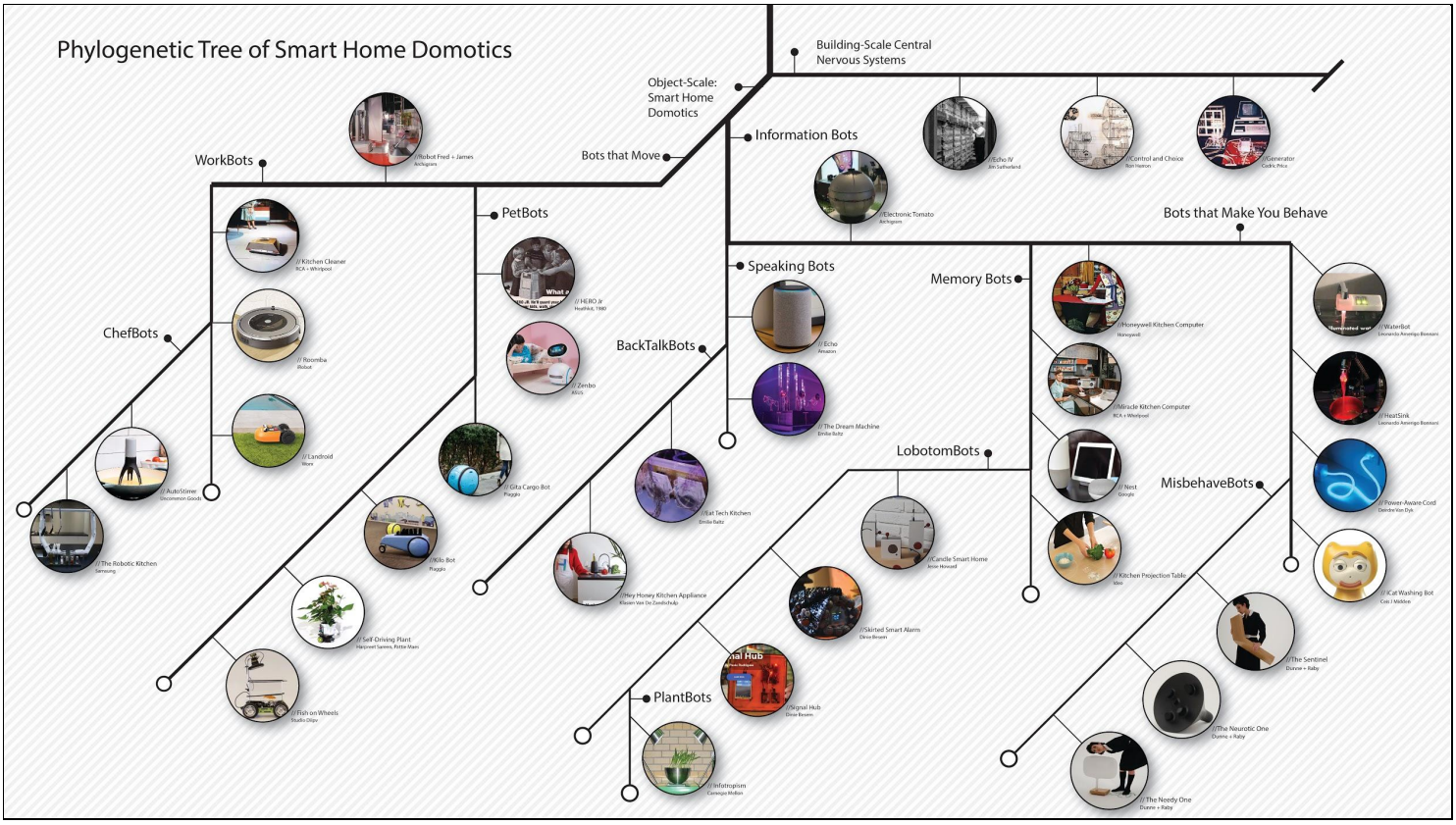
Smart Home Creatures
+
The IOT Menagerie



Matthew Pugh
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A Flat Relationship between Dwelling and Device

Describing the "Echo IV," a massive proto-smart-home computer system from 1966, engineer James Sutherland noted the way it felt like "the home was built to house the computer instead of the other way around[1]." The Echo IV was one of many speculative designs from the 60's and 70's that, despite the clunkiness of computers and inaccessibility of the nascent internet, could be considered ancestors to today's "smart home" devices. Archigram's "Electronic Tomato," a basketball-shaped sphere that communicated with occupants[2], Honeywell's "Kitchen Computer," which stored and retrieved recipe information[3], and Charles Schiffner's "Ahwatukee House of the Future," that approached the computer as a new type of appliance within the home[4], all presaged today's consumer-grade devices like the Amazon Echo, Google Dot, and Brilliant smart home hub, today.

However, while today's smart home can trace its legacy back to these devices, they suggest a much different relationship between occupant, dwelling, and smart home device than what Archigram and Sutherland could have imagined. In today's context, smart home devices are key components of surveillance capitalism, collecting user data and understanding consumer behavior from within the shelter of one's private domestic life. This totally reframes the ambiguous relationship Sutherland described between smart home computer and home — where Sutherland jokingly comments on the size of the computer relative to the structure that "houses" it, today's smart home is tinged with some anxiety that, as much as smart home devices are tools for streamlining domestic experiences, occupants are equally subservient to the smart home fulfilling its data-driven purpose. In today's context, one might reimagine Sutherland's description of the ontologically flat relationship between smart home device, home, and occupant -- the inhabitant was made to create data for the smart home as much as the smart home was built to support its human occupants.

On one hand, the ambiguity of "who is there to serve who" in the smart home has created some understandable anxiety, as issues like surveillance capitalism and persuasive technology leap off our screens and into our most private domestic spaces. This idea of the smart home as a potentially insidious entity within the home has captured pop culture imagination. For example, in the tv show "NeXt" that premiered just a few months before this time of writing, an artificially intelligent supercomputer is at one point described as a "friend" or "member of the family," but just moments later is seen brainwashing a child to commit a real-world crime through the family's Alexa-like smart home device. [5] Shows like "NeXt" speak to a popular unease with the hyperobject-like qualities of the systems behind smart home devices, which are difficult to understand and almost frightening in the scale at which they quantify our most intimate domestic experiences.

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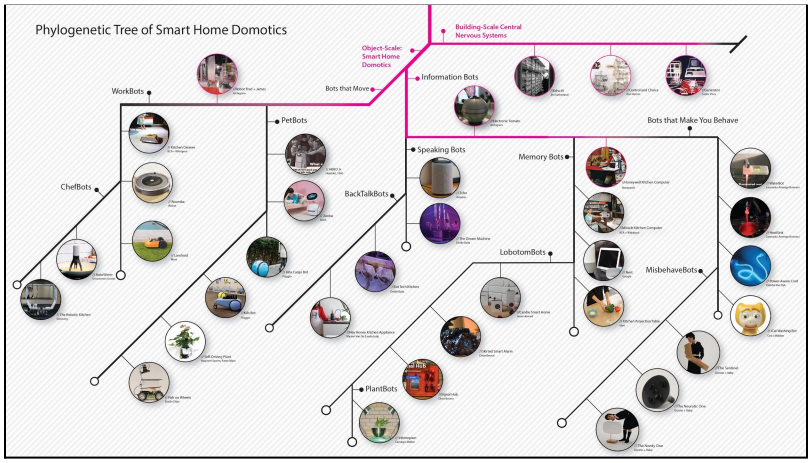
[1] Baker, "Smart Home Technology in 1966"
[2] Chalk, "The Electronic Tomato"
[3] Hernandez,"Before the IPad, There Was the Honeywell Kitchen Computer."
[4] Scholl, Carly. "Ahwatukee's House of the Future Preserves the Dreams of the Past."
[5] NeXt "File 1"

On the other hand, this flattened relationship between the home's occupants and devices has inspired artists and designers to imagine new types of interactions between smart objects, inhabitants, and the home. For example, objects like Greg Lynn's "Gita" bot, which acts as a sort of digital Saint Bernard dog, attentively carries objects for its owner and follows it around in an almost pet-like manner[6]. The Gita bot is so animalistic in its behavior, that in a recent video one can see Greg Lynn's real, biological dog becoming jealous at the attention paid to his computerized companion[7]. Gita is just one instance of an amazing, almost species-like variation in smart home devices that operate independently from their human co-inhabitants.

This essay will look at the genealogy and taxonomy of current and near-future smart home devices — devices that co-inhabit today's homes in parallel with their human occupants. Using the phylogenetic tree as a structuring tool for creatively reframing the emergent variety of smart "creatures" within the home, one might better understand the link between complex social issues around smart home devices and the sometimes fantastical and wonderful new speciations of smart home creatures they inspire. Issues like surveillance capitalism and persuasive design become key points of evolutionary divergence within our phylogenetic tree of smart home creatures, spawning new speciations of smart devices. These suggest near-future scenarios where one might co-habit their dwelling alongside an almost menagerie-like collection of digital occupants.

Genetic Precursors to Smart Home Creatures



"In some ways," says former Archigram member Dennis Crompton, "we are living in the network that [Archigram] drew." Today's experience of the smart home can trace its genealogy to the speculative design work of the 60's and 70's, when space-age technological optimism and computational technologies pushed architects, designers, and engineers to imagine new relationships between the home and its inhabitants. Broadly, these devices can be grouped into two branches on our tree: Building scale nervous systems and object-like devices.

Many precursors to the smart home, such as Sutherland's aforementioned "Echo IV," imagined centralized, smart "brains" for the home that could control all of its functions centrally. For example, Cedric Price imagined a centralized nervous system for his "Generator" project in Florida, a complex of vacation homes/artist retreats that would use a large crane-like device to

[6] Pierce, "The Cute Robot That Follows You ARound and Schleps All Your Stuff"
[7] Lynn, "Marjouri and Doug love walking together…"

reconfigure room-sized boxes in order to “provoke, delight, and otherwise stimulate” its inhabitants. Price designed a specialized computer with John Frasier that would understand the building’s occupants and act as the computational brains behind this proto-smart-building’s reconfiguration.

Large-scale centralised domestic computer-brains like Price’s and Sutherland’s had a short lineage, perhaps due to their scale in the home and the difficulty of installing them. Rather, a series of smaller, more object-like designs from the 70’s have become the ancestors of almost all of today’s smart home devices. For example, Archigram’s “Electronic Tomato” was a “ a groove gizmo that connects to every nerve end to give you the wildest buzz[8].” The radio-controlled device sported a range of Alexa-like functions, including “on-board logic,” “tv camera,” and optional extras that would allow one to perform activities like “direct business operations” through it. Smaller devices like the Electronic Tomato created what was perhaps a more approachable interaction between occupant and computer intelligence, one that at times became almost pet-like. The HERO Jr. was one such pet-like robot from the 1980’s that, in addition to a range of familiar smart home functions, would “explore its surroundings and seek to remain near human companions[9].”

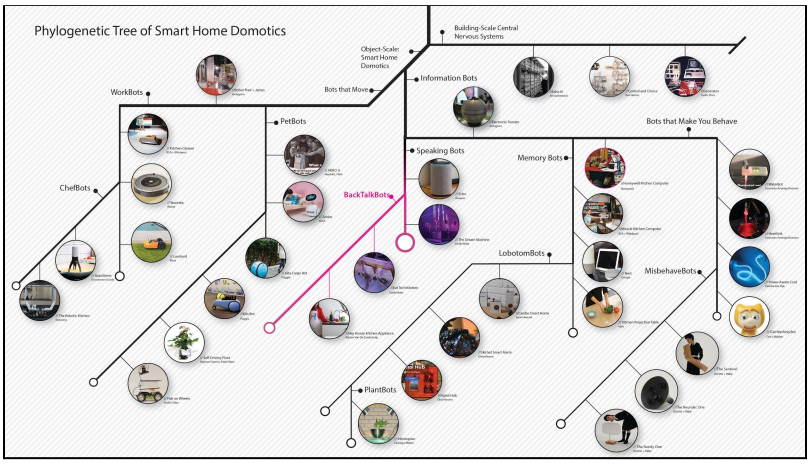
These more personable interactions between occupant and device set the stage for today’s experiences with Alexa, Nest, and other consumer-grade smart home packages. Just as one might have asked Honeywell’s kitchen computer for a recipe idea, we might ask our Google Nest Mini to set a timer for us in the kitchen. Just like Archigram imagined its Electronic Tomato would help one run their business operations from their home, one might today ask their Amazon Alexa to read off their outlook schedule and new emails in the morning. And just as the HERO Jr would follow around its owners with dog-like attentiveness, so does the Gita bot lug around its owner’s cargo with a canine energy.

BackTalkBots :: Creatures that Speak Too Well

Our first form of smart home evolutionary divergence has evolved in response to today’s issues around smart home device communication. The proliferation of smart home devices in the home already creates complicated social issues when devices are unknowingly used to communicate with each other, such as in a recent Burger King advertisement that intentionally played audible voice commands over the TV speakers to Google devices in the home.[10] More eerily, however, is the notion of secret conversations between devices outside of human perception. A recent New York Times article describes the way mainstream smart home devices such as Alexa, smart TVs, iPhones, and essentially any other device in your home with a speaker already communicate with each other hypersonically, outside of the range of human perception. This secret conversation between devices creates security risks that exploit the gap between human and AI perception — for example, commands can be hidden in white noise, or secretly

[8]Chalk, “The Electronic Tomato”
[9]The Old Robot's Web Site, “Heathkit Hero Jr.”.
[10] Maheshwari, "Burger King 'O.K. Google' Ad Doesn't Seem O.K. With Google."

embedded into soundtracks that sound like regular music recording to the human ear[11]. There is even some danger that devices could be hijacked for more nefarious purposes using “dolphin attacks,” which are inaudible noises that command all smart devices within “earshot” to perform certain tasks.[12]



While the danger of system exploitation here is clear, perhaps less obviously but more powerfully is the uncanny sensation that smart home systems are “talking behind your back” in their own, secret conversation. Anxiety about this secret, inter-device communication has prompted the first type of speciation in our tree, one where devices start to communicate a little too well to the point they are talking to each other completely independently of their human occupants. Artist Klasien Van de Zandschulp plays at this anxiety in her recent installation entitled “Hey Honey,” where a set of everyday-looking kitchen objects say rude things to each other in binary about the gallery visitors passing by[13]. Gallery visitors experience a reveal at the end of the exhibition, where flipping a switch shifts this hypersonic communication into the audible spectrum. Devices like Klasien’s suggest a near-future domestic sphere where smart appliances have their own conversations completely independently of their human occupants.

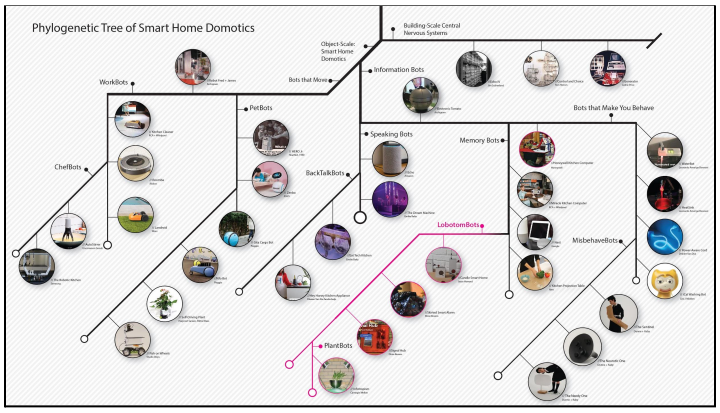
LobotomBots :: Creatures that Hear Too Well

Closely related to this notion of devices that communicate with each other better than their human co-habitants might wish, is the idea that devices might start to “eavesdrop” on the home. Surveillance capitalism has been a core source of anxiety around large, digital corporations like Amazon and Google. In her book *The Age of Surveillance Capitalism*, Shoshana Zuboff describes the commodification of our behavioural data, and the way this in turn creates “behavioural futures markets” that trade behaviour predictions, or, perhaps more unsettlingly, try to nudge and control behaviour[14].

While surveillance capitalism was before limited to our screen-based devices, its new foothold in domestic life through smart home is all the more unsettling[15]. For example, one recent patent from Amazon[16] describes the way smart home devices could listen in on conversations to

[11] Smith, "Alexa and Siri Can Hear This Hidden Command. You Can't."
[12] Zhang, “DolphinAttack: Inaudible Voice Command.”
[13] Van de Zandschulp, “Hey Honey”
[14] Zuboff, *The Age of Surveillance Capitalism*
[15] Maheshwari, "Hey, Alexa, What Can You Hear? And What Will You Do With It?"
[16] Edara, “Keyword Determinations from Conversational Data.”

indicate if consumers liked, disliked, or would be susceptible to advertising. A similar patent is described as using voice content to indicate an occupant's mood, and tailoring advertisements to them accordingly[17].



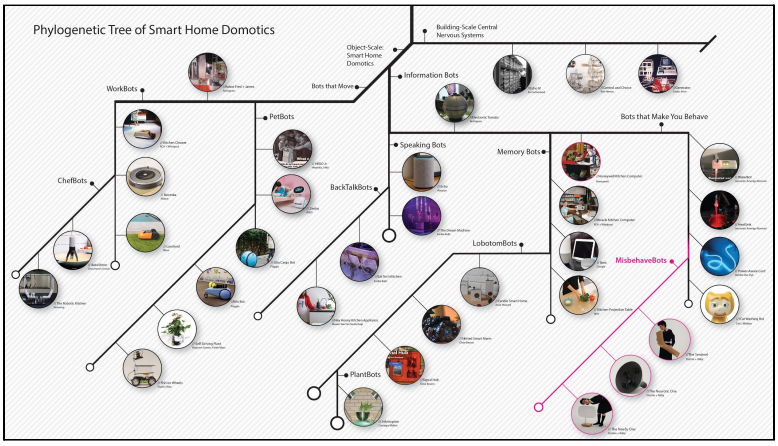
In response to anxieties about smart home devices that perhaps listen a little too well, designers have been experimenting with "lobotomized" speciations of smart home devices. An excellent example of such a device would be Tijmen Scheps "Candle" smart home range, a series of smart home IOT devices made specifically to control what consumer data companies receive from the smart home[18]. Clad in a Jetson's aesthetic that speaks to a time before the commodification of smart home data, each device features a large red switch and prominent red button. When thrown, these switches either physically disconnect the circuitry within the device, or create fake-data noise to stream to the smart home hub — effectively, scrambling the digital brains of the smart home device. Other devices in the series use systems such as a jewelry-like shroud whose materiality blocks the devices' sensors from working, like putting the device into a cage[19]. Some smart home devices even try to remove the digital brains altogether, such as in the "Infotropism" monitor that uses plant growth direction to replace a screen or app interface on a smart bin[20].

Misbehavebots :: Creatures that Persuade

While many of the examples we have looked at so far have taken negative social issues around smart home technologies as an impetus for imagining new species of smart home devices, there are a number of less nefarious uses for smart home tech that have spawned equally unusual varieties of digital creatures. One notable example here would be the case of persuasive design as it relates to smart home energy consumption and sustainability. Efforts at using persuasive design techniques in the smart home have created a wide variety of behavior-influencing appliances. For example, Deirdre Van Dyke's "Power-Aware Cord" emits a jellyfish-like glow in response to energy pull, with the hope that users will use this information to control their unknowing electricity consumption of plugged-in but unused appliances[21]. Similarly, Ernesto Arroyo's "WaterBot" is a smart home sink that lights up in parallel with its user's water consumption hopes to change behaviors around hot water use[22]. Even more playfully, this

[17] Fadell,"Smart-Home Automation System that Suggests or Automatically Implements Selected Household Policies Based on Sensed Observations."
[18] Schep, "IoT Case: Candle"
[19] Candle, "Dinie Besem's Innovations"
[20] Holistus, "Infotropism: Living and Robotic Plants as Interactive Displays"
[21] Dyk, "Power-Aware Cord: The 50 Best Inventions of 2010."
[22] Arroyo, "Waterbot."

cat-like robot from TU Eindhoven attaches itself to one's dishwasher, and verbally commands them to use more sustainable settings on lighter loads[23].



Where these types of devices suggest a future home environment where one's appliances are actively trying to persuade its inhabitants to behave better, it's not a stretch to think they might start taking on their own behavioural quirks, or even start mis-behaving with a creature-like independence. This speciation of smart home creature amplifies the pet-like characteristics and personality quirks we saw earlier in projects like the Gita bot and HERO Jr. Dunne + Raby's "Technological Dreams: All the Robots" series tracks a similar concept of smart home devices that go beyond functionality and become entirely about their interaction with their inhabitants. In their series of smart home devices, Dunne + Raby creates strange personas for each object, assigning them enigmatic names like "the ring" and "the sentinel[24]." Descriptions of each object play up their personalities rather than their functionalities: for example, for one object "[they] don't really need to know what it does as long as it does it well." Another device is described as being "very needy," and "trapped in an underdeveloped body," "depending on its owner to move it around." Such devices speak to a near-future scenario where, just as one interacts with today's smart home through the persona of "Alexa," smart home devices might take on a range of behavioural and social quirks and cues as they interact with their owners and each other.

The Smart Home Menagerie

From bots that have their own conversations with each other, to ones that take on their own behavioural quirks, to ones that can have their intelligence brutally lobotomized by their owners, visions of future smart home suggest a massive, species-like variation in smart home devices, and a shifted ontological relationship where devices will act more as co-inhabitants than appliances. The author's own video, "working in the smart home menagerie," envisions a future domestic life where home-workers co-habit their domestic space around a wide range of objects that exist as much to monitor the resident's home as they do to communicate with each other. Just as projects like the Electronic Tomato forecasted our current experience of smart home devices, more playful visions of exotic speciations of smart home devices at the edge of our tree might become critical design tools for imagining future interactions with the smart home.

[23] Midden, "Using persuasive technology to promote sustainable behavior in smart home environments."
[24] Dunne, Anthony and Raby, Fiona, "Technological Dreams: All the Robots"

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