Alexandre C. F. Filho, Carlos E. R Duarte, Daniel R. da Silva, Eduardo D. Peixoto, Gabriel P. O. Ruotolo, João G. da S. Haveiro, João V. C. Souza, José G. R. Teles, José R. R. Teles, Lavínia R. Lima, Letícia L. Mendes, Luis F. F. de O. Freitas, Marcelo R. Jordão

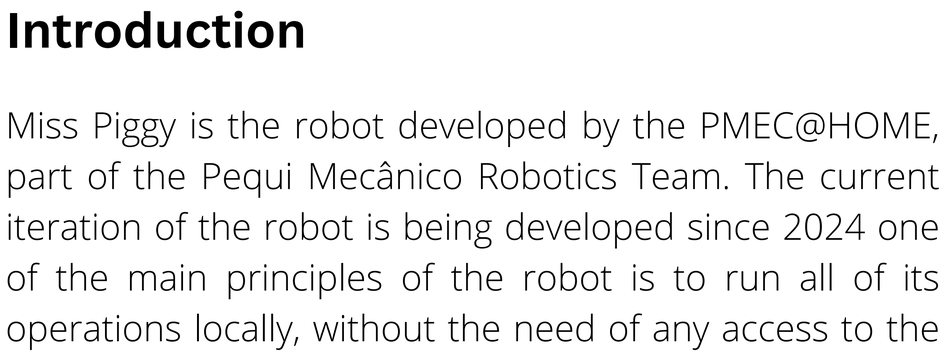
MISS PIGGY

RoboCup@Home Brazil Open 2025

Introduction

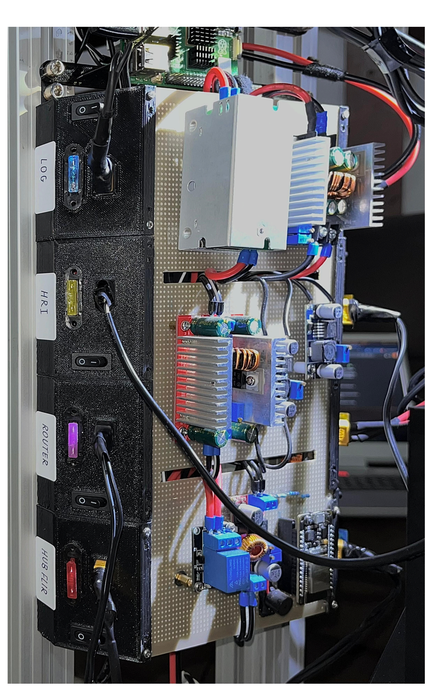
Miss Piggy is the robot developed by the PMEC@HOME, part of the Pequi Mecânico Robotics Team. The current iteration of the robot is being developed since 2024 one of the main principles of the robot is to run all of its operations locally, without the need of any access to the internet maintaining the privacy of the household environment intact. Designed for everyday home care, Miss Piggy's computational system is a testament driven entirely by our team of dedicated undergraduate and master's students.

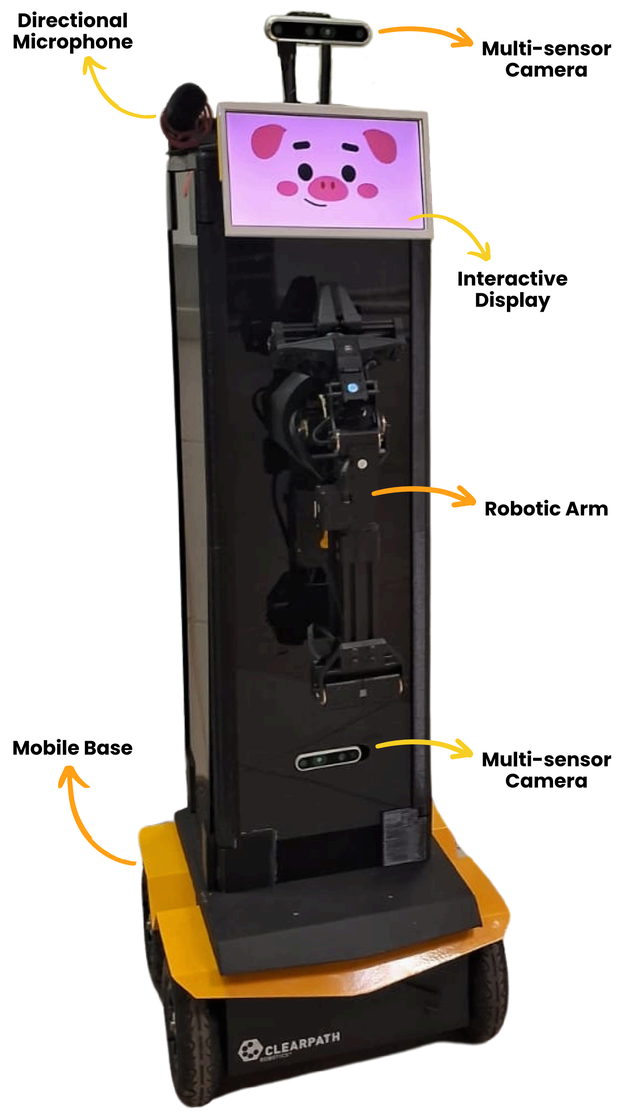
Recent Efforts



WakeWord: Our recent paper details a streamlined pipeline for creating robust WakeWord models in low-resource languages. Utilizing a zero-shot TTS model (xTTS) for high-quality synthetic data generation, our ROS 2-integrated approach achieved an F1-score of up to 0.91 in real world validation, demonstrating effectiveness for diverse linguistic contexts in robotics.

ECSBOX: The Energy Center System (ECSBOX) for Miss Piggy's power distribution is beind developed as a unified, modular prototype. It efficiently distributes 42V battery power to eight interfaces, each with control and overload protection. The ECSBOX is also being developed for battery supply monitoring, diagnostics, and emergency power cut-off.





Robot Software Information

Operating System	Ubuntu 22.04 JetPack 6.2.1 (Jetson AGX) Ubuntu 22.04 (Jackal Mobile Base)
Main Communication Framework	ROS 2 Humble
Navigation	Nav2
Localization	EKF
Mapping	Rtabmap
Object Detection	YOLO11
Human Recognition	YOLOv8
Speech Synthesis	FastSpeech & HiFi-GAN
Speech Recognition	Parakeet
Natural Language Understanding	Qwen2.5

Robot Hardware Information

Base	Clearpath Jackal UGV
Microphone	Rode Videomic GO
RGB-D Cameras	Intel Realsense D435i Intel Realsense D455
Speaker	LG XBOOM XG5S
IMU	HMC6343
LIDAR	RPLidar A1
Primary Embedded System	NVIDIA Jetson Orin AGX
Secondary Embedded System	Intel i5, 32GBRAM, NVIDIA GTX1650
Gimbal Setup	2x Dynamixel Servos (XM430 & XM540)