

WheezyBot

Animatronic Companion Robot

A project in IN5590 by Erik Masovn Haave & Andreas B. Nore
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1 Intro

WheezyBot is an expressive animatronic robot inspired by ElectronBot and Wheezy from Toy Story.

- Detects people using an onboard camera
- Reacts with smooth, expressive servo motions
- Plays short audio clips for personality

2 Tools

Hardware:

- Raspberry Pi 3B+
- Camera Module 3
- PCA9685 + 5× SG90 servos
- I²S amplifier + 3W speaker

Software:

- Python
- YOLO11n exported to NCNN
- Custom servo layer with time-based interpolation
- Full test suite using pytest

Optimization:

- Smooth servo motion via time-based interpolation and selective servo enabling
- Background pose interpolation thread for “alive” movement
- Modular motions/poses for reusable animation design
- Faster person detection using real-time NCNN inference

3 Software details

A simple state machine governs behavior:
Idle → *Detect* → *Track* → *React*
All components are modular:

- Custom servo driver with angle clamping
- Non-blocking motion system using threads
- Unified hardware/firmware/software structure

4 Conclusion

Goal completion: A fully working 3D-printed robot that detects people and responds with movement and sound.

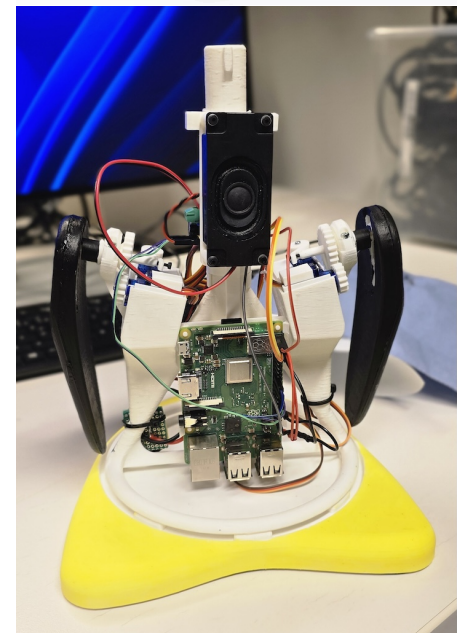
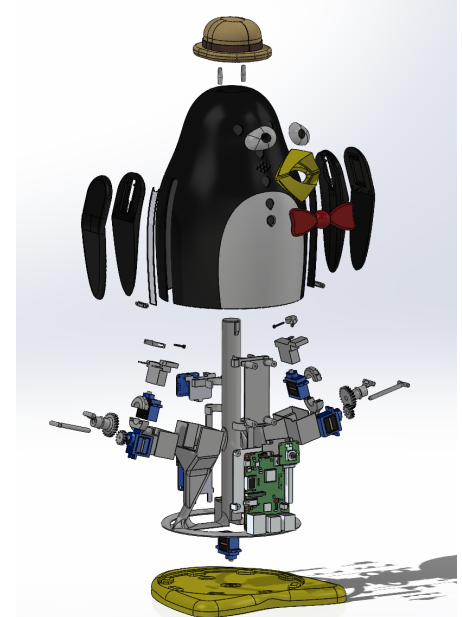
Performance: Real-time detection on the Pi, smooth servo motion, and reliable long-running behavior.

Future work: More expressive animations, richer audio responses and face-based reactions



Extra figures

Internal layout



- Custom wiring and mounting plates.
- Easy to service and expand.



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GitHub repo →

