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ARTIFICIAL INTELLIGENCE IN SMART HOME DEVICES: THE FUTURE OF THE SMART HOME

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Анотація

У статті висвітлена тема сучасної потужної технології «smart home». Проаналізовано перспективи розвитку даної технології, виявлено технічні та філософські аспекти повного втручання штучного інтелекту у керуванні домогосподарством.

Ключові слова: *штучний інтелект, smart home, технологія, Інтернет речей.*

Abstract

The article highlights the theme of the modern powerful technology "smart home". The perspectives of the development of this technology were analyzed, technical and philosophical aspects of the full interference of artificial intelligence in the management of the household were revealed.

Keywords: *artificial intelligence, smart home, technology, Internet of things.*

The entire tech world is debating the consequences of artificial intelligence and the part AI is going to play in shaping our future. There is an infinite number of spheres where artificial intelligence is used so it is useful to highlight ten most important items among them: smartphones, smart cars and drones, social media feeds, music and media streaming services, videogames, online ads network, navigation and travel, banking and finance, smart home devices, security and surveillance.

Smart home devices is perhaps the youngest and both most demanded developing area where artificial intelligence is mixed with Internet of things, analytics and Big Data. Smart home technology uses devices connected to the Internet of things (IoT) to automate and monitor in-home systems. It stands for Self-Monitoring Analysis and Reporting Technology. The technology was originally developed by IBM and was referred to as Predictive failure analysis. Smart home technology allows users to control and monitor their connected home devices from Smart home apps, smartphones, or other networked devices. Users can remotely control connected home systems whether they are home or away. This allows for more efficient energy and electric use as well as ensuring your home is secure. Smart home technology contributes to health and well-being enhancement by accommodating people with special needs, especially elder people.

Today Smart home technology is represented by use of AI in wireless speaker systems, thermostats, monitoring systems, domestic robots, smoke/CO detectors, lighting systems, door locks, refrigerators, laundry machines and water detectors. But what would be this technology in the nearest future with the total domination

of AI? To predict it we should to think of Artificial Intelligence as computing power that is able to perform particularly complex tasks that would otherwise require a human brain to perform.

A motion sensor might trigger a light to turn on. But if a home had Artificial Intelligence, it might consider the time of day, the person walking around the home, and where he/she was walking in deciding which light to turn on and how long to keep it on for.

Let's imagine the universe of things a house can be aware of: it can be aware of the presence of the people who live in the house (along with their personas); it can be aware of what they're doing; it can even be aware of what every device in the house is doing. If you want the house to think like a human, the house needs to be able to analyze the data a human would analyze before making a decision. A truly intelligent home would combine a number of sensory interfaces such as facial or voice recognition, context-based suggestion and responsive notifications to reduce the amount of input required on the part of the homeowner.

Ideally, this would all come together to create a control system that streamlines or simplifies users' decision-making processes in a rapidly changing environment. A particularly extreme scenario would be the ability to stage an evacuation in the event that a small-scale fire started in, for example, the kitchen. Having sensed the blaze, the AI would alert each member of the house, requiring everyone in the family to acknowledge the alarm. It then intelligently guides each person to a safe meeting point based on their location, using only routes that it knows are currently safe for them to use. Adults are informed as to the status of the rest of the house's occupants throughout this process, so they know that everyone is aware of the fire and is making their way out.

When it comes to AI modelling, there are two basic approaches that can be taken. A world model is where all of the system's intelligence is supplied to it through the programming, supplying it with the information it needs to make informed decisions. The other approach – and the one favoured by current machine learning projects, lies in the construction of a framework that more closely resembles a human thought process, resulting in a which can teach itself about the environment around it and can create and update its own world models.

While it would be useful for an AI to access and share knowledge across a whole network of properties and external information so it can improve its behavioural data, the most important element will be its ability to understand and prioritise local activity when making a decision. Say a user wakes each day at 6am and leaves the house at 7am; you wouldn't want a AI to decide that 7:28am was the optimum time to put the kettle on because the average time for homeowners to wake was 7:30am. Yet if a system could calculate the ideal time to wake a homeowner up based on sleeping patterns, weather data, and the likely traffic on their commute – as well as checking their calendar to see whether they are due to be at work that day – then it could combine a number of internal and external factors to make an informed choice each morning as to the best time to wake up the homeowner and brew them a cup of coffee.

A fundamental question for artificial intelligence in the home will lie in how much power we are willing to grant an overarching control system. Should it be allowed to make its own decisions independent of human input, or should it simply make recommendations for the user to review and approve? Would the latter not negate its usefulness as an automated system?

The first issue is that AI shouldn`t make any errors because it is unacceptable and dangerous for people lives in Smart home technology. Even a one in ten thousand chance of making a wrong decision could be a liability when it comes to home automation, in which case a failsafe or trip switch will need to be built in as a

counterbalance. Additionally, the fact that the home is such a personal space means that residents will absolutely need to feel in control of their space. Because of this, offering the user the opportunity to tweak and override any AI automation will go a long way towards creating a service that is more amenable for homeowners.

The other pillar upon which an AI for the home will have to be built is whether or not it is 'friendly' – a term coined by researcher Eliezer Yudkowsky. As he points out: "Friendly AI is not a module you can instantly invent at the exact moment when it is first needed, and then bolt on to an existing, polished design which is otherwise completely unchanged."

Expanding this idea further is a recent Google Brain paper titled 'Concrete Problems in AI Safety'. This research again focuses on a residential situation and suggests five practical challenges involved in creating an AI-enabled cleaning robot. These involve ensuring that the robot will not cause damage in order to work faster, will not find loopholes to activate its reward system, will offer a level of human oversight and control, will adapt to different locations (where rules might change) and will only explore more efficient ways of performing its role in a safe, secure manner.

When you consider that all of these are simply the result of a relatively limited scenario (cleaning a home), then this begins to shed some light on the huge task facing companies and institutes looking to bring artificial intelligence into the home. Yet, if the current enthusiasm from investors into AI projects and researchers is sustained, then there is a strong chance that we will see a growth in machine learning ideas being employed with the goal of developing increasingly intelligent home environments.

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