TRIVIIS
Anais de Conferências e Mesas de Debates do Seminário Internacional de Pesquisas em Midiatização e Processos Sociais

Adding the digital to the natural: Smart gardens[1]

Adicionando o digital ao natural: jardins inteligentes

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Abstract: The practice of gardening has been augmented by the incorporation of sophisticated technological innovations. As advertised, these technologies generate new forms of data that assist the gardener in achieving success. These technologies are presented as both effective and environmentally friendly. Nevertheless, as is evident from the field of media studies, there is another perspective to consider. A significant question that arises is how this affects our relationship with nature. Gabrys (2016) discusses the concept of a "thingification dilemma," which refers to the increasing influence of objects and technology on human senses and activities. Nassehi (2019) speaks of a distinct new way of relating to nature. This presentation prompts the consideration of the potential implications of the use of smart technologies that are designed to facilitate connections between humans and the non-human world.
Keywords: smart Technologies; gardening; observation.

Resumo: A prática da jardinagem foi ampliada pela incorporação de inovações tecnológicas sofisticadas. Como anunciado, essas tecnologias geram novas formas de dados que auxiliam o jardineiro a alcançar o sucesso. Essas tecnologias são apresentadas como eficazes e ambientalmente amigáveis. No entanto, como é evidente no campo dos estudos de mídia, há outra perspectiva a ser considerada. Uma questão importante que surge é como isso afeta nossa relação com a natureza. Gabrys (2016) discute o conceito de "dilema da coisaficação", que se refere à crescente influência dos objetos e da

[1] Conferência apresentada no VI Seminário Internacional de Pesquisas em Midiatização e Processos Sociais. POSCOM-UFSM e ECA-USP na "MESA 6 — Interfaces: mediações e midiatizações (das tradições, conversações e perspectivas)".
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tecnologia nos sentidos e atividades humanas. Nassehi (2019) fala de uma nova forma distinta de se relacionar com a natureza. Esta apresentação leva à reflexão sobre as potenciais implicações do uso de tecnologias inteligentes projetadas para facilitar as conexões entre humanos e o mundo não humano.

Palavras-chave: tecnologias inteligentes; jardinagem; observação.

1. Introduction

The natural environment is becoming increasingly technologized, with data collection, processing, and analysis occurring in these environments (Gabrys, 2020, 1). The practice of gardening as a leisure activity, is now being augmented by the incorporation of smart technologies. Instead of the traditional method of checking the soil by hand or inspecting the plants by eye, digital gardening tools are about to take over. Even gardens are now part of the "mediatized worlds" (Hepp & Krotz, 2014).

The popular practice of gardening has emerged as a valuable resource for the industry, stimulating the development of a diverse range of products, including novel plant varieties and innovative tools and gadgets. I focus on the role of gardening as a leisure pursuit. However, it is important to note that commercial farming has already adopted a significant degree of automation and sensor technologies.

At the outset of my presentation, I will provide some illustrative examples of these tools, which are already in use. I will then examine how they are marketed by the industry. Given that this is the nascent stage of these technologies and that they are developing rapidly, I assume that the relationship between humans and the natural world will undergo significant transformation. By adopting a systems-theoretical perspective, I will offer some insights into the potential impact of these technologies on our relationship with nature.

2. Smart garden tools

The array of available tools encompasses a diverse range of resources, including apps designed to assist in plant identification, podcasts offering insights into various aspects of gardening, and online communities where individuals can engage in discussions about their gardening experiences.

In this presentation, I want to focus on technological gadgets, such as smart gardening devices, which are becoming increasingly prevalent. The scope of these devices encompasses everything from inexpensive plant monitors (Figure 1) designed for analyzing the humidity level of indoor plants to sophisticated monitoring and care systems (Figure 2,3,4,5).

Figure 1 — Smart garden tools

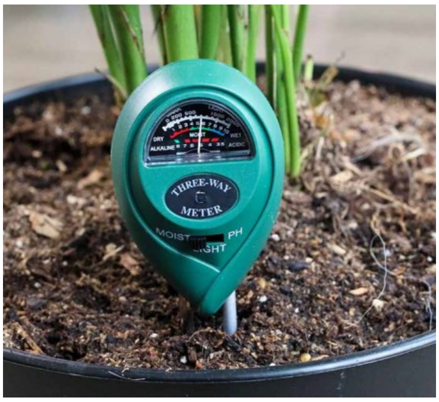
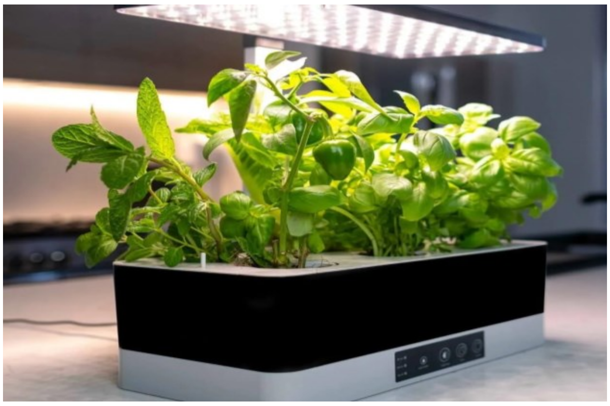


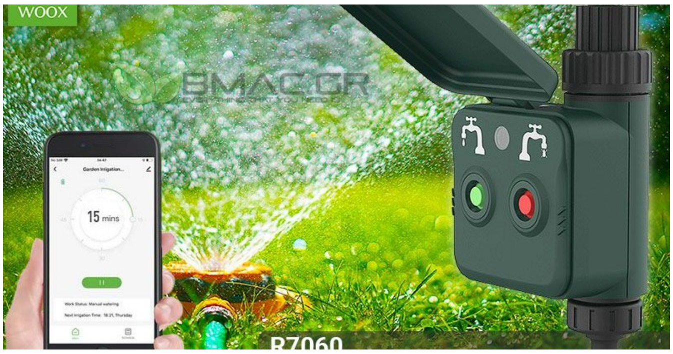
Figure 2 — Smart garden tools



For instance, the smart pot (Figure 2) typically incorporates a variety of sensors that gauge the moisture content of the soil and automated features that facilitate automated watering based on the moisture level detected by the sensors. Additionally, light and nutrition sensors provide data for the creation of an optimal growing environment. Connecting the data to a smartphone application enables the home gardener to receive alerts or notifications when attention is required. The data can be stored for the purpose of tracking the growing history.

Smart irrigation systems (Figure 3) are advanced watering systems that incorporate local weather data to adjust watering schedules based on current and predicted weather conditions. Soil-based sensors are used to determine the moisture content of the soil. The goal is to ensure that plants receive the optimal amount of water. Such systems are capable of independently managing multiple zones, each with specific watering requirements. This is particularly useful in areas with diverse plant types or varying sun exposure. The integration of smart irrigation systems with mobile applications that permit gardeners to remotely control and monitor their irrigation systems.

Figure 3 — Smart garden tools



The increasingly popular automatic or robotic lawn mowers (Figure 4) mow the lawn autonomously according to a programmed schedule. Equipped with various sensors, they can detect obstacles and navigate around them. Rain sensors detect wet conditions and pause mowing to prevent damage to the lawn and the mower itself. The gardener has the option of controlling and monitoring the mower remotely via the utilization of either an app or smart home systems, which enables voice-based control through various platforms.

Figure 4 — Smart garden tools

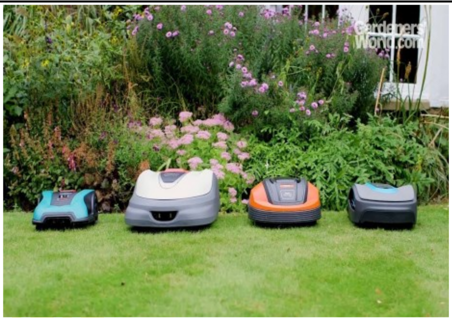
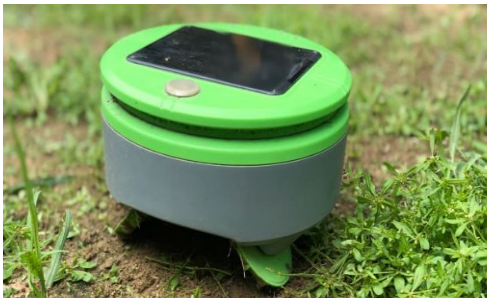


Figure 5 — Smart garden tools



There are also weed-eating robots on the market (Figure 5). These use sensors and algorithms to identify and target weeds. If they are functioning correctly, these devices are capable of distinguishing between weeds and crops based on their size, shape, and even color. They use mechanical methods to remove weeds, such as cutting or uprooting. These autonomous vehicles navigate the garden using GPS, cameras, or other sensors.

3. How are these gadgets advertised?

Advertisements frequently portray a techno-optimistic narrative, suggesting a deeper connection between humans and nature through the use of technology. The increasing integration of computers and sensors in garden gadgets, for example, is seen as a way to facilitate this connection and bridge the gap between humans and the natural environment. This integration is believed to enable nature to communicate with us. Especially sensing technology for plants is seen as having the potential "of developing a deeper connection between people and their gardens". By providing

> […] real-time information on what is happening in your garden, gives you tips on how to make your plants thrive, and even gives you insights as to what plants or plant groupings will grow best in a given environment" (https://fuseproject.com/work/edyn-garden-sensor/#digital).

The “objective” data generated by the sensors is considered to be more reliable than that produced by human observation, and this data is believed to optimize gardening practices.

One significant argument concerns control, given the inherently unpredictable and surprising nature of gardening. A lack of control can be a deterrent for an enthusiastic amateur gardener. In this context, technology offers a solution:

> By integrating smart garden tools like automated sprinklers, sensors, traps, and gardening robots with existing smart home ecosystem, you can even more easily control your garden and stay on top of key data insights (https://blog.arduino.cc/2023/09/12/7-little-known-tech-solutions-to-take-your-garden-to-the-next-level/).

New technologies help gardeners succeed by “informed and intelligent decisions”. Success is already a programmed outcome, thereby preventing any potential for disappointment.

Furthermore, the advertisers claim that these technologies possess a social potential:

> With the right tech gadgets and tools, you can make gardening much more engaging and rewarding for kids, sparking what could be a lifelong interest in the hobby” (https://blog.arduino.cc/2023/09/12/7-little-known-tech-solutions-to-take-your-garden-to-the-next-level/).

The use of automated lawn movers enables users to save time, allowing them to spend more time with their families. Machines can substitute for tedious activities, freeing up time for social activities. Images, such as, of a father playing with his children indicate that he is engaged in leisure activities rather than performing laborious tasks such as cutting the lawn with a mechanical lawn mover.

These technologies are regarded as a source of progress, for improving the quality of life. Such technologies provide a sense of control and autonomy, which, in the long term, should reduce the likelihood of failure.

4. How do these technologies change our relationship to nature?

As illustrated in the advertisement, digital technology has the capacity to address individual, social and ecological issues, including the scarcity of time (a robot lawnmower can perform this task), the loss of control due to the unpredictability of nature, and the potential for success in gardening with the appropriate data. The issue of water scarcity is a concern in the context of automated drip irrigation systems, which facilitate efficient watering. Technology is capable of facilitating the detection of environmental issues, such as the identification of soil problems or the presence of pests. Proponents of these technologies claim that they are highly effective and environmentally friendly.

These technologies offer solutions to problems as depicted in advertisements. The question thus arises as to what problems they solve and what new problems they may potentially cause.

4.1 The role of technology

Luhmann argues that technology is often viewed as a cause-and-effect relationship, with the underlying distinction of whether it works or not. He characterizes the security of technology as being based on its repeatability and the control of defects, which he considers to be “delusive” (1990, 225). As he argues, “we lose control of causalities”, because societies have “become much too complex” (1990, 224). “The gist of technology is simplification. Unanticipated effects are just the reverse side of the coin…” (1990, 228). We use technology to solve problems. The height of the lawn is excessive and requires trimming. However, the advent of these technologies has also led to the emergence of new problems.

The first of these “unanticipated effects” (Luhmann 1990, 224) is the necessity of producing all the gadgets. This has an environmental impact, including the use of metals, energy from data centers and cloud computing, and the production of waste. Cubitt speaks of “toxic media”, including the toxicity of the production processes of media materiality itself, toxic infrastructure in terms of energy and minerals, and the immense environmental costs in terms of material and energy use (Cubitt 2017). On the one hand, digital technologies are employed to monitor the health and disease of gardens, optimize the use of resources, and on the other, they also contribute

> […] to the very problem of environmental change that they would avert by requiring significant energy and material resources for computer hardware and data processing (Gabrys, 2020, 4).

A further aspect affects our epistemological relationship with nature. The advent of digital technologies has led to the generation of novel forms of data through the processes of sensing, data collection, and processing. For example, digital plant monitors are capable of measuring a multitude of variables pertinent to the growth of plants. These include the amount of light available to the plants, the levels of essential nutrients in the soil, the temperature around the plants, the pH of the soil, and the moisture level in the soil. These measurements are then displayed to us. This approach to the garden is strikingly different from the conventional manner in which humans encounter them. Our understanding of plant health is typically based on our own senses and experience. Gabrys speaks of a “thingification dilemma”, when more and more things take over human senses and activities, which are radically distinct from how humans make sense of the world (Gabrys 2019).

Consequently, the data enables us to perceive the garden in a novel way, while simultaneously obscuring it (Nassehi 2019, 111). Nassehi discusses in his latest book “Patterns. Theory of the digital society” that technology has a doubling function, whereby produced data results in a “doubling of the world”. This function can become reflexive. For example, if the soil is observed to be damp but the device indicates that it is arid and requires watering, then either the perception of the observer is questioned, or the data processing of the device is called into question.

However, it is frequently the case that the data processing of the machine in question is not accessible or, at the very least, is largely invisible. This is due to the fact that the data refers only to itself, and thus the manner in which it is processed remains unknown. Even though the weed-eating robot is not aware of weeds, it is capable of distinguishing them from other plants. By analyzing large datasets of images, the robot has learned to recognize different types of plants based on their visual features. The process of connecting data involves the collection and linkage of information that is related to one another.

It is crucial to acknowledge that the robot is only capable of performing tasks within the parameters of its own abilities. The data produced by the robot is self-referential, meaning that it has its own reference and is limited to the capabilities of the robot itself. In the context of Luhmann's theory, robots and data are observer-relative. It can be posited that data and robots are self-referential observers (Nassehi 2019, 113). They create a reality of their own, or, as Nassehi states, a "doubling of the world". Furthermore, due to their self-referential nature, they are not entirely predictable.

4.2 The creation of new realities

In contrast to advertisement saying that these technologies are "developing a deeper connection" between people and their gardens, these technologies are pre-ordinated to the environment, or, in other words, act as intermediaries between the environment and humans. They create a reality of their own, where for example the soil has been digitalized into coded numbers and sizes. Consequently, there are at least two distinct realities that humans are confronted with: the reality of one's own perception and the reality of the data produced. Coded numbers and sizes ultimately give the impression of objectivity, which means having control of what is going on in the garden.

The use of numbers and quantities in gardening serves to reduce uncertainty, thereby creating the impression of control. However, this phenomenon is not exclusive to those engaged in horticulture. Nassehi (2019, 44) posits that the contemporary digital society is distinguished by a surplus of control (Kontrollüberschuss). The logic inherent to digital technology, and its claimed objectivity, differs from the originality of human perception. Moreover, technologies are becoming increasingly autonomous in their decision-making processes. Automated sensor-based irrigation systems determine the optimal time for watering and weed-eating robots select which plant must be removed.

This implies that, in contrast to advertising, we are increasingly detached from the natural world, as a consequence of our reliance on data and measurements provided by these machines. In result, this changes the way we approach a garden. For instance, digital garden technology can influence the design of gardens and the microscopic life in the soil. For a smart irrigation system to function optimally, specific planting arrangements are necessary. A robotic lawnmower is most effective when utilized on vast, homogeneous, and monocultural lawns, and its operation at night can lead to injury or irritation of wildlife.

Using these technologies affects how we perceive the garden, and how the garden presents itself to us. It affects how we develop gardening practices, including what we consider relevant, how we evaluate and categorize, and what we overlook. In paraphrasing Nassehi (2019, 86), it can be argued that a completely new way of relating to the garden emerges. In addition, the gardener must also decide which technologies are appropriate and which are not.

Tsing (2016) describes this new way as further alienation which is a consequence of our progress-oriented thinking. The implementation of these technologies, which have been justified in the name of progress, has served to further alienate humanity from the natural world. This has ultimately resulted in the Anthropocene epoch.

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