# Open-source wearable AI - From Wikipedia, the free encyclopedia (2044)

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# Summary

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The essay that follows is presented as a Wikipedia article, written from the vantage point of 20 years in the future. It explores the current and future advancements in wearable AI systems, with a particular focus on emerging open-source initiatives.

Wearable AI is an umbrella term encompassing wearable hardware devices specifically engineered to integrate with Artificial Intelligence (AI) systems. Recently gaining popularity with companies like *Humane Inc.* and *Rewind Inc.*, these devices are predominantly aimed at consumer use. Although wearable AI systems can also serve business and industrial purposes, this essay centers on their application in consumer devices.

In this imagined future, the essay acknowledges a transition from wearable AI systems to a era of *Implantables*, or AI-enhanced neural interface devices that have been directly inserted into the human body or brain. By reflecting on this transitional past that facilitated the integration of AI into daily life and the human body, the essay predominantly focuses on the developments and impact of wearable AI. However, occasional references are made to the future-present, offering glimpses into the emerging era of Implantables.

Following the stylistic guidelines of Wikipedia, this essay includes cross-links and references to both existing and non-existing terms. Existing terms and concepts are represented by blue hyperlinks, which direct readers to real information on corresponding Wikipedia pages or references. Non-existing or fictional terms, which are yet to be established (to the best of our knowledge), are identified by purple coloring, similar to how Wikipedia denotes pages that should exist but do not yet. Occasionally, the essay incorporates references to Wikipedia's citation guidelines for stylistic purposes, such as "[citation needed]." This approach enhances the essay's connection to Wikipedia's editing guidelines and the use of cross-references to enhance readers' understanding and access to further information.

It explores the historical development, use cases, technologies, and ethical and social implications of wearable AI systems, as well as their impact on the present-future.

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# Open-source wearable AI

From Wikipedia, the free encyclopedia

Open-source wearable artificial intelligence is any wearable technology[1] using artificial intelligence[2] (AI) that has open-sourced its hardware[3] and software architecture. Common types of wearable AI include "smart" pendants, glasses[41], contact lenses[50], earbuds, cochlear implants, subvocalizers[51], mouthpads[48], eye-trackers[4], and neural headsets.

Wearable AI gained significance during the Cambrian Explosion of Deep Learning Models, between the years 2023-35. Their primary benefit in having a wearable was in providing user context to an integrated multi-agent AI system[5]. Their development directly impacted the following advancements of implantable AI and direct brain-machine interfaces. The open-source community made significant contributions to wearable AI's technological and social development, making it more accessible, powerful, and versatile.

## History

*See also: History of Wearable Computers[6]*

### Early developments

The development of wearable AI was enabled by a convergence of key trends in computing and electrical engineering, which MIT professor of artificial intelligence Siri Turingani termed the Great Confluence. One crucial trend was the ongoing miniaturization[7] of electronics, known as Moore's Law[8]. This principle states that the number of transistors on an integrated circuit chip roughly doubles every two years, enabling the creation of increasingly compact electronic devices.

During what Neil Gershenfeld[10], Director of MIT's Center for Bits and Atoms[52], called the Third Industrial Revolution[9,49], affordable yet highly capable electronic devices became more accessible to everyday consumers and enthusiasts. Open-source initiatives like Arduino[11] and Raspberry Pi[12] sizably contributed to their accessibility.

During the same period, significant developments occurred in the field of machine learning[13] with the creation of powerful yet compact models that could be embedded in small devices such as the Raspberry Pi, a low-cost single-board computer, or microcontrollers, such as the ESP32[14]. Notable examples of this advancement include TinyML[15], Edge Impulse[16], and TinyDB[17], among others. As generative AI[18] gained popularity, the open-source community[19] made significant strides in reducing the size and computational requirements of multi-billion parameter models, such as Meta's LLaMA[20], enabling them to run on devices as small as Arduino boards through projects like TensorFlow Lite[21] for Microcontrollers.

## First companies

An initial wave of for-profit, closed-source companies quickly recognized the potential of providing Large-Language Models[22] with additional user context and memory for personalization through wearables. In 2023, the company Humane[23] released one of the first wearable consumer hardware products built for AI interactions and integration. Startups like Rewind[24] and Tab quickly followed with alternative form factors. Rewind, for instance, focused on smart pendants that could record and analyze interactions using AI, offering insights and memory aids.

Meanwhile, former tech giants such as Meta[25] and Apple[26] worked on their own hardware devices with AI capabilities. Meta initially developed the Meta Raybans[27], a pair of smart glasses with video and audio capabilities, adding AR capabilities in later iterations. Apple and Samsung[28] heavily integrated generative AI models into smartphones. Apple also added advanced AI features to their second and third generations of the Apple Vision Pro[29].

These early efforts promoted attention and ideas around wearable AI and also set standards for how wearables could be innovatively and aesthetically integrated into the fabric of daily life.

## Hardware residencies

Hardware residencies emerged shortly after the establishment of for-profit companies in the field. Open calls and invitations were made to encourage open-source hardware[30] projects focused on creating wearable artificial intelligence (AI) pins and pendants. Artists also became involved in exploring and constructing early prototypes.

One of the key elements in these early iterations was the use of Raspberry Pis and Seeed Studio chips from the Xiao series[78]. Additionally, online hardware such as TeamOpenSmartGlasses[31] on Discord[32] played a significant role in fostering collaboration and knowledge exchange.

Hacker residencies[33] for open-source wearable AI development played a crucial role in advancing the field. These residencies became vibrant communities where developers and tinkers from diverse backgrounds converged to explore various form factors and application areas. Medical, mental health, companionship, assistance, and other domains were all subjects of experimentation and exploration. Notably, the Massachusetts Institute of Technology[34] and its associated MIT Media Lab[35] emerged as a hotspot for this movement, attracting talented individuals and contributing to the advancement of the field.

## Notable projects

Around the mid-2020s, notable open-source projects began to surface.

AIWear was an early project focused on creating customizable AI-driven wearables in low-income communities, ranging from smart gloves for Virtual Reality[53] interaction to health-monitoring wristbands, offering their designs and software on GitHub[36].

One of the most impactful projects was OpenAIware, which was active from 2025 to 2034, an open-source platform that democratized the development of wearable AI. Their comprehensive library allowed users to customize and deploy open-source AI models to the hardware of their liking. Users could select from a vast library of plug-and-play[37] modules for sensory input—from auditory and visual to emotional sensors—tailored to their personal or professional needs.

The maturation of this ecosystem led to an explosion of creativity in wearable applications towards 2030. Subsequent plug-and-play ecosystems like ModuWear became immensely popular, offering a modular approach to wearable technology. Users could effortlessly interchange parts and functionalities of their devices, akin to building blocks, catering to an endless variety of contexts and preferences. This maximized the utility and versatility of wearables and significantly extended their lifecycle, aligning with growing sustainability concerns.

A key milestone was the establishment of universal standards for wearable AI interoperability. In 2026, the AugmentX Foundation[38] organized the First Conference on Standards for Wearable AI, which introduced influential guidelines for social and technological development for open-source wearable AI development.

## Financing

Pre-sales and advanced orders often enabled revenue generation ahead of full production. In addition to classic open-source fundraising strategies, a few projects utilized alternative financing methods. There were attempts within the open-source wearable AI community to utilize decentralized autonomous organizations[54] (DAOs) and issue decentralized tokens for financing.

Importantly, a rise in ethical venture capital focusing on sustainable and open technologies offered a novel investment route for open-source wearable AI startups.

## Distribution

As distributed manufacturing reached new heights in the late 2020s, open-source projects and companies used global networks of local production hubs for manufacturing hardware.

# Applications

## Personal productivity

Individuals could tailor their AI agents to optimize workflow, enhance focus, and manage time more efficiently. Compared to closed-sourced alternatives, open-source agents often offered more flexibility in customization. Custom integrations made it possible to seamlessly with various productivity[40] tools and platforms. Examples of applications include smart glasses[41] displaying real-time notifications and schedules to wristbands tracking and analyzing productivity patterns.

## Labor augmentation

AI wearables vastly augmented security and efficiency in workplaces. Security personnel leveraged enhanced night vision smartglasses for improved surveillance and threat detection in darkness. Furthermore, wearable AI monocles offered instant circuitry analyses in the engineering field, equipped with databases on electrical and mechanical devices. In healthcare, surgeons used smartglasses for augmented reality-assisted surgeries, overlaying vital patient data and anatomical maps in real-time to enhance precision. In agriculture, farmers monitored individual crop health[69] and environmental conditions directly through their smartwatches[70].

## Accessibility

Open-source wearable AI devices found several applications in the area of accessibility[71], due to their flexibility and adaptability. Before modern advancements in medical restoration, individuals with visual or auditory impairments could augment their senses with wearables. Alexa Smartwatchski and Jarvis Wearablenov started the OpenSenses project in Poland, developing real-time sign language translations and animated speech bubbles in AR for the hearing impaired. In 2027, the Harvard Generative Touch project started building AI devices that generating haptic feedback for the visually impaired.

## Communication

Through open-source initiatives, often organized on collaborative platforms such as OpenU, contributors expanded real-time support for rare and dying languages.

A key concept that originated from the open-source company LatentLife Inc. was human-to-human translation. It involved utilizing the superior emotional intelligence[72] capabilities of multimodal AI systems to overcome differences in (intralingual) communication styles. In this context, vision and audio-based wearables were used to infer the emotional state of the user's conversation partner and communicate their real needs and requests back to the user. Human-to-human translation proved useful for teams, friend groups, and couples. However, these systems occasionally provided incorrect information when they did not have sufficient time to finetune to a new conversation partner. Agent-to-agent systems were introduced to address this issue.

### Health

On-device and self-deployable models provided users with a privacy-preserving option for tracking and analyzing their biodata.

Google's open-source Wearables for Alzheimer's project attracted thousands of global contributors to develop individualized wearables for people suffering from the disease.

### Companionship

Some projects focused on creating intimate companionship agents for their users, which were shown to reduce loneliness.[citation needed] Open-source platforms like Xoul.ai[55] allowed for full customization of niche personas such as fanfiction characters.

### Education

Open-source wearable AI remains a popular tool for teaching about electronics and artificial intelligence. Many DIY kits are still available from organizations like the Lemon Pin Foundation and ByteBrain Inc., and are used extensively in K-12 and university education and makerspaces.

## Technology

*Main article: Wearable AI technologies*

Wearable consumer devices primarily served to extract contextual insights about the user that were needed for sophisticated AI personalization.

Depending on the software architecture and hardware used, wearable AI can receive contextual information in diverse forms, including audio, images, videos, biosignals (such as heart rate[57], EEG[59], EMG[60], electrodermal activity[58], and ultrasound[61]), as well as processed versions of these inputs, such as affective analyses, facial recognition[62], and inferred thought. Additionally, interaction data plays a crucial role in understanding how users behave, interact with others and their surroundings, and their habits when alone.

One key aspect of wearable AI was analyzing the user's personality. Many software systems faced the challenge of engaging with the multiple personas of an individual.

The development of software wearable AI opened up new avenues for creating intelligent and personalized user experiences. By leveraging wearable devices, AI systems could better comprehend user behavior, preferences, and needs, leading to more tailored and effective interactions.

## Architectures

*Main article: General-purpose artificial intelligence model*

At the core of modern wearable AI systems is often a versatile multi-modal, multi-agent[63] artificial intelligence model capable of handling various inputs. Most recently, instant-retrainment models were frequently employed, allowing for near-instant integration of additional context gathered through wearable inputs into the overall AI system. These models work in conjunction with self-correcting knowledge graphs[64], which help refine and enhance the understanding of the user's preferences and characteristics.

Architectures for processing and storing information can range from fully on-chip[65] to on-cloud[66] variations. In the open-source space, a few cloud providers and solutions that cater specifically to open-source projects emerged, providing them with custom privacy and security implementations. Many commercial open-source distributors and hobbyists use a hybrid model, supporting the wearable with on-chip working memory[67] and instant-retrainment on the cloud.

## Agent-to-agent networks

Wearable Artificial Intelligence (AI) technology expanded its capabilities to enable communication and information sharing among agents belonging to different individuals. By sharing relevant information about their respective users' circumstances, these agents could collaboratively handle productivity tasks such as booking meetings on behalf of their users.

Moreover, wearable AI agents aimed to enhance interactions by providing users with insight into each other's mental states. Acting as middlemen, these agents could offer tailored suggestions and support, ultimately improving user experience and satisfaction.

The open-source architectures empowered developers and users to customize their agents according to their preferences, bypassing constraints imposed by private company policies. For instance, already in 2025, individuals practicing BDSM[68] discovered limitations in customizing their agents using the most commercially available models, such as those offered by OpenAI[39]. Instead, they devised an alternative solution using a modified version of LaMDA 2, enabling them to create their own wearable AI agents. These customized agents provided better insights into partners' biostates during BDSM activities, leading to an enhanced and more personalized experience.[citation needed]

# Ethical and societal impact

See also: *Ethical and societal implications of wearable AI systems*

Towards the end of the 2020s, the rise of open-source wearable AI raised concerns from governments, businesses, and individuals, resulting in protests and legal actions initiated by the Open-Source Ethics and Transparency Initiative (OSETI). In an August 2029 briefing on the state of technology as part of the Sustainable Technology Goals[42] (STGs), the United

Nations Security Council Secretary Kaius Morrow stated, “Wearable and Implantable AI devices have advanced our modern society greatly, and yet we must move forward cautiously,” preceding the great Google Cloud data leak in early 2031.

## Privacy, Security, and Data Regulation

The widespread adoption of wearable AI pins introduced a new personal data collection and interaction paradigm. These devices, constantly recording and processing data, posed significant privacy concerns[43]. Whereas the personalized user experience was beneficial, it came at the cost of exposing the user’s personal and private information uncontrollably. In the late 2020s, the privacy concern reached its maximum due to the potential data misuse by both companies and third parties, especially as data movements called for policy regulation[44].

In the late 2020s, the Open-Source Wearable Hardware Movement, a policy-oriented think tank called for a policy regulation for data privacy in the United States. The risk of unauthorized access to sensitive personal information, including locations, health data, and personal preferences, led to repeated small-scale security leaks of open-source providers' cloud bases. To ensure a sustainable, human-centered, and secure way of operating, a call for regulation was demanded, to which governments and the United Nations Security Council[73] built on the principle of the “Right to Be Forgotten[56]”, aiming to empower individuals with greater control over their data. The resolutions included the Personal Data Sovereignty Act (PDSA), Wearable Technology Privacy and Security Standards (WTPSS), and Cloud Data Integrity Act (CDIA). Besides, multiple frameworks emerged, most notably the Open-Source Security Compliance Framework (OSSCF), which was required to join most wearable AI open-source communities.

## Google Cloud 2031 Data Leak

The early 2030s witnessed a pivotal moment in the discourse surrounding wearable AI devices. A major data leak from Google Cloud[45], which had been a major cloud provider for open-source models, exposed enormous amounts of private user information to the web. This incident had major societal implications internationally, including an increase in stalking, company attacks, and an increase in criminal rates. Wearable open-source AI companies were in the spotlight throughout the data leak, facing multiple testimonies before Congress. The scandal underscored the vulnerabilities inherent in the storage and management of personal data, prompting a reevaluation of data handling practices within the industry.

In response to the scandal, the open-source hardware community initiated a Movement Towards Self-Regulation (MTSR). A collaboration across cloud companies and open-source wearable hardware companies emerged, increasing transparency and manageability of user data. This cooperative agreement of companies was also manifested in the international Data Non-Disclosure Assurance Act (DNAAA). Specifically, this led to the development of Visualized Knowledge Databases, a transparent, free, and centralized platform in which every person could get an easy overview of their data. The self-imposed regulations represented a community-wide effort to restore public trust and establish standards for the responsible use of open-source wearable AI technologies.

In addition to policy, a significant portion of engineers in the open-source space started the development of instant Invisibility Cloaks for wearable AI pins. Devices equipped with the cloak would notify the user whenever another wearable was recording them, offering them the ability to erase themselves from the recording. This was made possible through the emergence of the Wearable Network of Protection (WNP), which let open-source AI wearables built under MTSR communicate with each other through secure channels for privacy protection.

### Bridging the digital divide

The democratization of technology through open-source models increased the accessibility of AI to a broader audience. A series of worldwide open-source technology surveys in 2035 showed an overall increase in technological literacy and engagement with and through open-source wearable hardware. AI wearables were often identified as a significant contributor to the pop-cultural entanglement movement, which called for the use of machines and computation as tools for more collaboration, scientific exploration, and a unifying human mission.

The open-source wearable AI movements helped bridge the digital divide[46] throughout the first half of the 21st century in low-income communities and countries. Through cheaper and affordable wearable companions, people could receive better access to resources, personalized learning, and a comfortable introduction to technological advancements. Defying the challenge of scarce energy access[47] in low-income countries, parts of the open-source wearable AI community focused on the development and distribution of low-power and low- or no-network devices. This made it possible for communities in low-income regions to access digital tools and vast amounts of knowledge.

## Impacts on the Present Day

Wearable AI paved the way for developing and integrating implantable AI into modern life. By widening accessibility and substantially increasing global technology literacy, they enhanced consumer acceptance and habits of wearing miniaturized computers.

Crucially, they deeply integrated artificial intelligence into people's every day and allowed AI agents to benefit and learn from user context. The technical challenges in making a personal wearable AI led to several model architectures now used in implantables, such as instant-retrainment, invisibility cloaks, and variations of agent-to-agent networks.

The last decades of open-source developments in the wearable AI space have shown the remarkable power of collaborative and sustainable technology development. Several of the legal implementations have inspired or directly been transferred to laws such as the Bio-Augmentation Privacy and Control Act (BAPCA) and Implantable Data Protection Act (IDPA).

## See also

- Wearable technology[1]
- Bioelectronic device[75]
- Personal informatics[76]
- Quantified self[74]
- Microchip implant (human)[77]

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