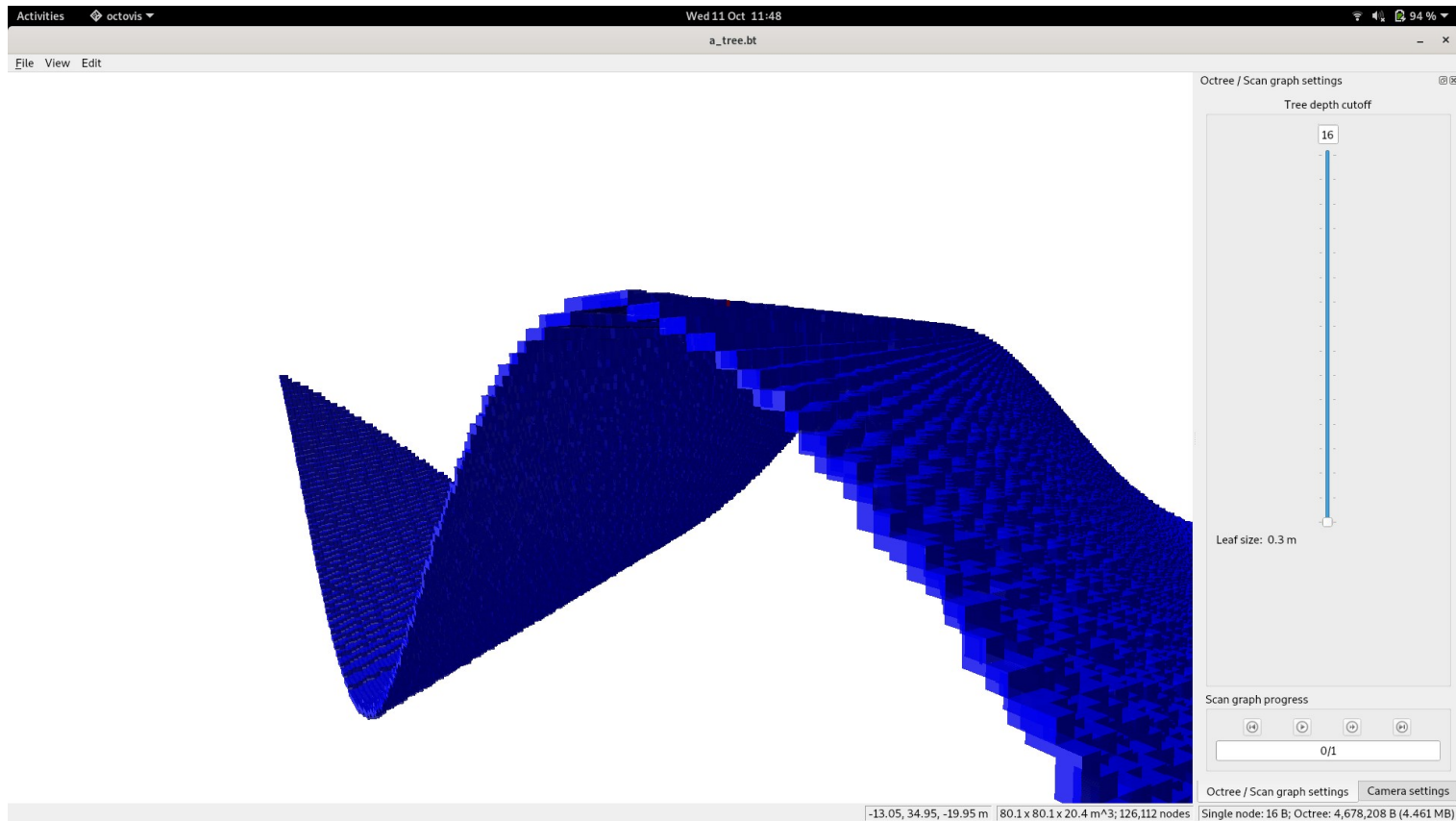


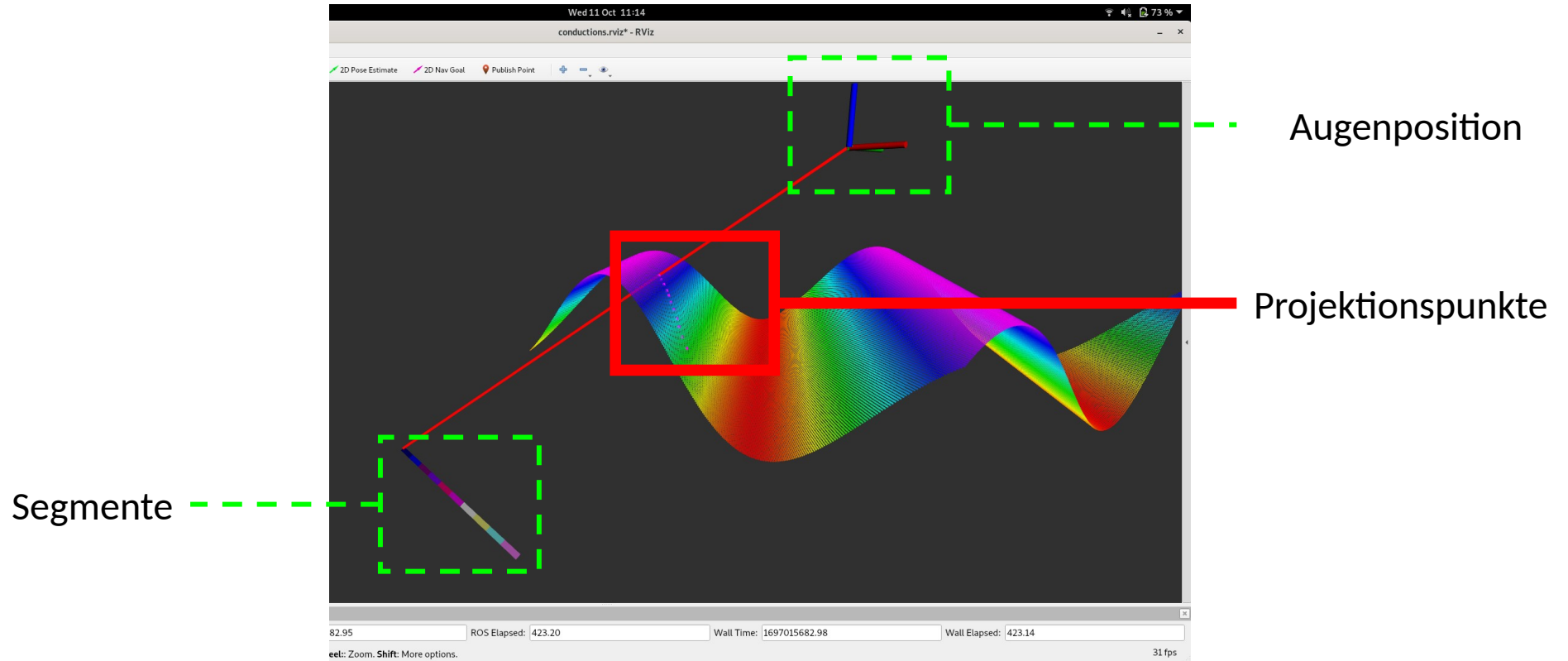


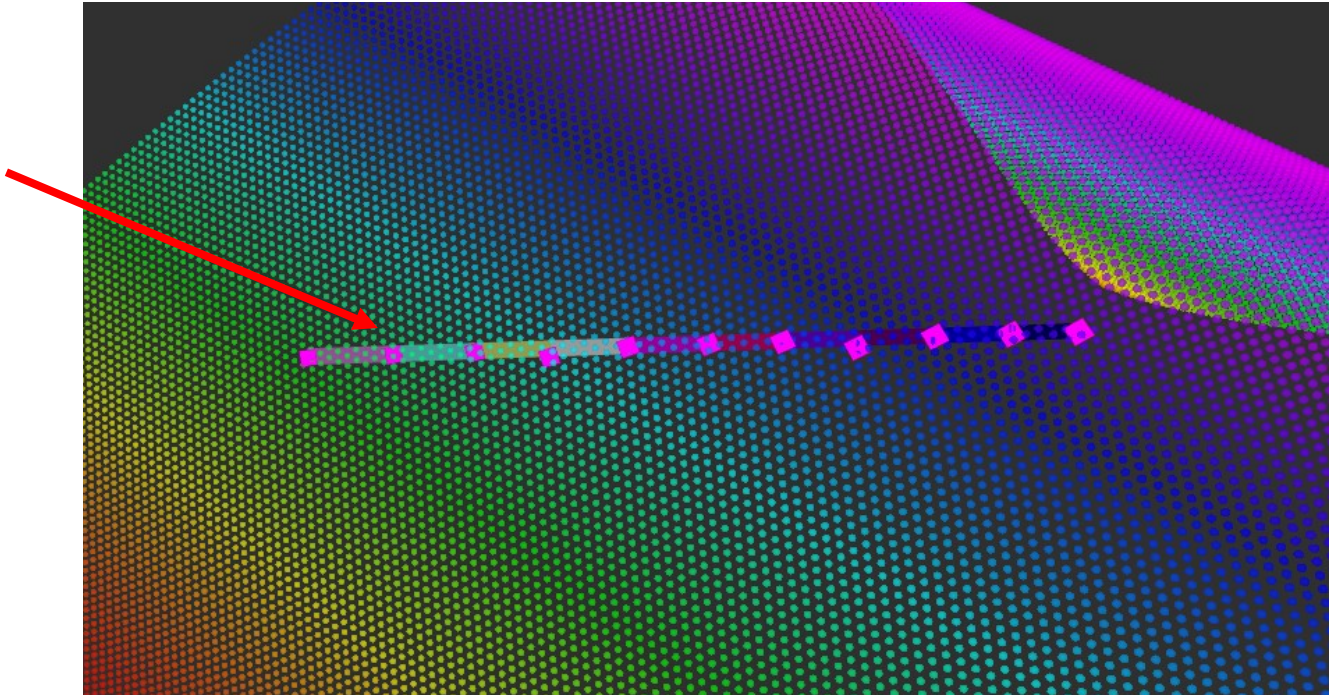
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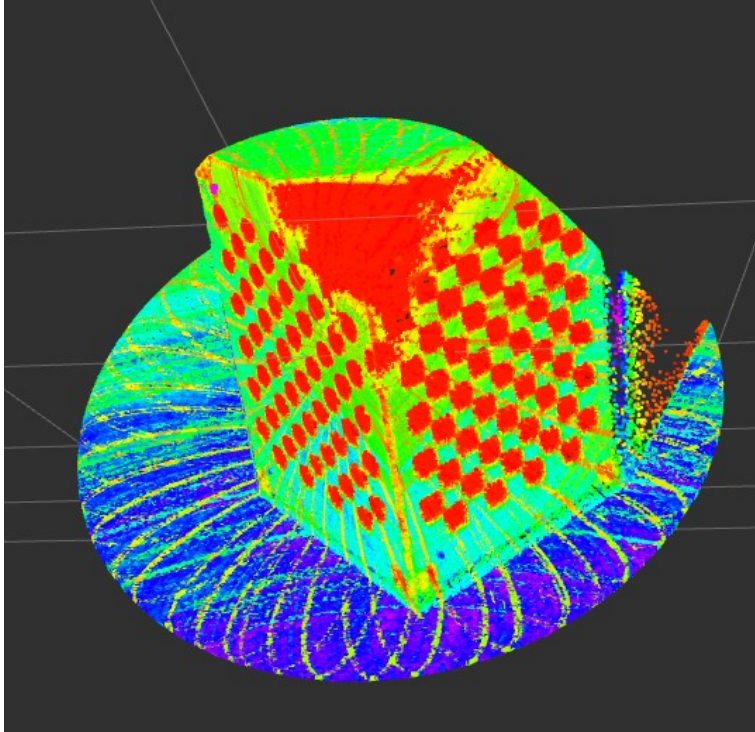




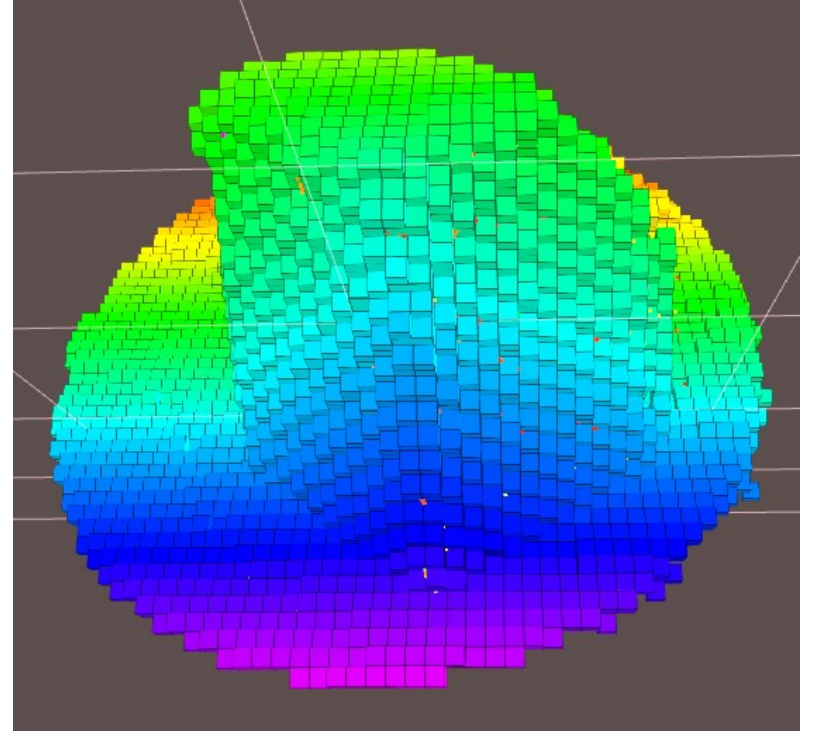




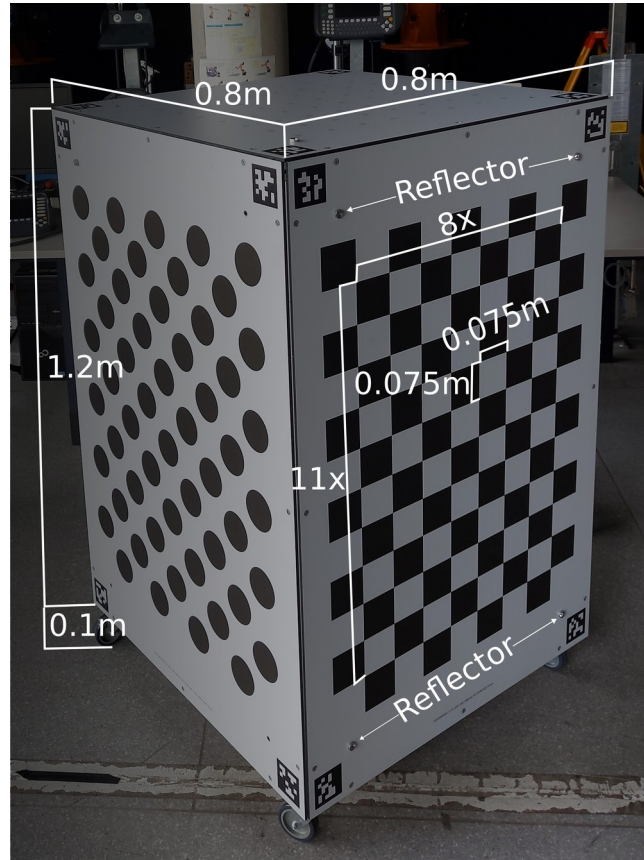


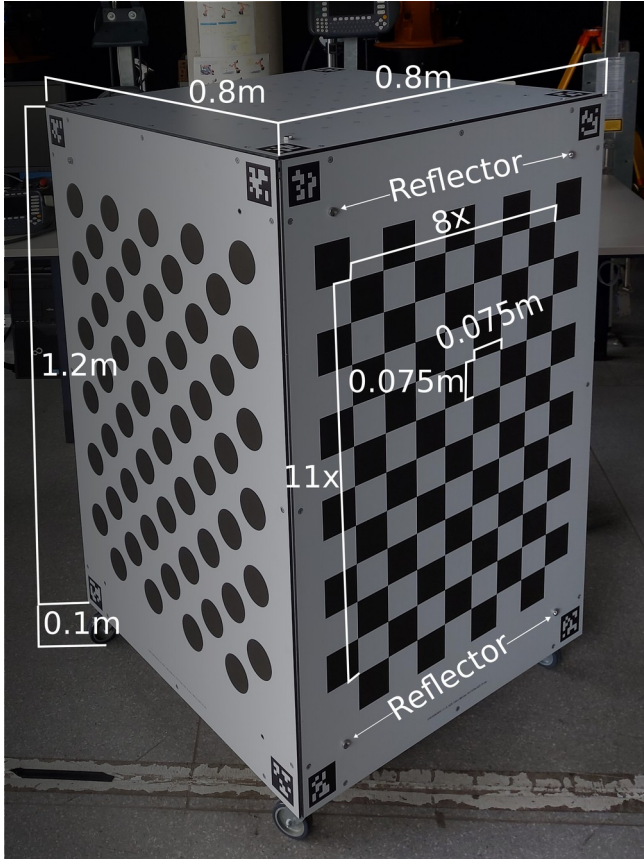


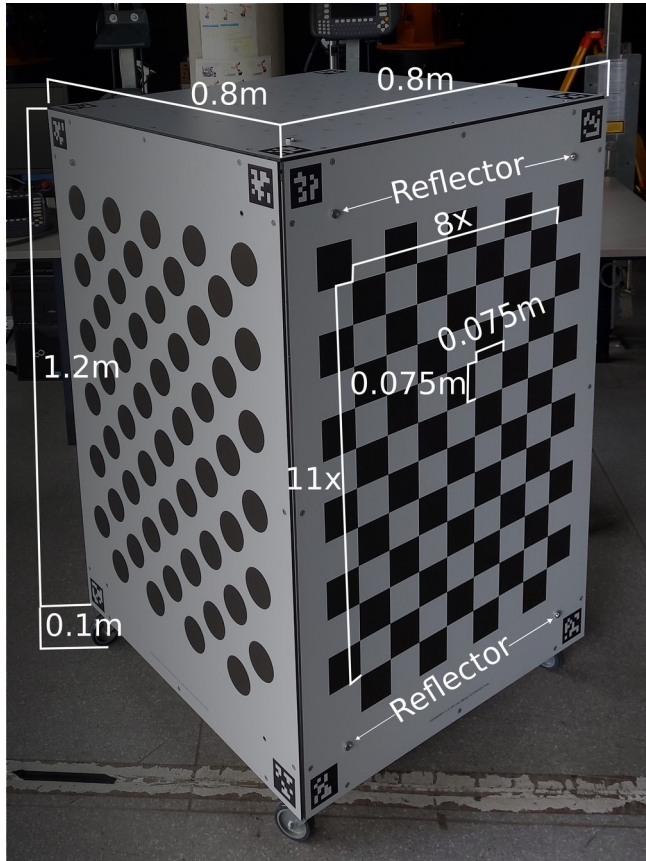
Livox



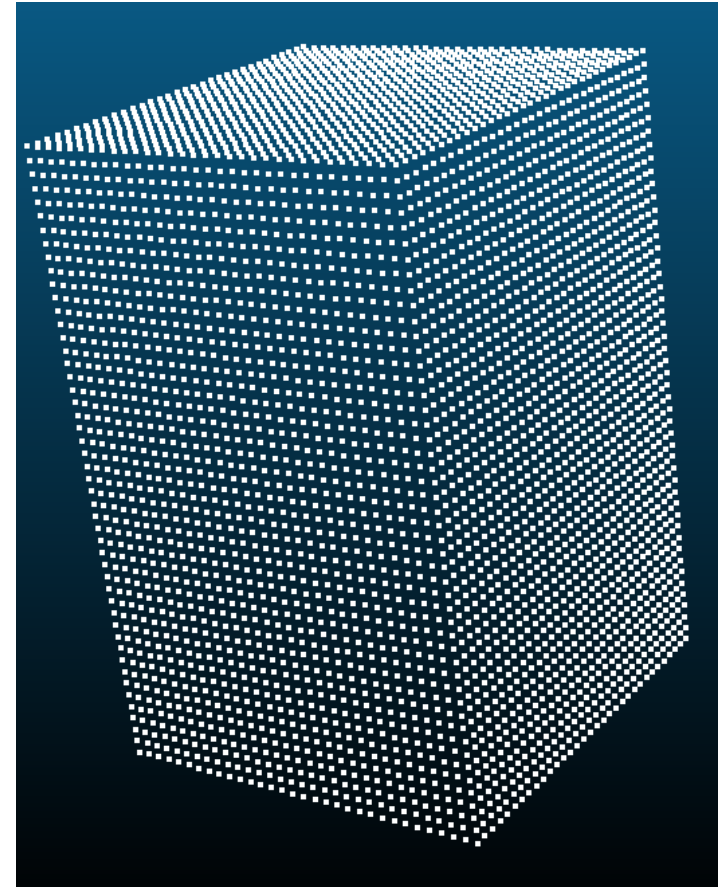
Octomap

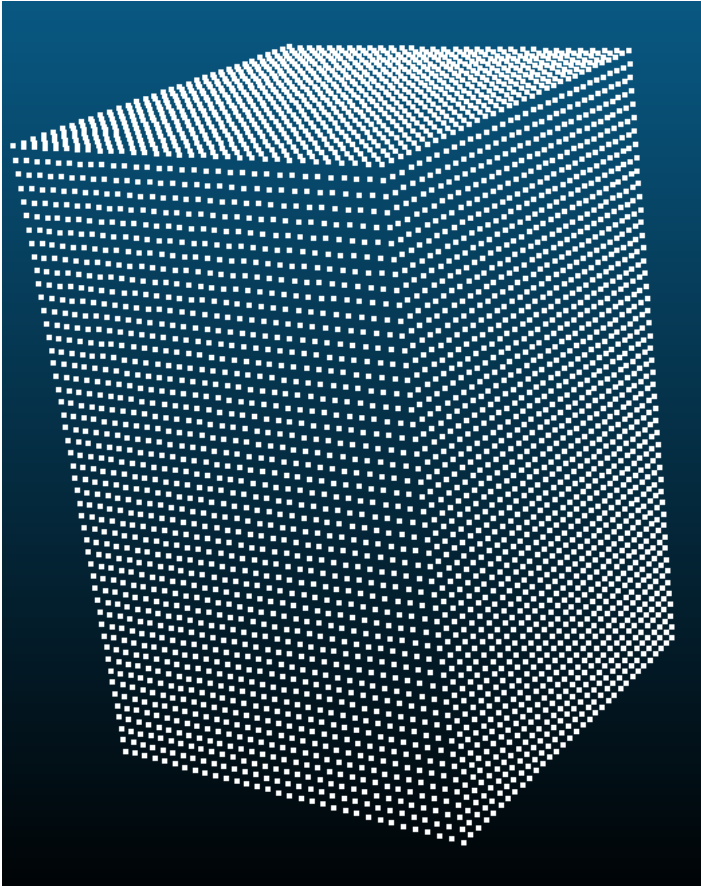






3D Modell

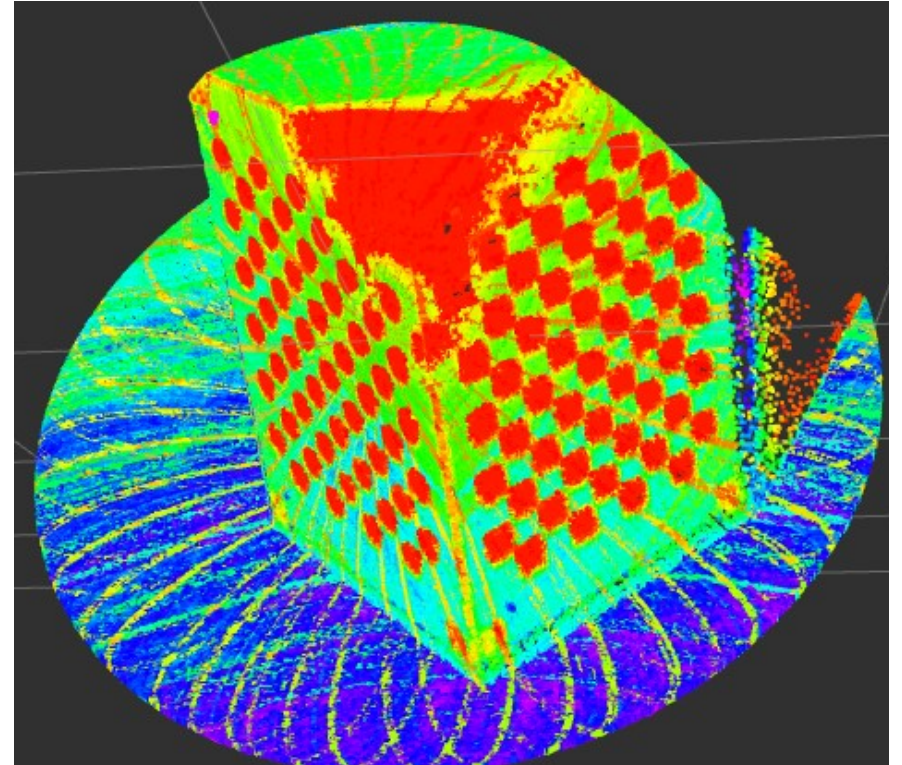
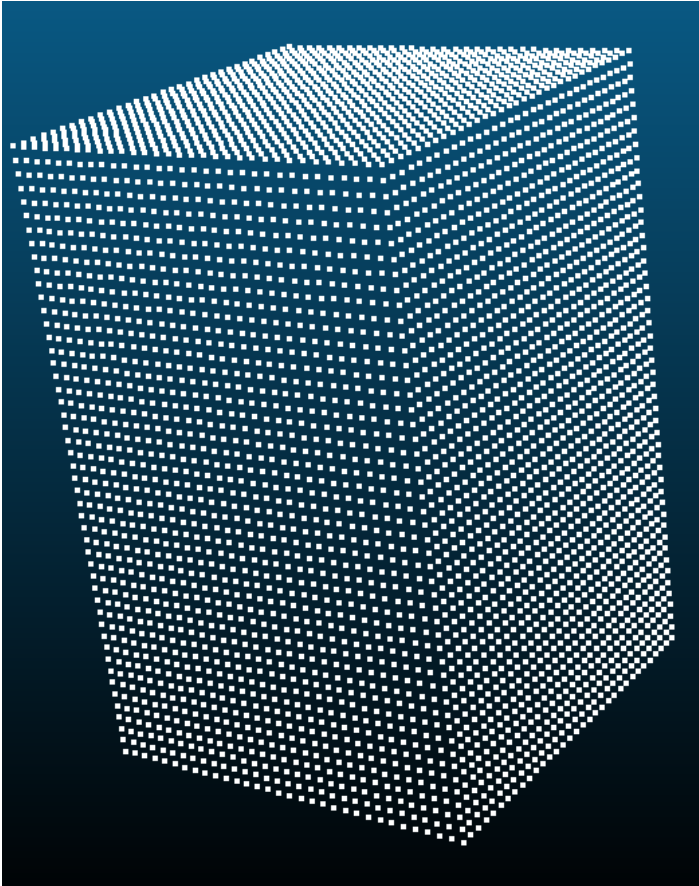


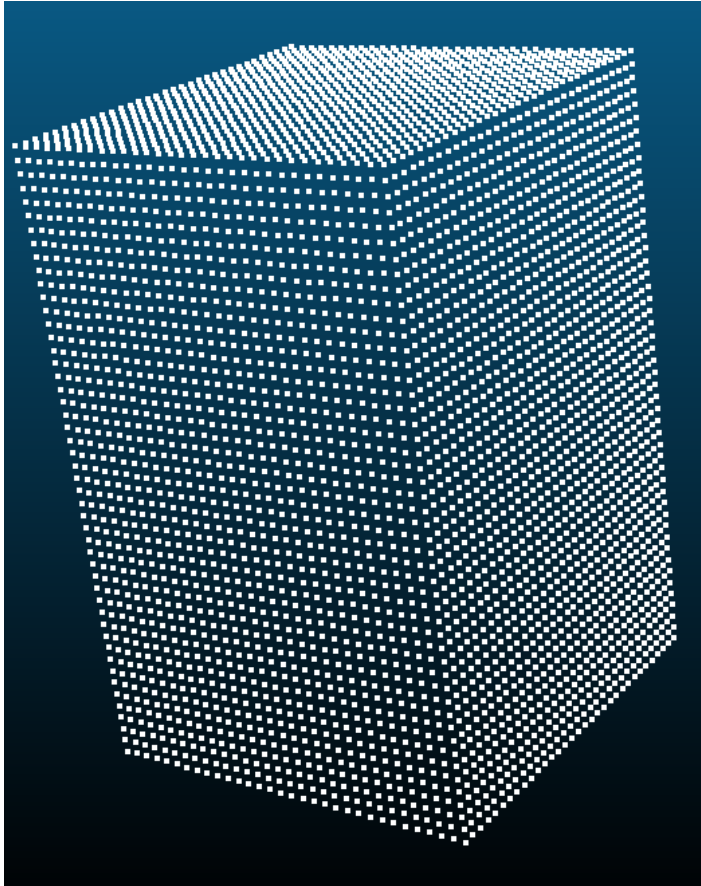


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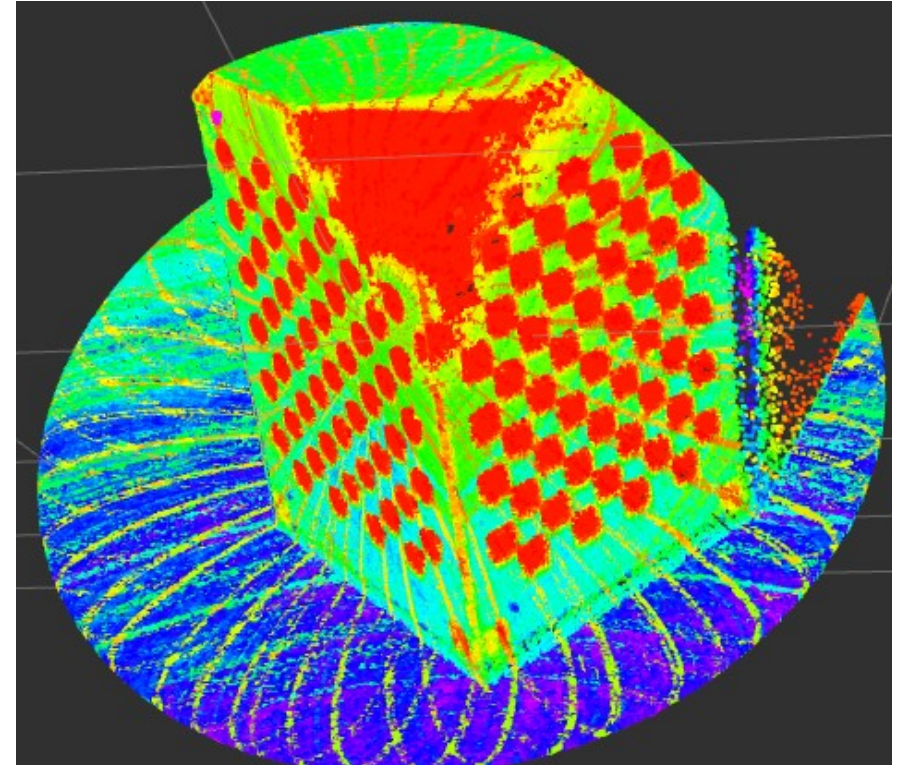
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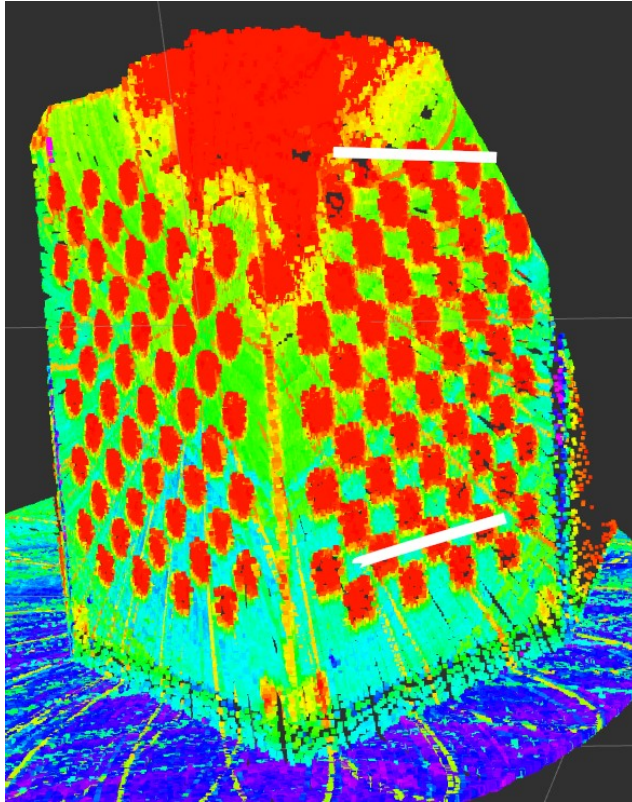
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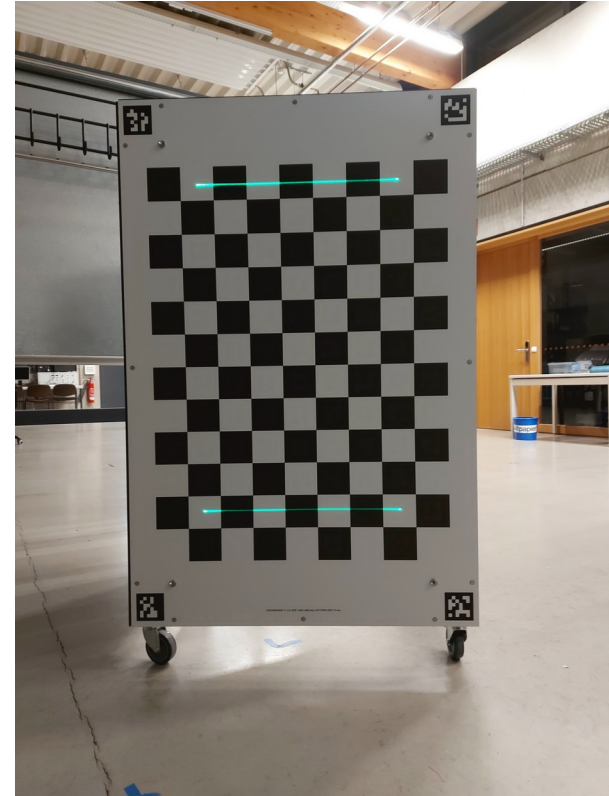
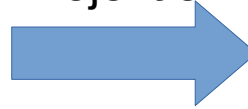


ICP
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Projektion



- Visualisierung der Pläne
- Unverzerrt aus der Augenposition
- Erste Lokalisierung über GPS
 - Verbesserung über Visual Odometry und Laserscanner

- [1]
<https://www.hessenschau.de/panorama/bahn-bagger-legt-flugverkehr-lahm---und-twitter-amuesiert-sich-v1,flughafen-it-twitter-100.html>
- [2]
https://www.hagebau.com/content/wissen/downloads/brosch%C3%BCrencenter/tiefbau/fachbl%C3%A4tter/fb_tief_strassenbau_2_2020_web.pdf
- [3]
<https://www.sh-netz.com/de/energie-service/informationen/leitungsauskunft-fuer-plan-und-tiefbau.html>
- [4] <https://www.livoxtech.com/showcase/1>
- [5]
<https://www.generationrobots.com/de/403994-ouster-os1-32-lidar-ver-6-mit-mittlerer-reichweite.html>

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