

LIL SPIDEY

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1 Intro

Lil Spidey is an 8-legged robot designed to mimic arthropod gait using the **Klann linkage** mechanism.

Goals:

- Stable walking with complex linkages.
- Autonomous tracking with Face detection.
- Solving the “Reality Gap” (friction/drift).

2 Hardware & Software

- **Control:** Raspberry Pi 4
- **Motors:** 2x Dynamixel AX-12A
- **Vision:** Pi camera module 3 + **YuNet** (ONNX)

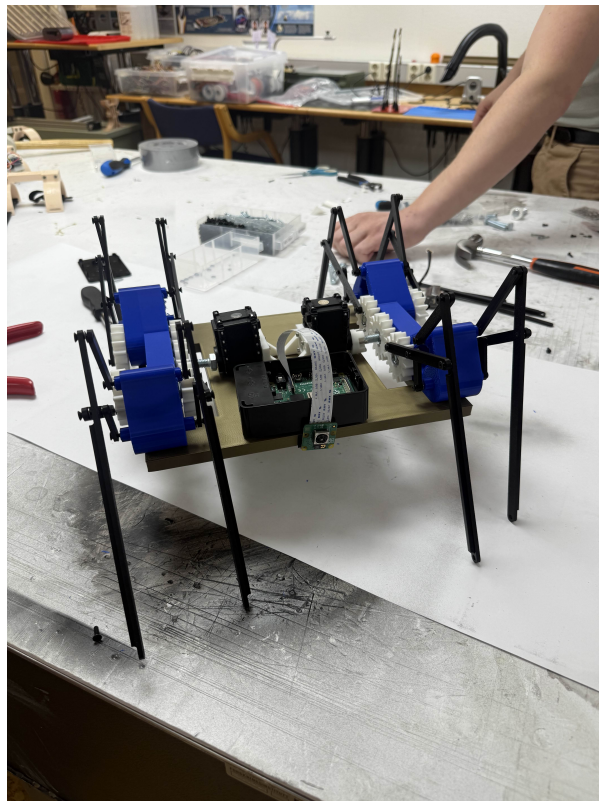
3 Optimization: The Reality Gap

Problem: Variable friction in the 3D-printed joints caused “Phase Drift”. In open-loop *Wheel Mode*, one side would lag, breaking gait synchronization.

Solution: Implemented `hard_phase_sync()`:

- Robot pauses periodically.
- Switches temporarily to *Position Control*.
- Resets legs to a calibrated “Home”.
- Resumes walking.

The Robot



4 Conclusion & Future Work

The prototype walks stably and tracks faces. The sync algorithm reduces drift caused by mechanical friction.

Future improvements:

- Test more leg lengths and stronger joints.
- Add more legs for stability.
- Upgrade to stronger Dynamixels or additional actuators.
- Increase power to compensate for mechanical losses.



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