

Fogget-about-it grow management system

Preparing the groundwork for the next agricultural revolution.

Problem definition:

- Over the last few years, there has been research into the cultivation technique known as “fogponics”, a high-intensity form of agriculture which benefits more from automation than any other.
- This project provides a management and control system for a fleet of fogponics units that can be extended to other use-cases.
- This is in continuation of a project I have been running off and for half a year. The physical prototype is (mostly) built but lacks a control panel.

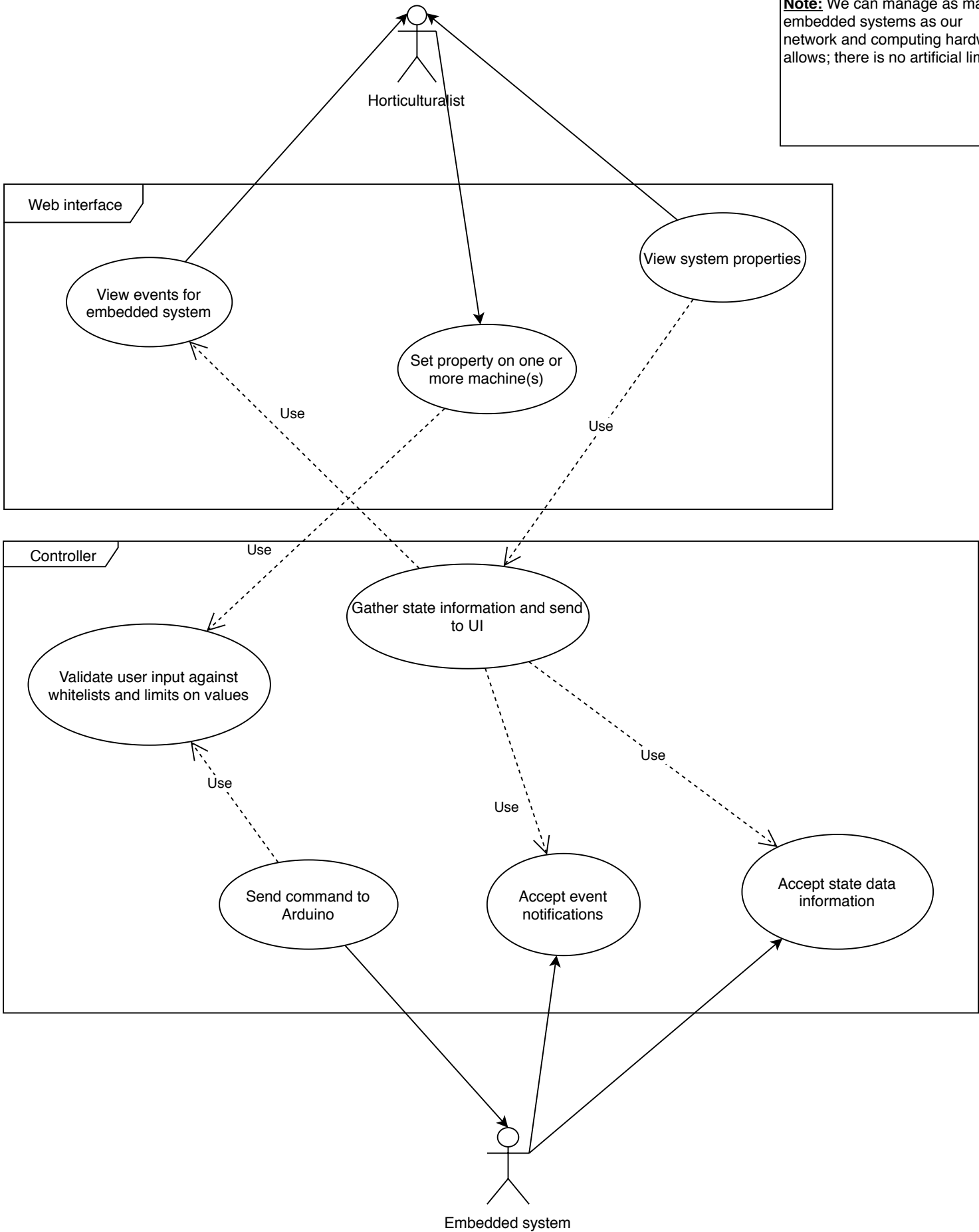
We got ourselves a control panel.

:)

Functional requirements:

- We're building a basic control system for an IoT use-case.
- The control system gathers and updates the current state information of the embedded systems growing plants.
- It must also be able to maintain a list of recent events for perusal by the end-user.
- New systems are to be automatically given sane defaults and added to the system pool. The only user responsibility must be sourcing the embedded system with a unique 64-bit integer ID.
- The end-user must be able to change settings.
- These settings must be validated in order to correct against nonsense inputs.
- "Computer, set the rooting chamber to -273 degrees C..."
- The embedded system running the grow environments should do their own validation as good engineering, but layers of safety protect against screwups downstream.
- In effect, it acts as an application firewall.
- That's basically it as far as *functional* requirements go.

Note: We can manage as many embedded systems as our network and computing hardware allows; there is no artificial limit.



Horticulturalist (web browser, supervisory and/or control system)

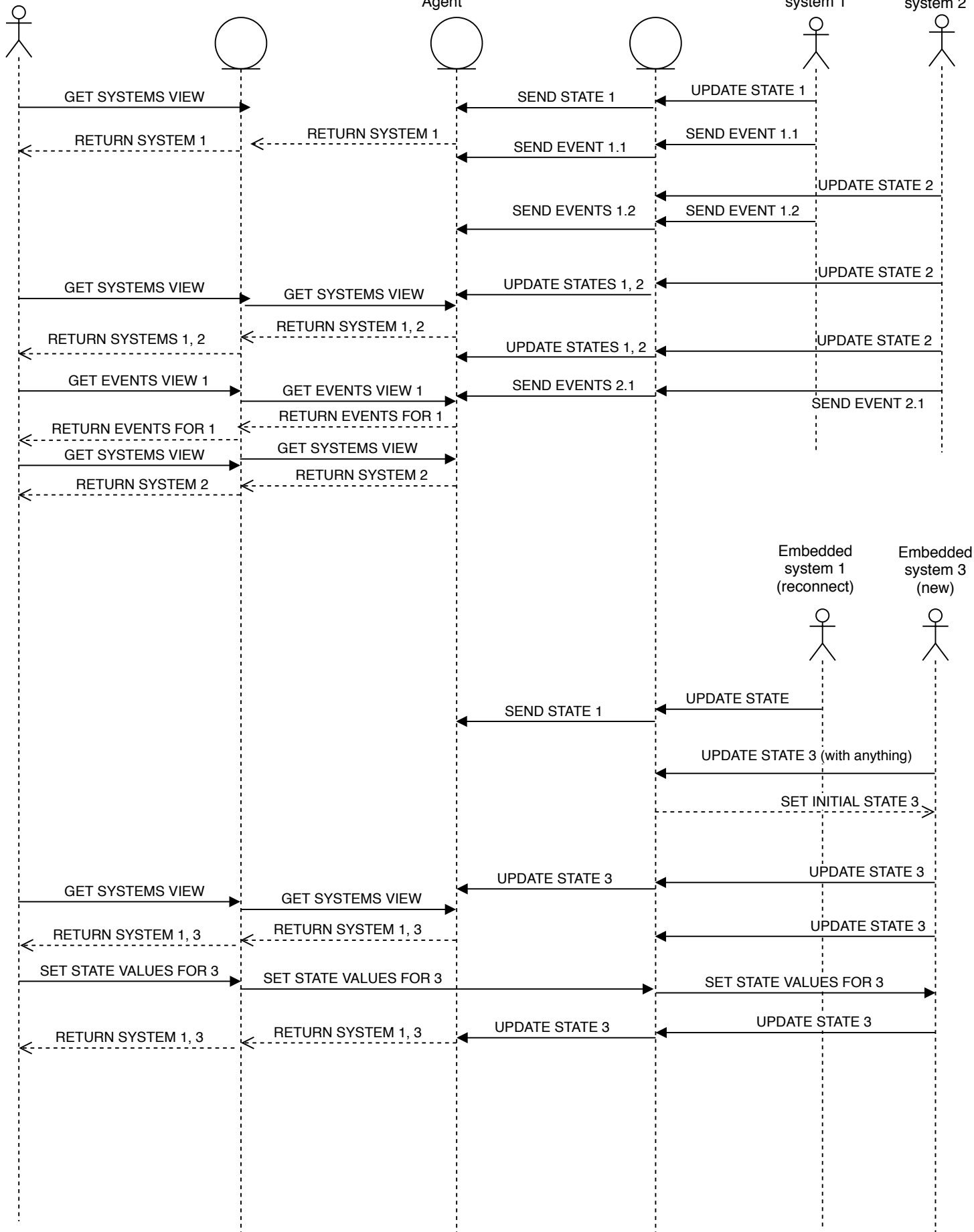
UI (web, ftp, telnet, etc)

UI Transfer Agent

Backend

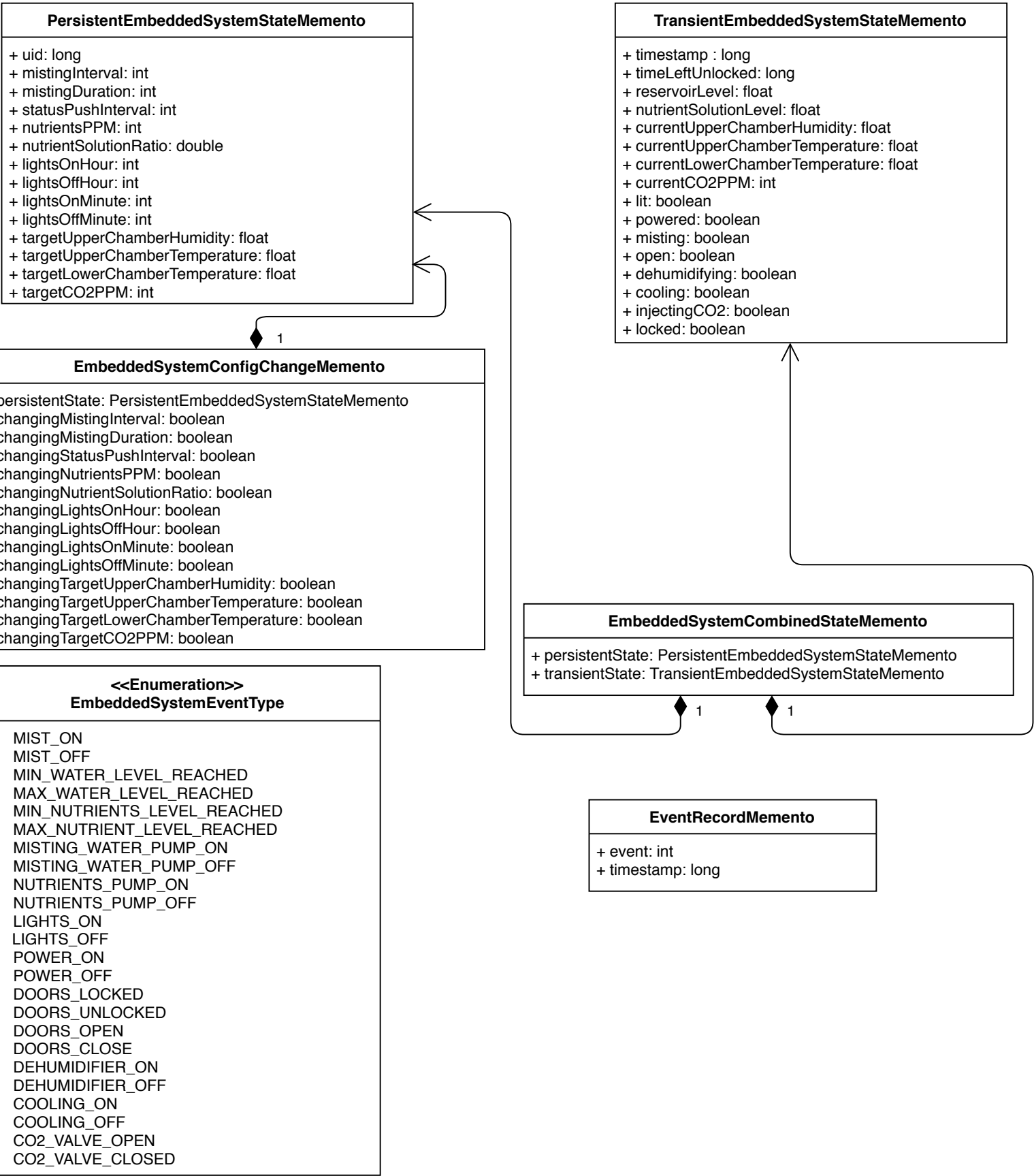
Embedded system 1

Embedded system 2



Design patterns:

- The main design pattern in use here is the memento pattern.
- Memento allows you to use state to represent logical items for recall when convenient.
- It is also really good for indicating your next intentions.
- Literally stands for “memory aid.”
- Also used in the web UI are builder patterns, but their use is perfunctory...
- Reusing code to write HTML tags to a page more neatly.
- Aside: I really wanted to keep it unix by using a simple command-line app, but we went that way instead and deep down I’m kinda glad I stepped out of my bubble.
- We also use a static factory method or two.
- However, they’re nothing too interesting as far as our use-case is concerned. They’re also completely perfunctory and don’t really warrant too much discussion.
- They’d be far more central for our purposes and worth talking about if we were writing a serializer, for example...



Model-Controller-View:

- Views are sent out the backend and into a separate utility that decouples data being sent out from the rest of the backend program; views talk to that program and don't even talk about our backend.
- Commands and state changes are sent via MQTT. These represent the controls and the in-flight representation of the model, respectively.
- The web UI uses a custom Servlet as a controller that kicks up the MQTT client the very first time it runs.
- The views are gathered and formatted by custom tag classes invoked by an otherwise logic-free JSP page.
- This represents proper modern practices.