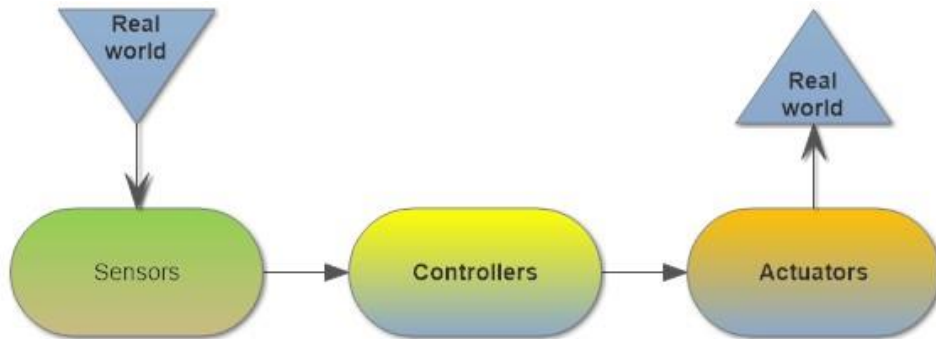


Evolving from home automation to a cybernetic house, explained

Is a cybernetic house feasible today? Like most automation, today's home automation products involve 3 things: **sensors**, to monitor selected real-world conditions... a **controller**, to make decisions as to whether and how to respond... and **actuators**, which turn controller commands into real-world actions. Here's a diagram of that.

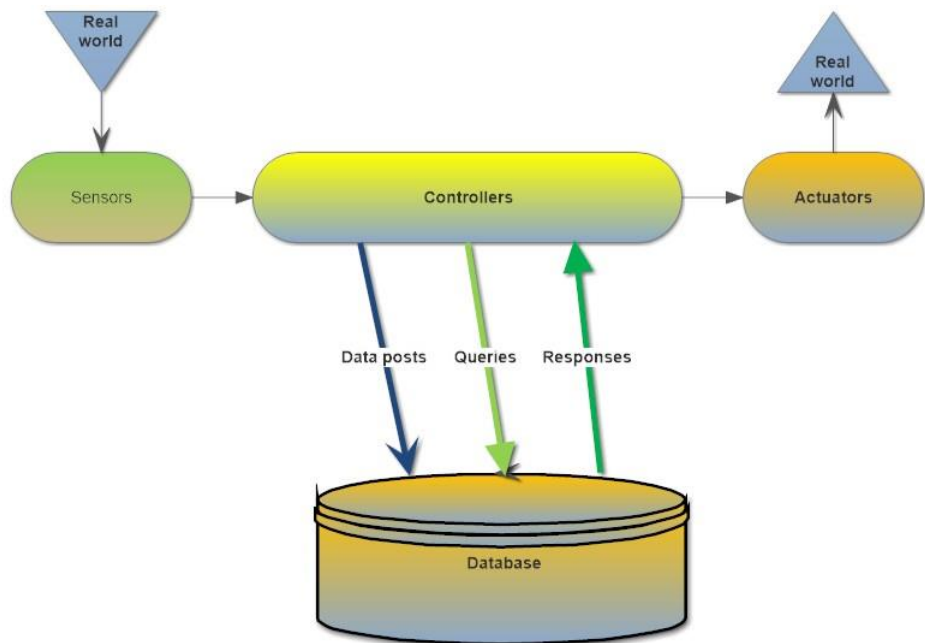


This depicts the elements of a classic control system and indicates the flow of operations within it.

A classic control system tends to have little or no memory of earlier readings, but could.

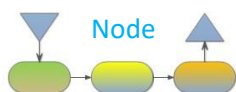
We could give it some memory by connecting it to a **relational database**. It can then post its readings to that database along with a notation of the date and time of the reading (called a "time stamp"), and that can be of value beyond just having a log of its readings. A controller can use queries to help guide its decisions.

A **query** is a relational database tool that lets you or a controller ask a simple to very complex question and immediately get back a very precise answer. It can also let the database act as a trial-and-error scratchpad.



A slightly more cybernetic system

In that role, a control system can occasionally try variations of its decision points, use a query to determine which is giving the best results, then self-adjust to this new optimization. This approach can, for example, help adjust for many kinds of seasonal variations in temperature, humidity, ambient lighting and so on.



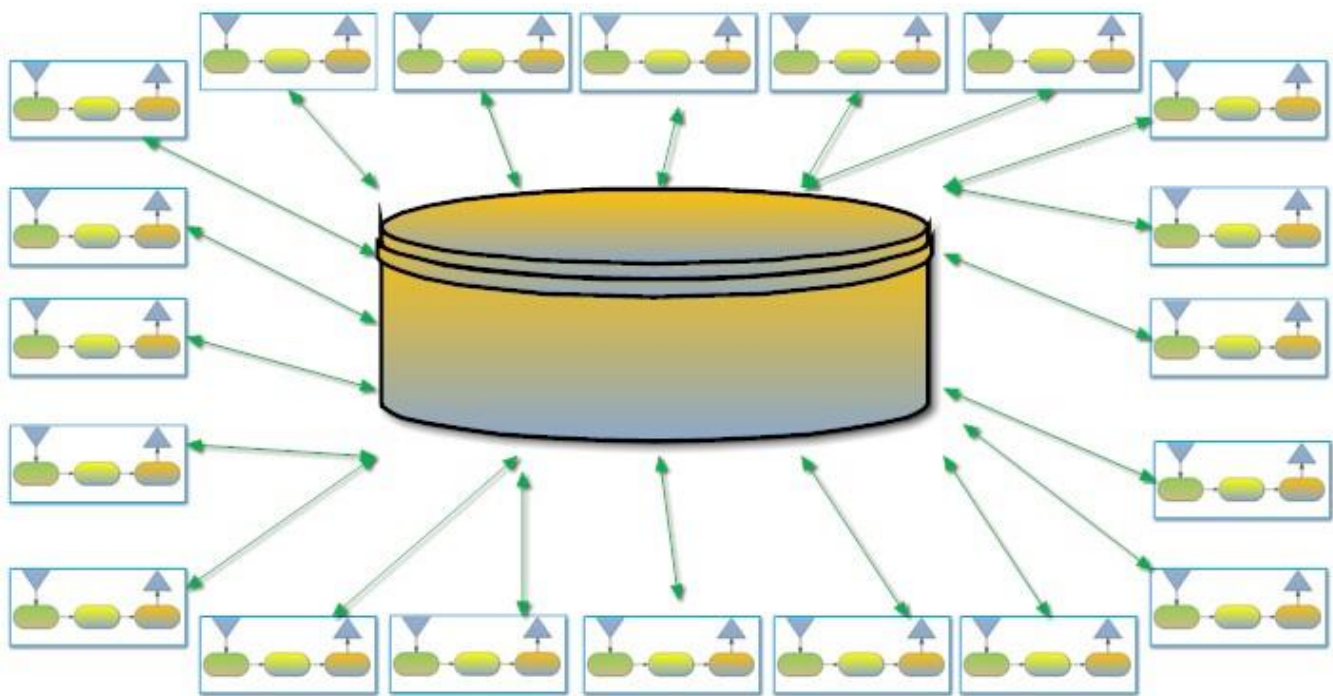
But what happens if that standalone control system becomes just one **node** among several similar nodes in a much bigger system? Sensor readings and actuator actions posted to the database by any and every node become available, by query, to any and every other node.

We now have a network of multiple nodes, each and all connecting to a single database.

With appropriate programming, this configuration can meet the definition of a cybernetic control environment: ***self-contained operation, situational awareness and adaptability.***

Each node may have any number of sensors, or none; a node may be able to undertake actions as a result of an occasionally repeating query or as a result of a request originated by another node. Each node may connect to any number of actuators, or none; traditional actuators manipulate tangible items in the real world but some activities, like sending messages, are essentially intangible activators. Each node still has only one controller, no matter how many processors are integrated into that one controller. *(These many-to-one relationships can get confusing; that's why we refer to that controller and its collection of connected sensors and actuators as a node).*

One of our node designs, for example, connects a Raspberry Pi controller to sensors that read ambient light, barometric air pressure, temperature, a thermal grid scanner, humidity, the open/closed status of the door, presses of wall switches and more. Its actuators include an amplified speaker, relays to control the ceiling fan, an infrared emitter to send TV remote control signals and more. Out of a total of almost 100 nodes in the overall house design, 30 are nodes that fit this paragraph's description – but there are others.



[Multiple nodes share information through a central relational database to create a true cybernetic architecture](#)

An even larger number of nodes are in a master control rack, each with its own purpose. Still other nodes are at points of presence near the sensors they read, the actuators they control, or both. There are, for example, nodes at the apron of the driveway, at the garage, at the front door, near the sprinkler control system, above the kitchen stove, underneath each bed and so on. Their database connection means that, through queries, any node with a job to do can know every relevant reading from every sensor connected to any other node, and can get smarter by looking at any desired history of every relevant reading.

In short, the cybernetic house is feasible today. It is just not yet (as of this writing) available off-the-shelf.