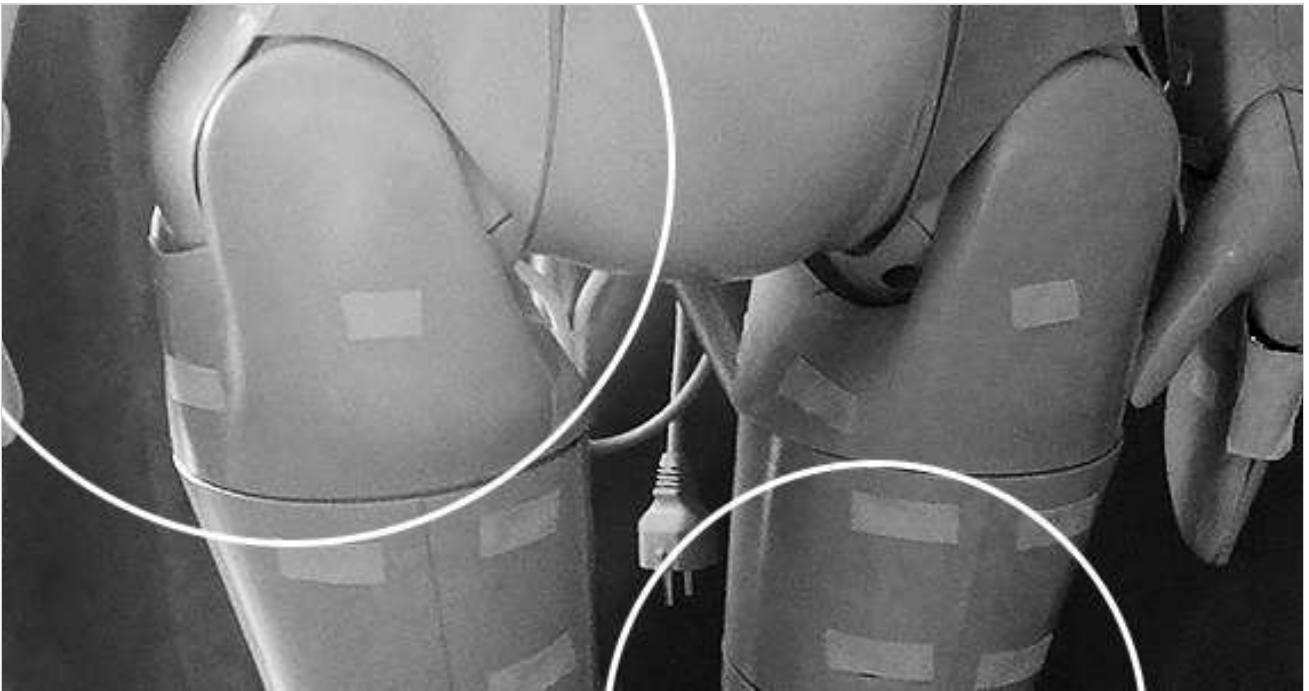


MA-UNI

A Human-Oriented Robotics Platform



**A persistent physical architecture for evolving robotics, computing
and embodied AI**

**MA-UNI is a design-first humanoid robotics platform based on a defined
human-oriented artificial body and physical identity**

What is MA-UNI?

MA-UNI (MA-chine UNI-que) is a design-first humanoid robotics platform based on a defined human-oriented artificial body and physical identity.

Instead of continuously adapting the physical body to each new generation of robotics technology, MA-UNI establishes the physical architecture first and develops the mechanical, electronic, sensing, control, software and AI technologies within that architecture.

The concept has already been translated into a full-scale physical prototype approximately 160 cm tall and weighing approximately 10–15 kg, with 30 basic programmable servo-driven axes.

The body is not a shell around the robot. The body is the robot's architectural framework.

MA-UNI is conceived as a long-term physical platform whose recognizable body and design identity can remain relatively stable while the technologies operating within it evolve through successive generations.

What is innovative about the approach?

The primary innovation is architectural rather than a single mechanical or software invention.

MA-UNI proposes a design-first approach in which the physical identity and human-oriented form of the artificial body are established first, while the underlying technology evolves within that framework.

Physical identity established first	Technology evolves within the body
Body treated as architectural framework	Successive technology generations can share one identity

This creates a potential separation between the long-term identity of the physical platform and the technological generation operating within it. Actuators, sensors, electronics, control systems, software and AI can be progressively improved without necessarily requiring the physical concept itself to be fundamentally redesigned.

A persistent artificial body may provide a stable framework within which robotics and AI can continuously evolve.

What problem or challenge is being addressed?

Humanoid robotics is progressing rapidly, but development is predominantly driven by engineering and technological capability.

As actuators, sensors, control systems, computing and AI evolve, the physical robot is often adapted to accommodate the requirements of each technological generation.

MA-UNI investigates the reverse approach: establishing a coherent human-oriented physical body first and developing the technology around and within it.

The fundamental conceptual uncertainty has already been substantially reduced. A defined physical concept exists, it has been constructed at human scale, and its integrated mechanical architecture has been demonstrated through a functioning prototype.

The remaining challenge is engineering.

What has already been built?

160

APPROXIMATE BODY HEIGHT · CM

15

APPROXIMATE BODY WEIGHT · KG

MA-UNI has progressed beyond the conceptual and purely digital stages and has been physically realized as a full-scale humanoid prototype.

All 30 axes are physically operational and individually programmable. Multiple axes can move simultaneously and in synchronization, allowing coordinated programmed poses and movement sequences.

The prototype demonstrates the feasibility of the basic physical architecture, modular construction and integrated servo-based actuation.

It is not yet an industrial or autonomous robot.

The current structure is optimized for concept validation rather than long-term mechanical reliability. Autonomous standing, balance and walking have not yet been achieved.

The conceptual and physical design is substantially established. The remaining development challenge is primarily engineering and technology integration.

What has already been proven?

The existing prototype provides physical evidence that the MA-UNI concept is constructible as an integrated humanoid system.

Physical scale	Full-scale human-oriented architecture
Actuation	Approximately 30 real servo-driven articulated axes
Control	Individual programmability and synchronized multi-axis movement
Construction	Modular, replaceable physical components
Fabrication	Digital design and predominantly 3D-printed components
Mechanical integration	Actuation integrated into the physical body
Architecture	Load-bearing skeleton with integrated external structural panels

The prototype substantially reduces the most fundamental conceptual risk: whether the proposed physical concept can be translated into a coherent three-dimensional construction.

This does not mean that the engineering problem has been solved. It defines the starting point from which structural, robotic and AI engineering can now proceed.

How does the technology work?

CURRENT PHYSICAL SYSTEM

Full-scale humanoid, approximately 155–160 cm tall and 10–15 kg, with 30 real servo-driven axes. Each axis is individually programmable; multiple axes can operate simultaneously and in synchronization.

The structure is digitally designed and predominantly 3D-printed. A load-bearing internal skeleton provides the basic structure, while external panels are integrated with the construction and contribute to structural stiffness.

CURRENT CONTROL

The present system uses an Arduino Mega and programmable servo actuation. Movement sequences are uploaded from a computer and can subsequently run without the computer remaining connected.

Rechargeable batteries are integrated into the body, with separate voltage levels used for logic and motor systems.

CURRENT LIMITATIONS

No external environmental sensors, cameras or closed-loop body-state feedback are currently integrated. The prototype can execute programmed movements and poses while supported, but it cannot yet stand or walk autonomously.

The next engineering stage replaces the proof-of-concept architecture with professional sensing, feedback, dynamic control, balance, locomotion, perception, software and AI.

Three generations of one architecture

The 36-month programme is structured around three successive engineering generations of the same MA-UNI physical architecture.

01

PROVE THE BODY

Structural engineering, strength, reliability, stability and definition of final physical parameters. Prototype 1 establishes the engineered physical foundation.

02

PROVE THE TECHNOLOGY

Actuation, electronics, power, sensing, feedback, control, software, AI and autonomous locomotion. Prototype 2 transforms the engineered body into a complete robotic system.

03

PROVE THE PLATFORM

Final integration, refinement, reliability, safety, professional design polishing and validation. Prototype 3 consolidates the final system.

These are not three independent robot concepts. They are three successive engineering generations of the same MA-UNI physical architecture.

36-month engineering roadmap

- | | |
|-----------|---|
| 01 | M1–M3 · Engineering Assessment
Full evaluation of structure, loads, materials, mass distribution, centre of gravity, joints, actuator interfaces, modularity and manufacturability. M3: Engineering Specification completed. |
| <hr/> | |
| 02 | M4–M9 · Prototype 1
Structural engineering, fabrication and testing of strength, reliability, stability and final physical parameters. M9: Structurally validated Prototype 1. |
| <hr/> | |
| 03 | M10–M18 · Technology Architecture & Prototype 2
Motorics, electronics, power, sensing, cameras, feedback, control, software, MA-UNIX and AI integration. M18: Fully integrated technology prototype. |
| <hr/> | |
| 04 | M19–M24 · Dynamic Operation
Independent standing, dynamic balance, weight transfer, controlled stepping, walking, disturbance response, fall detection and recovery. M21: Unsupported dynamic operation. M24: Autonomous walking. |
| <hr/> | |
| 05 | M25–M33 · Embodied AI & Prototype 3
Perception, interaction, planning, autonomous behaviour, final integration, reliability and professional refinement. M27: Embodied AI integrated. M30: Prototype 3 completed. M33: Ready for final validation. |
| <hr/> | |
| 06 | M34–M36 · Final Validation
Systematic validation of structural reliability, endurance, locomotion, balance, perception, safety and autonomous behaviour. M36: Validated autonomous walking demonstrator. |
| <hr/> | |

Financial requirement

MA-UNI has been developed independently and primarily through the founder's own resources over an extended period.

The existing prototype required approximately **€2,000 in material costs**, excluding the founder's engineering, design, development and assembly time.

The next stage requires a multidisciplinary team, professional engineering infrastructure, advanced components, testing and several prototype generations..

PEOPLE & EXPERTISE

Approximately 8–10 core team members, complemented by external specialists, research partners and engineering providers as appropriate. Personnel and professional engineering expertise are expected to represent approximately half of the programme requirement.

HARDWARE & VALIDATION

Prototype development, actuators, mechanical components, electronics, sensing, cameras, computing, AI infrastructure, manufacturing, laboratory resources, testing, safety and technical contingency.

Planning principle

The final cost structure should be refined after the initial engineering assessment.

What would success look like?

Success means transforming the existing MA-UNI physical architecture into a professionally engineered, autonomous humanoid robotic platform without losing its human-oriented physical identity.

At the end of the 36-month programme, MA-UNI should demonstrate independent standing, dynamic balance, autonomous walking, environmental perception, controlled physical interaction and autonomous behaviour.

Structural reliability	Autonomous locomotion
Sensing & feedback	Control stability
Safety & human-oriented operation	Endurance & reliability

The project should establish whether the MA-UNI architecture can function as a long-term physical platform for embodied AI: a stable artificial body within which mechanical, electronic, software and AI technologies can continue to evolve without requiring the physical identity of the platform to be fundamentally redesigned.

The central question is whether a stable, human-oriented artificial body can become a long-term physical platform through which embodied AI can exist, operate and evolve in the human world.

What are the main risks?

The fundamental conceptual risk has already been substantially reduced through the development of a full-scale physical prototype.

The remaining risks are primarily practical engineering and technology risks: structural strength and fatigue, actuator performance and reliability, joint loads, power and energy management, thermal behaviour, sensing and feedback, control stability, dynamic balance, locomotion, fall detection and recovery, perception, human-safe physical interaction, software integration and overall system reliability.

The key constraint

Engineering improvements may change materials, thicknesses, joints, interfaces, actuators and other internal components, but must preserve the established MA-UNI physical architecture and human-oriented identity.

These risks are addressed through staged development rather than a single final integration attempt: Prototype 1 isolates structural and mechanical risk; Prototype 2 integrates the technology stack; Prototype 3 consolidates and validates the complete system.

How does MA-UNI differ?

The main difference is the starting point.

Humanoid platforms such as Figure, 1X, Apptронik, Agility Robotics, Tesla, Unitree and Sanctuary AI demonstrate strong progress in locomotion, manipulation, perception, autonomy and AI-driven interaction.

MA-UNI does not claim that these approaches are technically incapable or commercially invalid. It investigates a complementary architectural direction: establishing a defined human-oriented artificial body first and developing the underlying technologies within that architecture.

The distinction is architectural rather than based on a single component or specification.

This creates a different development question: rather than asking how a particular generation of technology can be placed into a humanoid body, MA-UNI asks whether a stable artificial body can serve as a persistent platform within which successive generations of technology can evolve.

Complement rather than compete

MA-UNI is intended to complement existing robotics approaches by addressing a different layer of the humanoid platform: its concept, physical identity and long-term design vision.

ADVANCED ROBOTICS ENGINEERING

Mechanics, actuation, electronics, sensing, control, locomotion, software and AI integration provide the technological capability.

MA-UNI ARCHITECTURE

Physical identity, human-oriented form, architectural continuity and long-term design vision provide a persistent framework.

A strong engineering solution can potentially be integrated into the MA-UNI physical architecture. Conversely, the MA-UNI architecture can potentially provide advanced robotics engineering with a coherent human-oriented body and defined design framework.

Robotics engineering can provide the technological capability; MA-UNI can provide a persistent physical concept and human-oriented architectural framework.

Who could use MA-UNI?

MA-UNI is intended as a general-purpose humanoid robotics platform rather than a robot designed for one narrowly defined application.

Potential application areas include domestic environments, hospitality, retail, museums, education, offices, research environments and other human-centred settings.

Communication & information	Observation & perception
Basic manipulation	Routine assistance
Educational interaction	Autonomous physical tasks

A potential advantage is that a commercial version does not necessarily need maximum mechanical and AI sophistication before providing useful value. Earlier versions could provide reliable standing, calm walking, speech, environmental orientation, recognition and limited predefined interactions while more advanced capabilities continue to develop.

The broader commercial hypothesis is that MA-UNI could evolve through successive commercial generations while maintaining a recognizable physical identity.

Why could MA-UNI be disruptive?

MA-UNI proposes a different relationship between artificial intelligence, robotics engineering and the physical body in which intelligence operates.

The potential breakthrough is not a single mechanical invention or AI algorithm. It is the architectural proposition that an artificial body can have a persistent physical identity while engineering, software and AI technologies operating within it continue to evolve.

This may create a separation between the long-term identity of the robot and its technological generation. A future MA-UNI could retain a recognizable physical architecture while receiving improved actuators, sensors, computing, control systems and AI through successive generations.

It may also allow commercial deployment and technological development to progress simultaneously rather than sequentially.

The future humanoid may not need to be redesigned every time its technology improves. The technology may instead evolve inside a persistent artificial body.

MA-UNI does not claim that this transition has already been achieved. The project exists to determine whether the proposed architecture can be engineered and validated sufficiently to support it.

Who is required to build it?

The project combines an established conceptual and physical foundation with a multidisciplinary engineering capability that must now be built around it.

Founder Mario Milushev provides continuity of concept, physical architecture, design development and long-term vision. The existing prototype was developed independently and provides the physical starting point.

CORE ENGINEERING

Mechanical and structural engineering; robotics and actuation; electronics and embedded systems; power management; sensing and feedback; control; dynamic balance and locomotion.

INTELLIGENCE & INTEGRATION

Computer vision; software; AI and embodied intelligence; system integration; safety; testing; professional manufacturing.

The planned core team is approximately **8–10 people**, complemented by external specialists, research institutions, engineering partners and specialized testing or manufacturing providers where appropriate.

Team requirements will change across the three prototype phases; some specialists may cover more than one related discipline.

What support would accelerate MA-UNI?

MA-UNI needs the resources and environment required to transform an independently developed physical prototype into a professionally engineered and validated humanoid robotics platform.

01**Funding**

Multidisciplinary team, professional engineering infrastructure, advanced components, several prototype generations and systematic testing.

02**Technical Expertise**

Independent experts able to challenge assumptions, evaluate the architecture and define the most effective engineering path.

03**Team Building**

Connections to specialists, research institutions, engineering partners and manufacturing capabilities.

04**Validation & Network**

Testing environments, industrial partners, early customers, investors, suppliers and commercialization partners.

MA-UNI brings the established concept, physical architecture and prototype; the next stage requires the engineering ecosystem, expertise, partners and resources to determine how far that architecture can be taken.

THE CENTRAL QUESTION

Can an already established human-oriented artificial body become a professional, autonomous and evolving physical platform for intelligence?

MA-UNI should be understood as a long-term humanoid robotics platform rather than simply as another attempt to build a humanoid machine.

Its most important asset at the current stage is that a clear physical concept and architectural identity already exist as a full-scale functioning prototype.

The project deliberately separates the persistent identity of the artificial body from the technologies operating within it. Mechanical systems, electronics, sensors, control methods, software and AI can evolve while the physical concept remains substantially stable.

MA-UNI

**A Human-Oriented Humanoid
Robotics Platform**

Mario Milushev — Founder / Concept Designer

www.ma-uni.com