

TrimMate

New Generation of Smart Outdoor Care Robots

KÄRCHER



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The Reality of Hedge Care

8.9 million km

hedges shape the diverse landscapes of Europe.

3.5 tons / km

O₂ are produced by these hedges.

120 million hours

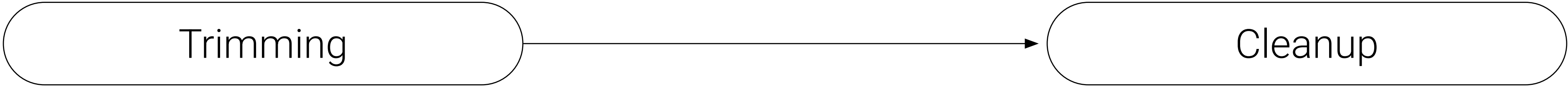
are spent every year on hedge maintenance.

- from funktechnologies



Why Does It Take So Much Time?

Today, hedge maintenance still relies largely on manual work. Trimming requires physical strength and skilled tool handling, followed by extensive cleanup. Traditional methods are time consuming, repetitive, and physically demanding. They also carry significant safety risks, especially when working overhead or on unstable platforms.



Trimming requires physical strength and skilled tool handling.



Traditional methods often involve a lot of overhead work.



Manual transport of large volumes of cut branches.



Shredding waste for disposal, mulch or compost.

...How might we reimagine hedge care
for a **safer, smarter**
and **more sustainable** future?

The Future of is

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The Future of Hedge Care is automatic.

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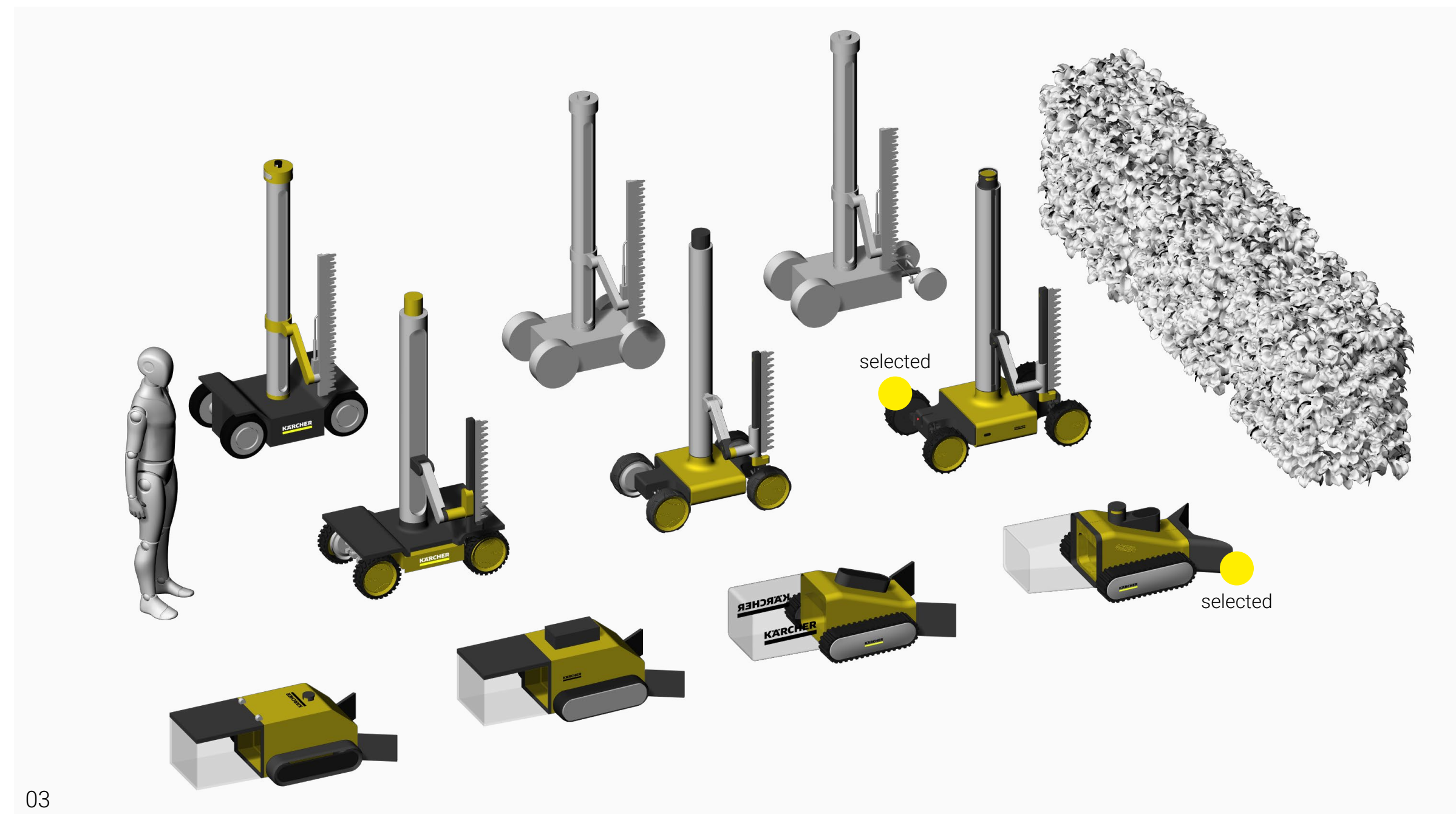
Exploration

As automation continues to transform other areas of garden care, I recognized a similar opportunity in hedge maintenance. I began mapping the workflow to explore how robotics could reduce workload and improve safety.

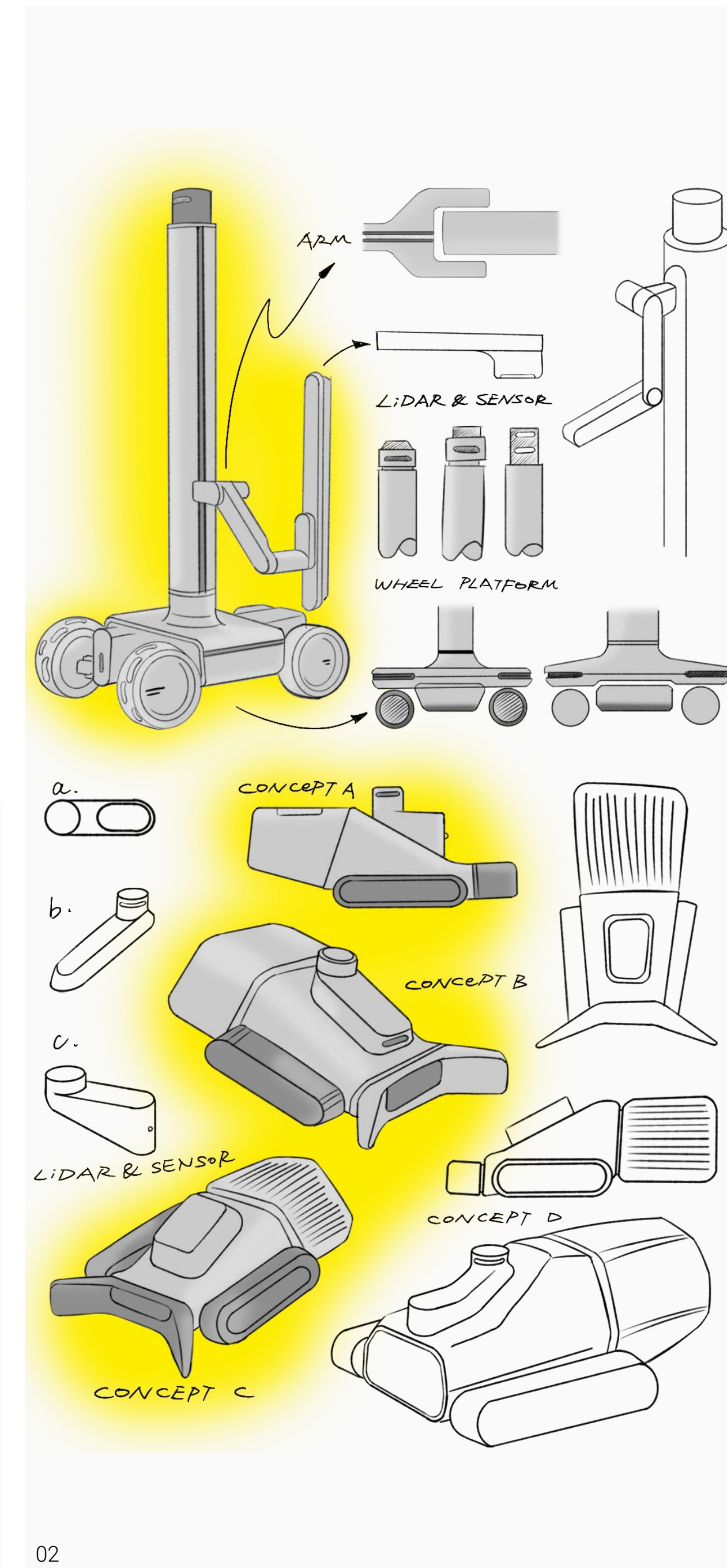
The system evolved through parallel sketching and 3D iteration, gradually refining proportions, functional architecture, and the interaction between the two robotic units.



01



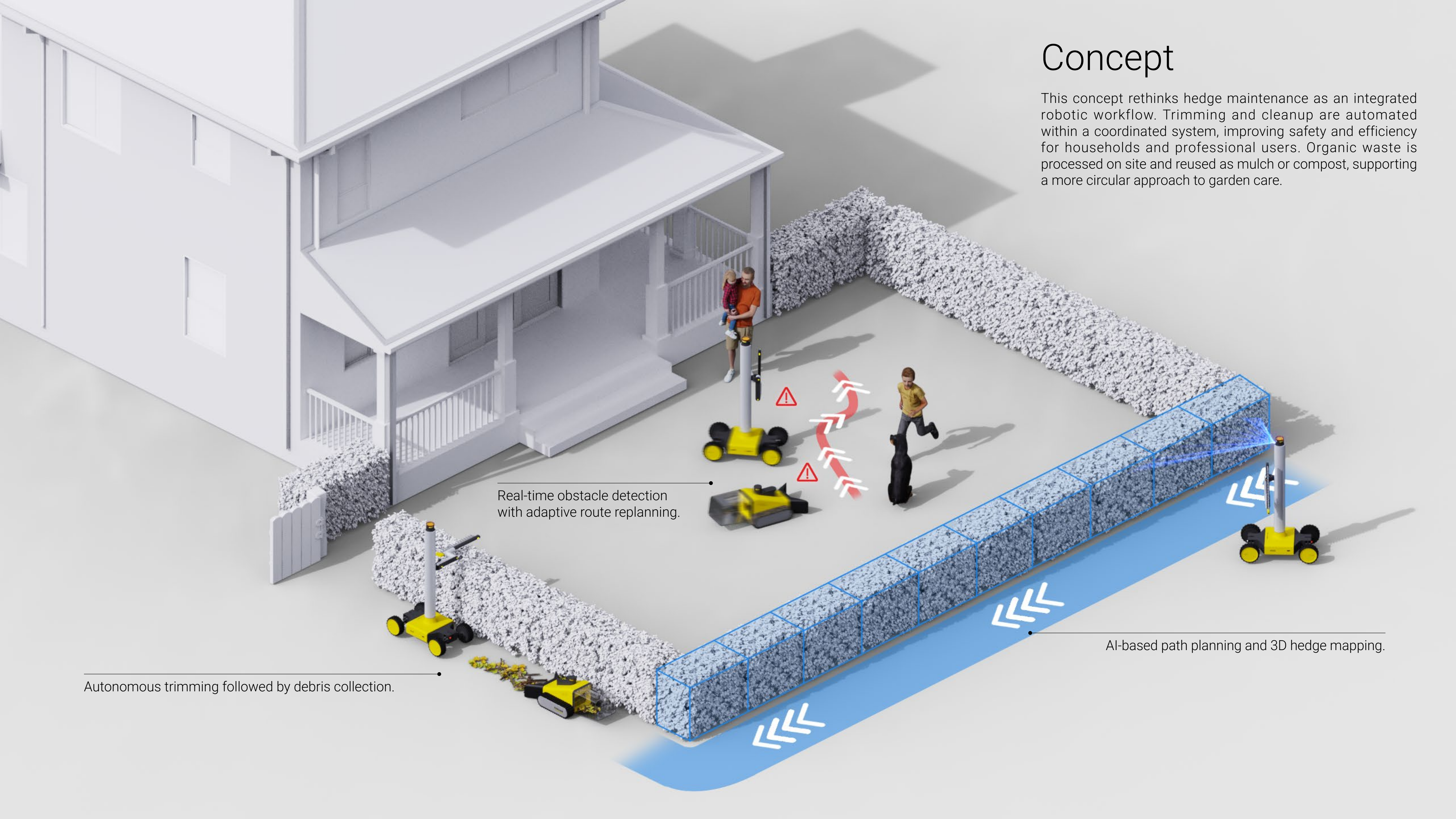
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Concept

This concept rethinks hedge maintenance as an integrated robotic workflow. Trimming and cleanup are automated within a coordinated system, improving safety and efficiency for households and professional users. Organic waste is processed on site and reused as mulch or compost, supporting a more circular approach to garden care.



Real-time obstacle detection with adaptive route replanning.

AI-based path planning and 3D hedge mapping.

Autonomous trimming followed by debris collection.

System Overview

A collaborative robotic system for autonomous hedge maintenance and garden waste recycling.



HGE X-75 TRIMMER
(Hedge Trimming)

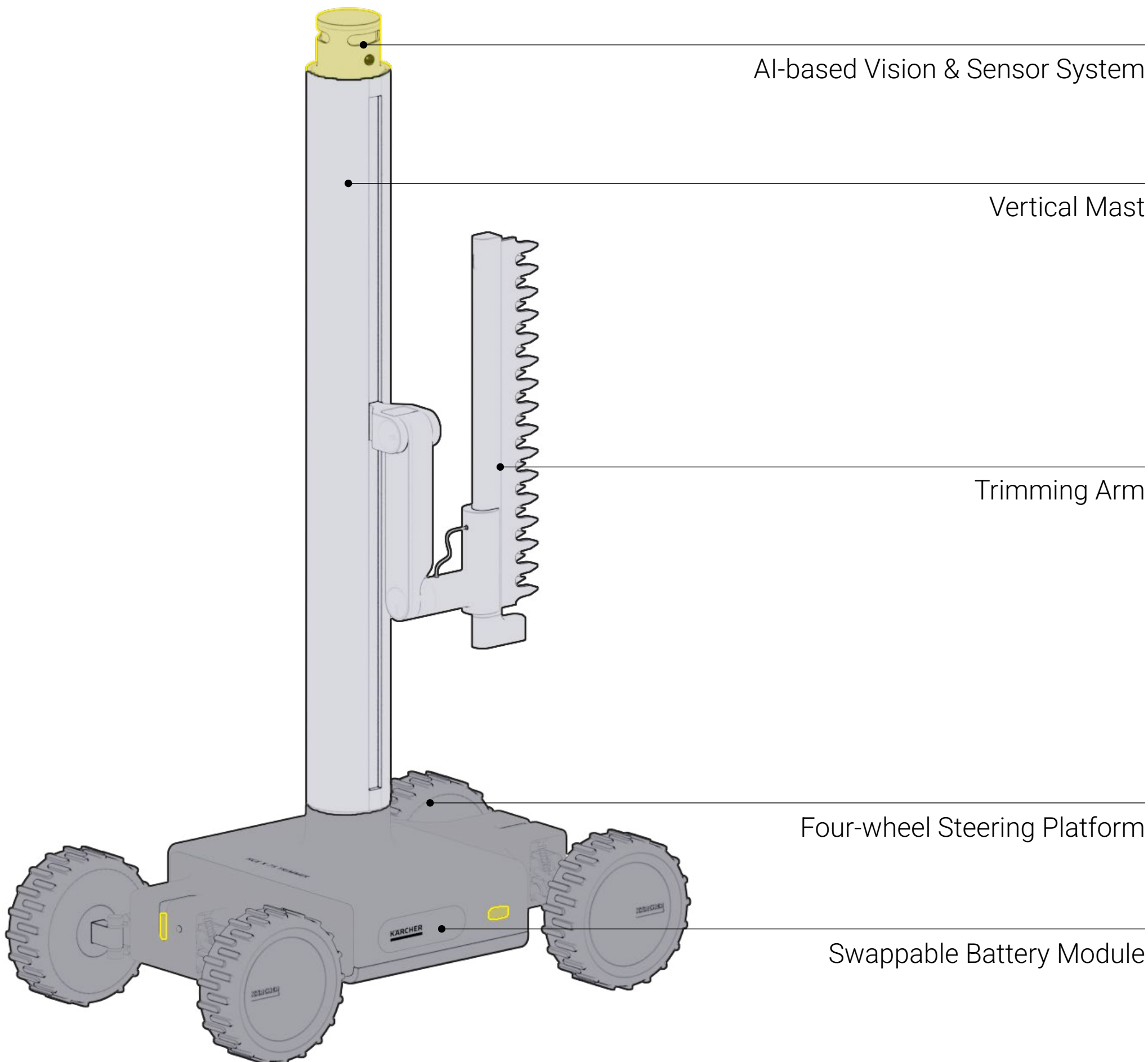


AXR X-65 RECYCLER
(Garden Waste Collection & Recycling)



180 cm

Architecture | HGE X-75 TRIMMER



Robot Details

The robot combines a multi-angle trimming arm with replaceable cutting blades for precise and adaptable hedge maintenance.

A four-wheel steering platform ensures agile navigation in complex garden environments.

Powered by a swappable battery system instead of combustion engines, it enables efficient operation with reduced environmental impact.



01 Foldable trimming arm
02 Four-wheel steering platform
03 Quick-release swappable battery module

01



02



03

Trimming Arm

The trimming arm rotates 360° around its vertical mast, with each joint offering up to 180° of articulation. This flexibility allows precise trimming across a wide range of hedge sizes.

LiDAR and depth vision sensing allow the system to detect hedge height and identify small animals or birds before cutting begins. Combined with low-noise, battery-powered operation, the robot minimizes disturbance and supports a more environmentally responsible approach to hedge care.

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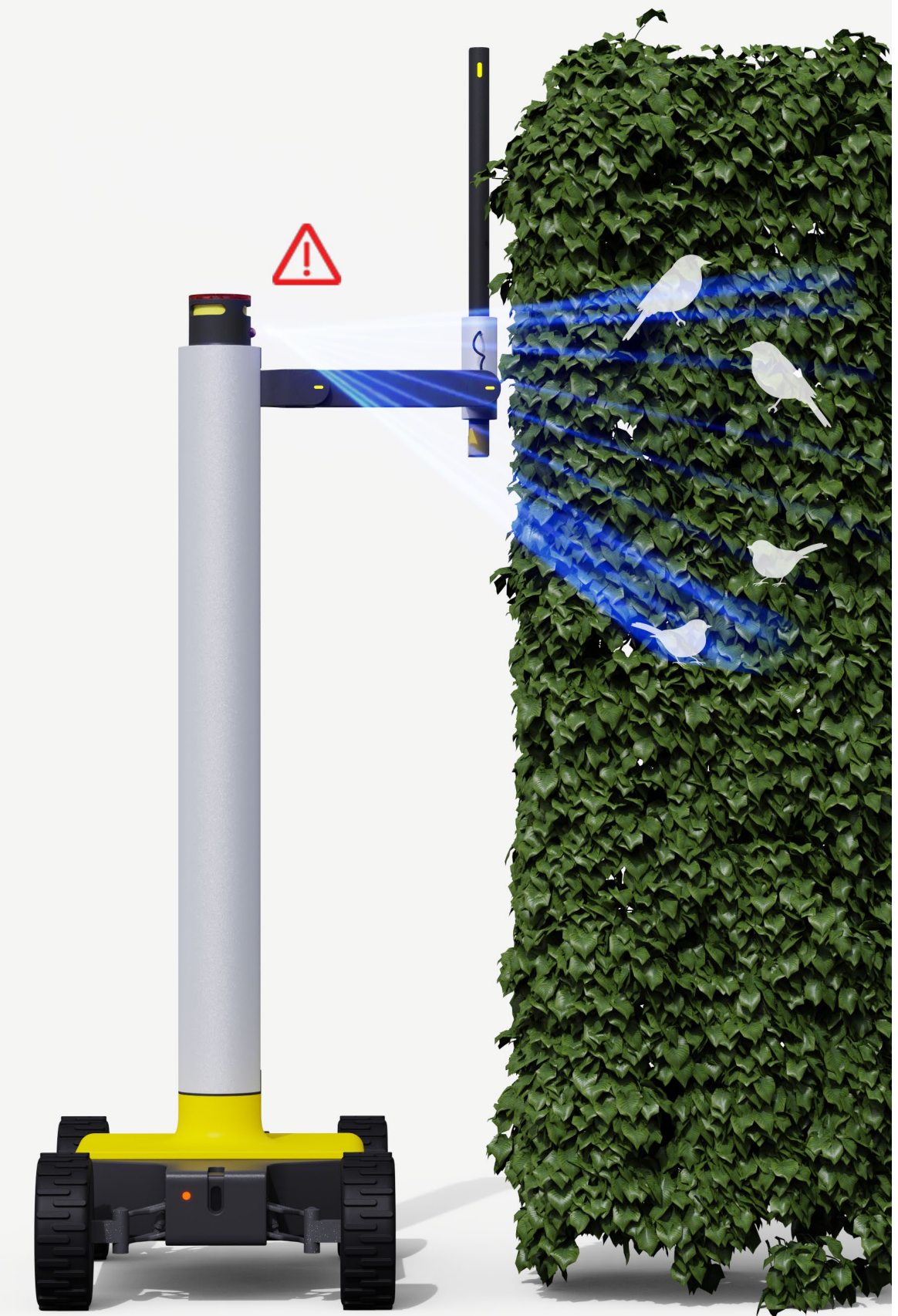
Minimum Trimming Height (cm) : **15**

02



Maximum Horizontal Trimming Height (cm) : **170**

03



Maximum Vertical Trimming Height (cm) : **240**

Wheel Platform

The four-wheel steering platform enables agile movement in narrow garden paths, with each wheel capable of turning up to 125°. An adaptive suspension system adjusts to uneven terrain, enabling stable movement while crossing roots and obstacles.

The bidirectional platform has no fixed front or rear, allowing seamless operation in either direction along the hedge line.



01



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- 01 Crossing branch obstacles
- 02 Moving in narrow hedge paths
- 03 Independently steerable wheels

Adaptive Trimming

The articulated trimming arm and agile platform enable the robot to adapt to diverse hedge geometries. From spherical and curved to trapezoidal forms, the system maintains precise alignment and consistent cutting accuracy across complex shapes.

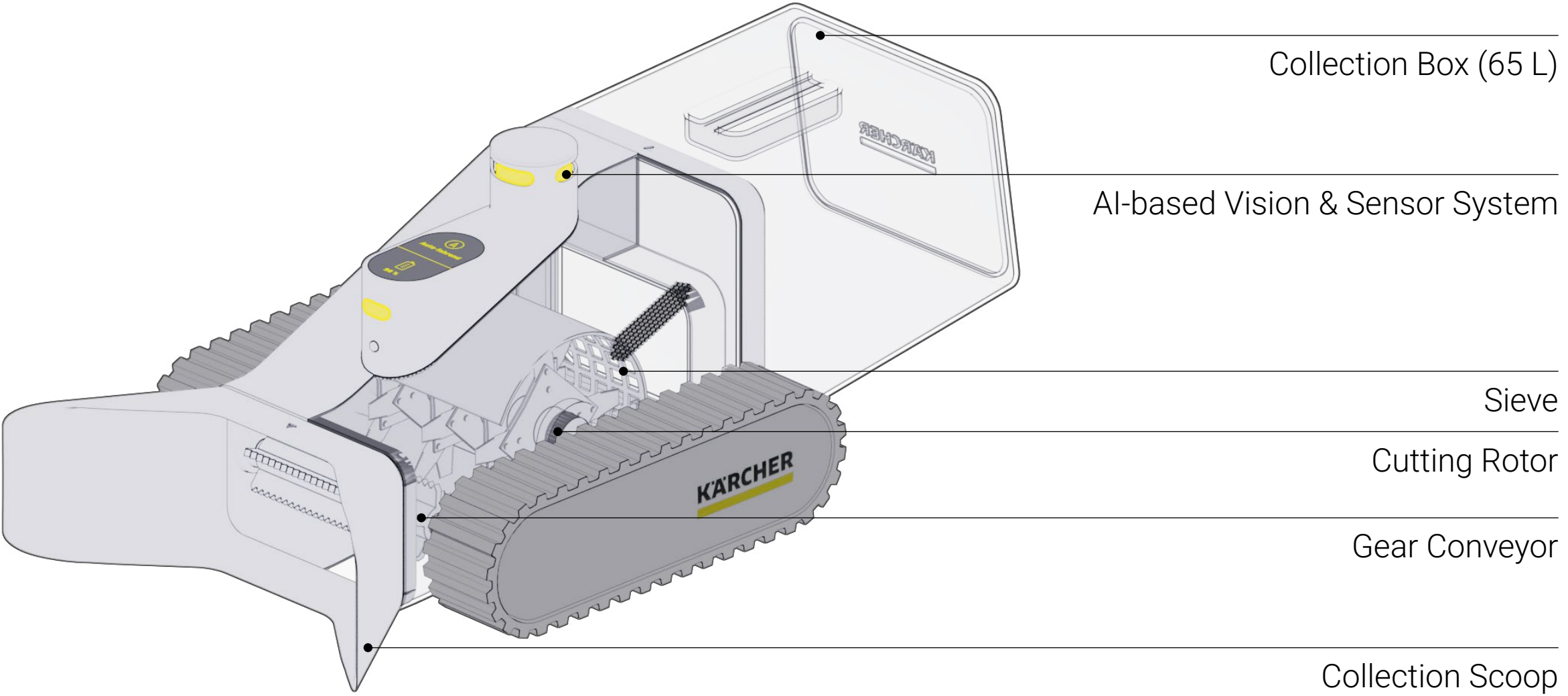


Spherical Hedge

Trapezoidal Hedge

Curved Hedge

Architecture | AXR X-65 RECYCLER



Robot Details

The robot is equipped with a removable front scoop that guides garden debris directly into the shredding system. The scoop also protects users from contact with internal cutting parts.

The internal feeding and shredding mechanism draws on established garden tool principles to ensure smooth material flow into the rear 65L collection container.

A tracked base enables stable movement across garden terrain while maintaining a low working height for efficient debris collection. An integrated display provides clear real-time system status for the user.



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- 01 Integrated status display
- 02 Low-profile debris intake
- 03 Removable front scoop

Built for Garden

The traction track system allows the robot to navigate complex garden terrain, including slopes, roots, and uneven surfaces, while maintaining stable and controlled movement.

A reinforced steel housing protects the internal drive components and reduces damage from impact or abrasion during operation.



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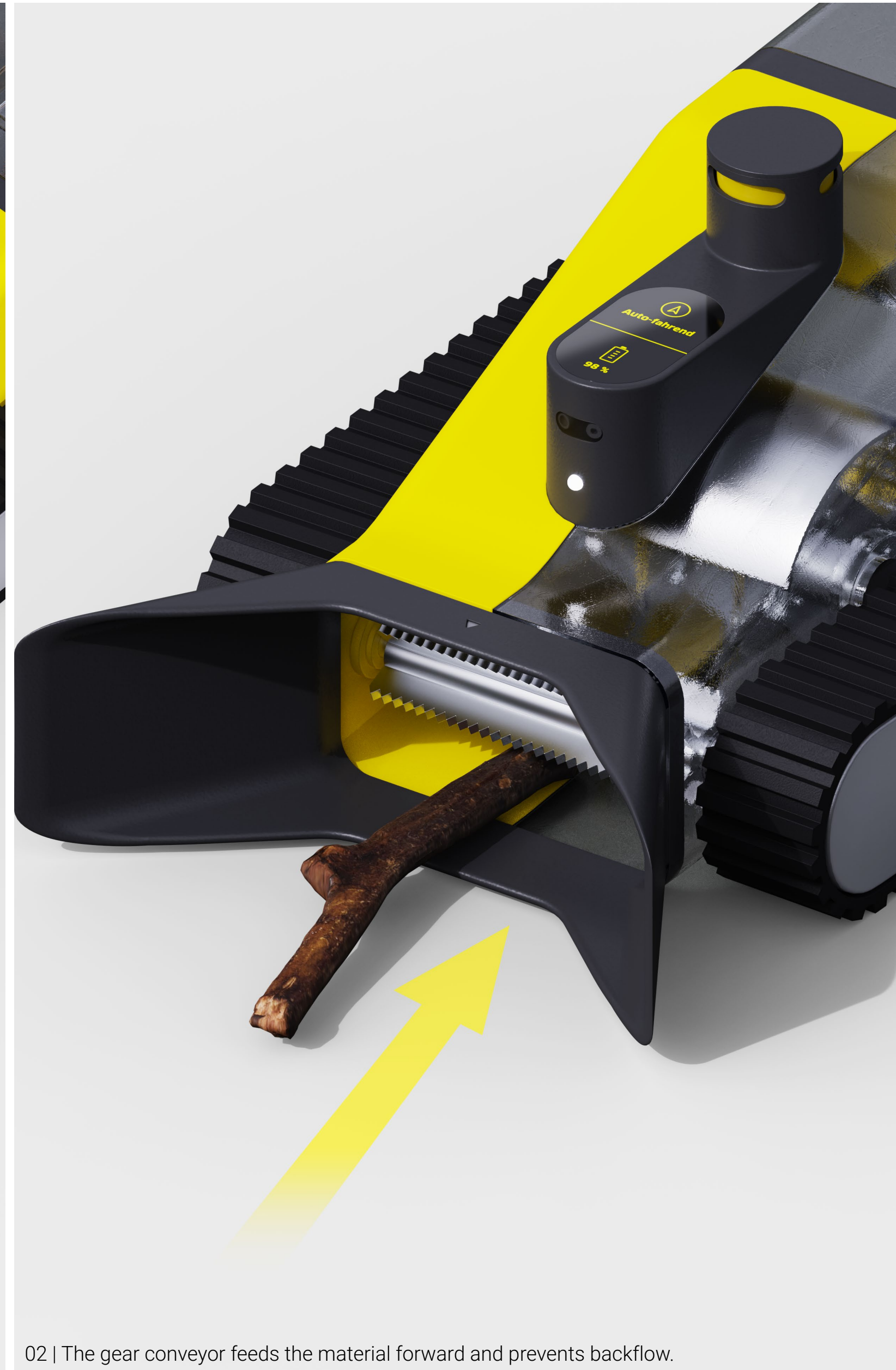
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- 01 Adaptable and compact design for different terrains
- 02 Obstacle crossing capability
- 03 Stable movement on slopes

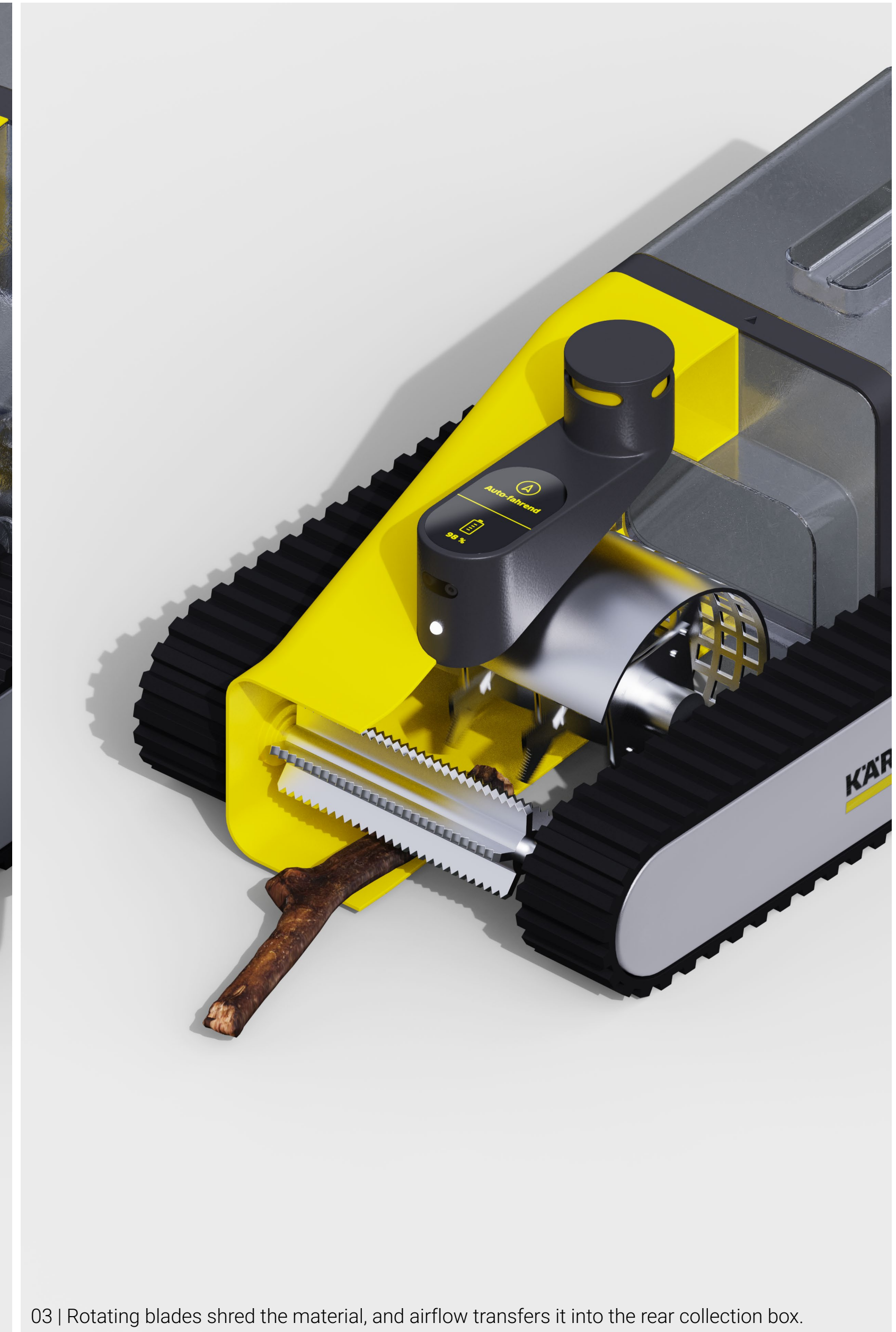
Garden Waste Collection



01 | Branches and leaves are guided into the robot.



02 | The gear conveyor feeds the material forward and prevents backflow.



03 | Rotating blades shred the material, and airflow transfers it into the rear collection box.

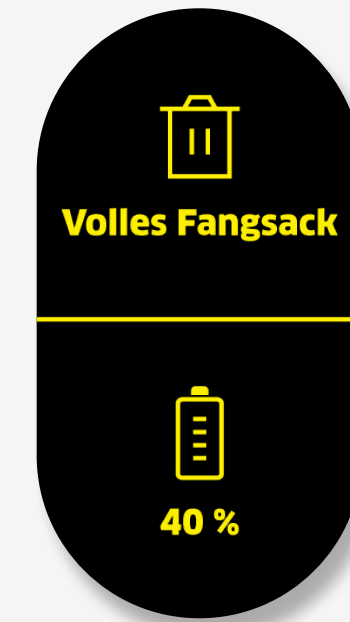
More Than Collection

AXR X-65 RECYCLER goes beyond simple collection. It encourages responsible garden waste management by shredding debris into reusable material.

When the collection box is full, the system notifies the user to empty it. The processed waste can be directly disposed of or reused as natural mulch or compost, supporting a more circular garden ecosystem.



01 | Automatic non-organic object detection



02 | Collection box full alert

03 | Processed debris for mulch or compost





TrimMate.

Designed for
the future of garden care.