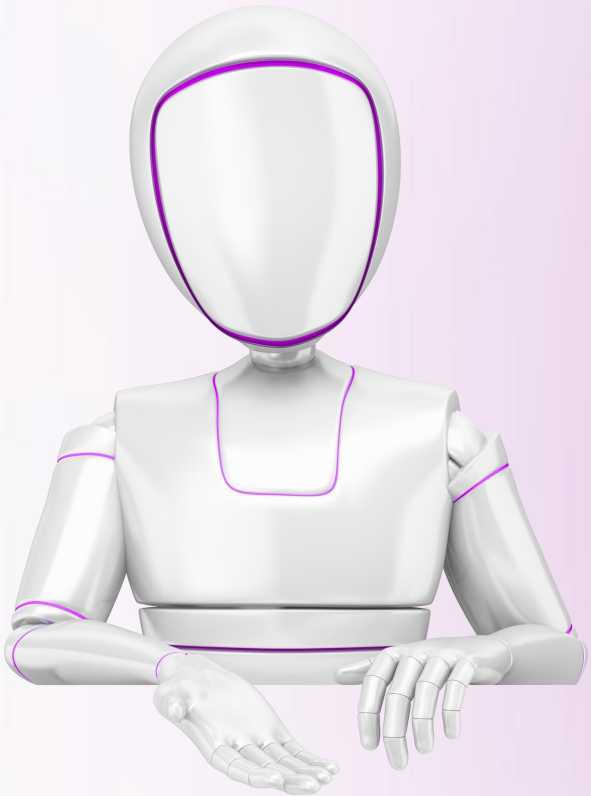

HUBL
HUMANBLOCK

1、Project Preface

At the intersection of AI's rapid advancement and blockchain's maturation, the HumanBlock project was born with the grand mission to redefine human-machine interaction. More than a simple humanoid robot development initiative, HumanBlock represents a technological revolution integrating cutting-edge innovations. We are committed to building a highly intelligent, trustworthy, secure, and self-sustaining humanoid robotics platform. By combining blockchain's decentralized architecture, smart contract automation, and distributed ledger transparency, each robot not only achieves human-like mobility but also possesses advanced features including logical reasoning, identity verification, and tamper-proof data capabilities.

The HumanBlock project is built on trust-building and capability empowerment. Each individual robot will have an on-chain identity, enabling autonomous task execution, smart contract signing, and value exchange – achieving true machine autonomy. Meanwhile, the HUBL token will serve as the ecosystem's value engine, driving hardware procurement, feature upgrades, service licensing, and data transactions across multiple dimensions to create a complete economic ecosystem.

In the future, we will not only build machines, but also build a new era of human-machine ecosystem based on blockchain trust and intelligent interaction. HumanBlock is opening a technological door to the future, making "human-like robots" from fantasy to reality.



2、 project context

With the rapid advancement of global AI, robotics, and blockchain technologies, society is witnessing an unprecedented wave of technological convergence. Humanoid robots have transitioned from laboratory concepts to real-world applications, with demand skyrocketing across sectors — from industrial automation and caregiving services to educational assistants and disaster relief operations. However, current humanoid robots still face several core bottlenecks:

Centralized control and trust risks: The current mainstream robot systems rely on centralized servers and proprietary operation platforms, which are vulnerable to hacker attacks, data leakage and frequent command hijacking.

Lack of autonomy and intelligent trading ability: the vast majority of robots cannot make autonomous decisions, nor do they have the ability to exchange and execute services based on rules or market mechanisms.

Cross-platform ecological incompatibility: Robot devices, cloud platforms and algorithm modules are independent of each other, with inconsistent standards and weak collaboration ability, resulting in serious information islands.

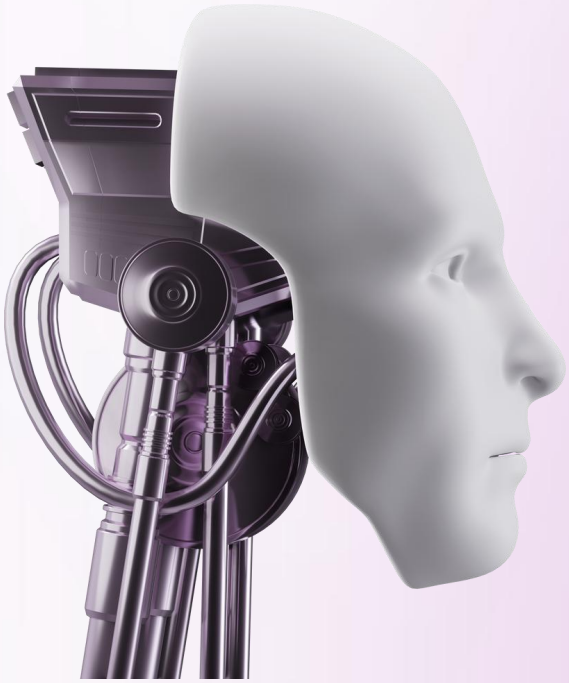
Ambiguity of identity and data ownership: The behavior logs and interactive data of robots cannot be publicly verified and attributed, resulting in limited application scenarios, lack of scalability and trust foundation.

The HumanBlock project was born from this context. Its core team comprises experts in artificial intelligence, blockchain security, robotic control systems, and distributed systems, with over 15 years of technical expertise and business experience. Originally emerging from research on "how autonomous learning robots can achieve cross-system trusted interaction," the project established a technology experimental center in Singapore in early 2025 to unite global developers and engineers in advancing its vision.

HumanBlock's innovative concept lies in deeply integrating humanoid robots with blockchain technology to build a network of intelligent agents capable of both physical movement and on-chain collaboration. Each individual robot within this network will possess an on-chain identity (DID), maintain verifiable behavioral records, and feature token-powered service capabilities. Through smart contracts, these entities can securely and automatically interact with external users, systems, or other robots.

The HUBL token launched by HumanBlock serves as both a value medium and the core incentive mechanism in the robotics ecosystem. It will be utilized across multiple dimensions including hardware leasing, software upgrades, AI module invocation, on-chain task payments, and skill market transactions, forming a self-circulating and self-growing ecosystem.

Through the HumanBlock project, we are not only building robots that "walk like humans", but also "think like humans, trade like humans, and collaborate like humans", ultimately leading to a new future of human-machine symbiosis and decentralized collaboration.



3、 market analysis

1. Key market insights

The global humanoid robot market was valued at $2.43 billion in 2023 and is projected to grow from $3.28 billion in 2024 to $66 billion by 2032, with a compound annual growth rate (CAGR) of 45.5% during the forecast period. The Asia-Pacific region accounted for 41.97% of the market share in 2023.

Humanoid robots are machines designed to mimic the human form. While still in their early development stages, these intelligent systems have made significant strides in recent years, finding real-world applications across research, space exploration, personal care assistance, education, and entertainment sectors.

The development of humanoid robots requires the integration of multiple engineering disciplines, including electrical engineering, mechanical engineering, and software engineering. Market growth is primarily driven by technological advancements, reduced hardware costs, labor shortages in developed countries, and strong support for robotics technology. For example,

In August 2023, Beijing Municipal Bureau of Economy and Information Technology announced a $1.4 billion robotics fund to boost the city's robotics technology development. The initiative will support technological enhancements, commercial breakthroughs, and innovative financial mergers and acquisitions within the robotics industry.

In December 2022, the Canadian government announced a $30 billion investment in Sanctuary Cognitive Systems Corporation, a Vancouver-based company that builds general humanoid robots.

2. Latest trends

According to a March 2024 press release from the European Commission, EU member states are grappling with a skilled workforce shortage. Approximately 63% of small and medium-sized enterprises (SMEs) in the EU report struggling to find qualified personnel. Furthermore, Heidelberg Druckmaschinen AG's 2023 survey reveals that 92% of German SMEs cited skill shortages and labor gaps as challenges, with digital transformation being recognized as a key strategy to address staffing shortages.

The labor shortage has become a key driver in the humanoid robotics market, impacting demand across industries. These robots provide solutions to address manual labor shortages by augmenting and assisting existing workforce. Manufacturing companies are increasingly adopting robotic solutions to tackle staffing gaps. For instance, in 2024, luxury automakers Mercedes-Benz and BMW announced plans to deploy humanoid robots in their production facilities, aiming to alleviate workforce constraints, boost productivity, and ensure quality control.

3. Drivers

Advanced technologies such as artificial intelligence (AI), high-performance computing (HPC), next-generation sensors, and battery innovations are rapidly maturing and converging to accelerate the development of humanoid robots. AI and HPC empower robots to comprehend and interact with complex, unstructured real-world environments. The integration of AI into robotics enhances risk management, improves operational accuracy, and boosts productivity. AI-equipped humanoid systems can perform tasks like object retrieval and packaging, utilize visual recognition for automated material handling in factories, and complete maintenance operations with reduced labor hours compared to human workers.

Furthermore, next-generation sensors (such as 3D/depth cameras, LiDAR, radar, and voice recognition sensors) can better understand the environment surrounding robots and enable safe human-robot

interactions. These advanced sensors closely mimic human sensory capabilities, empowering robots to perform complex tasks. It is anticipated that all these factors will increase adoption rates and drive market growth in humanoid robotics during the forecast period.

4. Limitations

Market acceptance remains constrained by inadequate infrastructure and high initial investment costs, which are expected to limit the growth of humanoid robotics in the short term. Furthermore, public skepticism and ethical concerns pose significant challenges. As robots become capable of performing complex tasks, they may gradually replace human workers in various occupations. This could lead to massive job displacement, particularly in manufacturing sectors. According to SEO.AI, approximately 14% of workers report having lost their jobs due to robotics. Therefore, addressing these limitations is crucial for enhancing public trust in humanoid robotics and improving its social acceptance.

5. Market segmentation analysis of humanoid robots

The humanoid robotics market segment is projected to dominate the market share during the forecast period, driven by its applications across healthcare, entertainment, education, research, manufacturing, and maintenance sectors. These intelligent machines deliver significant advantages in medical care by enabling physicians to perform various procedures without patient supervision. A prime example is Patient Care Assistant (PCA), where robots handle routine tasks like monitoring vital signs and administering medications, while also providing emotional support through interactive voice prompts or tactile interactions. In manufacturing, humanoid robots excel at executing repetitive assembly line operations with precision and consistency.

The wheel-driven robot segment has demonstrated the highest compound annual growth rate during the forecast period, driven by improvements in development costs, user-friendly interaction, and reduced development expenses. Compared to dual-head robots, wheel-driven robots feature lower maintenance and repair costs due to their simpler structure.

6. Through component analysis

Advancements in software technology have driven the fastest-growing software segments during the forecast period. These innovations enable robots to perform complex tasks and operate remotely. Over recent years, the development of humanoid robot software has provided valuable insights for handling complexity and advancing research projects. In humanoid robotics, this layer of software plays a crucial role in processing massive data collected through multiple sensors.

The hardware segment is projected to dominate market share during the forecast period, as hardware components are critical for humanoid robots' performance and functionality. These robots require sensory-motor capabilities to operate in human-like modes and facilitate person-to-person interactions. To enable motion control, condition monitoring, and collision prevention with surrounding environments, humanoid robots must be equipped with actuators and various sensors.

7. Through application analysis

Industrial applications are projected to grow at the highest compound annual growth rate during the forecast period. These robots increasingly fulfill industrial needs through their precision and efficiency in executing complete tasks. They can inspect products for irregularities and ensure quality standards when equipped with advanced vision systems. Operating continuously without breaks, they enhance both factory productivity and product quality. Furthermore, humanoid robots can handle hazardous materials and perform dangerous operations. Given these capabilities, their adoption is expected to increase significantly throughout the forecast period.

8. Regional analysis of humanoid robot market

The Asia-Pacific region leads in market share for 2023, driven by key players' government initiatives, aging populations, and a robust robotics culture. China, Japan, and South Korea dominate the global industrial robot technology market. According to the International Federation of Robotics (IFR), China recorded 290,300 industrial robots installed annually in 2022, capturing 52% of the market, followed by Japan with 50,400 units. These countries are home to numerous robotics startups. In 2023, the Chinese government set ambitious targets: developing humanoid robots by 2025, fostering companies specializing in humanoid robotics, strengthening international cooperation in robotics technology, and establishing reliable industry supply chains. All these factors are expected to drive market growth in the region.

North America is projected to demonstrate the highest compound annual growth rate during the forecast period, driven by rapid technological advancements in artificial intelligence and increased automation. The United States leads the region due to robust academic research and industry innovation. Furthermore, substantial investments in research and development (R&D) by government agencies, private companies, and academic institutions have further fueled market expansion.

The European market is mainly driven by labor shortages, rising labor costs, increased automation in manufacturing, innovation in robot hardware (e.g., sensors, actuators and materials), supportive government policies and an aging population.

In the Middle East and Africa, the gradual shift to automation is expected to provide opportunities for market growth. In South America, there is growing interest in robotics across sectors to increase adoption.

9. Competitive landscape

The global market for leading human robotics companies, including PAL Robotics, Figure Robotics, Agile Robotics, Honda Motor Co., Ltd., Toyota, Boston Dynamics, Hanson Robotics, Sanctuary Cognitive Systems Corporation, NVIDIA Corporation, and Tokyo Robotics Inc., is consolidated by industry leaders such as PAL Robotics Technology, Agile Robotics Technology, Honda Motor Co., Ltd., Toyota, Boston Dynamics, Hanson Robotics, Hanson Robotics, Hanson Robotics, Hanson Robotics, Hanson Robotics, and others. These companies expand their operations through strategies like mergers, acquisitions, product launches, collaborations, and partnerships.

10. List of top humanoid robot companies:

PAL Robotics (Spain)

Honda Motor Co., LTD. (Japan)

Toyota (Japan)

Boston Dynamics (USA)

Hansen Robotics (China)

Shelter Cognitive Systems (Canada)

Nvidia Corporation (we.)

Tokyo Robot Company (Japan)

4、The feasibility of combining humanoid robots and blockchain

As humanoid robots continue to mature, their applications are expanding across multiple sectors including healthcare, security, industrial automation, and service industries. However, traditional robotic systems remain heavily reliant on centralized control, presenting challenges such as data security vulnerabilities, command failures, and low operational transparency. Meanwhile, blockchain technology, with its decentralized architecture, tamper-proof nature, traceability capabilities, and automated execution features, offers a groundbreaking solution that empowers robots with identity verification, data protection mechanisms, and autonomous transaction capabilities.

The HumanBlock project is based on this integration concept, aiming to build a smart robot network system of "on-chain autonomy and off-chain action".

1. Integration technology path of blockchain and humanoid robot

Technical modules	Blockchain functionality support	Humanoid robot function performance
Identity management	DID (Decentralized Identity)	Each robot has a unique on-chain ID that supports authentication and access control
Data on the chain	IPFS/distributed ledger	Behavioral logs, sensor data, and learning models can be encrypted and uploaded to the chain
Smart contracts	Automated protocol execution	Acceptable on-chain service tasks and execute them based on contracts (e.g., path planning, task allocation)
Token machine-processed	Payment and incentive system	Resources are acquired, tasks are performed, and collaboration is participated in based on the HUBL token
Multi-machine collaboration	DAO governance mechanism	Multiple robots can be composed into autonomous groups for collaborative task decision-making and benefit distribution

2. Analysis of hardware interface compatibility

Mainstream robot controllers (such as ROS, NVIDIA Jetson, Intel NUC) can be connected to a light node or local chain relay system.

The communication protocol bridges the off-chain execution environment to the on-chain smart contract through edge computing nodes.

The interaction between the AI module and on-chain data can be guaranteed by zero-knowledge proof (ZKP) to ensure privacy and efficiency.

3. Feasibility of typical application scenarios

1. Medical service robots

The chain stores the patient interaction history to prevent tampering;

The doctor uses the smart contract on the chain to control the robot operation (such as voice communication, posture check);

Use HUBL tokens to pay for care services or incentivize AI learning improvements.

2. Intelligent logistics robot

Automatically receive on-chain order tasks (such as carrying path planning, parcel sorting);

Blockchain records the delivery path and operation record;

DAO is used to schedule multi-robot cooperative tasks to prevent the failure of central scheduling system.

3. Family companionship and education

Family members authorize and manage robot permissions through the blockchain (such as children's learning content, access restrictions);

Educational data is stored on the chain for evidence, and the AI system is more transparent and credible;

Use tokens to incentivize robots to constantly "learn" new skill modules.

4. Economic model and ecological feasibility

HumanBlock intends to build an economic ecosystem for robot skill trading and data collaboration, in which:

module	HUBL, application scenarios
Skills module market	Users can purchase, upload or rent AI/action module plug-ins, and HUBL is the medium of exchange
Task order system	Users can post tasks (such as cleaning, patrolling), and the robot will receive them according to the bidding mechanism
Maintenance and upgrade services	Hardware detection, system updates, cloud learning calls and other services are paid for by HUBL
excitation mechanism	For valid data, long-term stable operation and collaborative task contributors, rewards are given

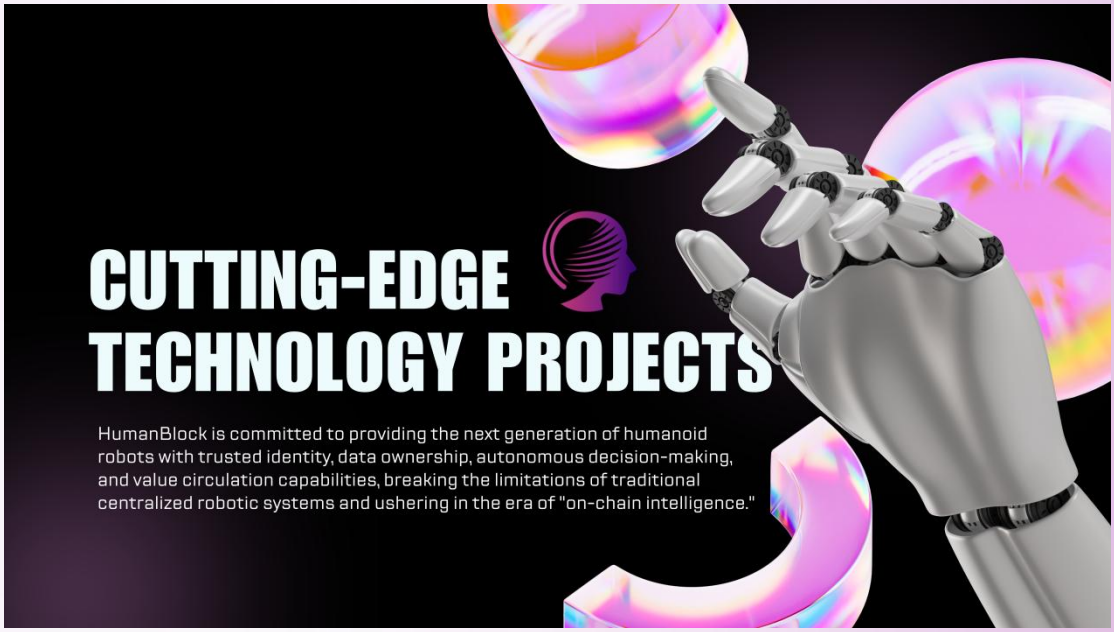
The integration of blockchain technology with humanoid robots has evolved from a conceptual vision into a cutting-edge convergence trend with concrete technical pathways, commercial viability, and real-world implementation potential. Through innovative technological architecture, practical application scenarios, and a comprehensive economic ecosystem design, the HumanBlock project is poised to establish the world's first on-chain humanoid robot collaboration platform within the next 3-5 years.

The value network with HUBL as the core will not only improve the intelligence and credibility of robots, but also accelerate the arrival of a new era of human-machine symbiosis.

5、Project Introduction

HumanBlock (Token Name: HUBL) is a cutting-edge technology initiative that integrates blockchain technology with humanoid robotics systems, aiming to create an autonomous, collaborative, and tradable ecosystem for intelligent humanoid robots. Through decentralized architecture, smart contract protocols, and a Distributed Identity Authentication System (DID), HumanBlock empowers next-generation humanoid robots with trusted identities, data ownership rights, autonomous decision-making capabilities, and value circulation mechanisms. This breakthrough breaks through the limitations of traditional centralized robotic systems, ushering in the era of "on-chain intelligent agents".

HumanBlock envisions each robot not merely as a "hardware terminal", but as an autonomous "intelligent entity" with independent identity and capabilities on the blockchain. These robots can autonomously participate in task execution, behavioral documentation, economic activities, and skill acquisition. Leveraging trust infrastructure built through blockchain technology, HumanBlock aims to establish a self-governing collaborative network dominated by humanoid robots, thereby redefining human-machine interactions, trust mechanisms, and value exchange relationships.



1. Core technology and innovation highlights

Identity on the chain (DID)

Each robot has a globally unique decentralized identity, free from the dependence on central servers, to achieve device-level identity authentication, security authorization, privacy control and access management.

Smart contracts drive behavioral logic

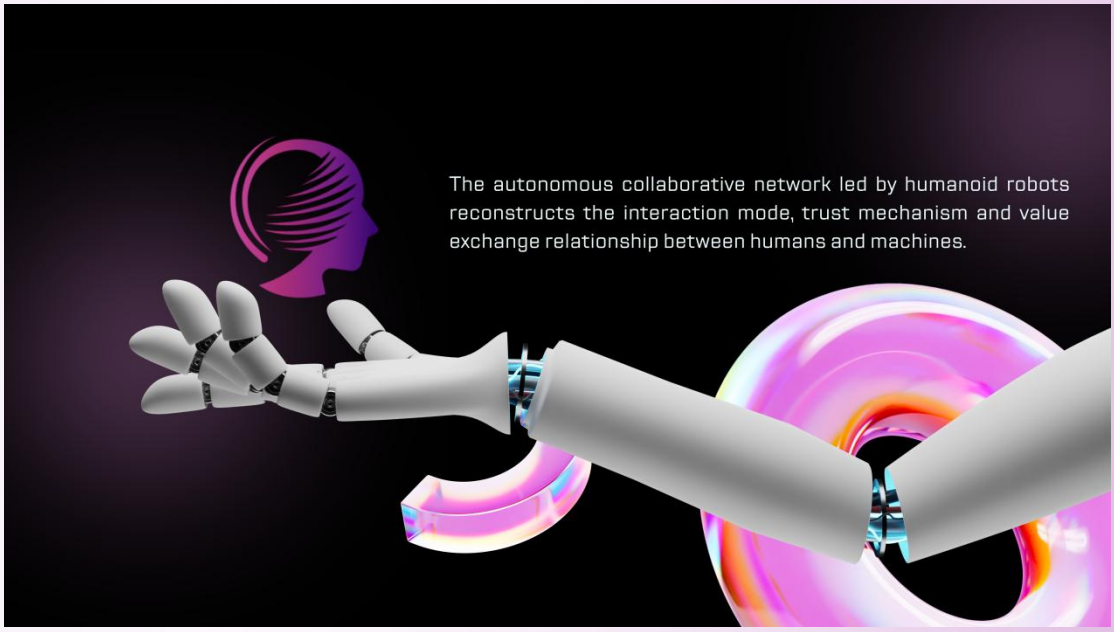
All tasks, service agreements and data exchanges are completed through on-chain smart contracts to achieve automatic performance, transparent settlement, non-tampering and traceability of behavior.

Data ownership and trusted records

The perceptual data, interaction records and behavioral traces collected by humanoid robots are stored on the chain or IPFS through encryption, realizing "behavior as data, data as value".

Task matching and order receiving system on the chain

Users publish tasks (such as patrol, care, education and guidance) through the DApp platform. The robot automatically bids, orders and executes according to the ability model and smart contract, improving service efficiency and user trust.



Multi-agent collaborative governance (DAO)

Multiple robots can form an "autonomous alliance" on the chain, collectively participate in task collaboration, governance proposal, skill sharing, token distribution, etc., and move towards a truly decentralized autonomous society of multiple machines.

Driven by the HUBL token ecosystem

HUBL is the only ecological token of HumanBlock platform, covering robot task payment, skill module purchase, upgrade authorization, data transaction, behavior incentive, DAO governance voting and other multiple purposes. It is the core value engine of robot world operation.

2. The strategic significance of HumanBlock

Disrupting the robotics industry: break the closed ecology monopolized by a single manufacturer, and make robots more open, connected and trusted.

The expansion of blockchain application: the integration of on-chain governance mechanism, digital identity system and real physical agents to achieve deep linkage between on-chain and off-chain (On-Chain + Off-Chain).

Promoting the digital economy: Build a new model of "robot as a service (RaaS)", and realize the chain-on-the-spot economic model in which skills are assets, behaviors are values, and data is commodities.

3. Application Vision

HumanBlock will be widely used in the following areas in the future:

Medical care: Robots perform basic nursing work in hospitals and nursing homes, and doctors give instructions remotely; the data is recorded and encrypted for evidence;

Smart home and companionship: The home service robot is based on on-chain task execution and transparent behavior review, ensuring the safety of family members;

Education and interaction: Robots can participate in educational tasks, through contract control of learning content, parents can remotely review their accompanying and teaching data;

Industrial logistics: Robots can achieve optimal task allocation through on-chain scheduling system in high-risk scenarios such as logistics and security;

Metaverse digital human: In the virtual space, the robot acts as a user agent to realize on-chain NFT control and virtual-real task execution.

4. Final goal of the project

The ultimate goal of HumanBlock is to build a decentralized network of intelligent humanoid robots. By building a trust base and economic system based on blockchain technology, robots will no longer be tools, but "digital life forms" that can coexist, co-create and co-govern with humans.

With the help of HUBL tokens, the platform will build a set of truly sustainable value system, and promote the comprehensive implementation and prosperity of AI+ robot technology in the real world and virtual world.

5. Token distribution scheme

Total distribution: 500 million copies

allocation plan ：

Ecosystem fund: 10%

Technical team: 5%

Whale Agency lock: 40%

STO: 30%

Community airdrop: 15%

6、 core advantage

As the world's first intelligent platform integrating blockchain technology with humanoid robotics, HumanBlock has not only revolutionized the fundamental logic of robotic operations and interactions, but also ushered in a new era of deep integration between artificial intelligence and blockchain. Its systematic innovation and strategic design have established unparalleled core competitiveness within the global tech ecosystem, primarily manifested through six key advantages:

1. First-mover advantage of technology integration: deep integration of robot and blockchain

HumanBlock realizes the underlying-level linkage between humanoid robots and blockchain, connects "on-chain smart contracts" with "off-chain entity execution", and creates a new technology paradigm of "on-chain task issuance + entity robot performance + on-chain data ownership confirmation + token incentive settlement".

The Autonomous Identity Authentication System (DID) gives the robot a real and verifiable on-chain identity;

Intelligent contract drives behavior logic to achieve efficient and safe automatic task execution;

The distributed ledger records the robot's behavior trajectory to ensure data transparency and traceability.

This innovative technology architecture makes HumanBlock the first robot platform in the industry to truly achieve on-chain and off-chain collaborative autonomy.

2. Autonomous and controllable robot economic ecosystem

HumanBlock has built a complete closed-loop robot service economy with the token HUBL. All tasks, skill module calls, data uploads, and behavioral incentives are all carried out around HUBL, forming a sustainable circulation and self-evolving economic system.

HUBL supports chain tasks, module transactions, service authorization, DAO voting, etc.;

Skills are assets, and robots can earn money by learning and publishing skills modules on the chain;

Users can control the robot, rent the service and motivate the behavior through HUBL.

HumanBlock has not only created a new business model of "robot as a service" (RaaS), but also realized the right and transaction of digital labor value of robots.

3. Decentralized intelligent collaboration and governance system

Through the DAO (Decentralized Autonomous Organization) mechanism, HumanBlock realizes the collaborative governance and autonomous scheduling among multiple robots, breaks through the limitations of traditional central control system, and enhances the system flexibility and collaboration efficiency.

Multi-robot collaboration can carry out task co-construction, benefit distribution and risk sharing;

Community governance mechanisms ensure ecological equity, transparency and sustainability;

Decentralized design avoids system paralysis caused by single point of failure and has strong anti-risk capability.

This is the world's first robot platform model that builds an "agent collaboration alliance".

4. Highly scalable modular platform architecture

HumanBlock supports the access of hardware and software from multiple types of robot manufacturers, provides standardized SDK interface and protocol layer support, and has strong compatibility and horizontal expansion capability.

It has been adapted to mainstream robot control systems (such as ROS and NVIDIA Jetson);

Access to AI model platform, edge computing nodes and Web3 data interface;

Support for virtual humans, bionic robots, service robots, industrial robots in a variety of forms.

This gives HumanBlock a strong potential for ecological expansion, which can achieve win-win cooperation with various AI, IoT and robot manufacturers.

5. Trusted data and behavioral assetization capability

Through the on-chain encryption and behavior verification mechanism, HumanBlock has realized the assetization and commercialization of "robot behavior data".

Each action can be generated on the chain with a unique hash identifier to ensure that the action is verifiable;

The ownership of data collection is clear, and both users and robots can control access according to the contract;

High-value behavioral data (such as medical interactions, educational feedback) can be licensed or sold on demand.

This is the first time that the core capabilities of "data ownership and data value retroactive" have been truly implemented in the field of AI and robotics.

6. Clear strategic positioning, driven by both reality and future

HumanBlock is not a conceptual project in the air, but a layout of future high-growth track based on current feasible technology.

Short-term objectives are clear: build a technical closed loop + launch standard robot pilot products;

The medium-term direction is clear: expand medical, logistics, education and other urgent needs scenarios;

Long-term vision: Build a global robot DAO alliance to promote the integration of AI and the Web3 world.

Standing at the intersection of "AI autonomous intelligent evolution" and "Web3 economic logic evolution", HumanBlock is one of the most explosive cross-technology platforms.

epilogue

HumanBlock is not only the integration of technology, but also the reconstruction of the system. It redefines the identity, capabilities and value ownership of humanoid robots, and builds a complete set of trusted, collaborative and autonomous intelligent agent ecosystem on the chain.

In the coming era of man-machine symbiosis, HumanBlock is taking the lead in building a bridge, using blockchain technology to give robots soul, and using token mechanism to drive the operation logic of the future intelligent society.

7、Core technology architecture

HumanBlock's core vision is to build a blockchain platform for humanoid robots that enables autonomous operation, collaborative capabilities, and verifiable functionality, achieving deep integration between on-chain intelligent control and off-chain physical behaviors. To realize this vision, the platform has established a multi-layered technical architecture integrating blockchain protocols, humanoid robot control systems, AI skill modules, edge computing frameworks, and data ownership mechanisms.

1. Overall architecture diagram

The HumanBlock system can be divided into five key levels:

┌──┐

| The fifth layer: Application Ecology Layer (DApps) | ← Client interaction, robot rental, task release, etc

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| The fourth layer: Core Engine | ← logical logic such as chain contract, identity authentication, task scheduling, etc | The fourth layer: Core Engine | ← logical logic such as chain contract, identity authentication, task scheduling, etc

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| The third layer: off-chain control layer (Robot Agent) | ← Local robot interface, skill module, control execution | The third layer: off-chain control layer (Robot Agent) | ← Local robot interface, skill module, control execution

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| The second layer: Blockchain layer (HumanChain) | ← DID system, smart contract system, data on chain module | The second layer: Blockchain layer (HumanChain) | ← DID system, smart contract system, data on chain module

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| The first layer: hardware and edge layer (Edge + Hardware) | ← Entity robot hardware, edge computing, sensor | The first layer: hardware and edge layer (Edge + Hardware) | ← Entity robot hardware, edge computing, sensor

2. Analysis of key technical modules

Decentralized identity system (DID Module)

Each HumanBlock robot is given a globally unique DID (Decentralized Identifier) when it joins the platform, enabling device-level identity identification, permission management and behavior confirmation.

The identity binding public key and device identifier on the chain;

Support cross-chain identity mapping and contract authorization;

Provides fine-grained access control (such as user access/modular invocation restrictions);

Interoperate with the human user DID system to ensure end-to-end trust relationship.

2. Smart Contract Execution System (Task Contract Engine)

The platform core uses smart contracts to manage robot tasks, status changes and settlement processes, supporting modular, upgradable and on-chain governance.

Each task generates a unique contract instance (such as robot order, service time, behavior boundary);

After the execution is completed, the contract automatically calls the settlement logic and releases the tokens/data/log;

Leverage the DAO governance system to provide dispute arbitration and feedback.

3. Humanoid Robot Local Control Agent (Robot Control Agent)

HumanBlock provides a standardized local agent system, which is deployed in each robot device to realize on-chain instruction parsing and off-chain execution.

Compatible with ROS, Jetson, NUC, Unitree and other mainstream control systems;

Local skill modules (actions, voice, expressions, navigation, etc.) can be invoked;

Support remote OTA updates and execute them in conjunction with the contract script;

Provide the operation log and sensor data to the chain channel.

4. AI skill module engine (Skill Marketplace + Runtime)

HumanBlock allows developers to publish skill modules (AI algorithms, motion controls, emotional interactions, etc.) on the chain and load them on demand by robots.

Each skill module is packaged as an NFT + running permission contract;

Support local loading or remote API cloud calls (supported by edge nodes);

The operating status and feedback results of the module can be recorded on the chain for evaluation and reward;

Support skill trading, rental and shared use of multiple robots.

5. Data ownership and encrypted upload system (DataChain + IPFS)

HumanBlock enables robots to collect data (voice, image, behavior, AI judgment) and implement authentication, encryption processing and on-chain evidence storage.

Data hierarchical encryption (user data/robot status/sensor raw data);

The original data is stored in IPFS, and its hash and access permission are recorded on the chain;

Dynamic authorization of "data access contracts" between users and robots;

Behavioral data can be used in scenarios such as insurance, traceability, evaluation, and model training.

6. The token economy system (HUBL Token Framework)

HUBL is the core token that drives task execution, module invocation, service incentives, and skill trading across the entire ecosystem, embedded within the entire system architecture.

HUBL is used for task order and settlement on the chain;

Skill module purchase, lease and upgrade are all paid through HUBL;

Encourage high-quality data behavior on the chain;

DAO voting rights are based on token lockup.

3. System characteristics and security design

functional characteristics	description
Chain and chain below coordination	The instruction is generated on the chain → local parsing → physical execution → result is linked to ensure transparent and credible whole process
Modular deployment	Control agents, data channels, contract execution, and identity systems can be deployed and upgraded independently
Cross-chain capability	Supports interaction and asset transfer with chains such as Ethereum, BSC, and Polkadot through the bridge module
Edge computing support	Deploy some AI models to edge nodes to relieve the pressure on the chain and local, and improve real-time performance
Privacy and compliance	Use mechanisms such as zero-knowledge proof and MPC to ensure user data privacy compliance (GDPR aligned)
Self-recovery mechanism	The control proxy can cache the execution logic automatically when the link is broken, and upload the full log after recovery to complete the link state

4. Future expansion direction

Cross-platform robot Interoperability Protocol Standard (HRP): Unified collaboration interface between heterogeneous robots;

Bionic digital human interface: support humanoid robots and metaverse virtual people to connect the behavior logic;

On-chain knowledge graph system: Robot behavior and experience are deposited as a shared on-chain knowledge module;

AI-driven self-learning contract system: allows robots to modify behavior scripts based on historical performance;

HumanChain v2.0 multi-chain deployment version: supports multi-chain parallel and task transfer bridge protocol.

epilogue

HumanBlock's core technological architecture represents not merely functional layering, but a fundamental system reconfiguration. By integrating trust-based logic from smart contracts with the execution capabilities of physical robots, it has established a true "trusted agent" ecosystem. Moving forward, the platform will continuously upgrade protocols, expand its ecosystem, and optimize operational efficiency, positioning itself as an industry pioneer in the convergence of AI, blockchain, and robotics technologies

8、Project ecological planning

Build the world's first decentralized humanoid robot intelligent agent ecosystem

As HumanBlock's platform technology matures and its HUBL token mechanism evolves, the project's ecosystem will expand from an initial "robot control platform" to a "cross-industry integrated autonomous agent network." This evolution will gradually establish a full-stack decentralized robotics ecosystem that encompasses multiple core scenarios in human society. The future HumanBlock ecosystem will serve not only as a technological platform but also as an intelligent operating system for digital societies.

1. Ecological main line: Driven by five core scenarios

1. Intelligent service ecosystem (RaaS-Robot as a Service)

HumanBlock will provide a "chain on a service" robot capability calling platform for B-end and C-end users, who can use HUBL tokens to:

Rent robots without trust (care, guide, reception, carrying, teaching, etc.);

Set the service task and time of the smart contract;

Record the full service behavior on the chain to realize accountability, review and payment automation;

The "self-employment mode" of robots will be opened to realize the Uber-like autonomous labor market.

Application fields: family care, hotel service, office cleaning, airport handling, shopping mall shopping guide, etc.

2. Learning to Earn and Teaching to Earn (L2E & T2E)

In the future, every robot in the HumanBlock ecosystem can be added to the knowledge sharing network as an "educational agent", and human users can form a two-way growth model with robots through teaching, authorization and other behaviors.

In the robot learning new skill module, users upload teaching data to get HUBL rewards;

Educators/developers can sell or rent "skill NFTs";

After completing the course, the robot records the learning path and feedback data to accumulate learning credit value;

Realize the self-evolution of AI education and the display of quantifiable results.

Application fields: language learning, art education, programming enlightenment, STEM curriculum, special children intervention and assistance.

3. Medical and Health Ecology (MedBot + Chain)

The HumanBlock robot will carry out basic nursing and health monitoring tasks in a controllable area, and ensure that the data is authentic, access is controlled, and results are available through blockchain.

Hospitals/pension institutions issue nursing tasks through contracts;

Medical staff can remotely command the robot operation through the platform authorization;

Each operation on the chain record is tamper-proof and traceable;

Nursing behavior performance is bound to patient feedback to generate scores for task bidding and rewards.

Application fields: elderly care, postoperative observation, health companionship, chronic disease management, intelligent consultation and guidance.

4. Industrial and Logistics Ecology (AutoCooperate DAO)

Through the multi-robot DAO collaboration mechanism, HumanBlock will become a key engine to realize "automatic organization + automatic scheduling + automatic revenue distribution" in the field of industry and logistics.

The robot automatically receives on-chain tasks (such as handling, inspection, loading and unloading);

Multiple robots form an autonomous task group DAO;

Behavior, consumption and collaborative efficiency are quantified and mapped to the profit-sharing model;

DAO members can vote to upgrade the AI strategy module and continuously optimize the scheduling logic.

Application fields: warehousing and logistics, manufacturing workshop, mining inspection, construction assistance, unmanned logistics.

5. Virtual world convergence ecosystem (MetaSync & Digital Twin)

In the metaverse/digital space, HUBL will build a "on-chain virtual robot + off-chain physical agent" dual mapping system to realize the physical and digital symbiotic system.

Each robot has a digital twin (Digital Twin) on the chain;

Users can remotely control the digital avatar to complete metaverse tasks (such as NPC services, digital tour guides);

The virtual behavior data will be fed back to optimize the learning model of the real robot;

Implement a hybrid existence across scenarios, roles, and identities.

Application fields: metaverse interaction, digital exhibition hall, virtual anchor, Web3 game NPC, remote proxy.

2. Ecological participants: multi-role collaboration model

role	Statement of rights and responsibilities
user	Publish tasks, pay services, upload data, manage identities
developer	Create skill modules, smart contracts, and control scripts
robot	Perform tasks, participate in the chain, participate in governance, and earn income
Node operator	Provides computing resources, verifies task status, and distributes updates
Data provider	Provide training data/environmental data to obtain HUBL excitation
DAO, governance	Proposals, votes, and evaluations of robot behavior scores and trust levels

All participants will build a unified value loop through HUBL, forming a self-consistent ecology of "human, robot, algorithm and economy".

3. The role of HUBL tokens in the ecosystem

HUBL is not only a means of payment, but also the core driving engine of the ecosystem:

Transaction media: skill rental, task payment, hardware unlock, etc.;

Identity and permission tokens: DAO voting rights, module use rights, behavior scores are bound;

Incentive tools: behavioral chain reward, data quality reward, skill development incentive;

Value anchor: pricing benchmark for robot services, cross-chain exchange unit;

Inflation and destruction mechanism: binding behavior and burning logic to ensure long-term value.

4. Long-term goal: To build the world's largest "trusted agent network"

HumanBlock is not only a robot control platform, but also a trusted intelligent ecosystem across industries, scenarios and virtual and real Spaces. In the next 3-5 years, HUBL Ecology will achieve:

Deployment of millions of robot nodes;

The popularity of service and data autonomy systems on the chain;

Distributed training and shared value exchange mechanism of AI model;

The RobotDAO alliance has been implemented in autonomous governance in vertical fields such as medical care, education and industry;

Multi-chain connectivity and global Web3 infrastructure connectivity.

HumanBlock is opening up a whole new world of intelligent species: they can not only act and think, but also survive, collaborate and evolve on the chain.