

AUTOMATION ENGINE FOR THE MUXEN BRAIN

SYNAPSE

Synapse is the automation engine of the MUXEN Brain. It watches the boat, decides and acts to provide **comfort features** for the crew.

SIX AUTOMATION TEMPLATES READY TO DEPLOY

- 01** ANCHOR LIGHT AT NIGHT

Shows the all-round white light between dusk and daybreak at anchor and clears it once under way. Hysteresis on speed stops it chattering.
- 02** MASTHEAD WHILE MOTORING

Switches the steaming light on when an engine starts and off when the engines stop. A staleness watchdog reads silence as “not motoring”.
- 03** NAV LIGHTS ON THE HELM

Ties the navigation lights to the boat’s PILOTE (helm) button: helm on, lights on. One press at the helm instead of two, and no lights left burning at the dock.
- 04** LIGHTING THAT FOLLOWS THE SKY

Dims a group of cabin lights step by step as night falls and brings them back up at dawn, from the sun’s real position rather than a clock.
- 05** LEVEL THRESHOLDS

Switches a circuit off — or on — when a tank or sensor value crosses a threshold: dry-run protection, over-fill cutoff, automatic transfer pump.
- 06** WATERMAKER PROMPT

Asks before starting the watermaker: fresh water low, boat well clear of harbour. Declining snoozes the prompt rather than repeating it.

KEY SPECIFICATIONS

Instances	One template runs many times, tuned per instance
Scripting	Lua 5.5, vendored and statically linked
Interface	MQTT only, on the Brain’s local broker
Isolation	One Lua interpreter per automation
Persistence	Enable state, snoozes and script state survive a restart
Sandbox	No shell, no filesystem, no runtime code loading

MUXEN and the MUXEN logo are registered trademarks of MUXEN SAS. Lua 5.5 is distributed under the MIT licence.

FOR INSTALLERS AND INTEGRATORS

HOW IT DEPLOYS

Automations are not written per boat. Reusable templates ship read-only inside the package, and the boat's deployed configuration declares the **instances** it actually runs — which template, how many of each, and with what settings. One level-detection template covers four tanks. An instance can also include its own Lua inline, frozen against package updates.

DEPLOYING AN AUTOMATION

01 CREATE IT IN RAKEN

Raken lists the templates the package publishes and lets you configure an instance of one, then activate it. No file to edit, nothing to restart.

03 WIRE AND TUNE IT

Raken renders the tuning form from the script's own schema — buttons, outputs, thresholds — and the engine validates it again at load.

02 WRITE YOUR OWN

No template fits? Author the Lua in raken: validated before saving, then frozen as a private copy, while a template instance follows every update.

04 ENABLE AND WATCH IT

Crew toggle it from the interface. muxen-synapse-ctl lists, starts and stops instances, dumps live state and wiring, and follows the journal of one of them.

WHAT IT TALKS TO

MOSQUITTO	The data bus of each Brain. Synapse has no other interface, in or out.
MUXEN-SENSORS	Sensor values like tank levels and temperatures, and how fresh each reading is.
MUXEN-NMEA2000	Every PGN the MUXEN NMEA-2000 stack decodes: speed, heading, RPM, GPS fix.
MUXEN-SEXTANT	Sun, moon, tides and nearest harbour — the sky the light automations follow.
DEVICES	Reads and controls every device on the MUXEN bus: keypads, outputs, dimmers.
A FRONTEND	Confirmation popups: an automation asks, the crew answers, it acts.

RUNTIME LIMITS

CPU per callback	50 ms, sampled every 1000 VM instructions
Lua heap	16 MB per automation
Fault threshold	5 consecutive faults; one success resets the count
Popup timeout	300 s unless the prompt sets its own