

Humanoids for human-centric wet-lab R&D tasks

How would you propose to automate complex tasks in human-centric pharmaceutical R&D wet labs, based on the latest generation of humanoid robots?

Answers to this [question](#) including a proposal for collaboration can only be considered if they arrive no later than November 19, 2026, 11:59 pm PST.

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What is the context of the problem that we would like to solve?

Pharmaceutical research laboratories have adopted a wide range of automation technologies, including liquid handlers, plate handling systems, and robotic workcells, to improve efficiency and throughput. While highly effective for repetitive and standardized processes, these solutions are inherently limited in flexibility and are therefore difficult to apply across the broader spectrum of laboratory activities found in early discovery and preclinical research. As a result, many critical tasks continue to rely on skilled lab personnel whose adaptability, dexterity, and decision-making capabilities remain challenging to automate.

Recent advances in robotics, artificial intelligence, computer vision, and learning-based control have created a new opportunity to address this gap. Emerging robotic systems are increasingly capable of operating in complex human environments, interacting with diverse tools and equipment, and acquiring new skills through demonstration and simulation. Among these developments, humanoid robots have attracted particular attention due to their potential to operate within environments originally designed for humans.

This is especially relevant for pharmaceutical wet laboratories, which represent highly heterogeneous and constantly evolving environments. Scientific workflows, assays, and operating procedures change continuously, while brownfield laboratory infrastructure consists largely of instruments and tools designed for human operators. Rather than redesigning laboratories around automation, an alternative path may be to deploy robotic systems capable of working within existing laboratory environments and interacting with established equipment, digital interfaces, and workflows.

The objective of this call is therefore not to identify the next generation of traditional laboratory automation. Instead, it is to evaluate whether emerging humanoid robotic systems can serve as a scalable automation layer for flexible, human-centric pharmaceutical laboratories. Proposals should demonstrate how humanoid robots can interact with laboratory equipment, tools, consumables, and workflows designed for human scientists while preserving the flexibility, adaptability, and agility essential to research-driven environments.

What are our minimal requirements?

Proposals are sought for adaptation, or evaluation of humanoid robotic systems intended for operation in pharmaceutical wet-laboratory environments. The proposed systems should align with the long-term vision of deploying versatile, human-compatible robotic platforms capable of performing laboratory activities within existing laboratory infrastructure and workflows. Preference will be given to proposals that are supported by proof-of-concept data, laboratory demonstrations, or simulation studies demonstrating relevant dexterity and manipulation capabilities required for wet-lab operation.

Proposed solutions should address the following aspects:

- **Adaptation of existing humanoid robotics platforms:** Modification, extension, or adaptation of existing humanoid robotic systems to perform representative wet-laboratory activities and workflows.
- **Operation in human-centric laboratory environments:** Design and validation of systems capable of effective operation within laboratory environments that were originally designed for human operators. The proposed approach should enable operation of standard laboratory equipment, tools, and processes without requiring fundamental redesigning existing laboratory infrastructure.
- **Adaptive sensing, reasoning, and control:** Integration of sensing, planning, and control capabilities enabling robots to operate in dynamic and variable laboratory environments. Relevant examples include:
 - Vision- and tactile-based perception for object recognition and manipulation
 - AI-driven task planning and decision making
 - Learning-from-demonstration approaches
 - Real-time force and feedback control for compliant interactions
 - Robust handling of variability in equipment, consumables, and workflows

Priority will be given to proposals that build upon existing integrated robotics platforms and demonstrate validated proof-of-concept systems within relevant laboratory workflows rather than purely conceptual developments.

Expected Proof-of-Concept Demonstration

The proof-of-concept should provide evidence and insight into the following aspects:

- **Execution of complex laboratory workflows:** Ability to successfully perform a representative wet-laboratory workflow comprising multiple sequential and interconnected tasks rather than a single isolated activity.
- **Dexterity and manipulation capability:** Demonstration of fine-motor skills, object handling capabilities, and manipulation performance relevant to laboratory operations, serving as indicators of the system's potential to generalize additional laboratory tasks.
- **Skill acquisition and extensibility:** Ability to efficiently train, integrate, and deploy new software capabilities, robotic skills, or laboratory procedures without extensive system redesign or manual programming.
- **Operation in existing human-centric labs:** Demonstration that the robotic system can interact with laboratory equipment, instruments, interfaces, and consumables commonly found in existing wet laboratories.
- **Human-robot collaboration:** Safe and effective operation alongside laboratory personnel while maintaining laboratory quality, sample integrity, and operational flexibility.

What potential solutions would be out of scope?

The following types of solutions are considered out of scope and will not be evaluated:

- **De novo humanoid hardware development:** Proposals primarily focused on the design and construction of a new humanoid robot platform rather than leveraging and adapting existing robotic systems.
- **Conventional laboratory automation operated by a humanoid robot:** Solutions in which the primary laboratory work is performed by dedicated automation equipment (e.g., liquid handling systems, robotic workcells, integrated automation platforms), while the humanoid robot merely supervises, operates, or services the automation system. The focus of this call is on the humanoid robot directly performing laboratory activities in human-centric environments.
- **AMR- or AGV-based logistics solutions:** Solutions primarily addressing transportation, material movement, or logistics workflows through autonomous mobile robots (AMRs), automated guided vehicles (AGVs), or similar mobile platforms without substantial laboratory task execution capabilities.
- **Non-humanoid laboratory automation systems:** Fixed automation solutions such as liquid handling workstations, robotic arms, screening platforms, laboratory orchestration systems, or robotic cells that do not employ a human-compatible, humanoid robotic embodiment capable of operating within existing human-oriented laboratory environments.
- **Greenfield automation concepts requiring extensive infrastructure redesign:** Solutions that depend on significant modification of laboratory layouts, replacement of existing laboratory equipment, or creation of dedicated robot-only environments. The focus is on operation within brownfield laboratory environments.
- **Purely conceptual proposals:** Concepts, white papers, or architectural studies without an accompanying physical prototype, integrated platform, or supporting proof-of-concept evidence demonstrating technical feasibility.
- **Simulation-only, AI-only, or digital-only approaches:** Solutions limited to simulation, digital twins, AI models, workflow orchestration, or software development without validation on a physical humanoid robotic platform performing representative laboratory tasks.
- **Single-purpose robotic solutions:** Systems engineered exclusively for one narrowly defined laboratory task without demonstrating a pathway toward broader applicability across multiple laboratory activities and workflows.
- **Applications outside pharmaceutical wet laboratories:** Use cases focused on manufacturing, warehouse logistics, clinical operations, healthcare delivery, home service, elderly care, hospitality, retail, security, entertainment, or other non-research environments.

What benefits do we offer to you in exchange for having submitted a solution?

Selected partners will gain the opportunity to collaborate directly with experts from Boehringer Ingelheim's Discovery Science Technologies and Global Facility & Engineering organizations. This interdisciplinary collaboration combines expertise in pharmaceutical research, laboratory operations, engineering, automation, digital technologies, and innovation management to support the development and evaluation of humanoid robotic solutions for wet-laboratory environments.

Successful proposals will be eligible for tailored collaboration and funding packages designed to advance their technology toward practical deployment in pharmaceutical laboratory settings. Funding levels will depend on the maturity, scope, and anticipated impact of the proposed solution. Where applicable, suitable business and intellectual property arrangements will be established on mutually agreed terms.

We recognize that potential solutions may originate from a broad range of organizations, including start-ups, scale-ups, academic spin-offs, research institutes, and established technology companies. For many participants, this initiative may represent an opportunity to validate and position their technology within the emerging pharmaceutical laboratory robotics market.

The primary objective of the collaboration is to advance promising humanoid robotic solutions from their current maturity level toward a laboratory-relevant proof-of-concept within approximately one to two years. Particular emphasis will be placed on adapting existing humanoid robotic platforms and AI models to pharmaceutical wet-laboratory applications and demonstrating their feasibility in representative laboratory workflows.

Depending on the maturity of the proposed solution, collaboration structures may vary. We are open to defining appropriate funding, performance milestones, and partnership models that create value for all parties involved. For successful proof-of-concept projects, Boehringer Ingelheim has a strong interest in exploring opportunities for longer-term collaboration and future deployment scenarios.

Boehringer Ingelheim is particularly interested in establishing collaboration models that appropriately balance the rights and interests of all partners. Proposals should therefore outline existing background intellectual property as well as expectations regarding ownership, access rights, and exploitation of jointly generated results. We are committed to identifying mutually beneficial intellectual property arrangements that support both innovation and future commercialization opportunities.

For selected projects, and subject to mutual agreement, there may also be opportunities for joint communication of the collaboration and its outcomes. Collaboration with a leading global pharmaceutical company may provide valuable visibility and serve as a lighthouse application for emerging humanoid robotics technologies in laboratory environments.

What are the key success criteria on which we base our selection for the best answer?

Proposals should provide initial proof-of-concept data, either from simulations or laboratory demonstrations, supporting the feasibility of the proposed approach.

- **Quality and feasibility of the proposal**
 - Clear project scope, technical approach, and expected outcomes.
 - Realistic path to achieving measurable results within approximately one to two years.
- **Delivery of tangible results**
 - Ability to demonstrate a defined prototypic laboratory task or workflow within approximately one to two years.
 - Clear definition of measurable success criteria for the proof-of-concept.
 - Potential to extrapolate the demonstrated capabilities toward broader laboratory applications and future scalability.
- **Capability to operate in human-centric wet laboratories**
 - Ability to safely and reliably interact with laboratory equipment, consumables, software interfaces, and workspaces originally designed for human scientists.
 - Potential to preserve laboratory flexibility and scientific agility while increasing automation levels.
- **Technical maturity and proof-of-concept readiness**
 - Degree of existing system maturity and integration.
 - Availability of proof-of-concept data demonstrating laboratory-relevant dexterity, manipulation capabilities, and autonomous task execution.
 - Preference will be given to proposals building upon existing robotic platforms and validated subsystems rather than early-stage conceptual developments.
- **AI integration, adaptability, skill acquisition**
 - AI and foundation model integration: Integrated software tools enabling development, training, and adaptation to support laboratory task execution, reasoning, and skill acquisition.
 - Ability to efficiently teach new laboratory procedures through approaches such as learning-from-demonstration, simulation, reinforcement learning, or workflow abstraction.
 - Evidence that the proposed architecture can scale beyond a single laboratory task and enable future skill expansion.
- **Intellectual property and collaboration framework**
 - Proposals should clearly describe:
 - Existing background intellectual property (Background IP) relevant to the proposed solution.
 - Dependencies on third-party intellectual property, software, models, data sets, or proprietary technologies.
 - Any known intellectual property restrictions that may affect implementation or future deployment.
 - Protection of Boehringer Ingelheim confidential information and operational know-how.

- Ownership and usage rights related to newly generated project results, models, software, and data.
- Suitable collaboration and IP-sharing constructs that enable productive joint development while protecting the interests of all parties.
- **Access to required infrastructure and resources**
 - Demonstrated access to the facilities, robotic platforms, computational resources, and technical expertise required to execute the proposed work.
 - Ability to support joint development activities and proof-of-concept implementation in collaboration with Boehringer Ingelheim.
- **Transferability to Boehringer Ingelheim environments**
 - Compatibility with typical pharmaceutical laboratory processes, equipment, and operating models including typical laboratory equipment, workflows, digital systems, safety requirements, and operational constraints.
 - Practical feasibility of deployment within Boehringer Ingelheim laboratory settings.

What information should be included in your answer submission?

Please use our answer submission template to provide a 4 - 5-page non-confidential proposal (available for download on the following [site](#)).

If confidential data exists that would strengthen the proposal, please indicate that information is available to share under a Confidential Disclosure Agreement (CDA). If we find the non-confidential concept proposal sufficiently interesting, we will execute a CDA for confidential discussions.

Anticipated Project Phases or Project Plan

Phase 1	Please complete your submission by November 19, 2026, 11:59 pm PST at the very latest.
Phase 2	Our review of all proposals will be completed by end of January 2027, and scientists will be informed after that.
Phase 3	Start of discussions for the collaboration agreement in Q1/2027.

Submitting a collaboration proposal

- Check the outline of the techMATCH profile “[Humanoids for human-centric wet-lab R&D tasks](#)” on opnMe.
- Alternatively, you may click the “Get Submission Template” banner to access the material transfer template.

- Follow the instructions to upload your submission document (requires login or registration).
- The upload allows you to attach additional application files if desired.
- You will be able to access your final submitted collaboration proposal in your personal dashboard and follow its review status.
- Please also visit the [FAQ section](#) on opnMe.com to learn more about our techMATCH program.