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# Calm Surveillance in the Leaky Home: Living with a Robot Vacuum Cleaner

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## Abstract

Understanding the attachment owners can feel to their robot vacuums, which also map and collect data about their homes, is key to understanding the ambivalences involved in the integration of automated visualities in the home. Drawing on qualitative video interviews and observations of people interacting with their robot vacuums, this article identifies three key factors in understanding how cohabitation with a robot vacuum and its particular form of automated sensoria is experienced by its user: firstly, the robot assists with work that we would otherwise do ourselves with the aid of a broom or traditional vacuum cleaner; it is thus often regarded as an extension of ourselves, the equivalent of a cleaning assistant, or even a kind of pet with which you can interact. Secondly, its ability to move autonomously increases the inclination to anthropomorphize the robot as a being with some level of agency and intelligence. Thirdly, the robot vacuum cleaner is a very visible part of the intimate sphere. It has its charging station in the home; it cannot be hidden away in a cupboard like an ordinary vacuum cleaner; more often than not, furniture needs to be moved around for it to run smoothly. This article argues that these three factors are important for understanding people's difficulty in perceiving the robot as an entity that potentially participates in surveillance practices, and to understand the nature of this form of surveillance that emanates from the leaky home.

**Keywords**

robot vacuum; everyday culture; surveillance; leaky home; automated vision; smart home; cleaning habits

In the course of the twentieth century, the labor of looking involved in surveillance has become automated, and, in that process, the visuality of surveillance has been extended to encompass other sensoria. Surveillance today maps, calculates, predicts, and preempts—at the same time as more and more connected devices enter the home. By 2030 it is estimated that there will be 125 billion connected Internet of Things (IoT) devices worldwide (IHS Markit). Such devices include Internet-connected locks, interactive assistants with video and audio recording, surveillance systems, and sensors that chart humidity, heat, and light. They also include the newer generation of robot vacuum cleaners that are Wi-Fi enabled and can be controlled via one's smartphone or through speakers in the home such as Amazon Echo or Google Nest. They come with different forms of automated vision, linked to their navigation system, ranging from cameras to lidar technology. Such automation renders the home "leaky" in the sense that they permeate it and open it up to remote control. Connected devices developed to assist with mundane everyday chores, such as the robot vacuum, thus walk a fine line between being helpful assistants and being surveyors. Indeed, some brands market their products explicitly on their surveillance capabilities. For instance, Trifo's Lucy is described as "Super sensing. I'm always aware of my surroundings. I scan and detect the smallest obstacles to avoid. I quickly identify people, pets, furniture, and even items down to an inch!" (Trifo). However, even those models that do not emphasize surveillance features in their marketing may be repurposed for surveillance. In 2020, researchers from Singapore University and the University of Maryland demonstrated that they could make a Xiaomi Roborock vacuum cleaning robot eavesdrop on conversations taking place

in the room where the robot was located (Sami et al.). Although brands such as the MIT-based iRobot, with its iconic Roomba, have been consistently vocal about the precautions they take to secure users' data (iRobot, "Data Security"; Astor), most models today map your home in order to be able to do the vacuuming. As an advanced documentation of an automated visuality that transgresses the visual faculty, this map may hold valuable information about you as a consumer, ripe for exploitation by marketing. Indeed, a large survey carried out in Australia, Canada, France, Japan, the UK, and the US found that "63% of people surveyed find connected devices 'creepy' in the way they collect data about people and their behaviours" (Consumers International and Internet Society 2) and "28% of people who do not own and do not intend to purchase a connected device make this decision because of lack of trust in security and privacy" (8).

Drawing on qualitative video interviews and observations of people interacting with robot vacuum cleaners, this article explores the robot's dual movement: on one hand, trotting habitually across the floorboards as a trusted companion that is deemed most benign when it fails to "see" obstacles in its way; on the other, the robot's ability to perform mapping of its own route that is able to be "seen" by the robot itself and thus potentially also by others. This dual perspective is at the heart of the paradox of the machine: part-benign pet whose sensory capabilities are regarded as inferior in comparison with that of its owner, part-surveillant intruder that sees more than its keeper. To unfold this paradox, we need to start by looking at the properties of the scene where these interactions take place: the home.

**The Leaky Home**

In this article we argue that the robot vacuum cleaner can function as a vehicle to address the wider implications of what we propose to call "leaky homes," i.e., automated homes that leak

through the connected devices and sensors that collect, transmit, receive, and share data (Sofia). These homes leak beyond their traditional architectural and spatial boundaries in so far as they are accessible from afar, with mobile phones often functioning as remote controls for the technologies in the home. Scholarship in surveillance, digital media, and cultural studies has addressed how the home's concrete walls are superseded by "incorporeal informational barriers that continuously monitor and document" (Rapoport 326) and how the connected home's smart sensors, interactive assistants, and networked machines are sources of extractable information and data. Moreover, as Tanja Wiehn aptly remarks with regard to digital infrastructures more broadly: "Digital infrastructures we encounter today and maintain our interpersonal relations with are not bound to binary categories of public and private; On the contrary, they thrive and expand on leakage, but nevertheless invoke the impression of containment" (62). This sense of containment and privacy can make users even more vulnerable because they believe that their information is protected in ways that often do not correspond with reality (Agostinho and Thylstrup 763–4). In the home, this sense of security and containment is particularly prevalent because the home traditionally embodies connotations of containment and shelter. In Western liberal traditions, the home is usually conceptualized as a shelter, an enclosed space of privacy and retreat. Classic phenomenological writings posit the home as a site for "dwelling" (Heidegger 145–61) and the house as a shelter for daydreaming that "protects the dreamer" (Bachelard 6), defined by qualities of safekeeping. Significantly, it is the trope of the home-as-shelter that the marketing of IoT technologies in the home often stresses. However, as feminist critique has long noted, conceptions of the home as a shelter contrast starkly with the experiences of women, for whom the home through the ages has been a site of labor—of tending to children, household chores, and family members—not to speak of those that are victims of domestic

abuse, who need shelter *from* the home (Dobash and Dobash). The experience of the home as a place of safety is thus both illusory and exclusionary, and we need to pay attention to this longer cultural history when conceptualizing the properties of the leaky home today. In this article, we contend that the conception of the home as a contained shelter secured by technology needs to be qualified if we are to understand the calm surveillance dynamics involved in the automation of home devices that "see" the home in different ways than humans because (as our small-scale empirical study indicates) technologies are not necessarily at their most invasive when they are invisible. Rather, their noisiness, blatant clumsiness, and the fact that we need to move obstacles for them may cause us to see them as benign when perhaps we should not.

**"Well, There is Nothing Exciting Here to Record"**

Influenced by ethnographic methods found in work on human-computer interaction (HCI), human-robot collaboration (HRC), and design anthropology, we conducted video interviews and observations of eight people in five different households.[1] The people that opened their homes to us all live in the greater Copenhagen area in Denmark. Stella (26) is a recent graduate in comparative literature; her partner Rune (36) is a system developer and administrator; they live in an apartment in central Copenhagen. Pernille (44) works in publishing, and Jesper (45) works for the postal service; they both live with Pernille's twin daughters in a detached house in a residential area 25 km north of Copenhagen. Mia (47) works with children with brain impairments and lives with her three-year-old son in an apartment north of Copenhagen. Marianne (72) is a retired nursery school head; she lives in an apartment in the north-western part of Copenhagen during the winter, and in a small house in her allotment garden over the

[1] When we make use of observations and interviews we use only first names. At the end of the reference list, there is a list of video interviews and observations with specific dates.

summer. Moreover, our study springs from auto-ethnographic reflections, and the informants therefore include co-author Kristin (40) and her engineer husband Rasmus (37), who live with their two-year-old daughter in a house in a forested area north of Copenhagen.

Our qualitative interviews are in line with other ethnographic studies that focus on how people project intelligence onto machines (Fink et al.; Taylor) and how robot vacuum cleaners are gendered (Sung et al., "Housewives or Technofiles?" 133–4; Strengers and Kennedy 23–48), as well as a large group of ethnographic HCI and HRC studies intended to enhance the design of robot vacuum cleaners (Sung et al., "Domestic Robot Ecology"; Vaussard et al.; Forlizzi; Forlizzi and DiSalvo; Hendriks et al.). We draw on these studies to support the observations we have made in our own small-scale fieldwork in order to shed light on the ways in which users experience the particular form of automated sensoria that the robot vacuum represents from a cultural studies perspective. However, our approach is inspired by sensory ethnography and design research (Pink; Pink et al. 99–105) and involves a combination of semi-structured qualitative video interviews and "home video tours" where our informants re-enact cleaning routines with their robot vacuum cleaners while they talk us through what they are doing and how they imagine their robot vacuum's capacity to move, see, and navigate. These kinds of home video tours, Sarah Pink et al. argue, can help to raise reflections on habitual everyday actions and allow researchers to access those reflections (108–12). Moreover, we expand on this methodology by focusing on the microanalysis of informants' body language when they speak about and show us the functions of their robot vacuums. We draw here on a filmic methodology inspired by Harold Garfinkel's ethnomethodology, which is developed by Kassandra Wellendorf, where camera recordings allow us to observe in detail the small nuances in informants' gestures, body language, choice of words, etc. This method allows us to gain insight into the everyday

negotiations and interpretations that these people perform when interacting with the automated sensorium of the robot vacuum.

The main purpose of our interviews was not to map people's sentiments about the surveillance implications of their robot vacuum cleaners. However, this issue came up in every interview. Mia does not consider her robot vacuum a potential source of surveillance, and this was not a concern for her when she was buying the robot. When we talk to her, she is unsure whether the model she bought has a camera, but her stance is anyhow that her life is far too boring to be of any interest for surveillance: "Well, there is nothing exciting here to record. I would rather log into something else, the royal family or something more exciting than my dust bunnies." She thereby displays a classic response to surveillance of "nothing to hide and nothing to fear," which has been particularly prevalent with regard to CCTV cameras and other kinds of overt surveillance (Solove). What is at stake here is the conception that surveillance is only surveillance if it is individualized; systematic data-gathering on a metadata level to identify consumer groups of "people-like-you" (which is an intrinsic part of the automated visuality of surveillance that we are interested in here) is seen as less problematic (van Dijck 200).

Marianne reveals a similar stance. When prompted, she explicitly states that she has nothing to hide, although she adds that she is aware that her phone might be listening in on her and that what she Googles has an effect on the advertisements that appear on her computer. It seems, however, that these concerns do not affect her everyday use of or sentiments about the robot vacuum. Her enthusiasm for the robot and its ability to make her life easier is predominant: "I think that it is creepy that they can . . . listen in, I actually think that it is really creepy, but . . . I also forget it. It is only when you remind me that I think about it, but otherwise I don't really think about it every day."

The youngest and most tech-savvy couple, Stella and Rune, have the strongest concerns. Rune works as a developer and systems administrator at a small company that specializes in networks for IoT devices. He has set up a main network with several subnetworks in their apartment, and he is keen to isolate the TV and robot vacuum and to constrain their access to anything beyond the absolutely necessary, in order to avoid hijacking and potential infection by malware. Stella's arguments focus less on the technical aspects, and she displays a more affective relationship to the potential risk. She explains that she would feel uncomfortable if the robot had an embedded camera. Stella regards the robot they acquired as "less invasive" than she had expected and links this with what she perceives as its disappointing navigation skills, which she accepts in order to avoid feeling under surveillance.

These statements on the surveillance potential of the robot vacuum point to a constellation of issues that we have observed in the material, to do with: 1) the robot vacuum's integration into the household, 2) its navigation skills and perceived intelligence due to imagined sensory capacity, and 3) the attention the robot vacuum calls to itself as a smart technology, especially when it does not function correctly and gets stuck on carpets or under chairs. These factors all contribute to the robot owners paying less attention to the potential for data leakage once the machine enters their home. It is these three factors and what they have to say about automated visuality that we shall now turn to.

**An Automated Member of the Household**

Our perceptions of robot vacuum cleaners' intelligence and agency is key to how we relate to them. In *The New Breed: What Our History with Animals Reveals about Our Future with Robots*, robot ethics scholar Kate Darling writes about humans' relationships with different kinds of robots, arguing: "Even very simple robots, when they move around with 'purpose,' elicit an

inordinate amount of projection from the humans they encounter" (100). According to Darling, animal detection capabilities that are biologically hardwired into our bodies are activated when objects move on their own, and we perceive such objects as agents (101). This may explain why so many owners of robot vacuums give them names and talk about them as if they were household members, projecting human sensory capabilities onto the devices.

This corresponds well with our findings. Mia compares the robot vacuum to the cleaner she employed before she bought it, but she also differentiates between what she calls "*my* vacuum cleaner"—her traditional vacuum, for which she uses a possessive pronoun signifying a sense of ownership—and the robot vacuum, which she has named Roberta as if it were something or someone in its own right. Moreover, her three-year-old son treats it like a pet, following it around and stroking it.

Others create more elaborate narratives around their robots. When asked to describe their robot vacuum, Pernille and Jesper explain that it is called Preben and is gendered with the pronoun "he." They say that he is "quite human" and that they talk about him in an appreciative manner when he has completed a task. They also volunteer the information that he is having an unhappy love affair with their robot lawnmower, who is called Bertha: "They drive around looking at each other, but—naturally—they never meet." When prompted on how the devices "see," they remark that evidently the robots cannot see each other, as they do not have eyes. Nonetheless, they continue describing the robot vacuum as if it is able to see.

While Pernille and Jesper thus seem to have embraced the projection of agency and happily tell the story of Preben and Bertha who keep an eye on each other through the window, Marianne affirms (when asked) that she does not regard her robot vacuum as intelligent and does not have any kind of affective relationship with it. She describes it as a tool and compares it to a

food processor or dishwasher that makes everyday life easier; she is careful to assign intelligence not to the machine but to the people who designed it. Nonetheless, although she mostly refers to it with the gender-neutral "it," she has named the robot Robert, after a cleaner she employed before she acquired it. She also describes the process of acquiring and setting up the robot as having been akin to a battle of wills which she reenacts with her feet when telling us about it: "It constantly wanted to go over the doorsills, and I wanted to determine where it should vacuum. We talked a bit about that, Robert and me. But I won, because I just shut the door, and then it just does one room at a time." For Marianne there seems to be a sense of resistance to the anthropomorphization of the device. She tells us that she does not want to come across as a "crazy old person" who does not relate to it as a pure object. Yet during the interview, it repeatedly becomes clear that this perception of the robot is difficult to maintain, especially when it moves around.

Moreover, for Marianne, her own and the robot vacuum's sensory capabilities intermingle when it comes to detecting dirt. Her own way of checking if it is time to vacuum is when she feels crumbs underneath her toes. After she starts the robot vacuum she repeatedly empties its dust chamber to check how much dirt it finds. Only when she sees that it is completely empty does she feel convinced she can stop the cleaning process.[2] We may argue that she uses the robot as an automated extension of her eyes and feet while at the same time she monitors it with her own senses by peeking into the dust chamber to determine when it is done.

[2] The primary trick of traditional vacuum sellers has often been to show how their product is able to detect and eliminate more dust than the average vacuum cleaner (Scott 222). As part of a demonstration, it was common to bring a pile of dust to pour out on the carpet, after which the housewife was asked to hoover with her own vacuum cleaner. When the carpet looks clean, the salesman would repeat the hoovering with his model. He then shows a full dust chamber as proof of how this model is able to suck up debris that is not visible to the human eye.

For Marianne, Mia, her three-year-old son, Pernille, and Jesper, in different ways, their relations with their robot vacuums involve the projection of agency and sensorial capabilities onto the machine. It is another being onto which character traits can be projected or with whom conversations can be had. The automation of tasks we might do ourselves here results in anthropomorphizing the device. With Rasmus we find another way of engaging with the machine in so far as he uses his own body to explain the robot's functionality, the obstacles it encounters, and its comparative shortcomings. The vocabulary he uses also anthropomorphizes the machine—he talks about its "mouth" and "legs," and he uses body language to exemplify it with his own body, thereby displaying a form of identification with the machine. Rune wriggles his bottom to demonstrate how the robot has problems entering the docking station, and he makes choking, guttural sounds when he talks about how it gets stuck on the fringes of the carpet. He is keenly aware that he is anthropomorphizing the machine and repeatedly comments on the fact, in this way maintaining an intellectual distance to the way in which his body language keeps displaying identification.

What is particularly striking in these examples is that both the anthropomorphizing and the identification are almost always connected to the robot vacuum's movements and capacity of seeing or sensing its surroundings, which is predicated on its navigation system. This points to a need to further understand the perceived correlation between intelligence and navigation.

**What the Robot Vacuum "Sees"**

Several of our respondents remark that sensing dirt underneath their bare feet works as a repulsive indicator of uncleanness. For instance, Rasmus distinguishes between "visible dirt" that blocks the view of a surface and "invisible dirt" that is not seen but which can be sensed underneath your feet. But how does the robot vacuum help us detect dirt?

The iconic Roomba, launched in 2002, did not map its surroundings until its seventh generation. Instead, it operated through randomized navigation, which meant that it moved in a random direction whenever it bumped into a wall or an object, thereby eventually covering the whole floor. At the time this was more efficient than its competitor, the now-discontinued Electrolux Trilobite, which used ultrasonic sensors to map obstacles. Today most models use different kinds of sensors, cameras, or laser navigation to create a floor plan, which is stored and can often be accessed remotely on a mobile phone, showing the robot's route, mapping its trail. Moreover, the Roomba's patented "dirt detect technology," implemented in some models in 2004, means that if its sensors detect more particles in a given area, it will pass over that spot several times (iRobot, "What is Dirt Detect™ Technology?"). However, observing a robotic vacuum cleaner for longer stretches of time almost inevitably affords a sense of puzzlement. What patterns, invisible to the human eye, does it detect on the floor? What rationales determine its choreography? This may prompt the eerie feeling of an unintelligible logic at play, or alternatively the outright dismissal of its intelligence—both of which, in different ways, point to how automated machinic vision and the intelligence behind it is imagined.

When we ask Mia if the robot vacuum is intelligent, she responds: "I suppose so, because it can find its way around." But then she goes on to describe the seemingly illogical routes it takes: "It does not take the smartest or most intelligent route, but I suppose there is a purpose to it." She has confidence that "some smart people have calculated that this is the best way and have programmed it for that." Nonetheless, for her, the robot's apparently irrational navigation is a sign that it lacks intelligence in the human sense of the word, which she also finds reassuring: "It cannot think for itself. I don't want it to take over my home." She would not want it to be more intelligent than it is: "It is me that pushes a button and says it should start. I don't want it to

be able to register anything itself. It doesn't need to be able to do that. I prefer to be the one in control." This aligns with a 2011 user design study that investigated how people preferred their robot vacuums to behave, which concluded: "People prefer a calm, polite, and cooperative robot vacuum cleaner that works efficiently, systematically and likes routines" (Hendriks et al. 194). Moreover, an empirical study from 2014 contended that people wished to understand how the robot navigated because this gave them the sensation of being in control: "Most households were skeptical about the Roomba's random path, and one mother expressed her disappointment: 'How does it decide where it goes? It is stupid, it does not see where the dirt is, it always moves away from it!'" (Vaussard et al. 386). This resonates heavily with our findings. For most of our informants, the robot vacuum's ability to navigate and employ an automated sensorium seems to be a measure of its intelligence. Jesper and Pernille find it strange that Preben is unable to find the shortest route home to his docking station. They are able to see the docking station right behind him, but since he does not orient himself in the room in the same way as they do, he often takes a detour. Automating visuality here results in a sense of superiority in relation to the robot. The robot's navigation is also a mystery to Marianne:

> A robot vacuum has its own life and moves as it pleases. And I cannot figure it out. It must have something coded so it runs diagonally and then straight and then diagonally, and if I think that it needs to clean more thoroughly in a place, then I can block its route.

The robot's navigation is thus a sign both of the machine's enigmatic nature—it "has its own life"—and of Marianne's ability to outsmart it and take control. However, those that anthropomorphize the robot to a greater extent, such as Pernille and Jesper, seem to have a greater tolerance for behaviors that appear irrational to the human sensorium. This aligns with what social psychologist Sherry Turkle refers to as the ELIZA effect, i.e., "that desire to cover

for a robot in order to make it seem more competent than it actually is" (131). Although the robot vacuum is probably less of a black box to Rune, who is more tech-savvy than our other informants, he also displays tolerance for its inadequacy and finds it amusing to watch the robot "puttering around" the home. He explains that when it enters a room, it stops to orient itself, looking a bit confused, before resuming its cleaning job, which he finds hilarious. Yet Stella and Rune are also among the most concerned about privacy: they consciously chose a model that is intelligent enough to do the job but not so intelligent that it makes them feel surveilled. This may be another reason why they accept its shortcomings, although its tendency to keep getting stuck under the same section of pipe is a cause of annoyance. The robot vacuum's flawed ability to "see" is thus at the same time a cause of concern and what renders it a benign pet that can be regarded as part of the family.

**Calm Surveillance**

Despite the wish for "calm, polite, and cooperative" robots expressed in the 2011 study mentioned above (Hendriks et al. 194), and despite what many of our informants tell us about their puzzlement at the robot vacuum's movement patterns, it is apparent from our small-scale study that living with a robot vacuum cleaner is anything but a calm experience. It often requires a considerable reorganization of the home. Kristin and Rasmus had a big debate when they acquired the robot vacuum about whether their long Moroccan felt carpets would be compatible with the robot or would have to be removed; they were eventually put into storage because it was too much work to move them every time the robot vacuum was started. Pernille and Jesper usually start the robot vacuum when they leave the house because it is noisy. In an interview we conducted with Stella before she and Rune acquired their robot vacuum cleaner, she explained that she would have no patience with remodeling her home to accommodate the machine: "If I

have to pay thousands of kroner for an intelligent tool that can clean for me, then I won't bother with having to move everything around." However, when we visit her later, after they have had the robot vacuum for a couple of months, they have set up pieces of cardboard to stop it from getting stuck under a pipe, and they have arranged their shelves so that they do not touch the floor, to allow the robot to move beneath them. They have also fixed some loose cords so the robot will not get tangled up, and Rune has installed "no-go lines" around their carpets so that it will not get stuck on them. Stella explains (while laughing) that the robot needed two weeks of "house-training" before they could put it to work on its own because it would get stuck on their carpets.

Living with a robot vacuum cleaner thus requires its own set of work on the cohabitants' part to clear the way for the robot to be able to move as smoothly and unobtrusively as possible. Its presence is anything but "calm" in the way computer scientist Mark Weiser imagined that technologies in the home would become. In his seminal 1996 text "Open House," he proclaimed:

> Over the next twenty years computers will inhabit the most trivial things: clothes labels (to track washing), coffee cups (to alert cleaning staff to moldy cups), light switches (to save energy if no one is in the room), and pencils (to digitize everything we draw). In such a world, we must dwell with computers, not just interact with them.

For Weiser, dwelling means a comfortable cohabitation that is unobtrusive, rendering automation invisible. Our interviews suggest that the robot vacuum cleaner is rarely an invisible device that performs its function without calling attention to itself. Rather, it takes on a life of its own. Paradoxically, this noisy presence is part of the reason why our informants pay less attention to the machine's surveillance potential: its ability to move and its clumsiness contribute to the impetus not only to anthropomorphize it but also to regard it as less intelligent and less of a

threat. The capabilities of its navigation system and how the owners imagine its sensorium are central to how intelligent it is perceived to be, and the robot vacuum's helplessness often also reassures its cohabitants that it does not have the ability to surveil them. This means that even if the presence of the robot vacuum is anything but calm, paradoxically the form of surveillance it represents *is* calm, albeit in a different understanding of the word than what Weiser sets out above. It is a form of surveillance that we may fail to notice precisely *because* the robot vacuum does not blend into the surroundings. In our data-saturated everyday lives, we expect surveillance either to be overt and explicit, as with CCTV cameras or baby monitors, or to take the form of silent, ubiquitous data-tracking (Steiner and Veel). The disturbing presence of a robot vacuum that we regard as a member of the household somehow falls in between these categories.

Going back to the notion of the leaky home that we set out in the beginning of this article, we now see how the example of cohabitation with a robot vacuum that we have explored shows how the cultural trope of the home-as-shelter is challenged in new ways by the technology-saturated leaky home. Here the home-as-shelter trope breaks down not so much from the tedium of housework or the threat of domestic abuse, as feminist critique has historically argued, but rather through the seemingly benign calm surveillance of the robot's automated gaze. The automated home is perceived not only by us but also by the connected devices that inhabit the same space as us, in this way harboring, on one hand, an increased level of surveillance potential and, on the other hand, an affective engagement with non-human agents which causes us to pay less attention to the former. Most IoT and artificial intelligence devices are designed to make people integrate and accept them rather than raising privacy or security concerns. For that very reason, a wealth of insight is available from looking at people's body language, vocabulary, and concrete interactions, as we have done in our interviews. Further research may expand our

findings to consider the implications of other automated devices in the home, such as Alexa, Google Nest, smart locks, or thermostats. However, as our small-scale fieldwork shows, the robot vacuum cleaner is a particularly interesting case study because of the autonomy it displays as it moves around the house—often causing its owners to personify it and treat it as a household member in a way that downplays its surveillant implications but also highlights how automated visuality is perceived by those living with it on an everyday basis.

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**Video Recordings of Interviews and Observations**

Kristin. Personal video interview. 8 Aug. 2019.

Rasmus. Personal video interview. 10 Aug. 2019.

Pernille and Jesper. Personal video interview. 13 Nov. 2019.

Rune and Stella. Personal video interview on Zoom. 14 Sep. 2020.

Mia. Personal video interview. 21 Sep. 2020.

Marianne. Personal video interview. 22 Sep. 2020.

Rasmus. Personal video interview. 1 Oct. 2020.

Rune and Stella. Personal video interview. 1 Jul. 2021.

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