Kilo (Shop Rover) — Project Memory (Live)

> **Scope:** Minimal, high-signal reference of paths, commands, and invariants. No app code. Use this as the starting point of every new chat.

Ground Truths

- **OS:** Debian **Trixie**
- **Runtime: viam-agent** (not viam-server)
- **Cloud machine:** `kilo-test-main.id4wy89fqq.viam.cloud`
- **Local UI (already installed):** http://localhost:7860 · systemd unit: `kilo-ui.service`
- **Active Viam config (no secrets):** `/etc/viam.json`
- **Local modules dir:** `/opt/viam/modules/`
- **Kilo venv:** `/opt/kilo/venv/`
- **Kilo scripts:** `/opt/kilo/bin/`
- **Docs & Ledger:** `/opt/kilo/docs/` (ledger: `PROJECT_LEDGER.md`, manual: `README.md`)
- **Maps (Cartographer):** `/opt/viam/maps/`

Hardware & Mappings

- **Cameras:** `front_cam` → `viam:luxonis:oak-d`; `rear_cam` → `rdk:builtin:webcam` @ `/dev/video0`
- **PCA9685 (I^{2}C-1):**
- `steering` pin **1**, 50 Hz, **500–2500 µs**
- `throttle` pin **0**, 50 Hz, **1000–2000 µs**
- lights pins **2–9** (head, bar, aux1, aux2, under, rear, left, right)
- **Base:** `drive` = `viam-labs:base:ackermann-pwm-base`
- attrs: `wheelbase_mm: 313`, `turning_radius_meters: 0.8`, `max_speed_meters_per_second: 2.5`
- maps: `steer → steering`, `drive → throttle`

Services (present)

`apriltag`, `obstacles` (distance), `motion`, `navigation`, `slam` (cartographer), `speech` (speechio), `safety` (generic)

Networking & Address (Loopback to Agent)

```
# Detect viam-agent TCP port and export robot address
PORT="$(ss -lntp | awk '/viam-agent/ && $1 ~ /LISTEN/ {print $4}' | sed 's/.*://;q')"
```

```
export KILO_ROBOT_ADDR="127.0.0.1:${PORT}"
echo "$KILO_ROBOT_ADDR"  # blank? -> restart agent then re-run
```

Critical Commands

```
# Agent
systemctl status viam-agent --no-pager -l
sudo systemctl restart viam-agent
journalctl -u viam-agent -n 200 --no-pager

# Preflight & ESC calibration (requires agent addr)
PORT="$(ss -lntp | awk '/viam-agent/ && $1 ~ /LISTEN/ {print $4}' | sed
's/.*://;q')"; export KILO_ROBOT_ADDR="127.0.0.1:${PORT}"
/opt/kilo/bin/kilo_preflight.sh
esc-cal --addr "$KILO_ROBOT_ADDR" --insecure

# Local module sanity
ls -l /opt/viam/modules/ackermann-pwm-base/ackermann
```

OAK-D Lite IMU (BMI270) — Movement Sensor

Goal: Replace fake `oak_imu` with real DepthAI IMU. - Module paths: `/opt/viam/modules/oak-imu/oak_imu_module.py`, launcher: `/opt/viam/modules/oak-imu/oak_imu` - Model ID: `kilo:movement_sensor:oak-bmi270` - Install deps:

```
/opt/kilo/venv/bin/pip install --upgrade depthai viam-sdk
```

- Config entries (in `/etc/viam.json`): add local module + component named `oak_imu` with model above; set `frequency_hz: 100`. Wire to SLAM if desired.

Cartographer — Map lifecycle

- Maps dir: `/opt/viam/maps/`
- Save state → use the UI **Save SLAM Map** button (writes `tag.pbstream` to maps dir).
- Localize-only: set in `slam` service: `enable_mapping: false`, `existing_map: /opt/viam/maps/<tag>.pbstream`.

Wander

```
kilo-wander start     # logs → /var/log/kilo-wander.log
kilo-wander stop
```

GitHub (Repo: `theholybull/kilo`) — Minimal, Safe

Remote (SSH): `git@github.com:theholybull/kilo.git` · **Branch:** `main` · **Snapshot dir:** `/home/kilo/kilo-github`

Safe snapshot push (excludes secrets; preserves originals):

```
sudo bash -lc '
set -euo pipefail
REPO_DIR="/home/kilo/kilo-github"; REMOTE="git@github.com:theholybull/kilo.git"; BRANCH="main"
mkdir -p "$REPO_DIR" && cd "$REPO_DIR"; git init -b "$BRANCH" 2>/dev/null || true
(git remote get-url origin >/dev/null 2>&1 && git remote set-url origin "$REMOTE") || git remote add origin "$REMOTE"
mkdir -p home/kilo opt/kilo etc/systemd/system opt/viam/modules var/log
rsync -a --delete --prune-empty-dirs --exclude ".git/" --exclude "__pycache__/"
  --exclude ".cache/" --exclude ".ssh/" --exclude ".gnupg/"
  --exclude "*.env" --exclude "*token*" --exclude "*secret*"
  --exclude ".local/share/keyrings/" /home/kilo/ home/kilo/
rsync -a --delete --prune-empty-dirs --exclude ".git/" --exclude "__pycache__/"
  --exclude "*.env" --exclude "*token*" --exclude "*secret*" /opt/kilo/ opt/kilo/
for f in /etc/systemd/system/kilo-*.service; do [ -f "$f" ] && install -m 644 "$f" etc/systemd/system/; done
[ -d /opt/viam/modules ] && rsync -a --delete --exclude ".git/" /opt/viam/modules/ opt/viam/modules/
for f in /var/log/kilo*.log /var/log/kilo-*.log; do [ -f "$f" ] && (mkdir -p var/log; tail -n 1000 "$f" > "var/log/${f#/var/log/}"); done
( hostnamectl 2>/dev/null || uname -a ) > .HOSTINFO || true; date -Iseconds > .SNAPSHOT_TIMESTAMP
git add -A; (git diff --staged --quiet || git commit -m "sync(safe): $(date -Iseconds) $(hostname)")
git push -u origin "$BRANCH" || true'
```

Safe update from repo (no deletes; keeps secrets):

```
sudo bash -lc '
set -euo pipefail
REPO_DIR="/home/kilo/kilo-github"; REMOTE="git@github.com:theholybull/kilo.git"; BRANCH="main"
```

```
[ -d "$REPO_DIR/.git" ] || { mkdir -p "$REPO_DIR"; cd "$REPO_DIR"; git init -b "$BRANCH"; git remote add origin "$REMOTE"; }
cd "$REPO_DIR"; git fetch origin; git checkout -B "$BRANCH" "origin/$BRANCH" || true
rsync -a --exclude ".ssh/" --exclude ".gnupg/" --exclude ".cache/" --exclude "*.env" --exclude "*token*" --exclude "*secret*"
  --exclude ".local/share/keyrings/" "$REPO_DIR/home/kilo/" "/home/kilo/" || true
rsync -a --exclude "*.env" --exclude "*token*" --exclude "*secret*" "$REPO_DIR/opt/kilo/" "/opt/kilo/" || true
[ -d "$REPO_DIR/etc/systemd/system" ] && rsync -a "$REPO_DIR/etc/systemd/system/" "/etc/systemd/system/" && systemctl daemon-reload || true
echo "[OK] Updated local files from Git (safe)"'
```

Do-Not-Change List

- `wheelbase_mm: 313` · `turning_radius_meters: 0.8` · `max_speed_meters_per_second: 2.5`
- Steering PWM: **500–2500 µs**; Throttle PWM: **1000–2000 µs**
- `drive` maps: `steer → steering`, `drive → throttle`
- No `processes` section in `/etc/viam.json` (deprecated)

Open Items / Next Up

- IMU: confirm `oak_imu` values live at ~100 Hz and feed into SLAM
- Map lifecycle: record → save `.pbstream` → localize-only → small goal tests
- Wander tuning: speed caps + turn behavior with `obstacles-distance`

How to Use This Memory

- Start new chats with: **“Use the *Kilo Project Memory — 2025-10-24* canvas as context.”**
- Keep this page open while working. Update it only with paths/commands/invariants.