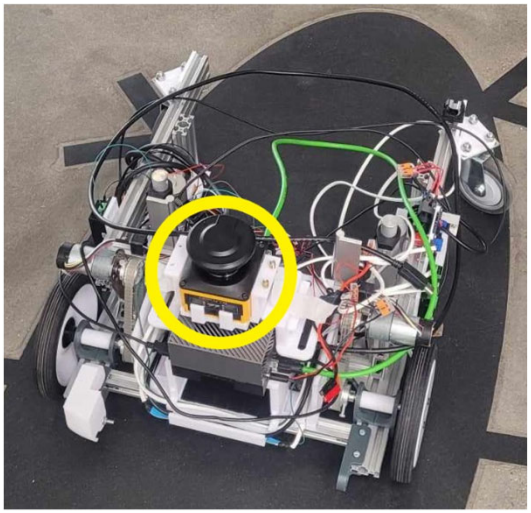
Laser Scanner & Navigation

SDU

Laser Scanner

- We tested different laser scanners at OUH
- Conclusion: Hokuyo UAM
  - Fewer “ghost points” caused by reflections
  - 1 protection and 2 warning zones
- Used for
  - Obstacle avoidance
  - Emergency stop



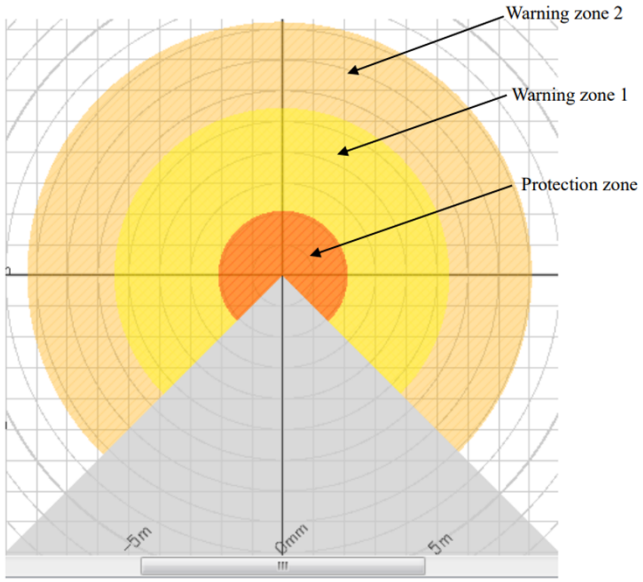


Figure 3-4 Scanning range

SDU

Mapping, Localization & Navigation

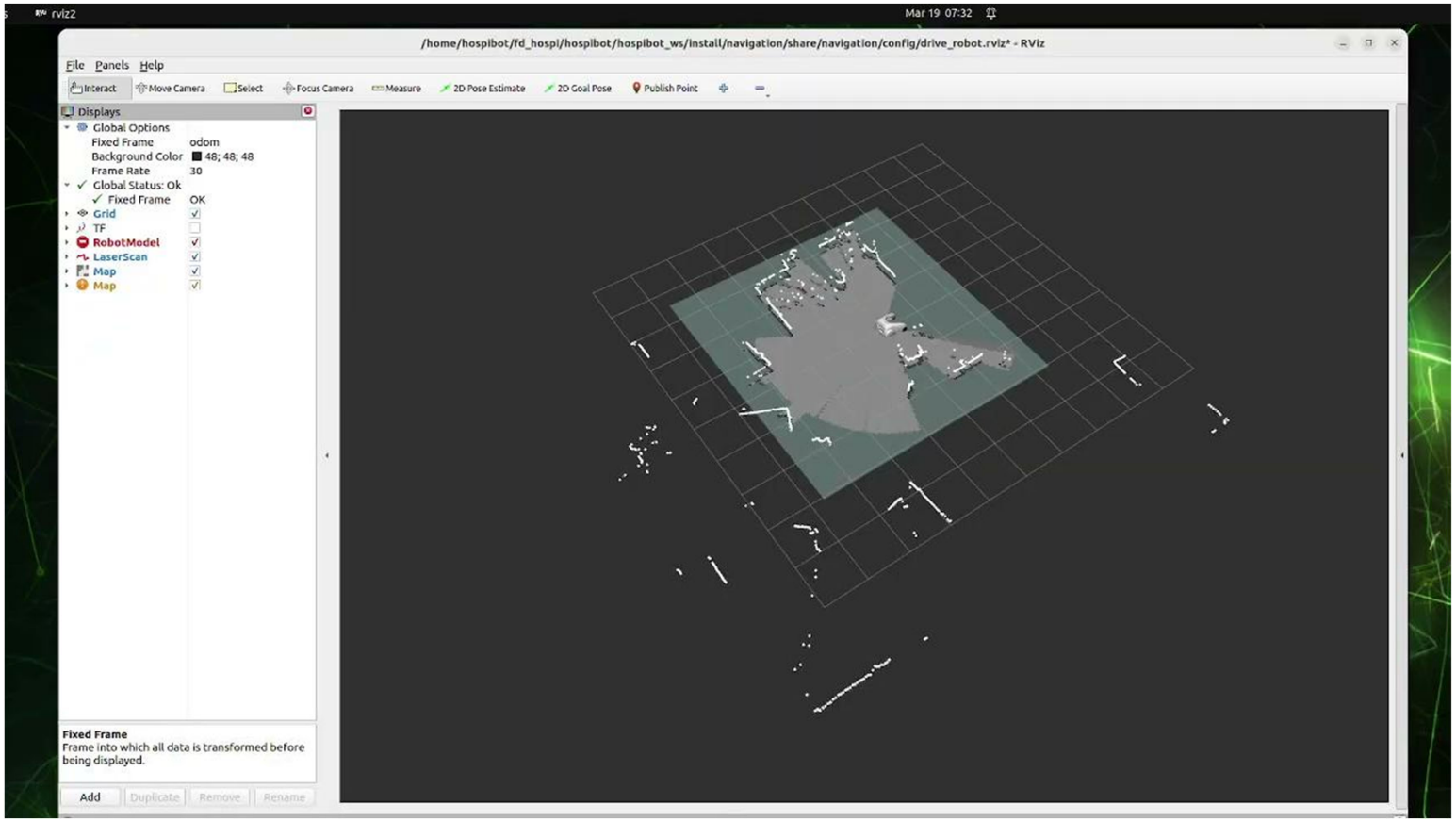
- Next goal: Localize and navigate autonomously

- Current status:
  - First attempts have been made, with some success, but it is not very reliable yet.
  - Sensor observations need to be optimized (combing wheel odometry & laser scan matching) to make localization reliable.

Mapping: ROS2 Cartographer
Localization: Nav2 AMCL
Navigation: Nav2

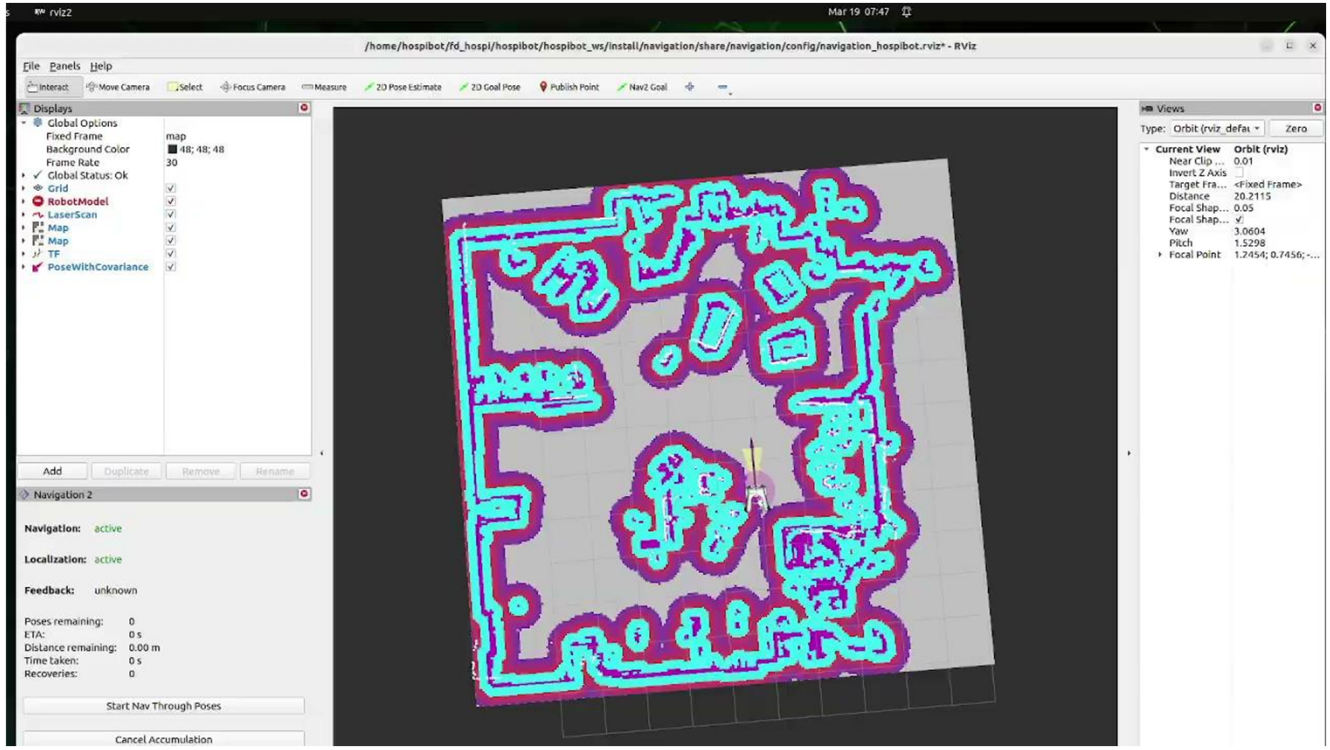
SDU

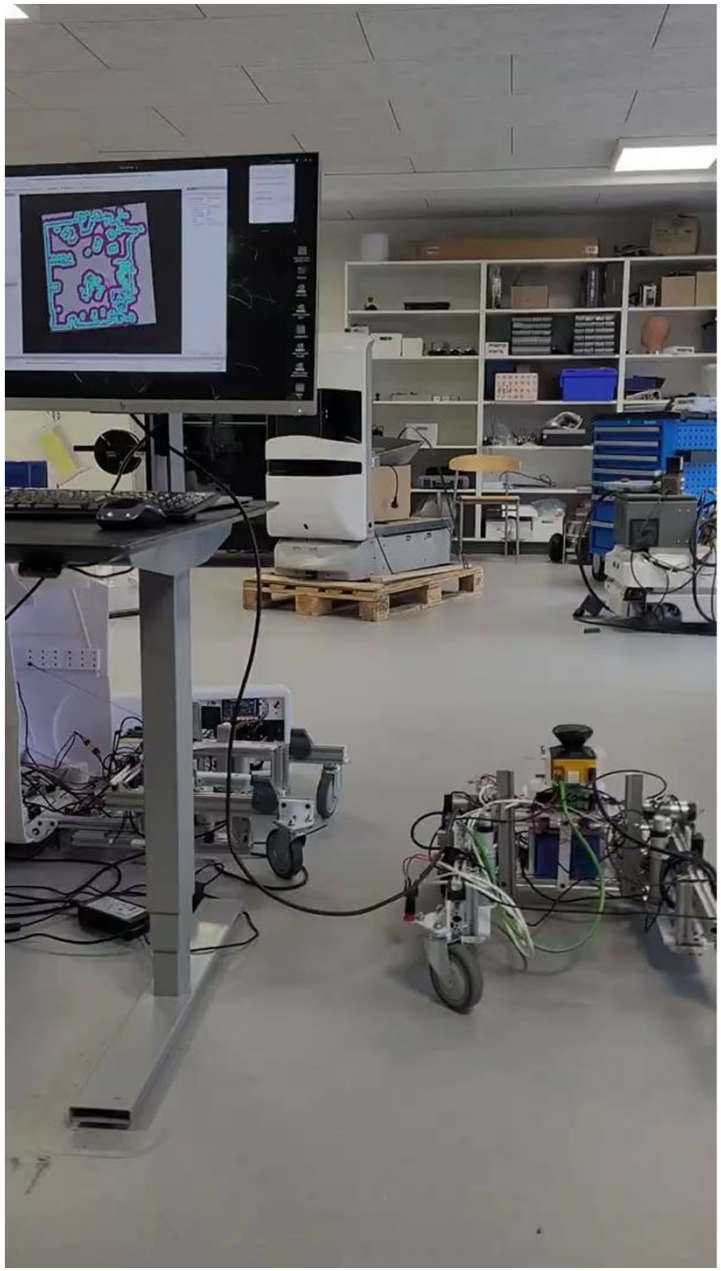
Mapping


rviz2
Mar 19 07:32
/home/hospibot/fd_hospi/hospibot/hospibot_ws/install/navigation/share/navigation/config/drive_robot.rviz* - RViz
File Panels Help
Interact
Move Camera
Select
Focus Camera
Measure
2D Pose Estimate
2D Goal Pose
Publish Point
Displays
Global Options
Fixed Frame odom
Background Color 48; 48; 48
Frame Rate 30
Global Status: Ok
Fixed Frame OK
Grid
TF
RobotModel
LaserScan
Map
Map
Fixed Frame
Frame into which all data is transformed before being displayed.
Add
Duplicate
Remove
Rename

SDU

Navigation





SDU

Localization Problems

SDU

UNIVERSITÄTSKLINIKUM
Schleswig-Holstein

HospiBot

TZL 3
Payload development for use cases

UNIVERSITÄTSKLINIKUM
Schleswig-Holstein

Brief recap from Payload Meeting (January 12th – online)

Options for payloads (application and partner input):

- Greeting, guiding, way-finding, info screens
- Small scale logistics
- Light cleaning
- Security patrolling
- helping patients with non-emergency tasks

UNIVERSITÄTSKLINIKUM
Schleswig-Holstein

Brief recap from Payload Meeting (January 12th – online)

Options for payloads (application and partner input):

- Greeting, guiding, way-finding, info screens → SDU / FHK
- *Small scale logistics*
- *Light cleaning*
- Security patrolling → UzL
- *Helping patients with non-emergency tasks*

Development of greeting & guiding payloads started (end in period 2)

Last use case still open and needs to be discussed (start in period 2)

UK SH UNIVERSITÄTSKLINIKUM Schleswig-Holstein

Timeline

- Period 1
  - Three use cases are chosen for implementation
  - Use case 1 implementation started
  - Use case 2 implementation started
- Period 2
  - Use case 1 implementation completed
  - Use case 2 implementation completed
  - Use case 3 implementation started
- Period 3
  - Use case 3 implementation completed
  - Final documentation of the three use cases completed
  - Two scientific publications about use cases
  - Fifteen social media posts

Security patrolling

- Ideas:
  - Patrolling at night, Audio/Video documentation, alarm function, call police
  - First line of detection, call human assistance in case of abnormalities
  - Patrolling of patients that are not supposed to leave the department – e.g. dementia patients from the geriatric department
  - Find unconscious persons and alarm help

- Cave:
  - GDPR (cameras seem to be allowed in DK but are not available in DE)

Rendering of potential robot (AI generated image by Oskar Palinko)

Data-saving / privacy sensor solutions

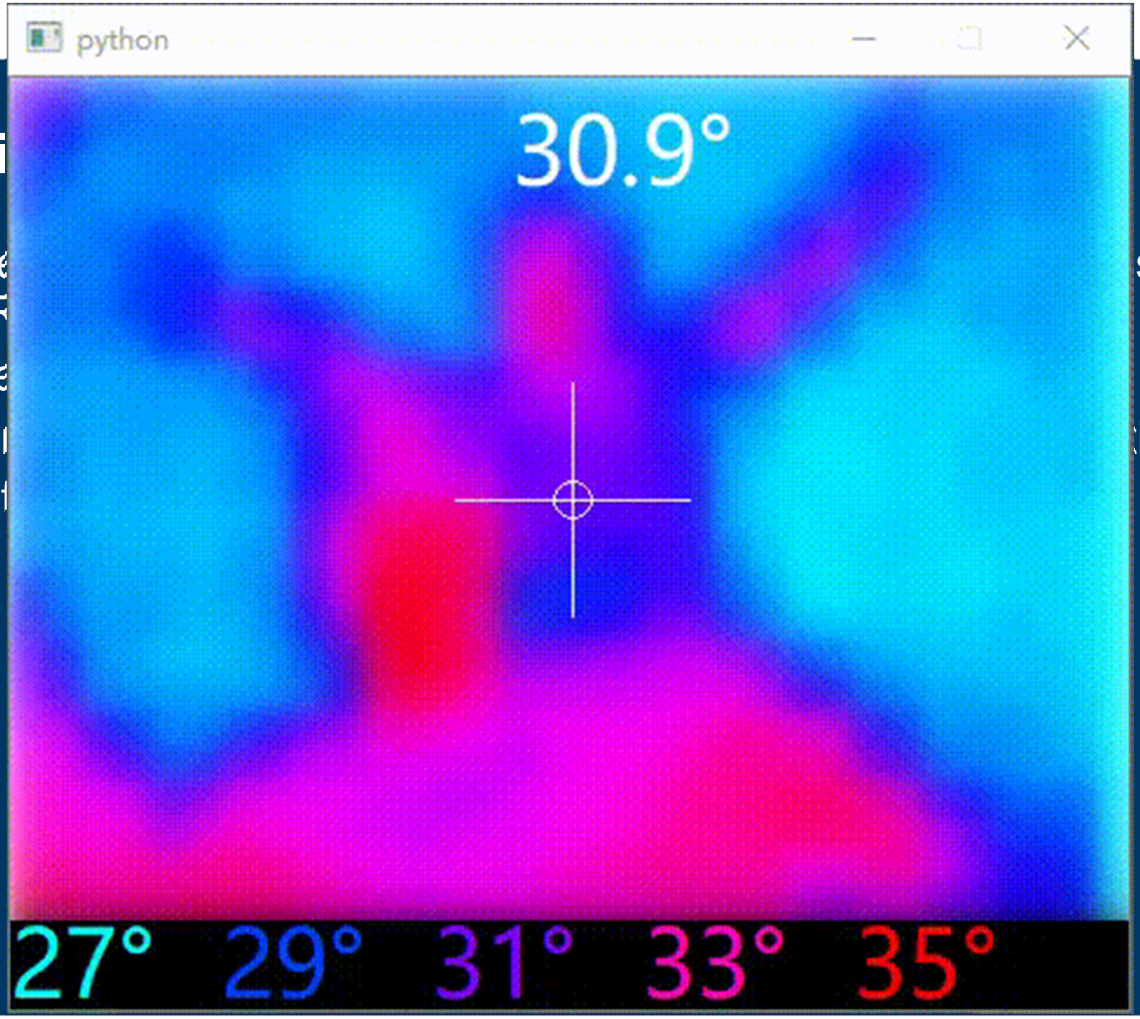
As Cameras might be problematic (depending on context or location), a sensor solution without immediate need for RGB-Images is to be implemented for the patrolling use case:

- **Infrared Camera (costly or low resolution)**
- 60GHz radar module (human presence detection, heartbeat, respiration)
- RGB-cameras (for testing)

Data-saving / pri

As Cameras might be sor solution without immediate need for R case:

- Infrared Came
- 60GHz radar ion)
- RGB-cameras (



UNIVERSITÄTSKLINIKUM
Schleswig-Holstein

Data-saving / privacy sensor solutions

As Cameras might be problematic (depending on context or location), a sensor solution without immediate need for RGB-Images is to be implemented for the patrolling use case:

- Infrared Camera (costly or low resolution)
- **60GHz radar module (human presence detection, heartbeat, respiration)**
- RGB-cameras (for testing)

Data-saving / privacy sensor solutions

As Cameras m solution without immediate nee e:

- Infrared
- 60GHz
- RGB-cam

UNIVERSITÄTSKLINIKUM
Schleswig-Holstein

Our status & next steps

- Hiring process for a scientific employee (finally) started
- Start of the development as soon as possible

- Requirement / specification workshop
  - Input from clinical partners
  - Input from policy development

UNIVERSITÄTSKLINIKUM
Schleswig-Holstein

Mange tak for opmærksomheden!

Robert Wendlandt

Klinik für Orthopädie und Unfallchirurgie
Universitätsklinikum Schleswig-Holstein, Campus Lübeck
Ratzeburger Allee 160 ▪ 23538 Lübeck
+49 451 500 41180
Robert.Wendlandt@uksh.de