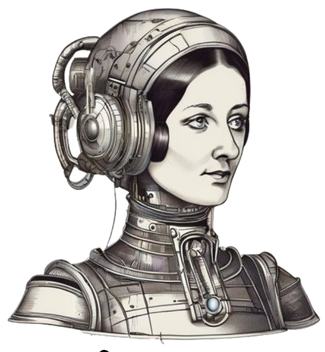

ADA ROBOTICS

ATHENA: Autonomous Task Handling and Execution Agent

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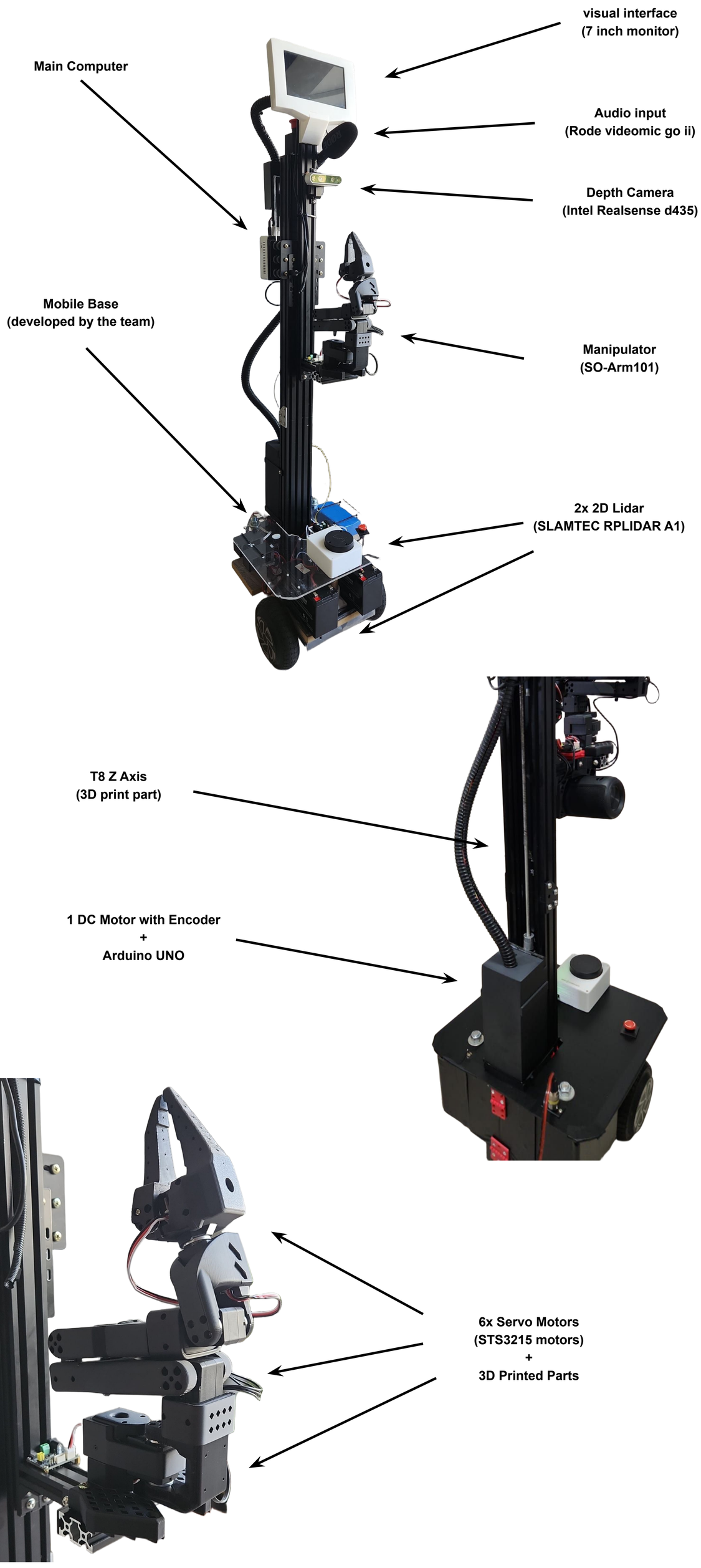
Introduction

Over the past few months, the AdaRobotics@Home team has continued refining its service robot platform, enhancing both hardware and system integration. The robot now features an improved torso lift mechanism, upgraded base electronics, and redesigned 3D-printed structural components for greater reliability and modularity. Most notably, we have adopted the open-source SO-Arm101 manipulator, joining a growing community effort to advance accessible, high-performance robotic arms.

Our ongoing mission is to collaborate with the research and open-source communities—developing, testing, and improving state-of-the-art algorithms in perception, control, and human–robot interaction. This continuous evolution strengthens the robot's foundation for both competition and research applications, paving the way for broader contributions to the field of service robotics.



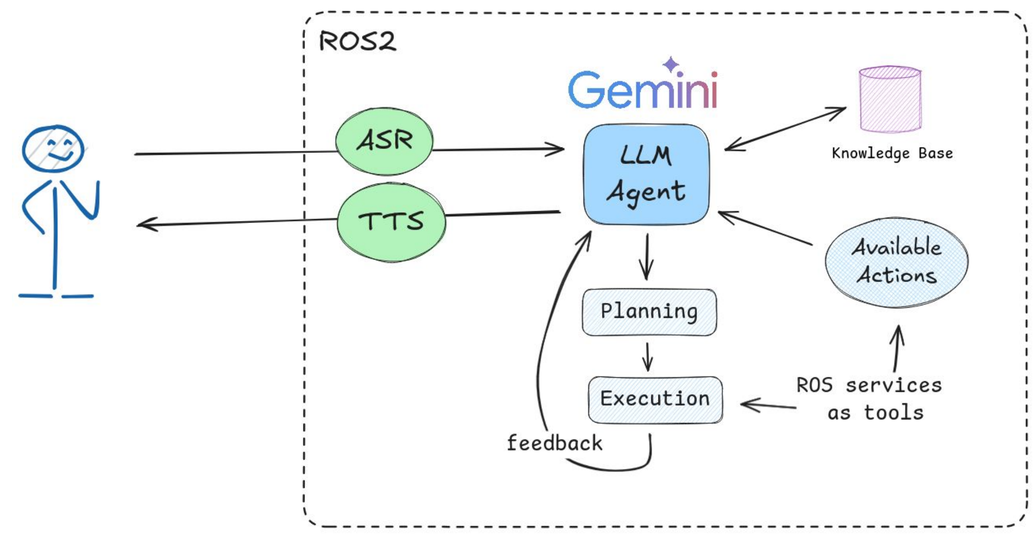
Current Work and Future

Integrating Language and Vision for Intelligent Task Planning

Our current research focuses on developing a unified architecture that leverages both language and vision-language models to enable intelligent task planning in service robots. We are pursuing two parallel directions.

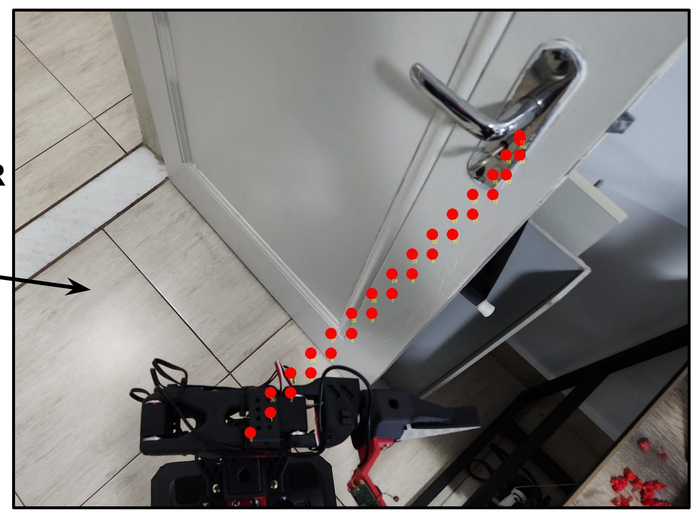
The first line of work extends our previous efforts in symbolic task planning, combining LLMs with ontology-based reasoning to generate structured plans for complex household tasks. This system has been successfully demonstrated to the public, showcasing robust high-level decision-making capabilities.

In parallel, we are integrating and testing Vision-Language-Model (VLM) models—such as Google's Gemini Robotics-ER 1.5 preview and several open-source alternatives—to enhance spatial reasoning and visual grounding. These models enable the robot to interpret its surroundings directly from camera input, enhancing its spatial reasoning and allowing it to bridge the gaps between the environment and deterministic states in its ontology.



Gemini API

Gemini Robotics-ER 1.5



Visual-Language Action Integration

Ada Robotics, using the SO-ARM101 manipulator, pursues two complementary tracks:

(1) Imitation learning via the Hugging Face Lerobot project to teach everyday tasks. We collect real demonstrations with LeRobot and train transformer-based, action-chunking policies (e.g., ACT) that learn coherent multi-step action chunks and can be refined with RL for robustness on SO-ARM101.

(2) Integration with SmolVLA: This Hugging Face model was trained using community data to perform tasks based on text input. We have been actively testing its integration into the Athena robot architecture while also contributing to the improvement and expansion of the community datasets.