

Sherbot Holmes – Autonomous Indoor Detective for severely limited tasks.

Sherbot Holmes

A project in IN5590 by Eivind Nordahl Andersen(eivindna@uio.no) and Eirik Møller Nilsen(eirikmni@uio.no)

1 Intro

Sherbot Holmes is a mobile animatronic robot designed to detect and approach predefined indoor objects using computer vision. The system is built around a Raspberry Pi 5 and a fine-tuned YOLOv11s model, enabling real-time object recognition and target following. The project combines robotics, perception, and expressive design to create an autonomous system that demonstrates some understanding and navigation in its environment.

▪ Early goals

- Find and approach a relevant target, such as an empty chair, a trash bin, or a specific lecture room sign (“Smalltalk” or “Simula”).
- Respond to user input either through voice commands (“Find the red chair”, “Show me the Simula room”) or through predefined physical buttons.
- The overall goal is to achieve robust, repeatable, and expressive behavior that feels intuitive and engaging during live demonstrations — focusing on the quality of perception–decision–motion integration rather than raw computational performance.

2 Tools

Important Components

- Raspberry Pi 5 + Camera Module 3
- 2x Dynamixel AX-12 + USB2DYNAMIXEL
- YOLOv11s (NCNN) + Python + OpenCV

Software highlights

Python-based control system using YOLOv11s and custom control logic. Optimization focused on fine-tuning the computer vision model on a custom dataset.

3 Conclusion

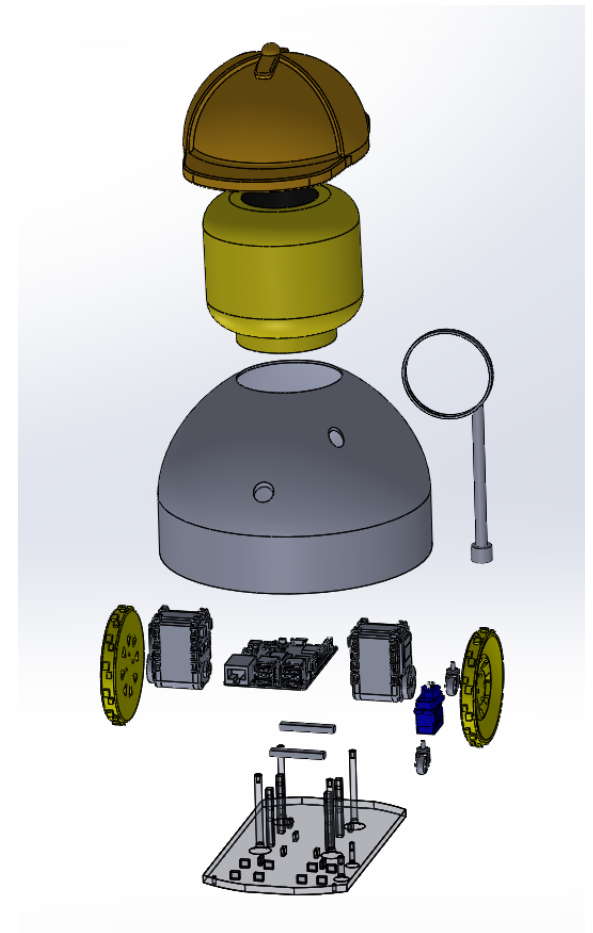
The robot achieved stable movement and visual object recognition, while interaction and control remained partially implemented. Voice control was developed but replaced by CLI input due to hardware limitations. Optimization focused on fine-tuning a YOLOv11s model for indoor object detection, enabling target following via selected classes. Performance was limited by a reality gap caused by low camera height, reducing accuracy for certain objects.

Future work includes improving low-angle perception, adding ultrasonic stopping, refining expressive feedback, and redesigning the chassis for better modularity and maintainability.

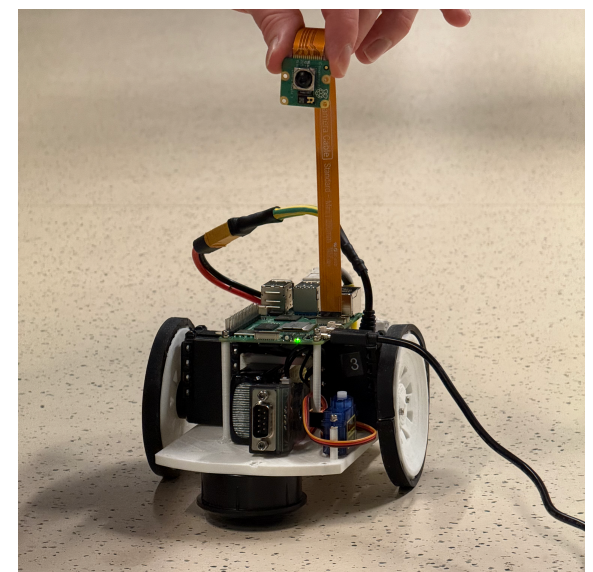


Initial assembled prototype.

Visual documentation



Exploded CAD view of Sherbot Holmes chassis.



Prototype during live testing and target tracking.



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GitHub repo →

