INSIGHT 7

AI-DRIVEN SMART ENVIRONMENTS EVERYWHERE

Many products could be sold with AI as a default, creating "smart" environments that can learn and evolve to adapt to the needs of owners and users. It may be difficult for people to understand the capabilities of smart environments, or to opt out of them.

TODAY

Autonomous devices and robots are increasingly present in our everyday lives. For example, restaurants are using robots to deliver meals.[1] Robot cleaners are commonly being used in commercial spaces.[2] In the agriculture sector, more autonomous and semi-autonomous machinery is being used to cultivate crops. In homes, AI is being added to everyday devices. Figure 1 shows further examples. Such devices could continue to gain new features as more capable AI models are released.[3]

Examples of products incorporating AI features

	Product & release	Description	Data analysis	Computer vision	Robotics	Language processing	Media generation	Navigation
Household devices	**Smart pillow** DeRucci, 2024	Monitors and intervenes to adjust the position of the head and reduce snoring and the risk of sleep apnea.	●		●			
	Video doorbell Amazon Ring, 2018	Allows users to see, hear and speak with visitors at their door and provides custom alerts.	●	●				
Wearables	**Smart glasses** Ray-Ban Meta, 2023	Performs tasks like taking pictures and answering questions using data from the user's field of view.		●		●	●	
	Mixed Reality glasses Apple Vision Pro, 2024	Blends digital content to surroundings and integrates an AI assistant.		●		●	●	
Commercial devices	**Spot robot** Boston Dynamics, 2020	Navigates complex terrains and perform tasks like data collection, inspection, and manipulate objects.		●	●	●	●	●
	Self-driving truck Galik, 2022	Driverless commercial delivery truck.	●	●	●			●

Figure 1. Examples of products incorporating AI features

Researchers and industry may need more data about the physical world to train more advanced AI. AI that collects real-time information on its physical surroundings is referred to as embodied AI (see Figure 2).[4] AI can be embodied in anything from smart phones to household devices or human-like robots. When connected to sensors and given mobility, AI can interact with people and physical spaces, for example by opening doors or summoning elevators.[5] As giving AI a body can allow it to learn from interacting with the world much like humans do, it may represent a path toward developing more advanced AI.[6]

It is becoming more difficult to understand the capabilities of devices in our surroundings. Some devices are referred to as 'robots' despite having no AI capabilities.[7] Other devices can have multiple AI functions. For example, tourists can rent AI-powered e-bikes that can give a guided city tour.[8] Bird watchers can buy AI-powered binoculars that identify wildlife.[9]

Older devices can often be retrofitted with new capabilities in ways that are not obvious from the outside. For example, an AI kit can make an existing tractor fully autonomous.[10] Security cameras that have been in operation for a long time can be connected to facial recognition software.[11]

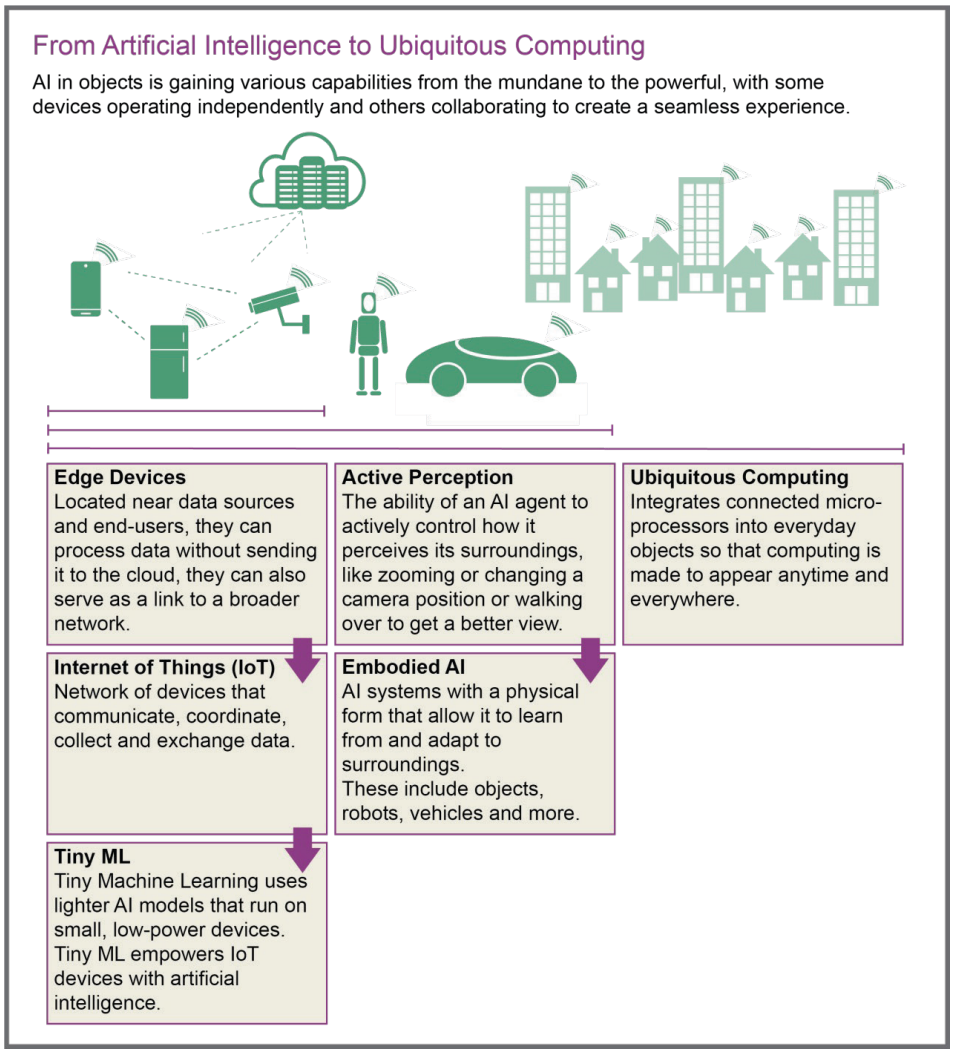

Figure 2. From Artificial Intelligence to Ubiquitous Computing

FUTURES

In the future, more AI-powered devices may be found in more settings, from workplaces to leisure spaces and dwellings. It may become impossible to avoid interacting with these devices. The number of IoT (Internet of Things) devices could reach 75 billion by 2025, more than doubling in four years[12] and the global AI software market could grow roughly fivefold[13] from 2022 to 2027.

Device manufacturers could be incentivized to add AI capabilities to more devices either as a selling feature or to collect data. Data can be useful not only to generate new revenue streams but also to train new models. This could be especially relevant if embodied AI proves useful in building next-generation frontier AI models, or if companies reach the limits of existing quality training data.[14] For example, by deploying a fleet of smart cars a company could use data on the city landscape, traffic, and the behaviour of pedestrians to train even more powerful AI models.

Everyday devices could end up having more powerful AI capabilities than needed. It may be easier to equip a device with an off-the-shelf, general-purpose AI, such as ChatGPT or Copilot, than to customize a model with more targeted functionality. Smart devices could become the default in new homes, ready to adapt to new owners or tenants. Devices could be sold with certain features locked behind a pay-for-access model, as was seen with the Amazon Ring,[15] and with Tesla,[16] and Mercedes[17] cars.

General-purpose AI could become standard in a way that increasingly blurs the lines between consumer product categories. For example, smart watches and fitness trackers have raised concerns that they might occupy a regulatory grey zone between medical devices and low-stakes consumer products.[18] The Aqara home sensor can be used for everything from controlling lights to providing security surveillance or detecting falls.[19] The appearance of such objects may not clearly signal their capabilities. Human-like robots may have eyes that can see through walls, for example – or the same sensors could be entirely hidden.

IMPLICATIONS

- People could require **new skills to navigate AI-powered spaces.** Manufacturers may need to use new kinds of labelling or instructions to disclose the capabilities of their AI devices in a way that allows consumers to make informed decisions
- People unwilling or unable to engage with AI-powered spaces may find themselves **unable to access certain services**
- Insurance companies could **encourage some kinds of AI monitoring or demand it as a condition of coverage.**[20] For example, facial recognition to confirm the identity of a driver to reduce auto theft
- **The rights and interests of individuals could come into conflict in new ways.** For example, wearing smart glasses in public spaces or sending a robot to pick up groceries could challenge privacy rights. Trust is needed to ensure that the devices are not collecting the likeness of people without consent.[21] Property owners could install AI-powered devices to protect their investment or help with maintenance. Tenants may find themselves in a smart home with services they do not want or settings they cannot change
- Smart environments could change advertising strategies. It could become routine for **AI-enabled devices to nudge users with personalized advertisements in real-time.** For example, smart cars may reroute drivers towards certain businesses and encourage them to stop to make a purchase

Endnotes

1 Cotnam, Hallie. Meet the Robotic Cat Serving Diners at a Gatineau Restaurant. CBC News, 27 October 2021.

2 Shibu, Sherin. Sam's Club Buys Hundreds of Autonomous Floor-Scrubbing Robots for Its Stores. PCMAG, 22 October 2020.

3 Kucharski, Kyle. Meta's Ray-Ban Smart Glasses Just Got Another Useful Feature for Free (and a New Style). ZDNET, 23 April 2024

4 Zia, Dr. Tehseen. Embodied AI: How It Bridges the Gap Between Mind and Matter. Techopedia (blog), 12 September 2023

5 Diligent Robotics. Moxi. Accessed 23 May 2024.

6 Berruti, Federico. An Executive Primer on Artificial General Intelligence. McKinsey, 29 April 2020.

7 Teisceira-Lessard, Philippe. Ambulances: Des robots pour ramener des patients à la vie. La Presse, 15 March 2024.

8 Dent, Steve. Urtopia's Fusion e-Bike Has Fully Integrated ChatGPT. Engadget, 10 January 2024.

9 Geschwindt, Siôn. These AI Binoculars Just Made Birdwatching a Whole Lot Easier. TNW | DeepTech, 12 January 2024.

10 Martin, Diana. Autonomous Tractor Retrofit Arrives in Canada. Alberta Farmer Express (blog), 27 October 2023.

11 I Already Have Security Cameras Installed. How Can I Add Face Recognition? LinkSprite, 6 March 2019.

12 The How's and Why's of IoT. Sogeti, Accessed 23 May 2024.

13 Shirer, Michael. IDC Forecasts Revenue for Artificial Intelligence Software Will Reach $307 Billion Worldwide in 2027. IDC, 31 October 2023.

14 Villalobos, Pablo, Jaime Sevilla, Lennart Heim, Tamay Besiroglu, Marius Hobbhahn, and Anson Ho. Will We Run out of Data? An Analysis of the Limits of Scaling Datasets in Machine Learning. arXiv, 25 October 2022.

15 Tuohy, Jennifer Pattison. More Ring Camera and Alarm Features Will Soon Require Subscriptions. The Verge, 3 March 2023.

16 Rivers, Stephen. $4,500 Bill To Unlock Extra Battery Capacity Has People Taking Sides Between Tesla And Customer. Carscoops, 9 July 2023.

17 Charlton, Alistair. Mercedes Wants To Charge $1,200 Subscription To Unlock Quicker EV Performance. Forbes. Accessed 23 May 2024.

18 Dharamshi, Alannah and Adrienne Lipsey. Exercising Privacy: Policy Options for Privacy and Wellness Wearables. CSA Group. February 2002.

19 Diaz, Maria. Aqara Just Launched a Smart Home Presence Sensor with Fall Detection. ZDNET. 21 April 2024.

20 Alini, Erica. Insurance Apps That Track Your Driving Could Now Yield Premium Increases - National. Global News. 21 March 2021.

21 Chowdhary, Krishi. Meta's New AI-Enabled Ray-Ban Raises Privacy Concerns. *Tom's Guide*, 5 January 2024.

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