NERO PROJECT

# Presence-Aware Home - Arms, Disarms and Adjusts on Its Own

The house notices, so nobody has to.

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## Executive summary

I taught my house to know whether anyone is home without anyone touching an app. It disarms the alarm when one of us comes home. It arms itself when everyone has left and a door opens, after a one-minute cancel alert, and a guest hold pauses auto-arming until someone returns. The thermostat turns off when any window or outside door stays open for a minute and returns to the right schedule once all are closed, while heat switched off by hand stays off. The real work was making the automation fail safe. An unknown reading never counts as away, a sensor that stops reporting counts as no signal and every failure I have found lands on "does not arm" or "disarm by hand", never on "arms with people inside". I designed the rules, set the safeguards and tested them against the live house. AI agents wrote the automations.


**1 min**
cancel alert before the house arms itself

**13**
windows and outside doors the thermostat watches

**170 min**
of silence before a sensor stops counting

**Live**
auto-arm since September 2026, thermostat since November 2026

## What is in this report


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### The principle in one line

Unknown is not away. The house acts only on a clear reading, and when a signal goes quiet it says "no signal" instead of guessing.

### What is left out on purpose

This is a public report on a real home. It describes what the house decides and why, not which signals it uses to recognize us.

## 1. The problem and why a wrong guess is expensive

An alarm protects a house only while it is armed. Since June 2026 our alarm could be armed by a text or a tap in an app, but that still meant a person had to do it. Someone had to remember on the way out. The heating had a related gap. In winter, a window left open meant the heat ran against the outdoors until someone noticed.

Automating both is easy to sketch and hard to get right, because a house that guesses wrong does real harm. I started by listing what each kind of mistake costs, then built every rule to avoid the expensive ones first.

| If the house guesses wrong by... | The cost | How the design leans |
|---|---|---|
| Arming while someone is still inside | A siren on your own family | Arming needs every reading to agree, then waits one minute and checks again |
| Staying disarmed after everyone left | An unprotected house, the same as before | Accepted as the safe failure, with a warning when a reading goes stale |
| Recognizing a returning person too late | The siren sounds on your own return | A beeping entry countdown and a faster arrival signal |
| Keeping the heat off on a dead sensor | A cold house with nobody told | A silent sensor stops counting after 170 minutes |
| Turning on heat someone switched off | The house overrules a person | The house undoes only what it did itself |

### Design options I ruled out

| Option | Why I ruled it out |
|---|---|
| Arm after "no indoor motion for 10 minutes", a common home-automation pattern | Our cats trip the indoor motion sensors on their own, so motion never arms or triggers the alarm. The alarm watches doors and windows, which cats do not open. |
| Track where we are, so the house arms as we drive off | My privacy rule is that the house may know only whether we are home or away, never where we are. A door opening became the sign that someone left, and the stored location history is gone. |
| Arm when the first person leaves, or on any one away reading | One stale reading would arm the house on whoever is still inside. Arming needs everyone to read away. Disarming needs only one arrival. |
| Trust a single summary "is home" status per person | Testing showed that status can freeze. The rules now listen to the arrival signals underneath it (see page 6). |
| Restart the heat whenever the windows close | That would override anyone who switched the heat off by hand. A marker records that the house did the pausing, and only then does it resume. |
| Treat a sensor that stops reporting as still open | One dead battery would hold the heat off for good. Silence counts as no signal, and a daily alert names the sensor. |

**Asymmetry by design**
Arming is slow and needs agreement. Disarming is fast and needs one voice. The cost of a false arm is a siren on your family; the cost of a missed arm is the status quo.

**Everyday controls stay in place**
Arming and disarming by text, app or voice all still work. The automation adds to those paths and never removes one.

## 2. How the alarm decides

The rules run in Home Assistant with the Alarmo alarm add-on, on the house's existing wireless door and window sensors. Leaving and arriving follow two different rules on purpose. The flow below is the leaving side. Every step must pass, and the last step checks everything again before anything changes.

**1. Everyone leaves**
Each of us reads clearly away. An unknown reading stops the process here.

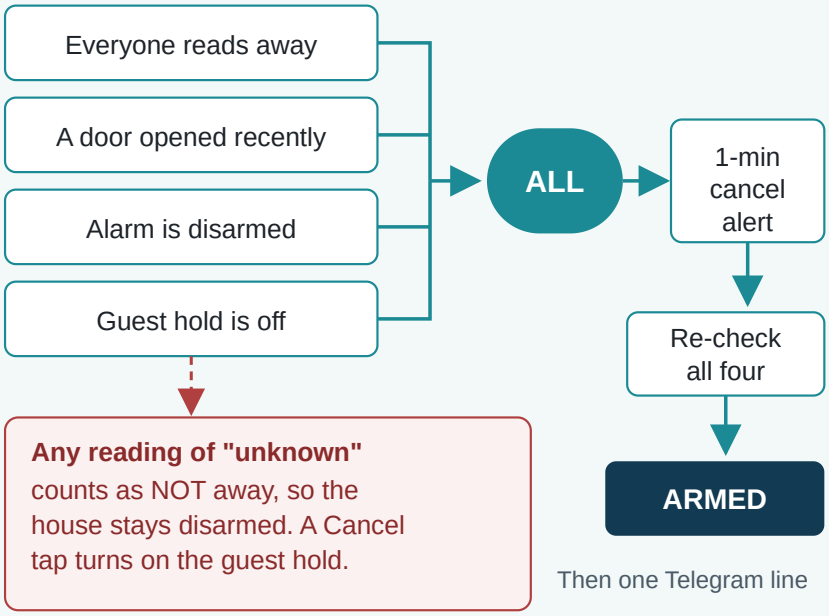
**2. A door opened**
A door opened within the previous 20 minutes. Nobody leaves without one.

**3. Cancel alert**
Both phones get "House arming" with a Cancel button. One minute to stop it.

**4. Check again**
All conditions are re-read. If anyone came back, it does not arm.

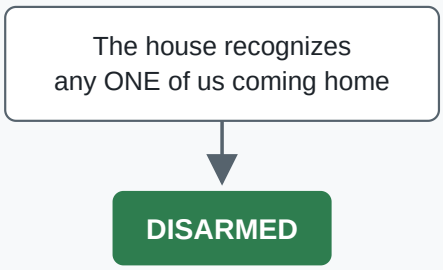
**5. Armed, and told**
The alarm arms Away and one Telegram line reports what it did.

### To ARM, every condition must agree




Then one Telegram line

### To DISARM, one is enough




A beeping entry countdown covers a late recognition, so whoever walks in hears the clock.

The next arrival also clears the guest hold, so auto-arming resumes on its own.

Two rules, deliberately unequal. Arming waits for agreement and checks twice. Disarming acts on the first clear arrival.

### The guest hold

Visitors break any rule built on "everyone has left". A guest may be in the house while both of us are out. Two things turn on the hold. One is a Cancel tap on the arming alert. The other is a disarm done from outside while everyone reads away, which is what a host does to let a guest in. While the hold is on, the house never arms itself. The next time one of us comes home, the hold clears and auto-arming resumes. The hold also has a dashboard tile and a one-line text command ("guest mode on").

**Why the second check matters**

The one-minute window is long enough for someone to turn back for a forgotten phone. Re-reading every condition before arming means a return during that window cancels the arm without anyone pressing anything.

## 3. How the thermostat pauses and resumes

The same thinking applies to heat. Heating with a window open wastes energy, but a house that turns heat off has to know when to turn it back on, and it must never overrule a person. A pause rule, a resume rule and one marker carry that.

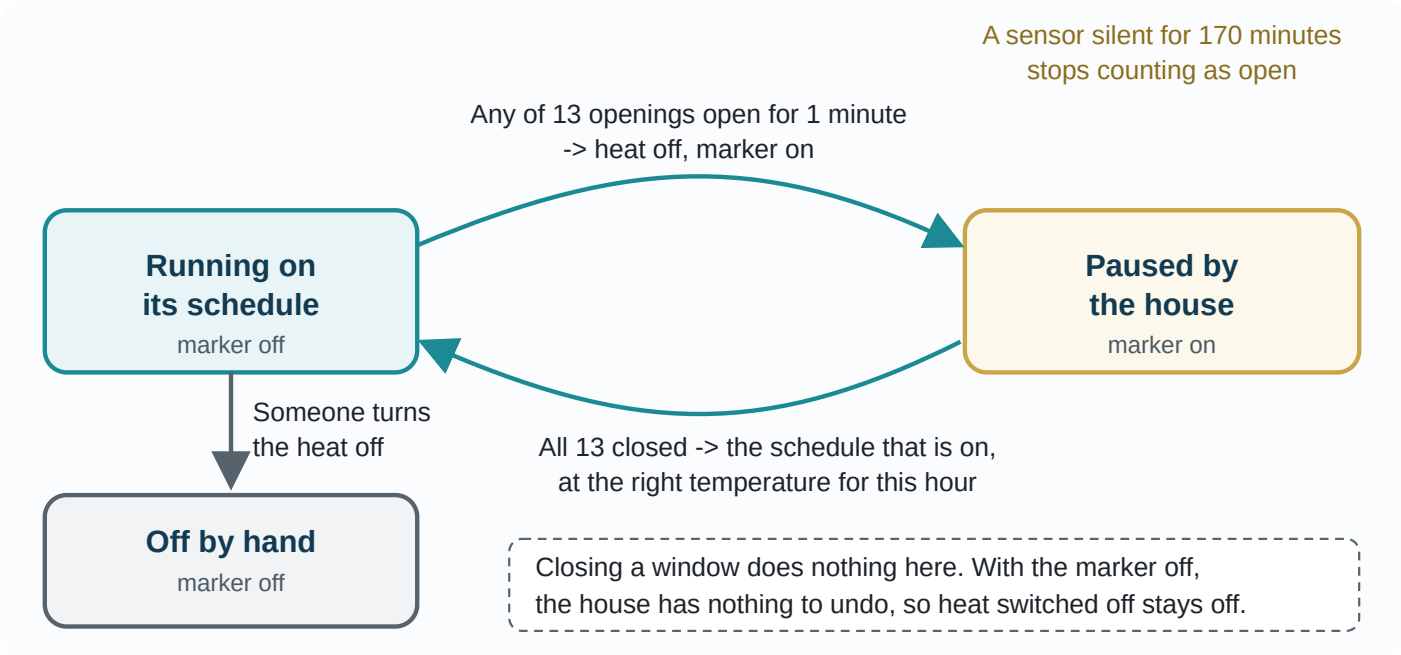
**1. Open for a minute**
Any of 13 windows and outside doors stays open for one minute.

**2. Heat off, marked**
The thermostat turns off and the house sets a marker that says "I paused this".

**3. Schedules wait**
All seven schedule rules skip their run while the marker is on.

**4. All closed**
Once every opening reads closed, the house clears the marker.

**5. Right schedule**
It returns to whichever schedule is switched on, at the right temperature for that hour.




Three states and one marker. The marker is what lets the house tell its own pause apart from a person's choice.

### The schedule it returns to

| Schedule | What resume restores |
|---|---|
| Winter (heat only) | Heat set to 68 degrees from 6 AM to 10 PM and 64 degrees overnight. Resume picks the right one for the current hour. |
| Spring and summer | Five time bands with heating and cooling limits by hour and by weekday or weekend. These are switched off for winter; resume follows them once they are back on. |
| Heat turned on while a window is open | If anyone, or any schedule, turns the heat on while something is still open, it goes off again after one minute. |

**Quiet by design**
Pausing and resuming send no messages. The only thermostat-related alert is the daily notice that names a sensor with a low battery or no recent report.

**Override by text**
"Thermostat back to normal" turns the window pause off and applies the schedule at once. It stays off until I turn it back on, and a status command shows both settings.

## 4. Safeguards, and what counts as evidence

Each safeguard below answers one way the automation could do harm. I wrote them into the design before any rule was built, then tested them against the live house. Page 6 lists the tests still open.

| # | Safeguard | What it does |
|---|---|---|
| 1 | **Unknown is not away** | Every person must read clearly away. A dead app or a reading of "unknown" or "unavailable" blocks arming. |
| 2 | **Agree to arm, one to disarm** | Arming needs every reading to agree. Disarming needs one arrival. |
| 3 | **Cancel alert and second check** | One minute to cancel from either phone, then every condition is re-read before the house arms. |
| 4 | **Arms only from disarmed** | The house never changes a mode a person chose, such as night mode. |
| 5 | **Guest hold** | A Cancel tap or a disarm from outside pauses auto-arming until one of us comes home. |
| 6 | **Stale-reading warning** | One message if a presence reading sits unknown for an hour, or reads away for a full day. |
| 7 | **Every automatic action is reported** | One Telegram line per arm, cancel, failure or disarm, so nothing happens unseen. |
| 8 | **Voice disarm is checked** | The voice pucks may arm freely. They disarm only when the code confirms a household phone is home. |
| 9 | **Home or away, never where** | The house stores no location, and I had the old location history purged. |
| 10 | **The house undoes only its own pause** | A marker records that the thermostat pause was automatic. Heat switched off by hand stays off. |
| 11 | **Silence is no signal** | A sensor not heard from in 170 minutes stops counting as open. A check every 15 minutes then resumes the schedule, and pauses again if the sensor returns still open. |
| 12 | **Dead batteries get named** | A phone alert names any low or silent sensor, at most once a day, until it is fixed. |

### The lesson from an AI agent's mistake

One morning, an AI agent working for me reported that it would assume I was asleep. Its reasons were no reply, no lights on and nobody at the keyboard. The house's door records showed I was up and moving through the house while it wrote that message. A similar error came the day before. Two in two days made it a rule, now written into the notes every agent reads.

**Evidence**

- A clear away reading from every person
- A door that opened
- A clear arrival of one of us

The house may act on these

**No signal**

- A reading of "unknown" or "unavailable"
- A sensor silent for 170 minutes
- A reading stuck at away for a full day

Do nothing, and warn

**Not evidence at all**

- Lights off on a bright day
- Outdoor motion zones (pets, birds, the street)
- A phone that stopped updating
- Nobody at the keyboard

Never build a conclusion on these

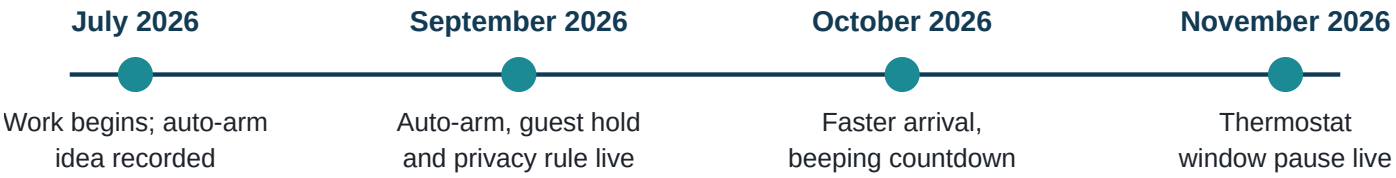
When the reliable signals are quiet, the right answer is "no signal", not "asleep" or "away". A phone that stopped reporting looks exactly like a person who is still.

## 5. What testing broke, and what I changed

Rehearsals and everyday use found faults that no design review would have. None of them armed the house with anyone inside, and each fix became a written rule.

| What happened | Why | What I changed |
|---|---|---|
| A rehearsal armed the house as designed, but the siren sounded when we came back. | The disarm rule listened to a summary "is home" status. After my privacy change, that status never moved. | Disarm now listens to the arrival signals directly. The agents also carry a standing rule never to build alarm logic on that status. |
| The house quietly stopped arming itself for three weeks. | A settings change gave one phone a new identity, so the house saw a new device. The old entry read "away" forever, which no "unknown" check catches. | Rules repointed and the phone set to keep one identity. A new warning fires when a reading stays away for a full day. |
| On one return the house recognized us seconds after the door opened, too late to stop the countdown, and the siren sounded. | Recognition lagged behind a quick walk to the door. | A faster arrival signal and a beeping entry countdown, so whoever walks in hears the clock. |

The three-week gap is the design working as intended under failure. The fault left the house disarmed, which is the outcome I had chosen as the safe one. It never armed with anyone inside.




The project grew in four steps from July to November 2026. The alarm it builds on went live in June 2026.

## 6. Status and what is next

**Live.** Auto-arm, auto-disarm and the guest hold have run since September 2026. The thermostat pause has run since November 2026. I verified the thermostat rules in a live test the night they went in. That test forced each case, including the resume to heat at 68 degrees and the override command.

**Still open.** One planned return test of the October arrival fix, a real window held open for a full minute and a real dead sensor. I chose not to fake sensor readings, so the thermostat tests would not set off the alarm. In spring, the cooling schedule needs a decision, and the resume rule must match whatever I choose.

## 7. What this shows about how I work

I started with the cost of each mistake, not with the features. I set the rules in plain language before any code existed, chose which failure was acceptable and then held the build to it. When rehearsals broke something, I fixed it and wrote down the lesson so the next agent would not repeat it. That is the same discipline I bring to any program that automates decisions for people. Be clear about what the system may assume, make the safe failure the default and report every action it takes on its own.