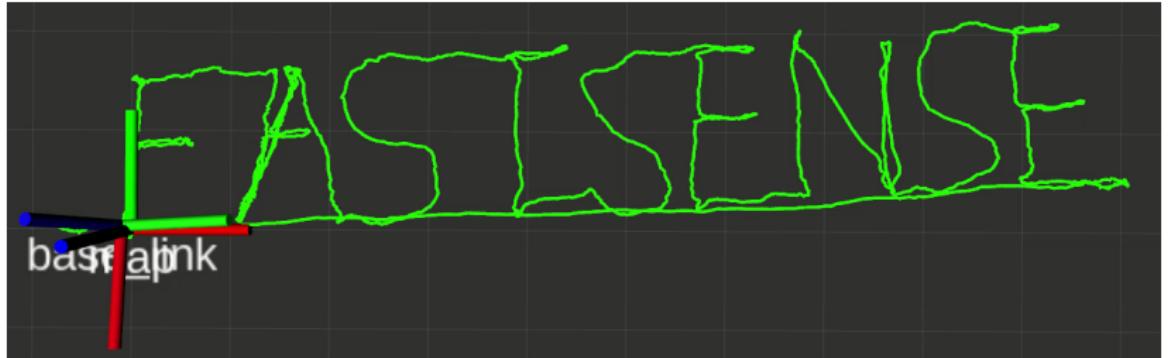


Projektgruppe



# Abschlusspräsentation

11. März 2021

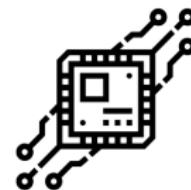
# Zielsetzung

Wissensbasierte Systeme  
Autonome Robotik



- SLAM
- TSDF Karten
- LVR2

Technische Informatik

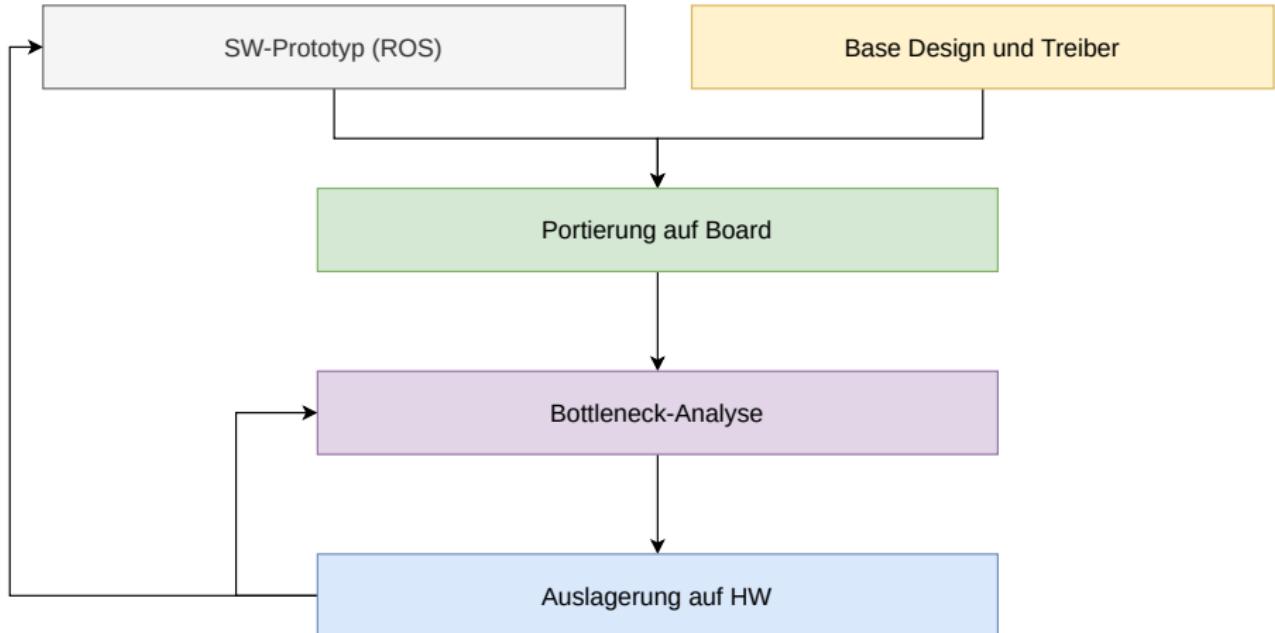


- Hardware Beschleunigung
- FPGAs
- High-Level-Synthese

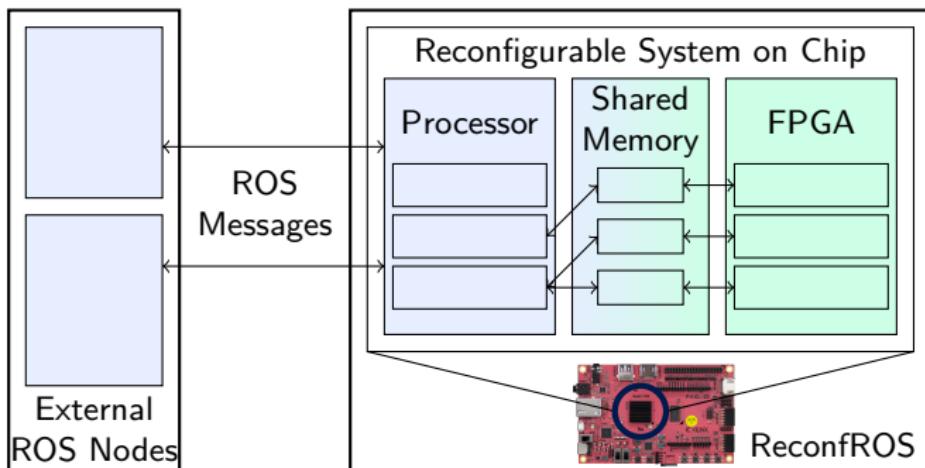
**Hardware Accelerated TSDF SLAM**

# **Meilenstein 1**

# Vorgehen



# ReconfROS



Camera image



Removing noise



Trail pixel extraction



Thresholding



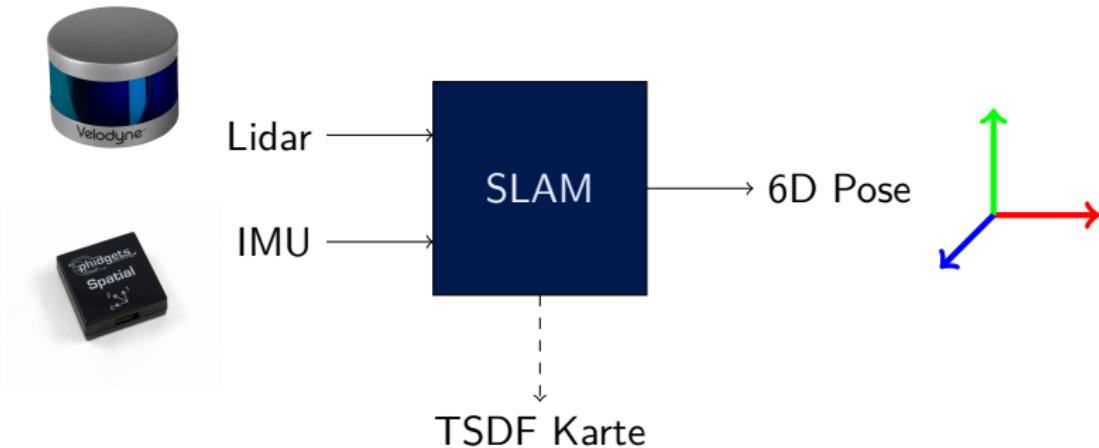
Remove fragments



Trail direction

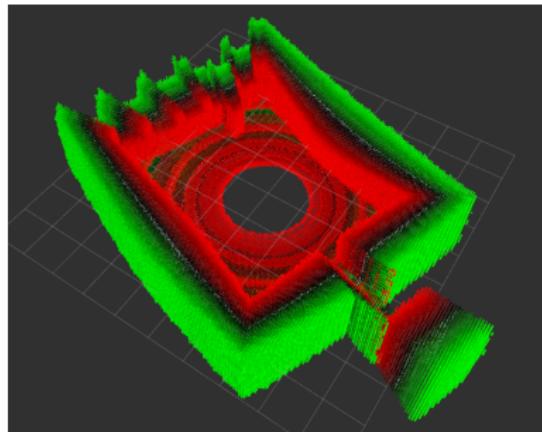
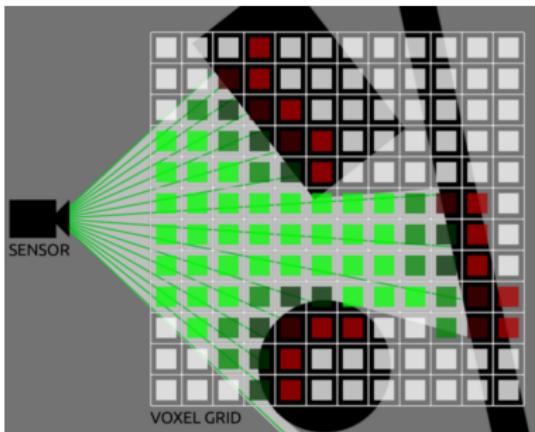
# **Meilenstein 2**

# SLAM-Box



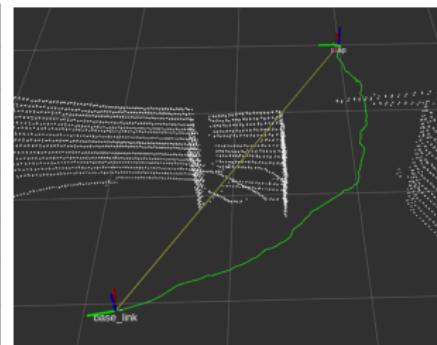
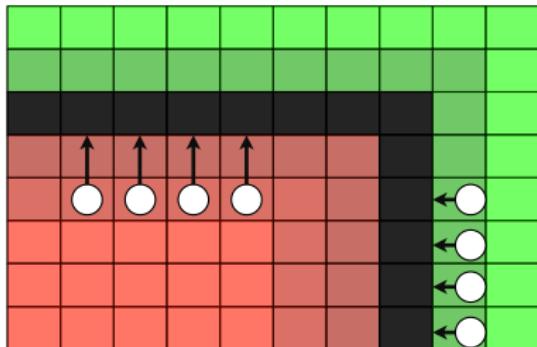
# TSDF

- Implizite Oberflächenrepräsentation
- Inkrementell erweiterbar
- Effiziente Meshgenerierung (Marching Cubes)



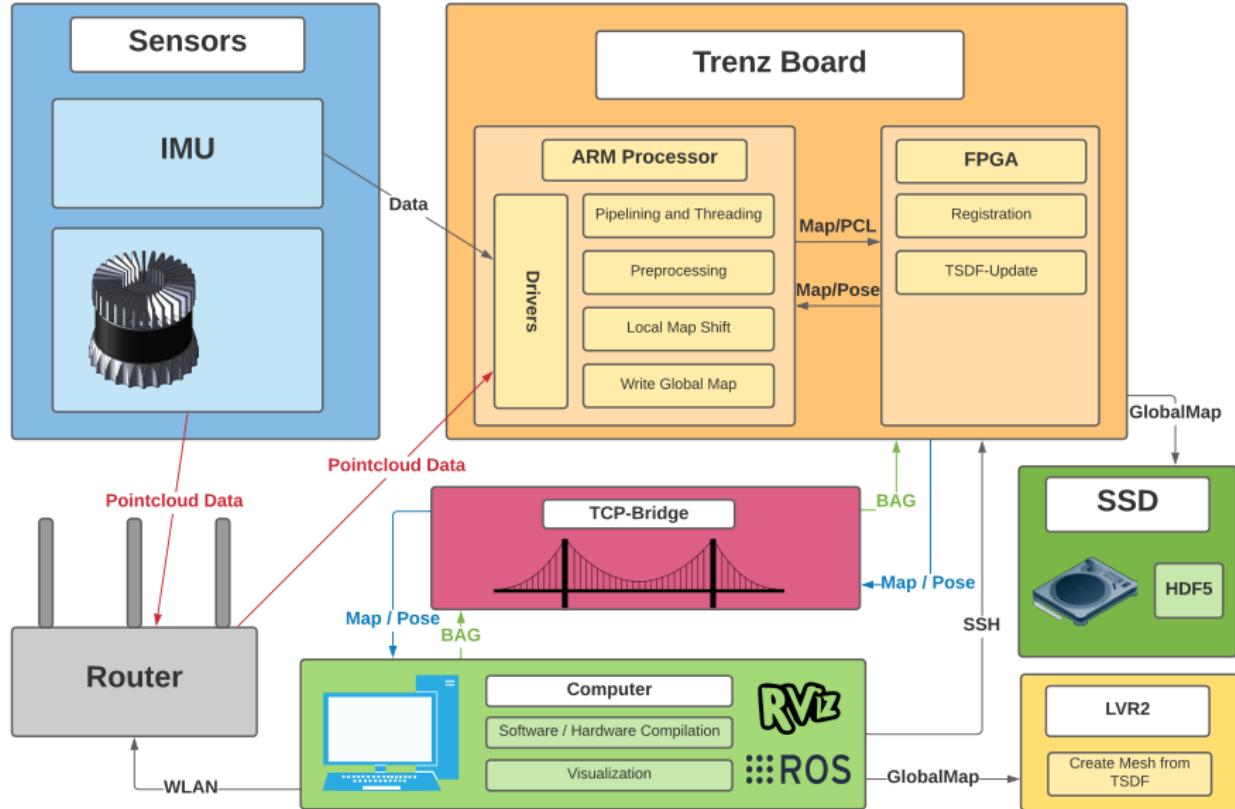
# Registrierung

- Point-to-TSDF
- Initiale Rotation (IMU)
- Erzeugt Posegraphen

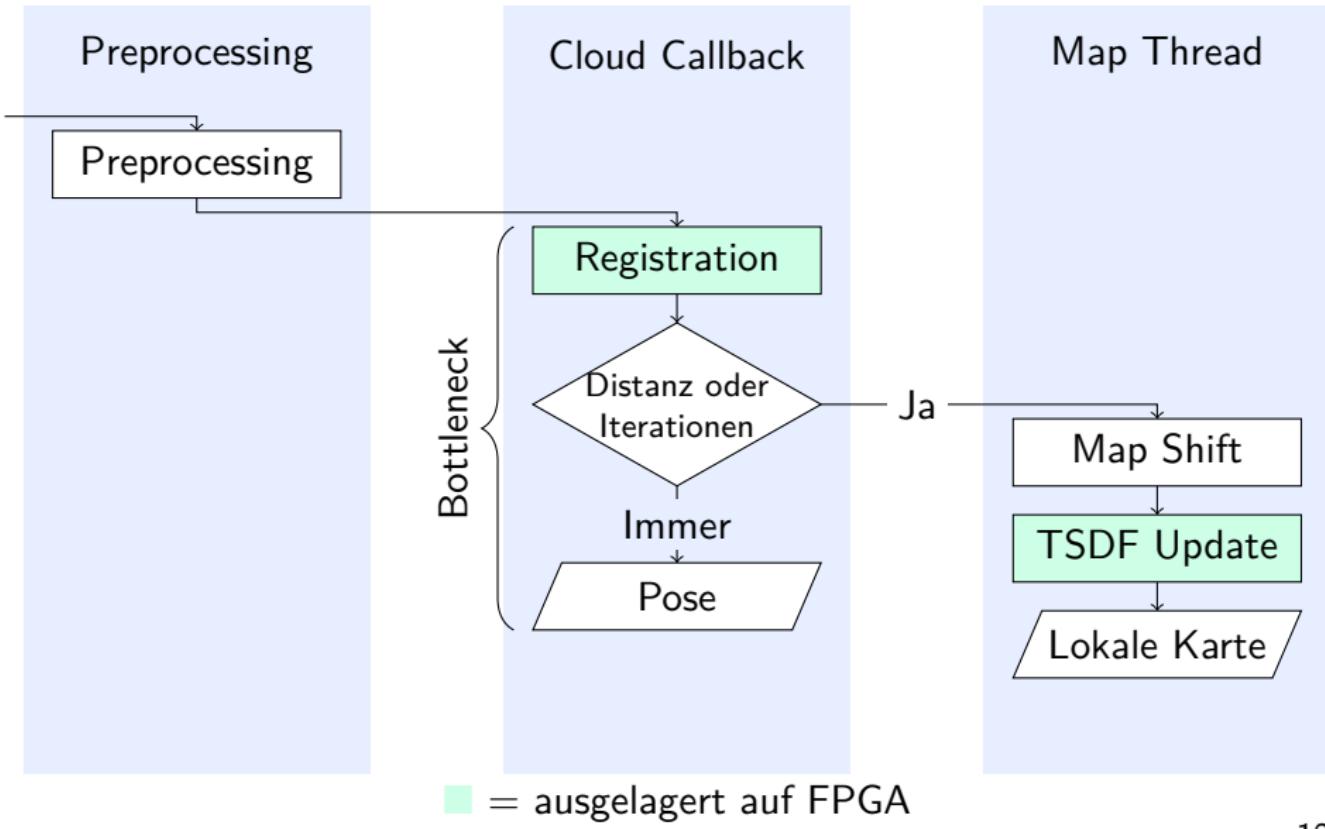


# **Meilenstein 3**

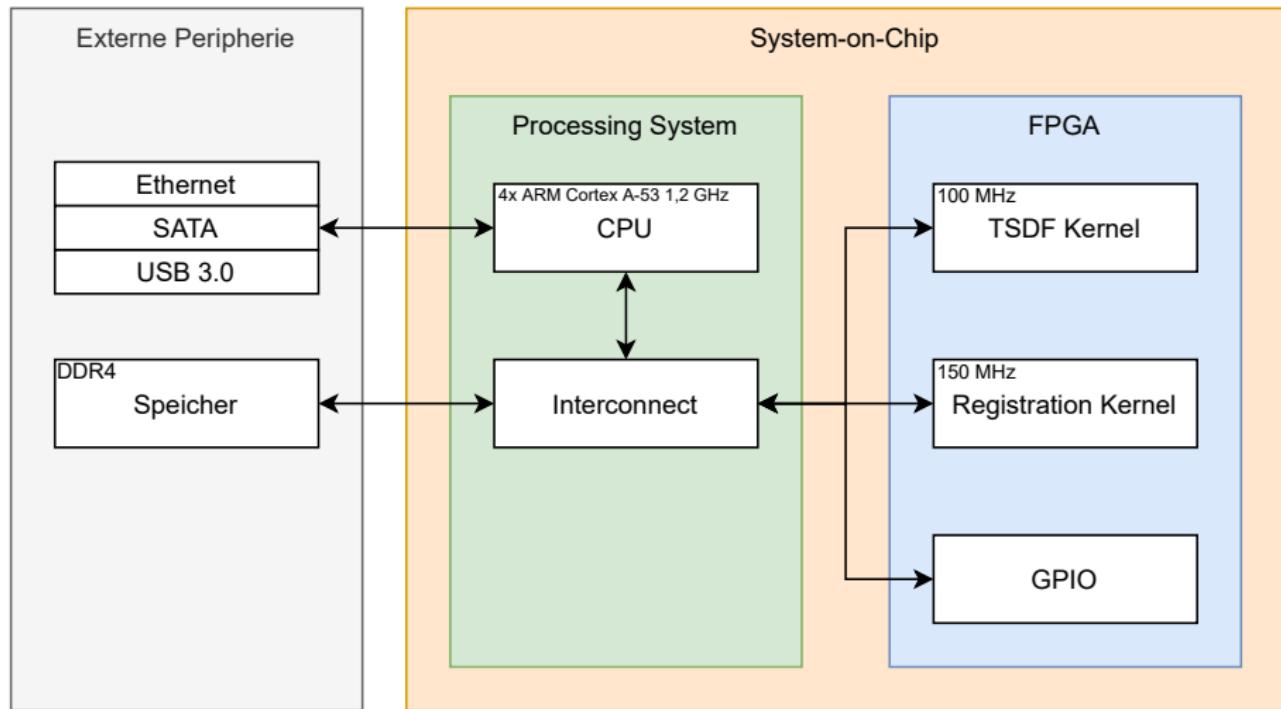
# Komponenten



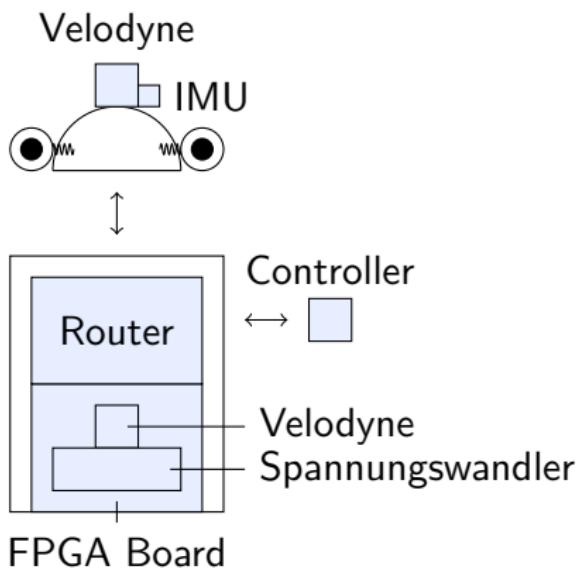
# Algorithmus



# Hardware Architektur



# Aufbau

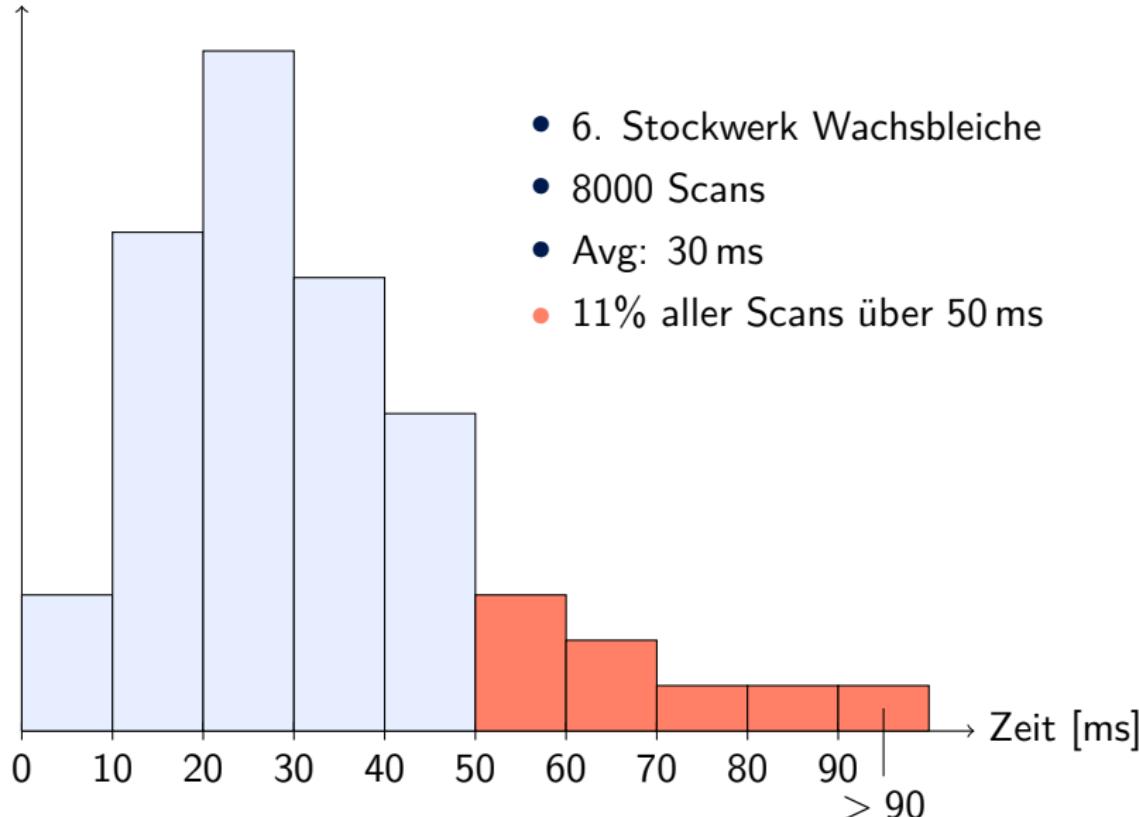


# Demonstration

# Evaluation

# Zeit

Anzahl Scans



# Power Consumption



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	Idle			Running		
	Mean	Min	Max	Mean	Min	Max
U [mV]	78,7	76	88	89,8	85,7	105,5
I [A]	1,124	1,086	1,257	1,283	1,224	1,507
P [W]	13,488	13,032	15,084	<b>15,396</b>	14,688	18,084

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# Genauigkeit

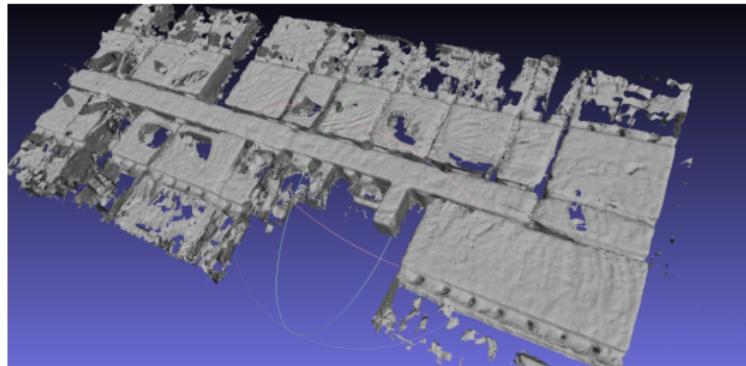
- 6. Stockwerk Wachsbleiche
- Distanz: 270 m
- Auflösung: 6,4 cm



→ Differenz: 7,5 cm

# Fazit

- Portables System
- Weiche Echtzeitfähigkeit
- Geringer Stromverbrauch
- Einfache Handhabung
- Einfache Analyse



# Ausblick

- Evaluierung mit anderer Sensorik
- Portierung auf Drohne
- Optimierung des Posegraphen (Loop Closing)
- Paper