PASHUPATI

User Manual

Patrol and inspection with the ZSBot Genisom L1W and the Pashupati Controller

Version 1.6 · 2026-11-15

For operators of a Genisom L1W running Pashupati. No robotics knowledge needed.

Revision history

Version	Date	Changes
1.0	2026-10-16	First version: Pashupati with Pashupati Controller 2.6
1.1	2026-11-01	Time synchronisation for the technician
1.2	2026-11-14	Trip meter on the main screen (Pashupati Controller 2.7)
1.3	2026-11-14	The camera sees low obstacles ahead
1.4	2026-11-15	The robot walks over what is lower than about 12 cm and passes gaps from about 0.7 m
1.5	2026-11-15	The status screen for your technician; menuconfig for the technician
1.6	2026-11-15	The robot backs up when it is stuck; the robot's internet on the handheld

The robot's own hardware (battery, charging, power switch, the ZSBot remote) is described in the ZSBot Genisom L1W manual. This manual covers what Pashupati adds: driving from the Pashupati Controller, teaching routes, patrols, and AI inspection. Parameters and tuning are in the Pashupati Tuning Guide.

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1 Safety first

The Genisom L1W is a strong, fast machine with legs and wheels. It weighs as much as a large dog and can hurt people or break things when it is handled carelessly. Read this chapter before you use the robot for the first time.

1.1 Before every run

- Walk the route. The floor must be dry, even and free of loose cables.
- Keep routes away from places where the floor ends: stairs going down, escalator openings, platform edges, holes. **The robot does not see drops.**
- Glass walls, mirrors and very thin objects can be invisible to the robot's laser scanner (LiDAR). Low objects in front of the robot, such as a box or a bag, are seen by the camera: keep its window clean. Objects lower than about 12 cm, such as a 10 cm step, a cable taped to the floor or a flat bag, are not treated as obstacles: the robot walks over them. Keep what it must not step on off the route.
- Charge the robot battery and the handheld. Start a patrol with at least 30 % battery.
- Keep the ZSBot remote nearby as a backup. It can take control of the robot at any time.

1.2 While the robot moves

- Stay at least 1 m away from a moving robot. Keep children and pets away from it.
- Never touch the legs or wheels while the robot is standing, and never lift or push it then.
- **In REMOTE (driving by hand) you are responsible for every movement.** The robot does not slow down for obstacles when you drive it.
- In AUTO the robot slows down and stops for obstacles in any direction. Still, stay close enough to stop it, and keep the handheld in your hand.

1.3 Emergency stop

IF ANYTHING GOES WRONG, PRESS STOP

The red **STOP** button on the main screen, or the B button on any page of the app, stops the robot at once. The robot then stands still and ignores every movement command until you release the stop.

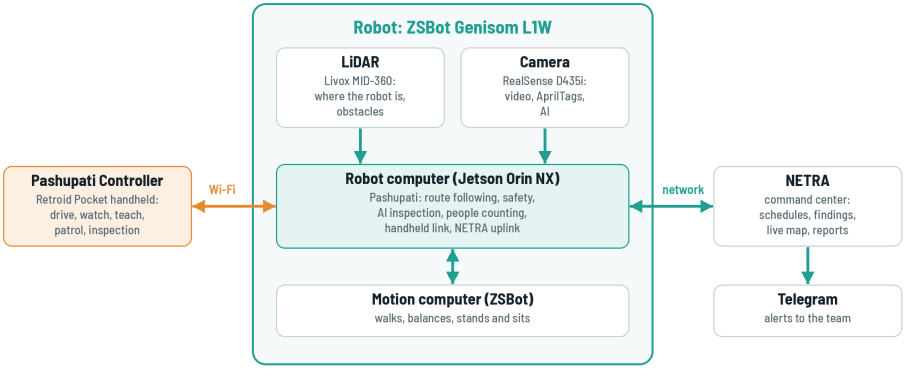
- To release the stop, hold **Hold to release** for one second. A patrol stays paused after a release: tap **Resume** when it is safe.
- **Motor stop** in the robot actions is the robot's own emergency stop. Use it only if STOP does not hold the robot. The ZSBot manual describes what the robot does then.
- NETRA (the command center) can also stop the robot from the office.

2 The system at a glance

2.1 What Pashupati does

Pashupati is the software that turns the Genisom L1W into a patrol robot. You drive a route once while the robot learns it. From then on the robot walks that route on its own, again and again. It stops at the points you marked, looks at the floor with a camera and an AI model, and reports what it finds, such as trash or a spill, to the handheld and to NETRA. Along the way it counts the people it sees and keeps clear of people and obstacles.

2.2 The parts

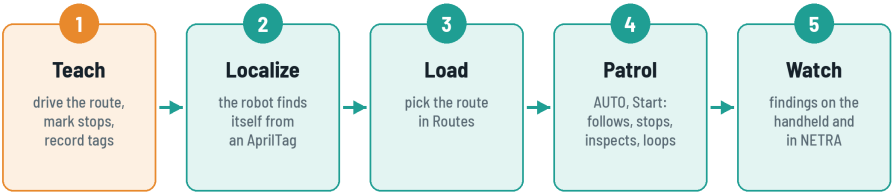


The parts of the system and how they talk to each other

Part	What it is
Genisom L1W	the robot: walks and rolls on four legs with wheels
Robot computer	an NVIDIA Jetson on the robot that runs Pashupati
LiDAR	the laser scanner on top: tells the robot where it is and what is around it
Camera	Intel RealSense: video for you, AprilTags, the AI inspection, and low obstacles in front
Pashupati Controller	the app on the Retroid Pocket handheld you hold

Part	What it is
NETRA	the command center in the office: schedules, findings, reports

2.3 How a patrol works



Teach once, then patrol

2.4 Words you will see

Word	Meaning
AUTO	the robot drives itself along the loaded route
REMOTE	you drive the robot with the handheld's sticks
Route	a path you recorded once; the robot repeats it
Stop point	a place on the route where the robot stops and inspects
AprilTag	a printed black-and-white square on a wall; the robot uses it to know where it is
Localize	the robot works out where it is on the map, usually from an AprilTag
Inspection	the AI looks at the floor in the camera image
Finding	something the AI reported, for example *Trash*
E-stop	the emergency stop (STOP button)

3 Getting ready

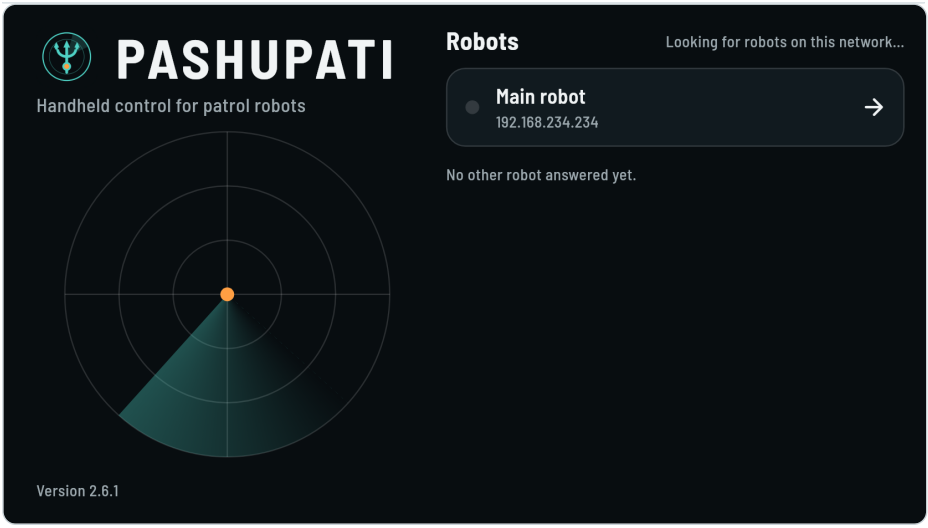
3.1 Power on

1. Insert a charged battery and switch the robot on, as described in the ZSBot manual. The robot stays down while it starts.
2. Wait about two minutes. The robot computer starts Pashupati by itself.

> **NOTE**
> Right after power-on the robot computer waits up to one minute for its clock to be set over the network. Give it that time before you start a patrol.

3.2 Connect the handheld

1. Switch on the Retroid Pocket and connect it to the robot's Wi-Fi network. Your technician tells you its name and password.
2. Open the **Pashupati** app. The start screen looks for robots on the network.
3. Tap **Main robot**, or the robot's name in the list once it is found.
4. The main screen opens (chapter 4).



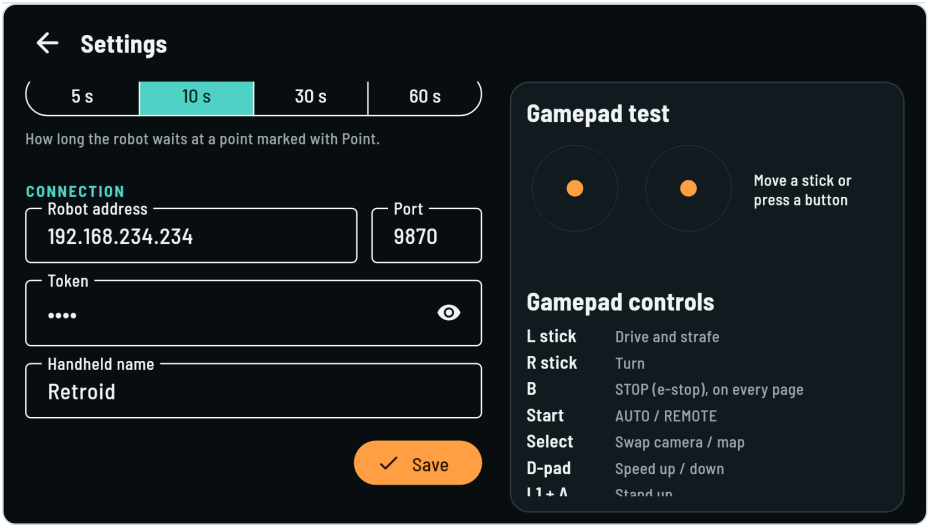
The start screen

The app says	What to do
The robot does not answer	check that the handheld is on the robot's Wi-Fi; wait until two minutes after power-on; check the robot address (next section)
The robot rejected the token	the token in the app differs from the robot's: see the next section
Another handheld is driving this robot	close the app on the other handheld

3.3 First-time setup

You only do this once per handheld, or when your technician gives you new details.

1. On the start screen, tap the version text at the bottom left three times quickly.
2. Enter the **Robot address** (`192.168.234.234` unless your technician says otherwise), the **Port** (`9870`) and the **Token**.
3. Give the handheld a name, for example *Retroid Security 1*, so others can see who drives.
4. Tap **Save**, then go back.



Connection settings, opened by tapping the version three times

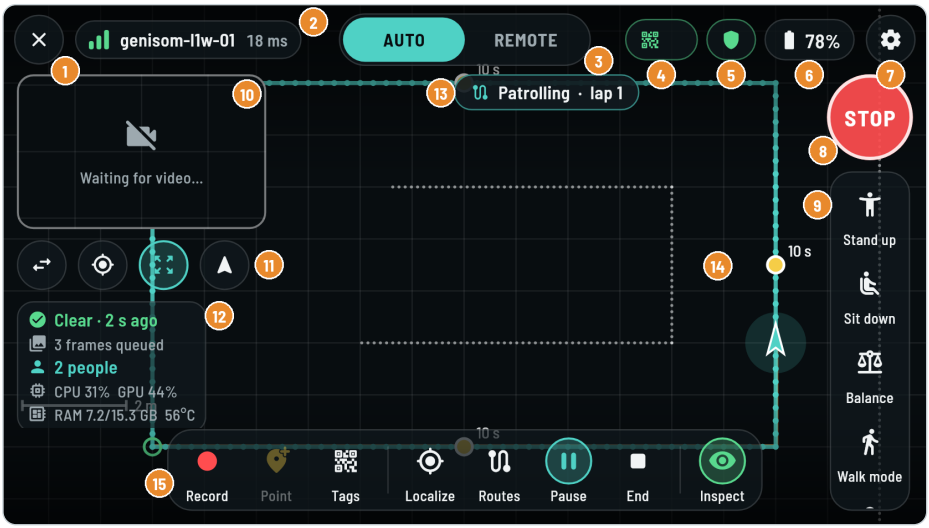
3.4 Stand the robot up

1. Make sure there is at least 1 m of free space around the robot.
2. Tap **Stand up** in the robot actions on the right, or hold L1 and press A.
3. Wait until the robot stands still.

> **THE ROBOT IGNORES THE HANDHELD**
>
> After someone used the ZSBot remote, the robot may listen only to that remote. Tap **Take control** in the robot actions to give control back to the handheld.

4 The Pashupati Controller

4.1 The main screen



The main screen during a patrol

	Part	What it shows or does
1	Disconnect	leaves the robot and goes back to the start screen
2	Link	robot name, signal bars and delay; red when the Wi-Fi link is weak
3	AUTO / REMOTE	who drives: the robot (AUTO) or you (REMOTE)
4	Localization	how the robot knows where it is: *Tag*, *Start pose*, *Pose*, or *No loc* in red
5	Protective field	green shield: path clear; yellow: slowed for an obstacle; red: blocked or no scan
6	Battery	robot battery level
7	Settings	speed level, video, language and more (section 4.4)
8	STOP	the emergency stop (section 1.3)

	Part	What it shows or does
9	Robot actions	stand up, sit down, balance, walk mode, gears, take control, motor stop
10	Small view	the camera or the map; tap it to swap the two views
11	View buttons	swap views, follow the robot, show the whole route, turn the map with the robot
12	At a glance	last AI result, frames waiting, people in view, the robot computer's load; the trip meter under it (section 4.5)
13	Patrol status	what the robot is doing now (section 7.5)
14	Map	the route in teal, stop points in yellow, the robot as an arrow
15	Toolbar	teach (Record, Point, Tags), patrol (Localize, Routes, Start, End), Inspect

The map can be moved with your fingers: pinch to zoom, drag to look around, twist with two fingers to turn it. Double-tap to follow the robot again.

4.2 Status chips

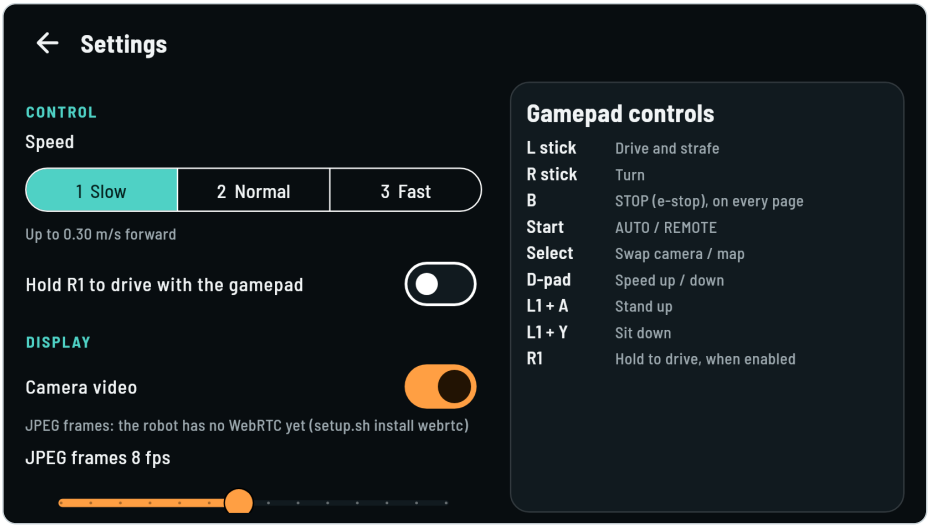
Chip	Shows	Means
Localization	*Tag base_map*	the robot found itself from that AprilTag
	Start pose	the robot uses its start position as the map origin
	Pose	someone set the position by hand on a computer
	No loc (red)	the robot does not know where it is: tap **Localize**
Protective field	*Path clear*	nothing in the way
	Slowed	the robot slows down for something near its path
	Blocked	something is too close: the robot holds still
	No scan	the laser scanner is not reporting: the robot will not drive itself
Health	*Needs attention*	something is wrong on the robot: tell your technician

4.3 Gamepad buttons

Button	Action
Left stick	drive forward, back and sideways (REMOTE)
Right stick	turn (REMOTE)
B	STOP, on every page
Start	switch AUTO / REMOTE
Select	swap camera and map
D-pad up / down	speed level up / down
L1 + A	stand up
L1 + Y	sit down
R1 (held)	drive, only when *Hold R1 to drive* is on in the settings

4.4 Settings

Tap the gear at the top right. Changes apply at once.



Settings, with the gamepad buttons on the right

Setting	What it changes
Speed	1 Slow, 2 Normal, 3 Fast: 30, 60 or 100 % of the robot's top speed when you drive
Hold R1 to drive	the sticks only drive while **R1** is held (a dead-man switch)
Camera video	video from the robot camera on or off
Lidar points on the map	shows the walls and objects the scanner sees
Robot CPU, GPU and RAM on screen	the load lines in the *At a glance* panel
Distance and speed on screen	the trip meter under the *At a glance* panel (section 4.5)
Language	English or Indonesian
Inspection at a stop point	how long the robot waits at a point you mark with **Point**

4.5 Trip meter

Under the *At a glance* panel the trip meter shows how far the robot walked since it was last reset and for how long it was moving, its speed now, its average speed while moving and its top speed. The robot counts by itself, also while no handheld is connected, and keeps the numbers when it restarts. To start again from zero, hold the trip meter for a second. Turn it off with *Distance and speed on screen* in the settings.

Line	Example	Means
Distance	*1.24 km · moving 52:10*	walked since the last reset, and the time spent walking
Now	*Now 0.38 m/s*	the speed over the last second
Average	*Avg 0.36 · top 0.52 m/s*	the average while walking, and the top speed

5 Driving by hand (REMOTE)

1. Make sure the robot stands and the area around it is clear.
2. Tap **REMOTE** at the top, or press Start.
3. Drive with the left stick (forward, back, sideways) and turn with the right stick.
4. Change the speed level with the D-pad, up for faster and down for slower.
5. To hand the robot back to the patrol, tap **AUTO** or press Start again.

WARNING

In REMOTE the robot does **not** slow down for obstacles. It goes exactly where you steer it. Drive slowly near people and start with speed level 1.

NOTE

In AUTO the sticks do nothing. The app reminds you: *AUTO mode: switch to REMOTE to drive.*

6 Teaching a route

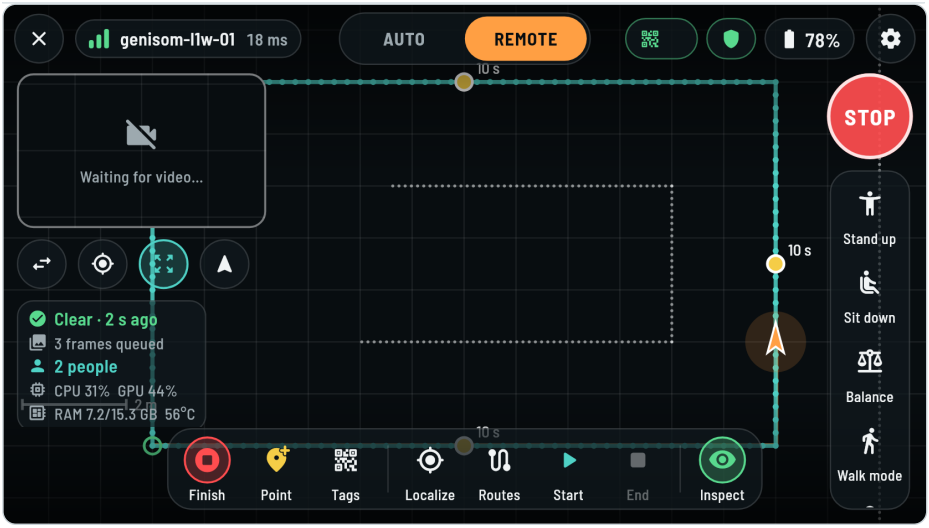
6.1 Plan the route

- Walk the route first and decide where the robot should stop and inspect.
- For a patrol that repeats on its own, end the route within 1 m of where it started. The robot then loops it.
- Fix AprilTags on walls along the route, at about the camera's height, and note their places. Your technician sets which tag numbers the robot uses.
- Avoid passages narrower than about 1.2 m (the robot fits through about 0.7 m, but has no room there to pass obstacles), glass walls, and every drop (section 1.1).

6.2 Record the route

A route belongs to a **site**: the map of one place with its AprilTags and its routes. Your technician creates the site once by starting the robot in teach mode and driving it through the place; after that, routes are recorded on it at any time. The robot records only while it knows where it is (localized).

1. Stand the robot at the start of the route and switch to **REMOTE**.
2. Tap **Record**. The app shows *Recording a route* and the button changes to **Finish**.
3. Drive the route slowly and smoothly. The robot remembers its path.
4. At each place where it should inspect, stop and tap **Point**. The app shows *Stop point, inspect 10 s* (the time comes from the settings).
5. At the end of the route, tap **Finish**. The app shows *Route saved*. The route is also sent to NETRA.



Teaching: Finish ends the recording, Point marks a stop

> **TIP**
>
> Do not worry about small wobbles while driving. The robot smooths the route by itself, and stop points always stay exactly where you marked them.

6.3 Record the AprilTags

Do this in the same session as the route, so the tags and the route share one map.

1. Drive the robot to where its camera sees an AprilTag well, about 1 to 2 m from it.
2. Hold still and tap **Tags**. The app shows *Tags recorded*.
3. Repeat for every tag along the route.

7 Running a patrol (AUTO)

7.1 Localize

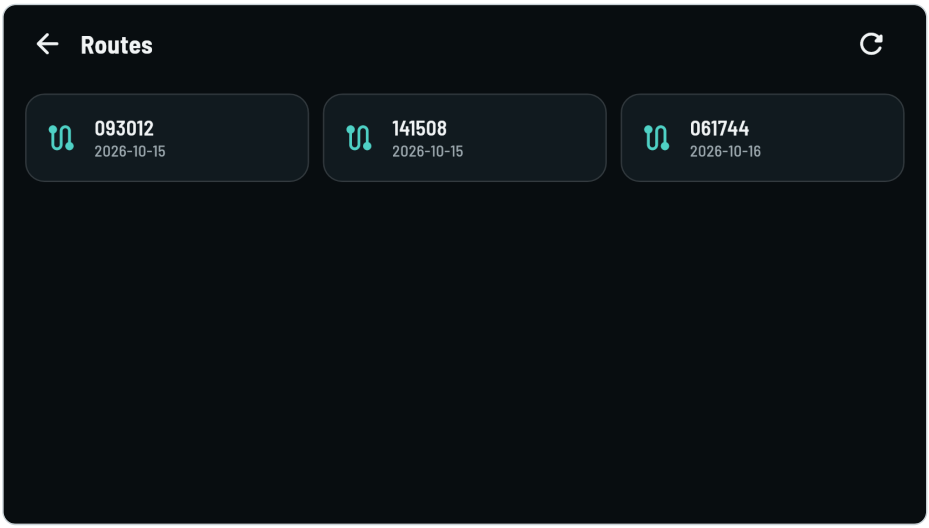
The robot must know where it is before it may drive itself. Look at the localization chip at the top.

- *Tag …* or *Start pose*: the robot knows where it is.
- *No loc* in red: turn the robot so its camera sees an AprilTag and tap **Localize**.

The robot also localizes by itself when it sees a known tag after start-up.

7.2 Load a route

1. Tap **Routes**. The list shows every recorded route by date and time.
2. Tap the route to patrol. The app goes back to the main screen and shows the route on the map.



Routes, newest first

7.3 Start, pause, resume and end

1. Check that the robot stands, is localized, and is near the route (closer than 3 m).
2. Tap **AUTO**, or press Start.
3. Tap **Start**. The status shows *Patrolling*. If the robot was beside the route, it first walks onto it (*Walking onto the route*).
4. **Pause** holds the robot where it is. **Resume** continues.
5. **End** finishes the patrol. The robot stops and stands.

> **NOTE**
>
> You can also tap **Start** in REMOTE. The patrol then begins as soon as you switch to AUTO.

7.4 What the robot does on its own

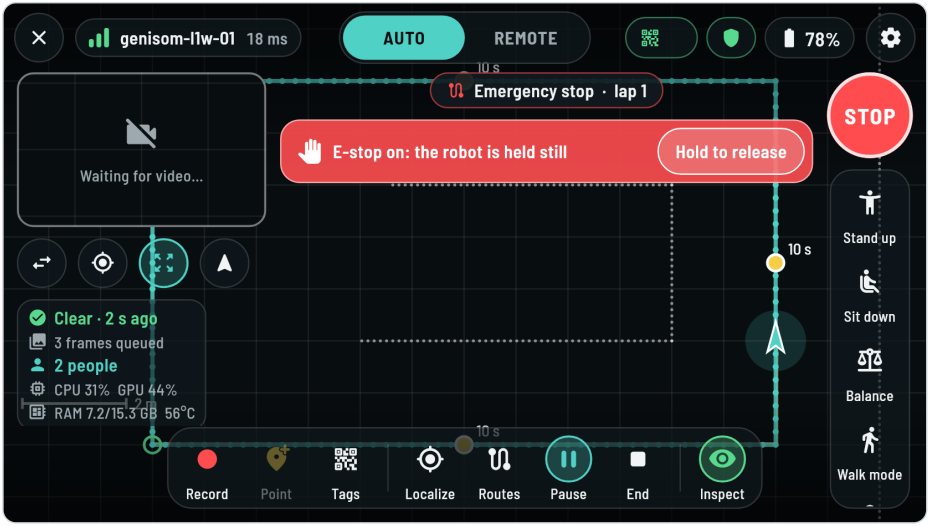
- **Follows the route** at the patrol speed (section 8.7), slower in tight bends.
- **Stops at each stop point**, turns to the recorded direction, waits for the AI to inspect, stays for the stop time, then walks on.
- **Passes obstacles** by sliding sideways, at most 0.8 m away from the route, through gaps from about 0.7 m wide. When there is no gap, it stops about 0.4 m before the obstacle and waits.
- **Slows down and stops** for anything in its path, in every direction (the protective field).
- **Backs up when it is stuck**: when it gets no further for 30 seconds (it can neither pass nor turn), it walks back about 1 m along the way it came, slowly, and tries again. It checks behind it like everywhere else. After three tries at the same place it stays *Blocked* and waits for you.
- **Loops** a route that ends near its start, lap after lap.
- **Goes home at low battery**: when the battery is low, it ends the patrol at the end of the current lap (20 % unless your technician changed it).

7.5 Patrol status

Status	Meaning	What to do
Idle	no patrol running	load a route and tap **Start**

Status	Meaning	What to do
No route loaded	there is no route to follow	tap **Routes** and pick one
Waiting for localization	the robot does not know where it is	tap **Localize** in view of a tag
Walking onto the route	it walks from beside the route onto it	wait
Patrolling	following the route; the lap number is shown	watch
Approaching a stop	aligning on a stop point	wait
Inspecting	the AI looks at the floor at the stop point	wait
Blocked	something is in the way for a while	clear the way; it continues by itself
Off the route	the robot is more than 1.5 m from the route	drive it back in REMOTE, then AUTO and **Start**
Sensors stale	a sensor stopped reporting	stop the patrol, call your technician
Paused	paused by you, NETRA or after an e-stop	tap **Resume** when it is safe
Emergency stop	STOP is engaged	release it, then **Resume**
Route finished	an open route is done	tap **Start** for another run

7.6 Emergency stop during a patrol



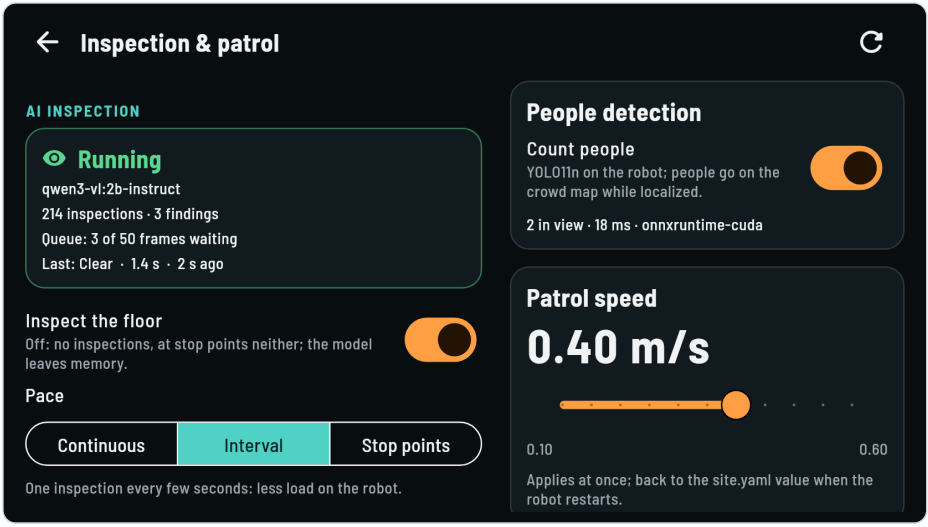
STOP engaged: hold the button to release

1. Press **STOP** or B. The robot stands still and the screen turns red.
2. Make the area safe.
3. Hold **Hold to release** for one second. The patrol stays paused.
4. Tap **Resume** to continue the patrol.

8 AI inspection and people counting

8.1 The Inspection page

Tap **Inspect** at the right end of the toolbar. The page shows the AI's state, its pace and model, the people counter and the patrol speed.



The Inspection page

The status box shows:

- the state: *Running*, *Loading the model…*, *Off*, *Error*, or *Not responding*;
- the AI model in use;
- how many inspections and findings there were since the robot started;
- the queue, in interval pace (section 8.3);
- the last result and how long ago it was.

8.2 Inspection on or off

Use the **Inspect the floor** switch. When it is off, the robot does not inspect, not even at stop points, and the AI model is unloaded to free the robot's memory. Turning it on again takes a few seconds while the model loads.

8.3 Pace

Pace	The robot inspects	Good for
Continuous	one image right after the other, all the time	the most thorough patrol
Interval	one image every few seconds (slider: 0.1 s to 5 min)	a lighter load on the robot
Stop points	only at the stop points of the route	inspecting chosen places only

In **Interval** pace the robot takes an image at every interval, even while the AI is still busy with an earlier one. The images wait in a queue and the AI works through them in the order they were taken. The main screen shows *3 frames queued* while images are waiting. Each finding is reported with the time and place where its image was taken.

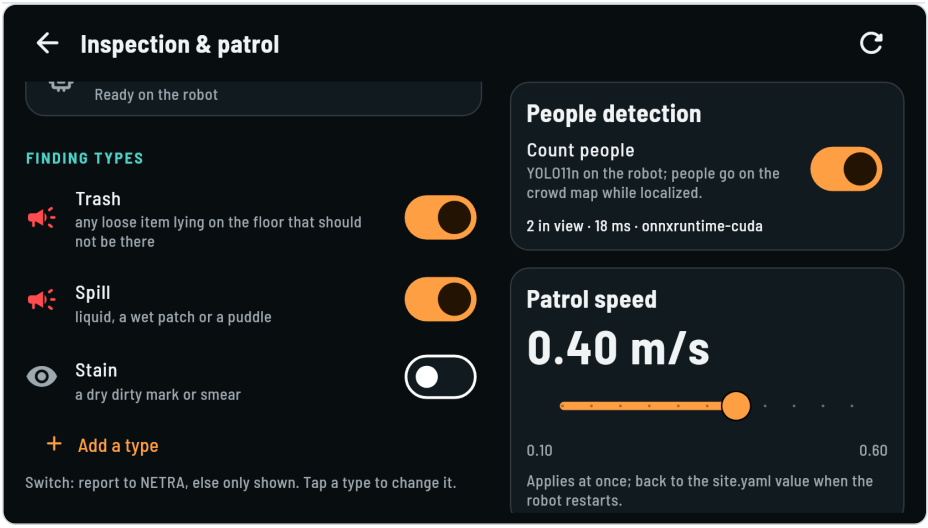
> **TIP**
>
> One inspection takes the AI about 1 to 2 seconds (shown on the page). With a shorter interval the queue fills up and the oldest images are dropped. When the robot stands still, identical images are not queued twice.

8.4 AI model

The **Model** list shows the AI models on the robot. *In use* marks the active one, and *Ready on the robot* marks models you can switch to. Tap a model to switch. The status shows *Loading the model…* for a few seconds. A model marked *Not pulled yet* must first be installed by your technician.

8.5 Finding types

The **Finding types** list says what the AI looks for. Each type has a description that the AI reads with every image.

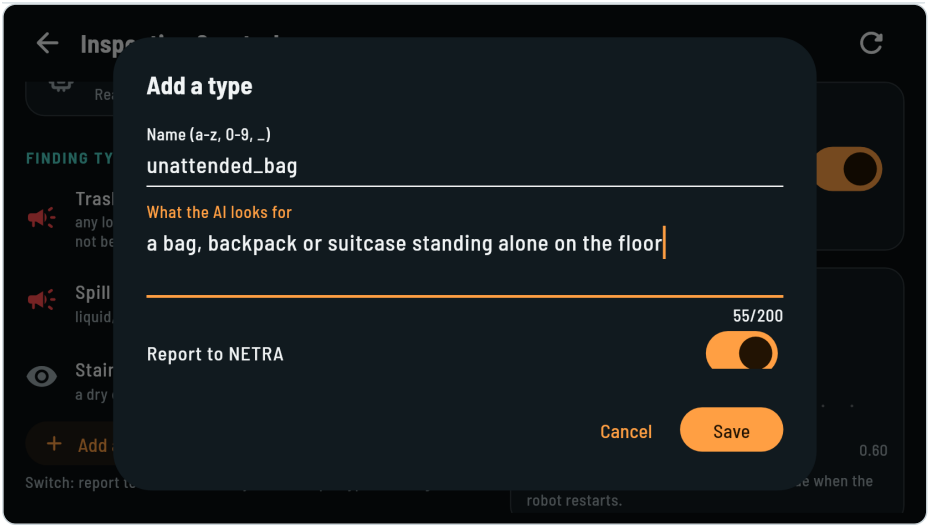


Finding types: the switch decides whether a type is reported to NETRA

- The **switch** of a type: on means a finding of this type is **reported to NETRA**; off means it is only shown on the handheld. *Stain* is off by default, because shiny floors and reflections are easily taken for stains.
- **Tap a type** to change its description or to delete it.
- **Add a type** creates your own type.

To add a type:

1. Tap **Add a type**.
2. Enter a name, for example *unattended bag*. The app turns it into `unattended_bag`.
3. Describe what the AI should look for, in plain **English**, for example *a bag, backpack or suitcase standing alone on the floor*. Short, concrete descriptions work best.
4. Choose **Report to NETRA**, then tap **Save**.



A new finding type

The robot keeps up to 12 types and remembers them after a restart.

8.6 People counting

The **Count people** switch turns person detection on or off. While it is on:

- the main screen shows how many people are in view;
- people are boxed on the camera video;
- NETRA receives where people were, for its crowd map.

8.7 Patrol speed

The **Patrol speed** slider sets how fast the robot walks its route, in metres per second. It applies at once. After a restart of the robot it goes back to the speed your technician set.

8.8 Results on the main screen

The *At a glance* panel under the small view shows the latest results without opening the Inspection page:

Line	Example	Means
AI result	*Clear · 2 s ago* (green)	the floor was clean in the last image
	Trash · 12 s ago (red)	a finding that was reported to NETRA
	Stain · 5 s ago (yellow)	a finding that is only shown
Queue	*3 frames queued*	images waiting for the AI (interval pace)
People	*2 people*	people in the camera view now
Load	*CPU 31 % GPU 44 %, RAM 7.2/15.3 GB 56 °C*	the robot computer's load; red near the limit
Internet	*Internet 38 ms*	the robot's own internet (its modem) answers; *offline* in red: no internet, findings wait on the robot

Each new finding also shows a short message, *Finding: Trash*, with a vibration. Tap the panel to open the Inspection page.

9 NETRA command center

NETRA is the command center that runs in the office. Your technician connects the robot to it. Through NETRA the team:

- sees every robot on a live map with its battery and status;
- starts patrols, now or on a weekly schedule, and can pause or stop them;
- receives findings with the photo the AI saw, the time and the place on the map;
- gets alerts in Telegram groups;
- sees crowd maps from the people counter.

Routes you record on the handheld are uploaded to NETRA automatically. If the robot loses its network, it keeps patrolling and sends its findings once it is back online.

Every time NETRA shows (a finding, a patrol event, an alert) comes from the robot's clock. Your technician keeps the robot's clock in step with NETRA's (section 12.4); if times in NETRA look wrong, tell your technician.

10 After the shift

10.1 Park and switch off

1. Tap **End** to finish the patrol.
2. Switch to **REMOTE** and drive the robot to its parking place.
3. Tap **Sit down**, or hold L1 and press Y.
4. Tap the disconnect button at the top left.
5. Switch the robot off and charge its battery, as described in the ZSBot manual.
6. Charge the handheld.

10.2 Daily checklist

When	Check
Before	the route is clear, dry and has no drops
Before	robot battery at least 30 %, handheld charged
Before	the ZSBot remote is at hand
Before	the app connects; the link is green; the localization chip shows *Tag*
Before	the protective field shows *Path clear*
Before	the Inspection page shows *Running* if the patrol should inspect
During	the handheld stays with you; STOP is within reach
After	the patrol is ended, the robot sits, its battery is charging
After	findings that need cleaning are passed on to the cleaning team

11 Troubleshooting

Find the problem in the first column. Call your technician whenever the robot behaves in a way this manual does not explain.

Problem	Likely cause	What to do
The app does not find the robot	the robot is still starting, or the handheld is on another Wi-Fi	wait two minutes after power-on; connect the handheld to the robot's Wi-Fi
The robot rejected the token	wrong token in the app	enter the token from your technician (section 3.3)
No gamepad found	the app does not see the handheld's controls	close and reopen the app
The robot does not move with the sticks	AUTO mode, STOP engaged, the robot is sitting, or the ZSBot remote has control	switch to REMOTE, release STOP, tap **Stand up**, tap **Take control**
No loc in red	the robot does not know where it is	turn it towards an AprilTag and tap **Localize**
Start does nothing, or *robot is … m from the route*	not localized, no route loaded, or more than 3 m from the route	localize, load the route, drive the robot next to the route
Off the route	pushed or blocked far from the route	drive it back to the route in REMOTE, then AUTO and **Start**
Blocked for a long time	something stays in the way; after three back-ups the robot waits	clear the way, or end the patrol and drive around it
The robot walks back a little by itself	it was stuck for 30 seconds and tries again from further back	nothing: that is normal; clear the way if it keeps happening
Internet offline	the robot's modem has no signal or no data	check the modem and its SIM card; the patrol goes on, NETRA gets the findings later

Problem	Likely cause	What to do
The robot stops or swerves for nothing right in front of it	a dirty camera window, or the camera sees the shiny floor as an obstacle	clean the camera window; if it goes on, tell your technician
Video stays black	Wi-Fi is weak, or the camera is off	move closer; check *Camera video* in the settings
Inspection shows *Error* or *Not running*	the AI is not running on the robot	tell your technician
Sensors stale or *No scan*	the laser scanner stopped	end the patrol, sit the robot down, call your technician
Needs attention, or red CPU, GPU or RAM	the robot computer has a problem	finish the lap, then tell your technician
Times in NETRA are off, or the robot stops with *TF stale*	the robot's clock is not in step	tell your technician (section 12.4)

Your technician may ask for the robot's **status screen**. On a computer connected to the robot (the technician sets it up), log in to the robot and type `pmonitor`: one screen shows the mode, the battery, the route, the sensors, the internet and the robot computer, one line each, with problems in yellow and red. Tap a line to see it in detail and **Back** to return. Send a screenshot, or tap **Report** and send the file whose name it shows. **Quit** closes it.

12 For the technician

12.1 Addresses and ports

What	Address
Robot computer (Jetson, Pashupati)	`192.168.234.234`, SSH user `robot`
Handheld link (teleop and discovery)	UDP `9870` on the robot computer
Video for the handheld (WebRTC)	TCP `8890`, UDP `8190`
Robot motion computer (ZSBot SDK)	`192.168.234.1`, UDP `8081` / `8080`
LiDAR (Livox MID-360)	`192.168.123.20`; robot computer `192.168.123.19` on that cable
Time	chrony on the robot computer (`TIME_SERVERS`); PTP master for the LiDAR on its cable
AI models (Ollama)	`127.0.0.1:11434`, on the robot only

12.2 Service commands

```
ssh robot@192.168.234.234
sudo systemctl restart pashupati   # restart the stack
journalctl -fu pashupati           # follow its log
pashu                              # ROS shell of the stack
ros2 topic echo --once /health/status
```

12.3 Configuration

File	Holds
`/etc/pashupati/pashupati.env`	the deployment: robot package, NETRA address and token, extras
`/etc/pashupati/site.yaml`	parameters of this robot and site, see the Tuning Guide
`~/.pashupati/sites/<site>/`	one site: its map, AprilTag positions (`tags.json`) and recorded routes (`routes/`)

Restart the service after changing either file in `/etc/pashupati` . `pconfig` (menuconfig) edits both through a menu: every parameter with its description and range, values checked before they are saved, a backup kept and a restart offered (Tuning Guide, section 1.2). `pmonitor` shows the robot's live state and writes a report file (Tuning Guide, section 8.7).

12.4 Time

The LiDAR, the camera, the robot computer and NETRA must use one clock: two clocks that differ make the robot stop (*TF stale*) and put findings at the wrong time in NETRA. Once per robot, set `TIME_SERVERS` (NETRA's host or its NTP server) in `/etc/pashupati/pashupati.env` , then:

```
scripts/setup.sh install timesync ptp   # chrony, and the PTP master for
the LiDAR
scripts/timesync.sh check               # offset to the time source, PTP
master running?
```

The offset must stay below 0.05 s. NETRA receives the robot's measured offset in its telemetry (`clock`). Details are in the Tuning Guide, section 8.6.

12.5 Update

```
cd ~/dev/Pashupati && git pull && git submodule update --init --recursive
scripts/setup.sh install dharma build config service && sudo systemctl
restart pashupati
```

The handheld app is updated by installing a new APK from the PashupatiController repository.

13 Quick card

To	Do
Stop the robot now	**STOP** or **B**; release: hold **Hold to release**
Stand up / sit down	**Stand up** / **Sit down**, or **L1**+**A** / **L1**+**Y**
Drive by hand	**REMOTE** (**Start**), left stick moves, right stick turns
Faster / slower	D-pad up / down
Teach a route	REMOTE, **Record**, drive, **Point** at stops, **Finish**
Record tags	stand in view of a tag, **Tags**
Patrol	**Localize**, **Routes** → pick, **AUTO**, **Start**
Pause / continue / end	**Pause** / **Resume** / **End**
Inspection settings	**Inspect**
Robot ignores the handheld	**Take control**
Swap camera and map	tap the small view, or **Select**