

Projektgruppe FastSense

Abschlusspräsentation

11. März 2021

Zielsetzung

- Autonome echtzeitfähige Kartierung
- FPGA-basierte Hardwarebeschleunigung
- Einfaches, handliches System
- Anbindung an bestehende Systeme (LVR2)

MS1: Trail Detection

TODO

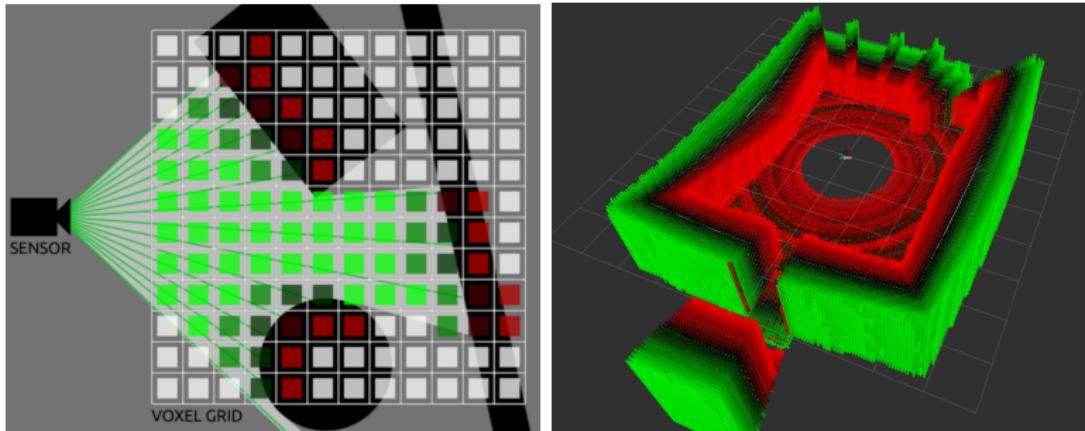
SLAM-Box

TODO

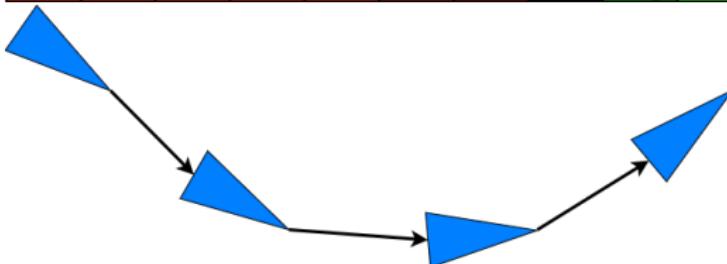
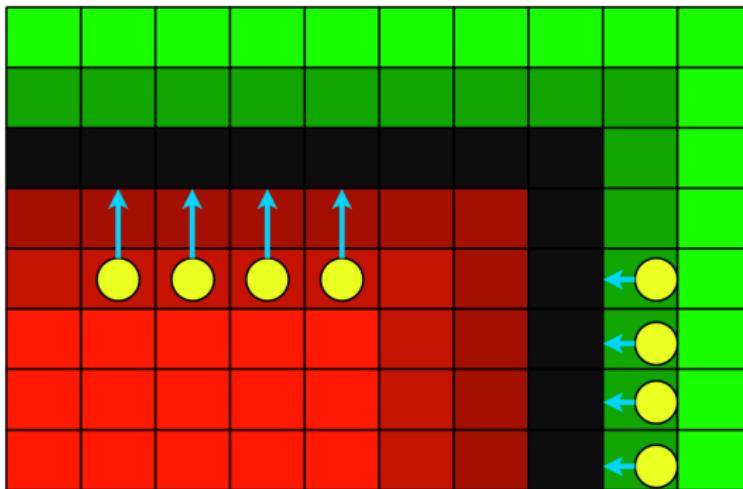
Vorgehen

TODO

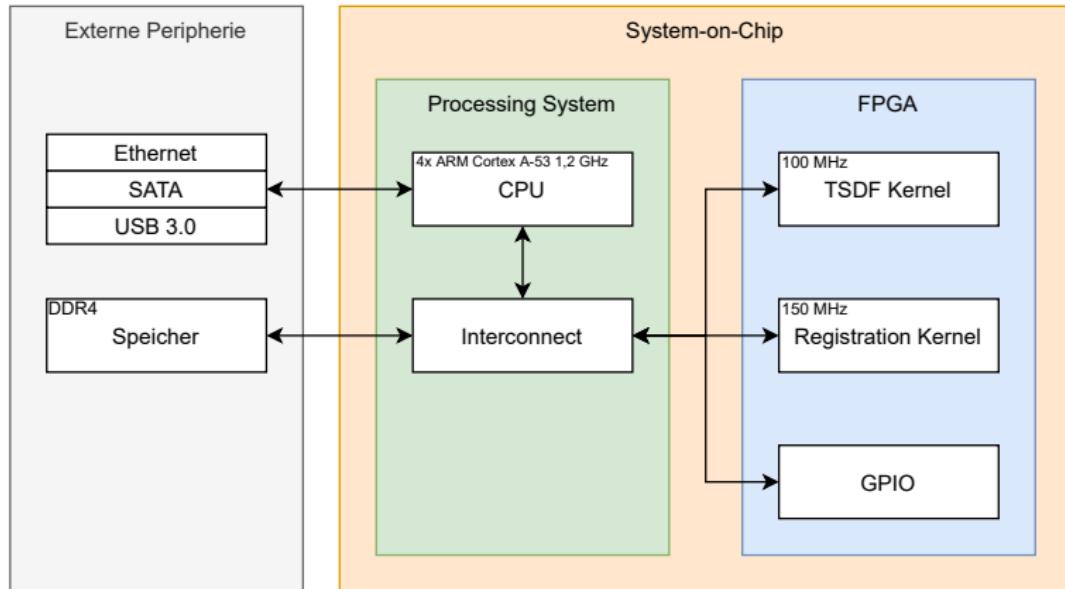
TSDF



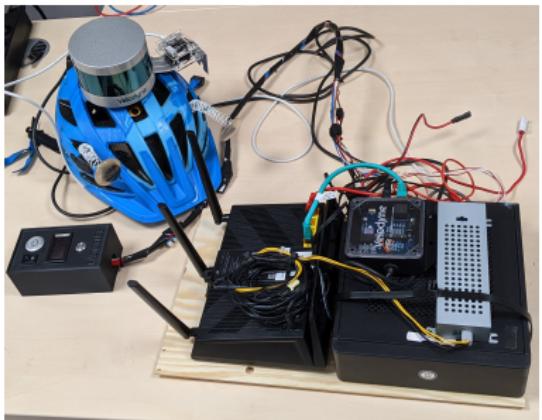
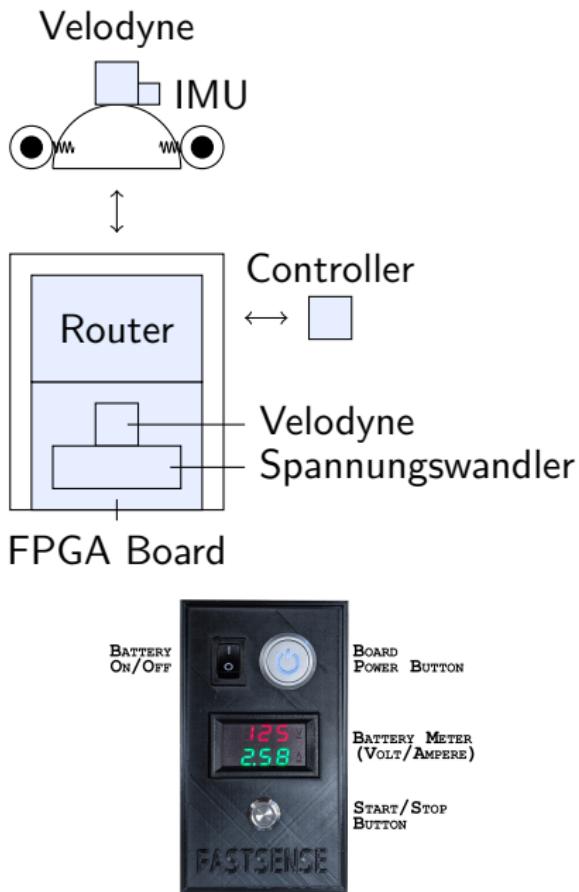
Point-to-TSDF Registrierung



Hardware Architektur

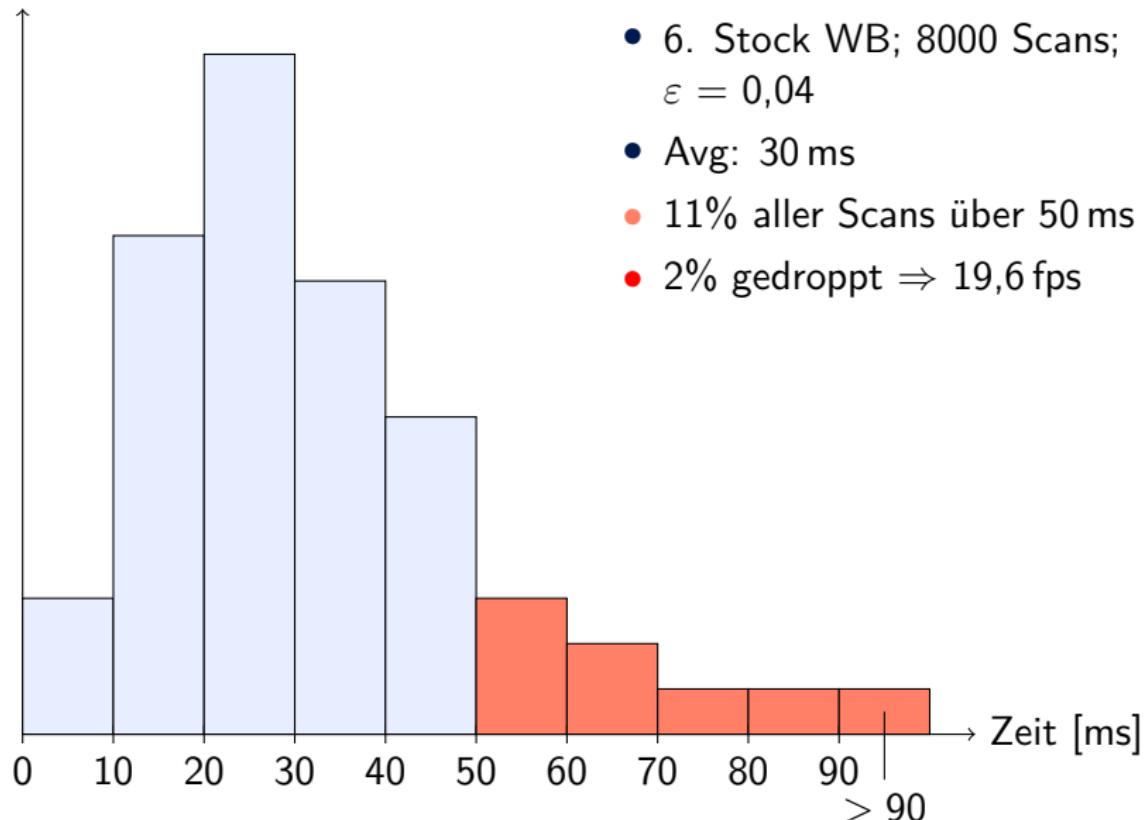


Aufbau



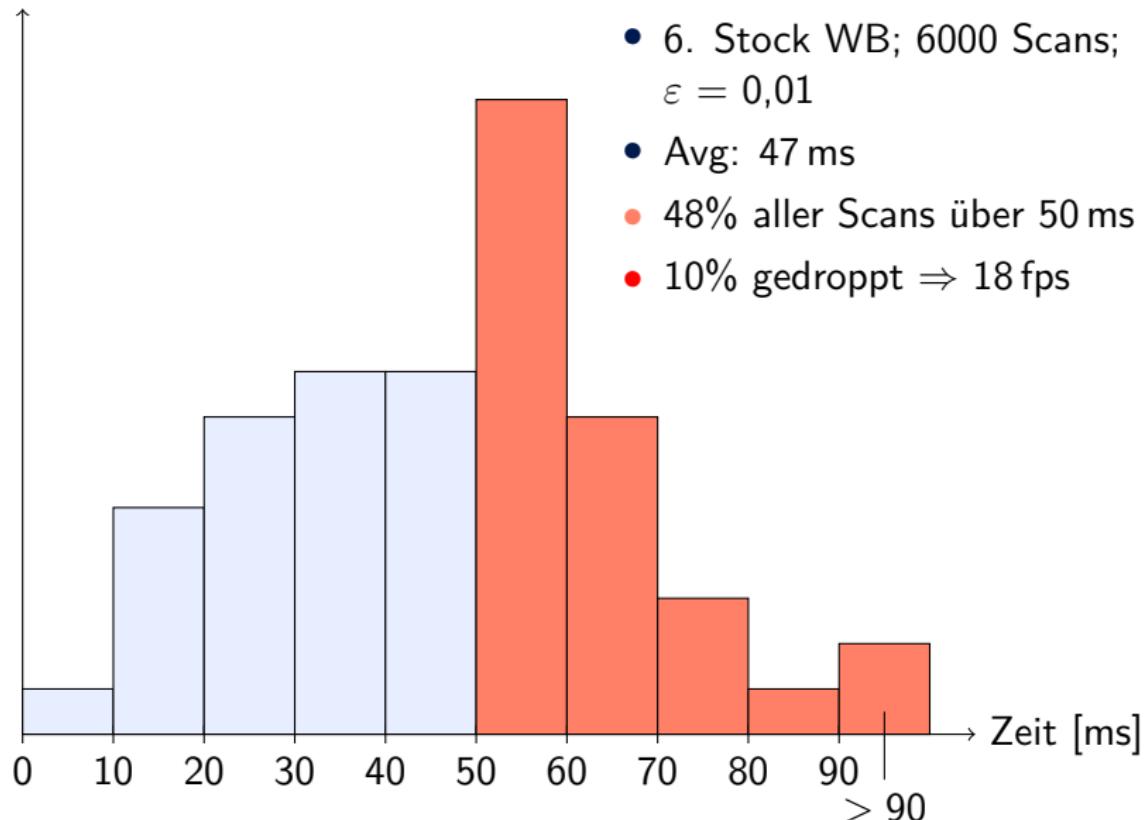
Evaluation: Zeit

Anzahl Scans

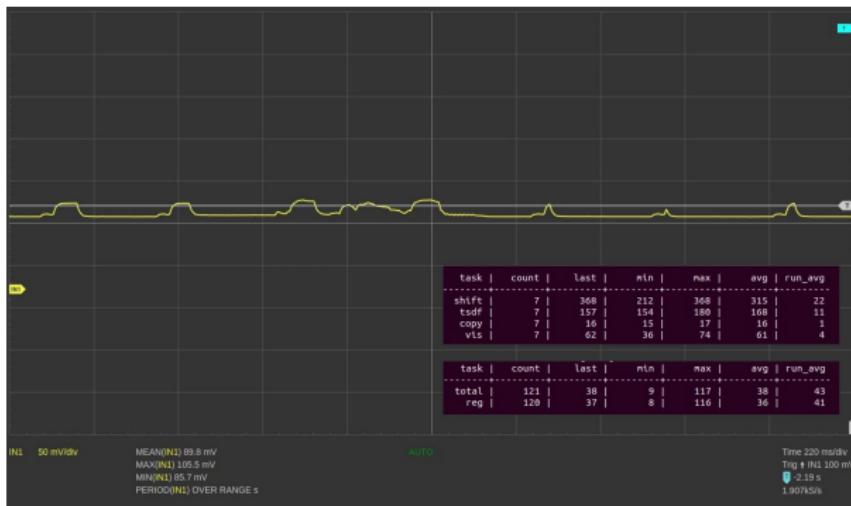


Evaluation: Zeit

Anzahl Scans



Evaluation: Power Consumption



| | 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 | 15,396 | 14,688 | 18,084 |

Evaluation: Genauigkeit

- 6. Stockwerk (Distanzabweichung in Meter)

| | | |
|---------------|---------|---------|
| ε | 0,01 | 0,04 |
| | | |
| 0,0615 | 0,0505 | |
| | | |
| Geschw. | langsam | schnell |
| | | |
| 0,0505 | 0,0437 | |
| | | |

- gesamt (langsam, $\varepsilon = 0,04$): 0,075349
- 8 Meter Labortest (Distanzabweichung in Meter)

| | hin | zurück | gesamt |
|---------|--------|--------|--------|
| langsam | 0,0548 | 0,0650 | 0,0861 |
| schnell | 0,1676 | 0,0459 | 0,1320 |

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