



HERA - Home Enviroment Robot Assistant

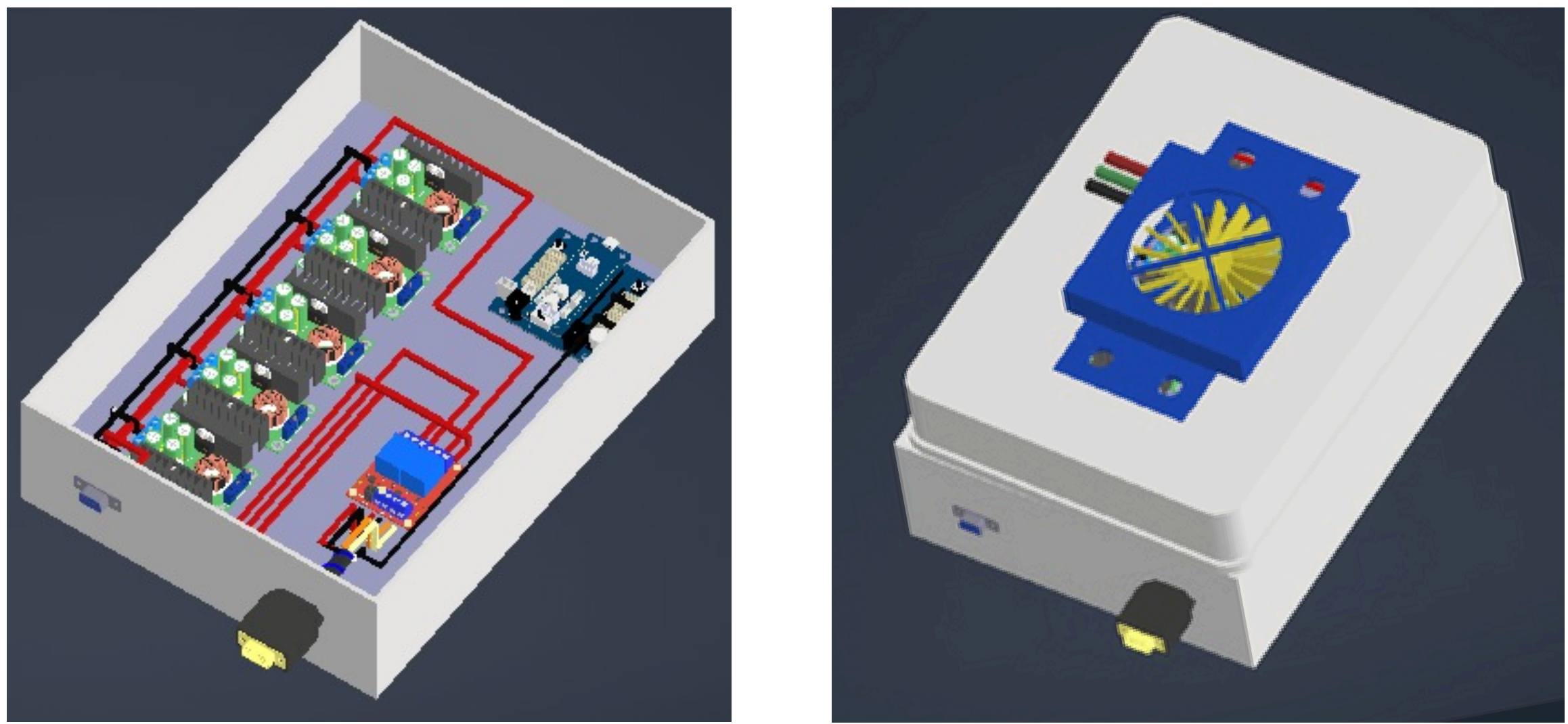
Hardware



Our team

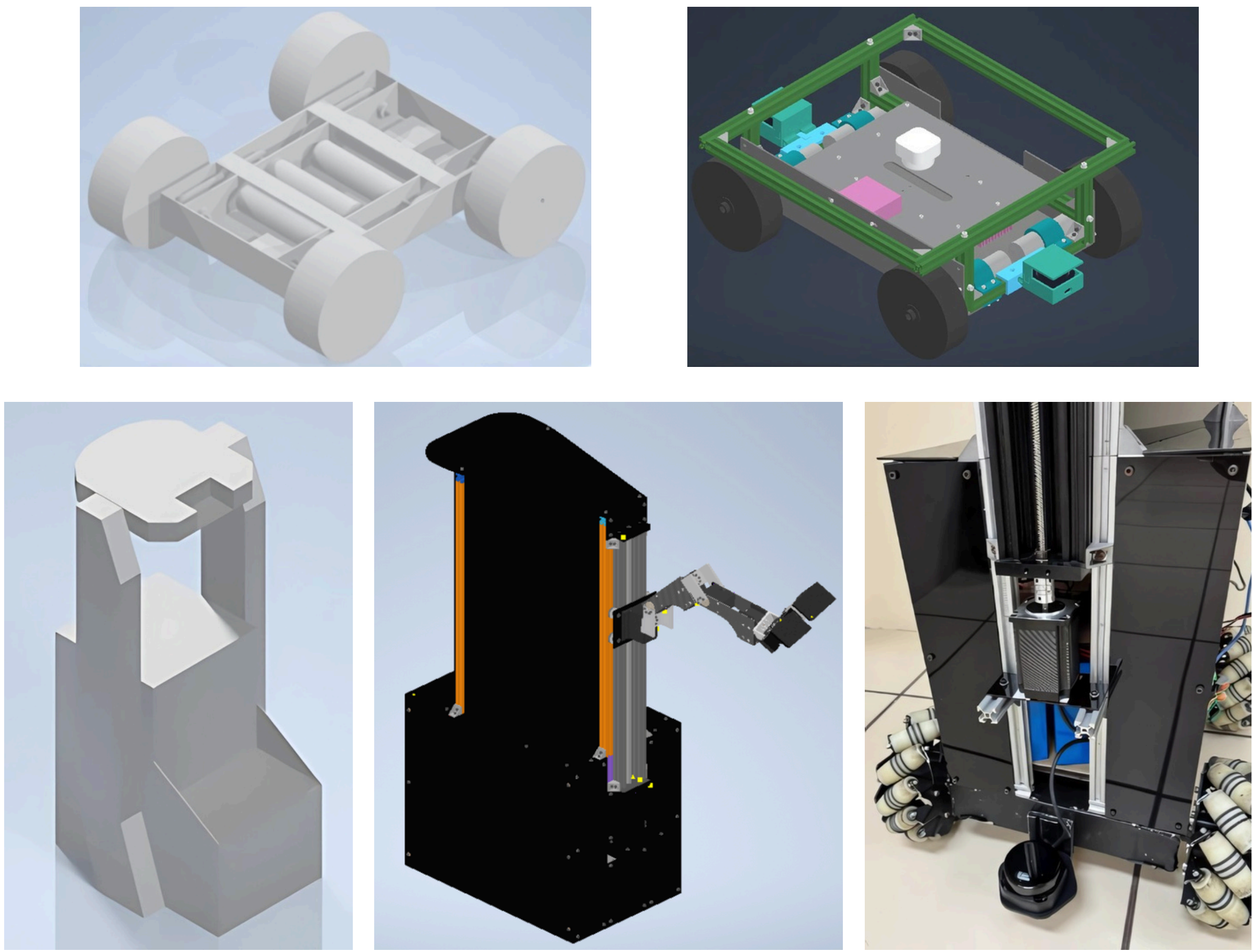
Since 2015, RoboFEI@Home brings together undergraduate and graduate students in engineering and computer science to develop robots that aid elderly individuals and people with limited mobility. Team members volunteer as organizers, technical advisers, and trustees, actively supporting and promoting the competition across Latin America.

Electrics advancements



IMU sensor	On/Off button	Motors optimization
Li-ion battery bank	ESP32 microcontroller	Eletronical case
Optimized charge	Independent base	Stepdown voltage regulator

Full robot remodel



	Old Hera	New Hera	Changes
Base	26.6Kg/58.643 lbs	14.8Kg/32.62841 lbs	44,36%
Torso	25.260Kg/55.689 lbs	12.676Kg/27.946 lbs	48,96%
Packing	Non modular model, hard to dismount	Modular, low-maintance, easy to pack	Packed into 2 bags instead of 4

Work in progress

- Objective: Implement context-aware facial expressions for enhanced human-robot interaction using the Hera platform.

Method: Analyze context, design & map expressions, implement on Hera, and validate with users.
- Objective: Evaluate and compare the performance of different battery types in robots under varied operational conditions.

Method: Analyze battery performance according to operating environments.
- Objective: Develop a robust system for person tracking and following in dynamic environments using sensor fusion and re-identification techniques.

Method: Synchronize sensors, fuse data with EKF, apply re-ID, plan safe following paths, test, and refine via tracking metrics.

Software

ROS
ROS2

Our project is available at <https://github.com/RoboFEI-Home>

Intel Realsense D435i		
hera_face	hera_detector	hera_tracker
HyperX Quadcast	RPLiDAR C1	Dynamixel XM540 & XM430
hera_speech	hera_navigation	hera_moveit_config
Optiplex 7020 Micro		
hera_navigation	hera_control	hera_moveit_config
Jetson Orin Nano Super		
hera_vision_system	hera_speech	

Latest work

- Objective: Analyse and compare different manipulation solutions in service robotics

Methods: Research Team Description Papers, interview members, and analyse general solutions.
- Objective: Compare the evaluation of YOLOv9, YOLOv10 and YOLOv11 for real-time service robotics

Method: A comparative benchmark of YOLOv9, v10, and v11 on an NVIDIA Jetson Orin platform measuring latency, power consumption, accuracy, and frame rate for embedded robotics.
- Objective: Enhance Hera robot's functionality and efficiency, improving its structure, systems, and human-robot interaction.

Method: Change the computational system, redesign the mechanical structure to reduce weight.
- Objective: Adapt US8K_AV so service robots running Raspberry-Pi-class hardware can detect safety-critical and social sounds in real time.

Method: Filter and rebalance classes, add "silence," split into ten folds, then benchmark classical and CNN models on a robot-mounted Pi.

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