TEAM BIGG-IRMI

Rescue Line



Front Camera Module

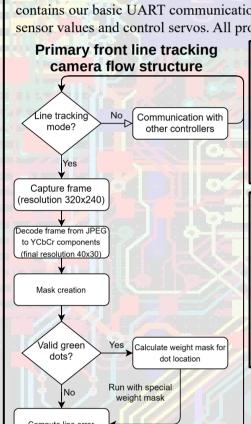


The front camera module comprises two ESP32S3 µCs. Each of these is connected to a 120/160° wide-angle OV2640 camera. The primary camera (right, 120°) is responsible for line tracking. The secondary camera (left, 160°) is responsible for the AI-based detection of the evacuation zone entrance.



Software

Our software consists of several elements, each running on a separate microcontroller. Each element contains our basic UART communication module and can therefore easily send motor commands, read sensor values and control servos. All programs are written in C++.

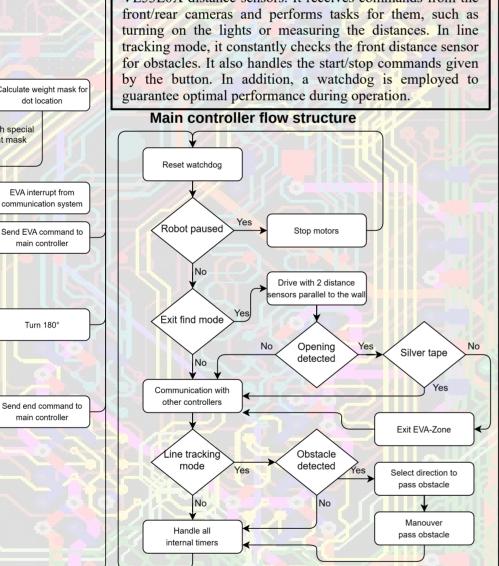


Line Tracking

The program operates using the primary front camera (camera #1), which contains a bespoke line tracking algorithm that has been developed from ground up. A variety of sophisticated techniques were employed to optimise runtime performance. These optimisations enable us to process approximately 20 FPS (30 ms capture, 29 ms decode, 800 µs line tracking)

Main Controller

It runs on the main controller board and is responsible for controlling the motors, the victim presence sensor and our 4 VL53L0X distance sensors. It receives commands from the



Main controllerboard

WS2812b addressable **LED** strip

MG90 metal geared

micro servo

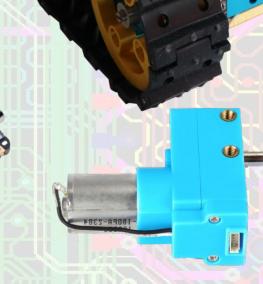


3x 12V Cooling fan



4x VL53L0X Time of flight distance sensor

camera uC



2x 12V Makeblock

12V 2200mAh Li-lon battery pack

3x OV2640 120/160° wide angle camera

Makeblock metal geared high torque Servo

Iren Biggel:

EVA-Zone

detected?

Dead end

End tile

Compute motor values

from error

- Born in 2008, Germany
- Team captain
- Embedded software development
- Project management
- Hardware design
- Testing

- Born in 2011, Germany
- Team member
- Mechanical CAD
- 3D manufacturing
- Testing

Mila Biggel:

- Video production

Achievements

2025 Qualification for European Championships achieved

- 2025 5th Place German Open Nürnberg
- 2025 2nd Place German Open Qualification Tournament
- 2024 7th Place European Championships Hannover
- 2024 1st Place German Open Qualification Tournament 2023 1st Place German Open Qualification Tournament
- 2022 2nd Place European Championship Portugal (Entry)



