Multifunctional Palm Handling Machine

One Machine, Total Palm Tree Care.

A next-generation robotic solution designed to automate harvesting and full lifecycle maintenance of date palm trees.

The Multifunctional Palm Handling Machine is an innovative robotic solution designed to transform how palm trees are harvested and maintained. By combining advanced robotics, intelligent tools, and a unique tree-surrounding mechanism, this machine enables safe, fast, and cost-effective palm tree operations—all performed by a single operator.

This innovative system offers investors access to a high-growth AgriTech segment. Its patented AI and robotics integration presents licensing, manufacturing, and global distribution opportunities, especially in regions facing food security challenges.

This system is protected by us patent No. US10485171B1 which was granted to *King Saud University* in 2019-11-26.

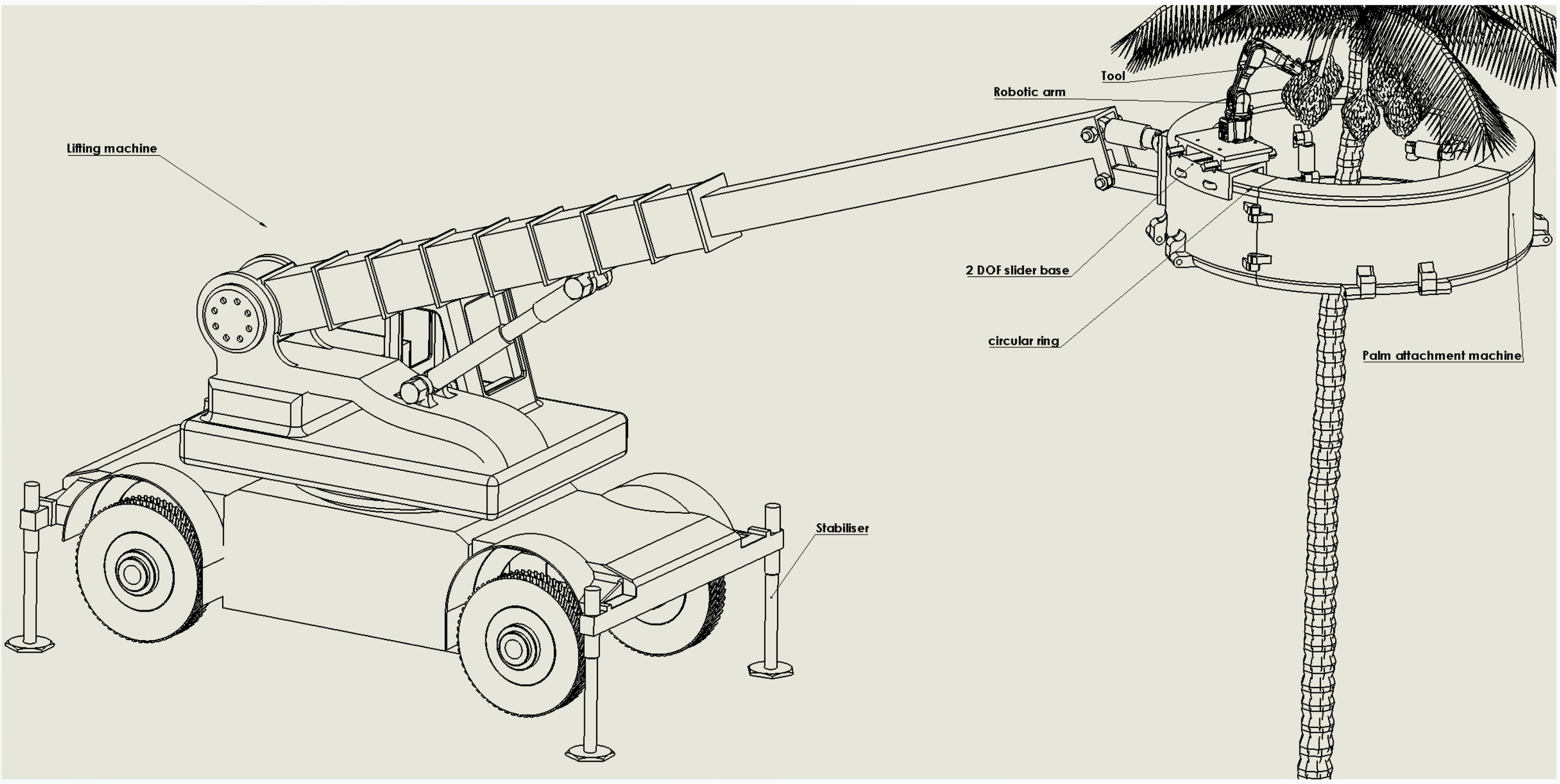
Industry Challenge & Solution

Key Highlights

- Harvesting & maintenance in one system
- One operator only
- Safe, fast, and cost-effective
- Suitable for palms of all sizes

Challenges in Date Palm Farming

- Severe shortage of skilled palm climbers
- High accident rates during manual harvesting
- Slow and costly pre- and post-harvesting operations
- Inconsistent quality due to human error
- Limited working hours due to heat and safety risks



Our Solution

The Multifunctional Palm Handling Machine introduces robotic automation and precision control into palm farming. It replaces multiple manual processes with a single adaptive system capable of performing all required palm tree tasks throughout the year.

Key Impact

Increases productivity per tree

Reduces labor dependency

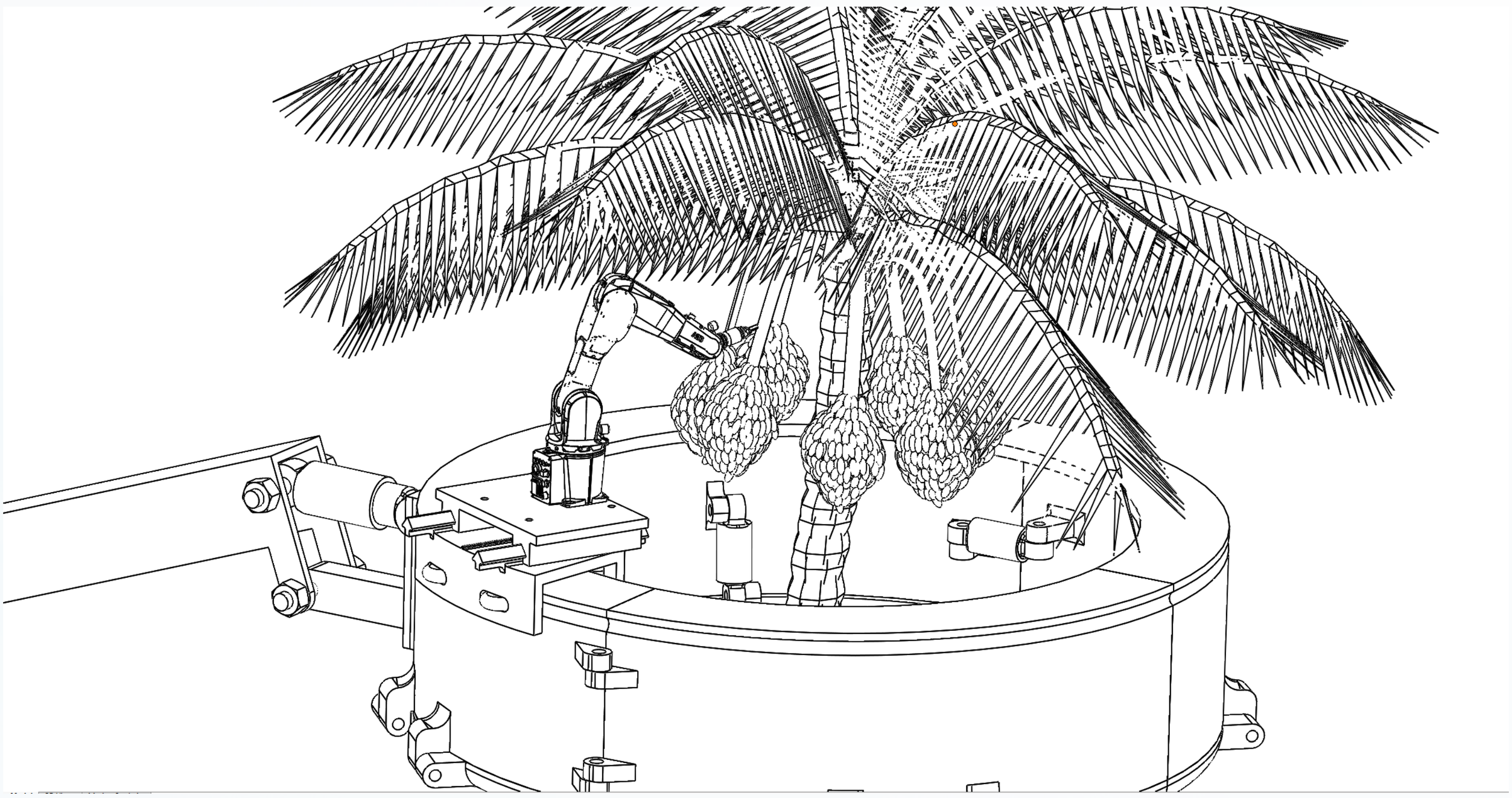
Improves worker safety

Ensures consistent operation quality

Applications & Functional Capabilities

Supported Operations

- **Pre-Harvesting Tasks:**
  - Pollination
  - Bunch alignment and attachment
  - Thinning and dethroning
  - Pest, dust, and spider removal
  - Bagging and protection
- **Harvesting Tasks:**
  - Full date bunch harvesting
  - Individual date picking
- **Post-Harvesting Tasks**
  - Tree inspection and maintenance



Smart Inspection

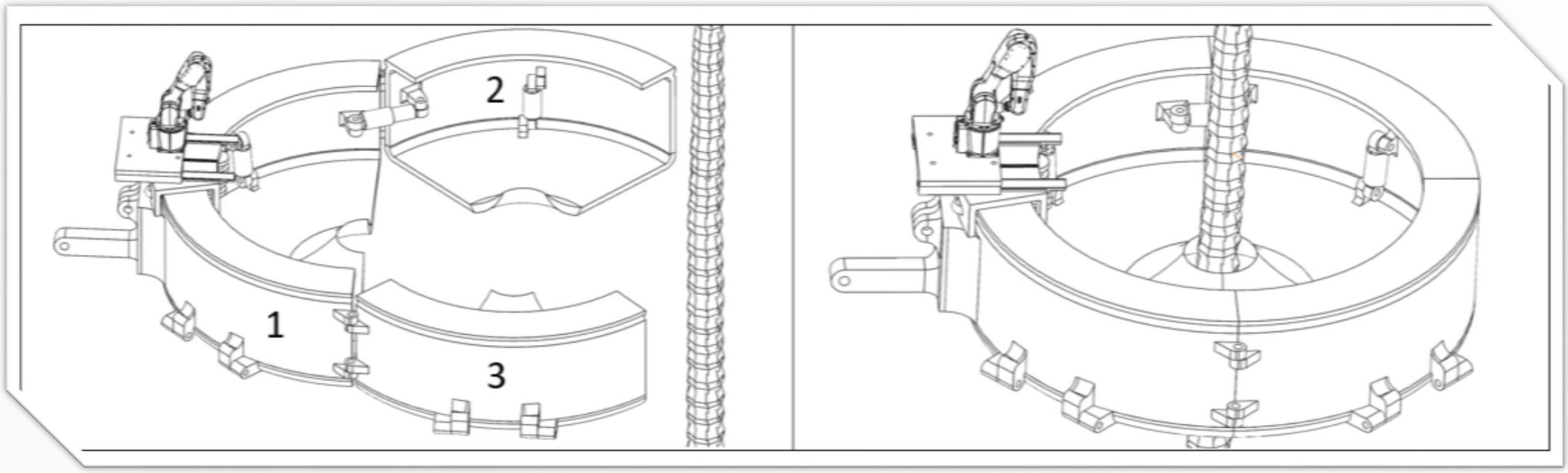
- High-resolution cameras
- Pattern recognition for stress and disease detection
- Early identification of palm health issues

Result: One machine replaces multiple tools, machines, and workers.

Mechanical Design & Tree Adaptability

Tree-Surrounding Circular Ring

- Openable and closable structure
- Surrounds palm trees safely without damage
- Adapts to different trunk diameters

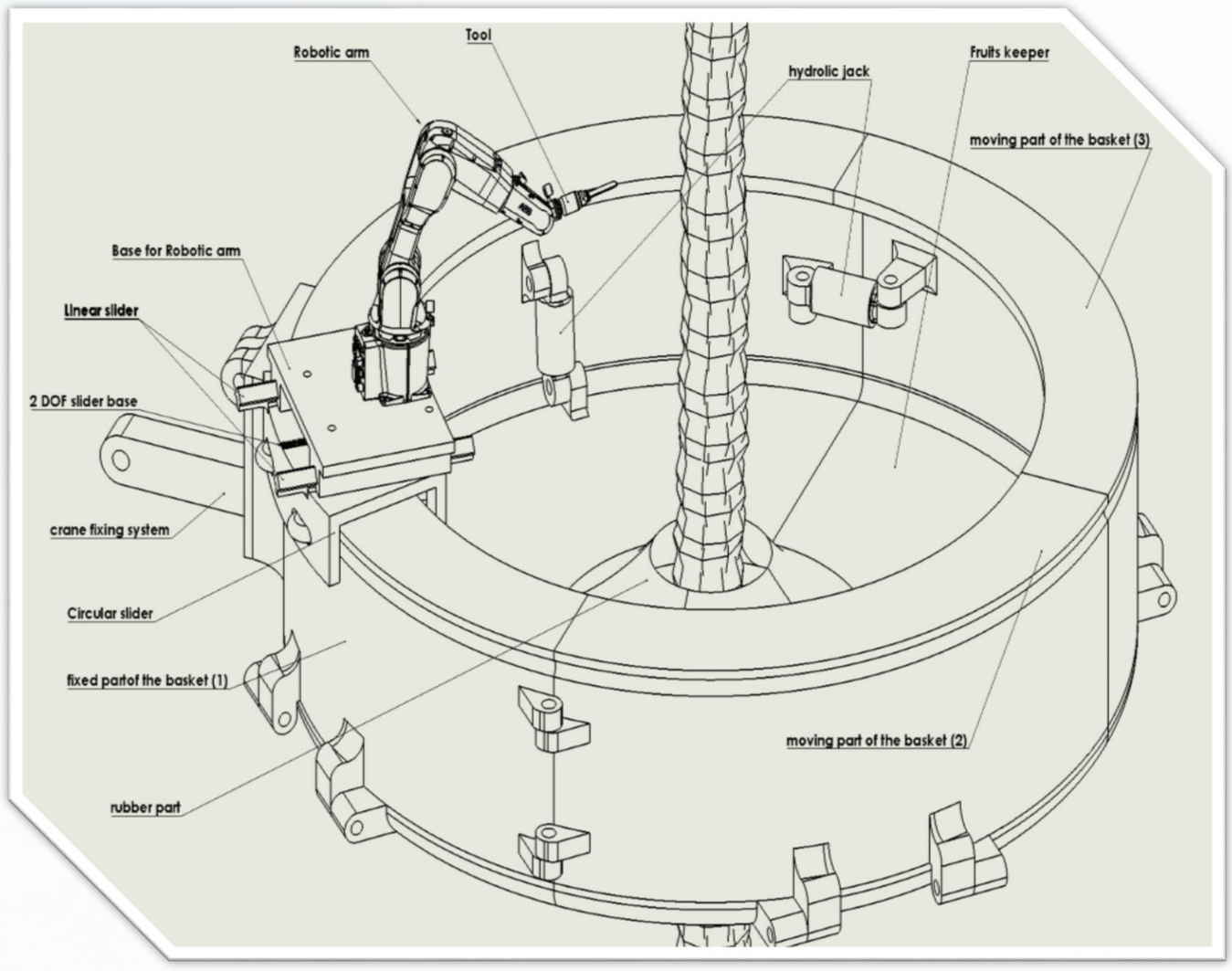


Mounting & Mobility

- Attached to cranes, telehandlers, or dedicated lifting vehicles
- One setup can serve multiple trees without repositioning the vehicle

Key Innovation:

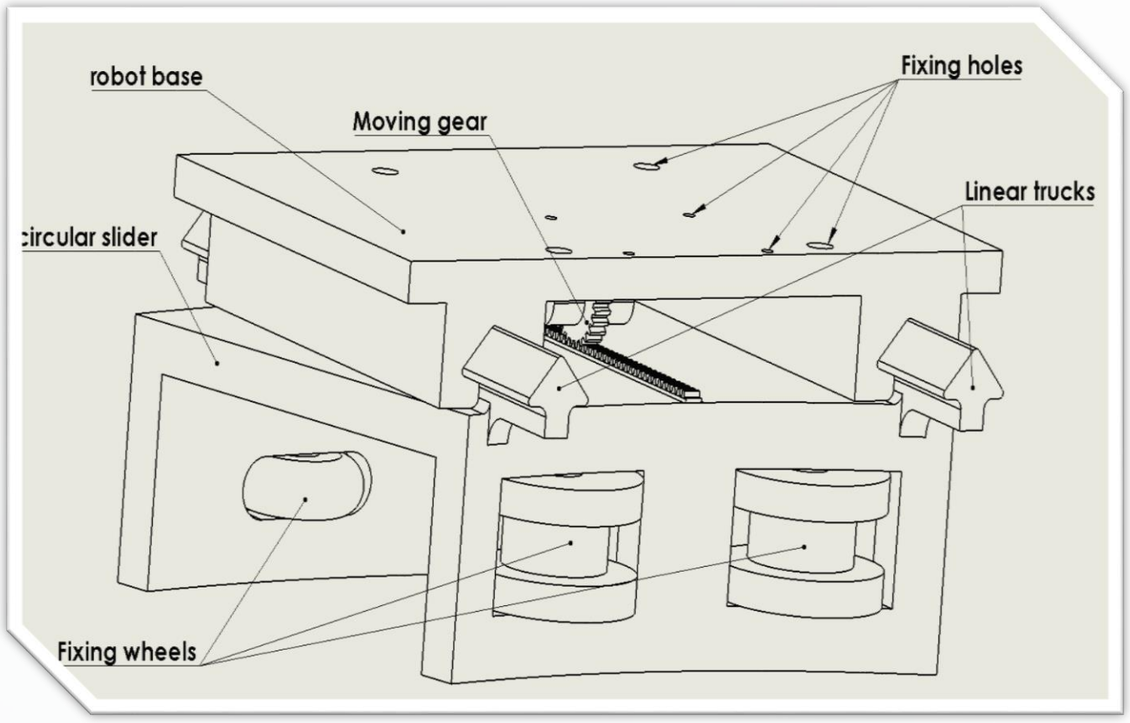
The ability to surround the palm tree, enabling complete 360° access.



Two-DOF Slider Base & Robotic Arm

Two-DOF Slider Base

- Circular motion around the palm tree
- Linear motion toward and away from the trunk
- Ensures precise positioning for every task

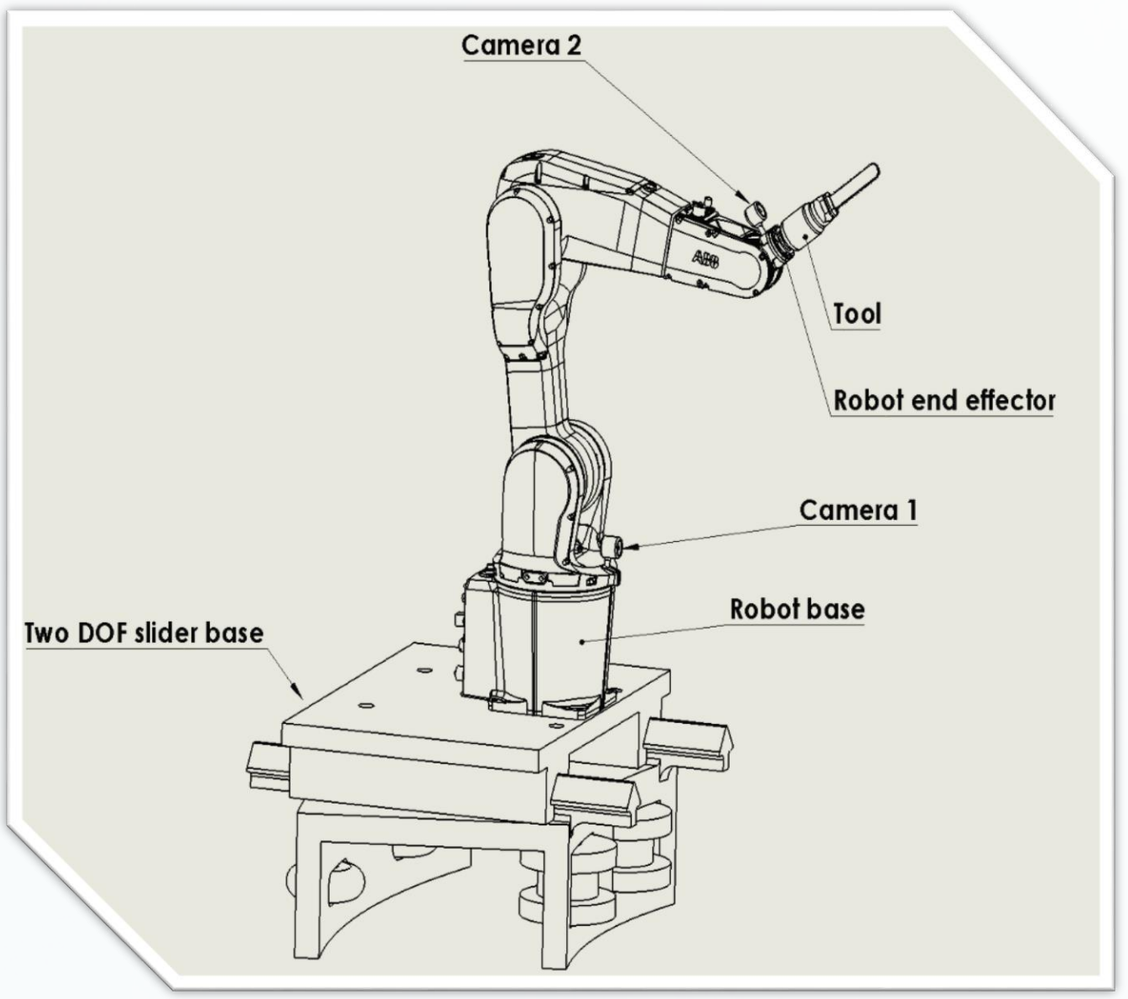


Multifunction Robotic Arm

- 6 Degrees of Freedom (6-DOF)
- High reach and flexibility
- Capable of accessing dense palm crowns.

Vision System

- Base-mounted camera for global view
- End-effector camera for tool precision
- Real-time visual feedback to the operator



Benefit:

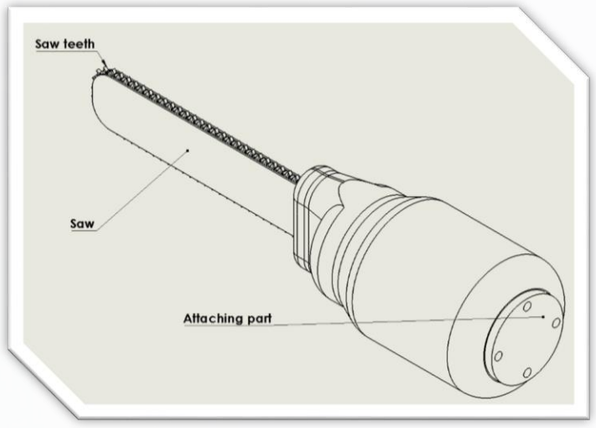
High accuracy with minimal operator effort.

Smart Tools & Automated Bagging

Interchangeable End-Effector Tools

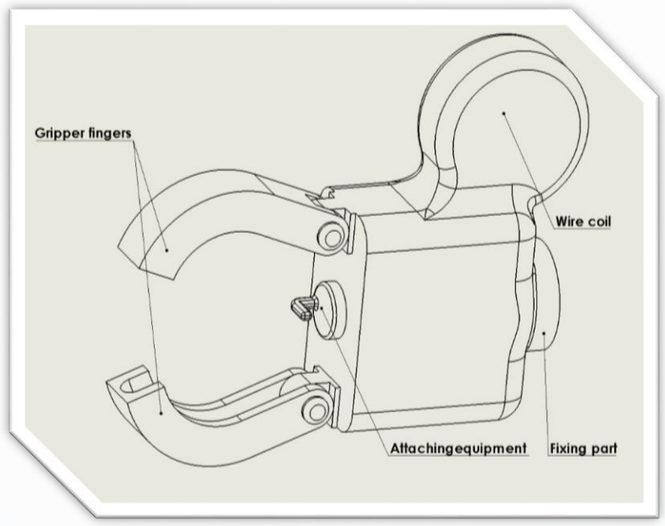
- **Electric Cutting Tool**

  For harvesting, thinning, and dethroning



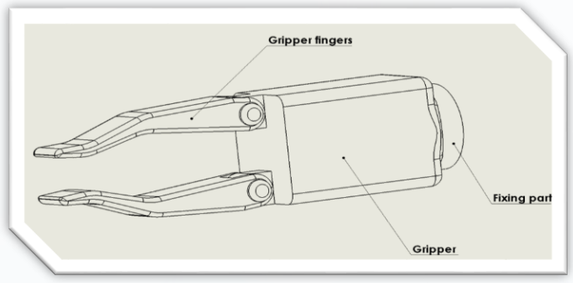
- **Smart Gripper**

  For bunch alignment and attachment with wiring capability



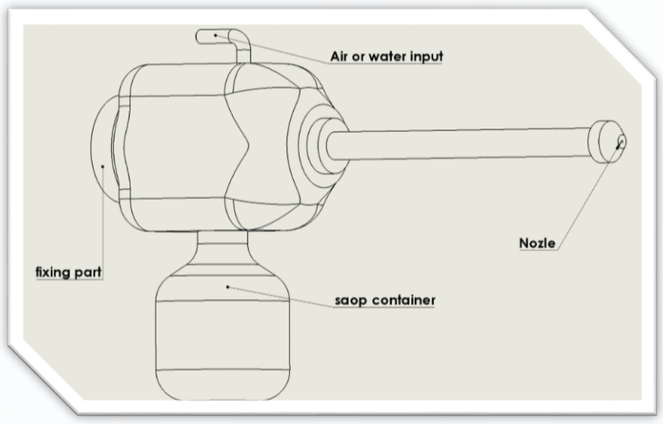
- **Mini-Gripper**

  For individual date picking



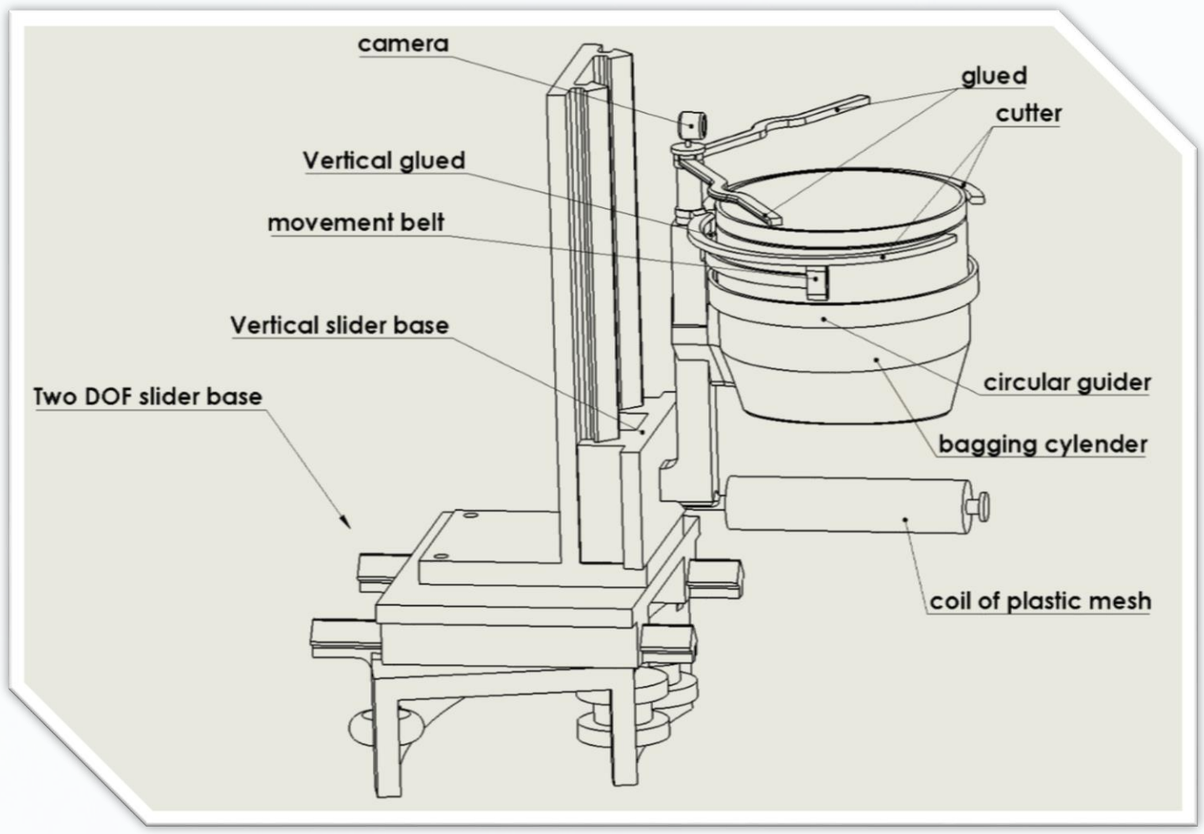
- **Sprayer System**

  Adjustable nozzles for pollination, cleaning, and pest control



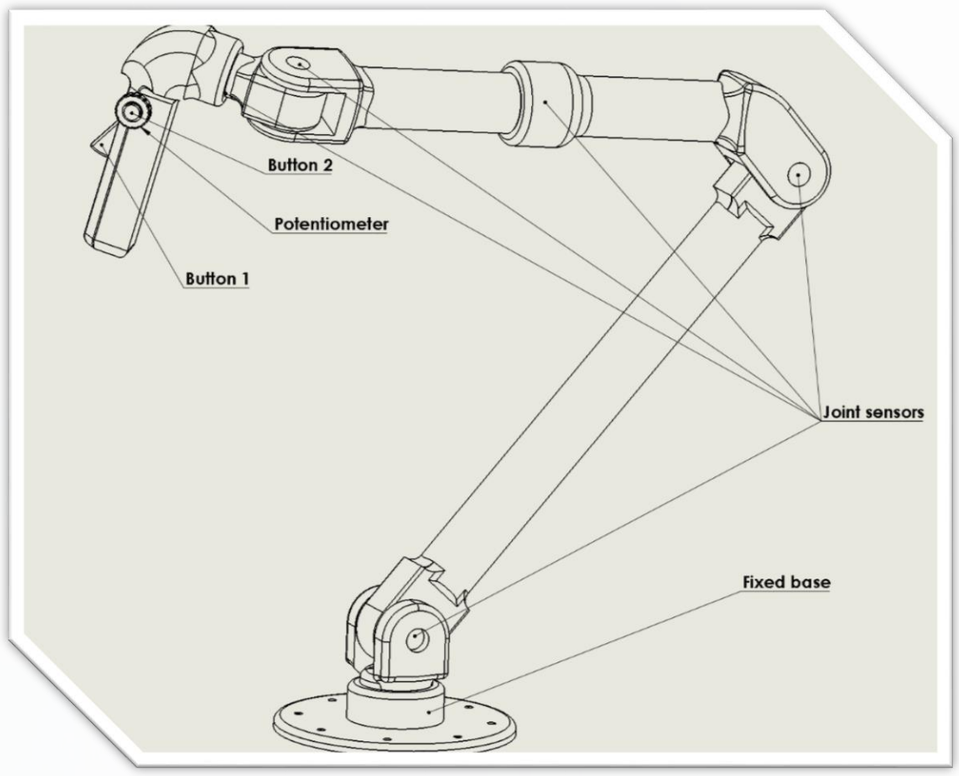
Automated Bagging Unit

- Fully automated mesh bag formation
- Sealing from top and bottom
- Protects bunches from insects, birds, and environmental damage
- Vertical motion adds a third DOF



Control & User Interface

- **Joystick for ring, basket, and slider base**
- **Arm-mounted controller or 3D joystick for robotic arm**
- **Three touch screens:**
  - Live camera feeds
  - Machine status
  - Parameter configuration



Value Proposition & Future Outlook

Why This Machine Matters

- One operator controls the entire system
- Year-round operation24/7 capability including night harvesting
- Significant reduction in long-term costs
- Increased farm profitability

Designed for the Future

- Scalable for large farms
- Compatible with smart agriculture systems
- Ready for AI-based automation upgrades

Final Message

The Multifunctional Palm Handling Machine is not just a harvester, it is a complete palm tree management platform, setting a new standard for efficiency, safety, and sustainability in date palm farming.

College of Computer and Information Sciences

كلية علوم الحاسب والمعلومات

جامعة الملك سعود
King Saud University



مركز أبحاث الروبوتات الذكية

Center of Smart Robotics Research

For more center information and other center products, please visit
https://www.cs2r.net

Contact Information

For inquiries and collaborations, please contact the Center of Smart Robotic Research at college of Information Sciences, King Saud University:

- **Email:** msuliman@ksu.edu.sa
- **Phone:** +966 503255927
- **Address:** College of Computer and Information Sciences, King Saud University, Riyadh, Saudi Arabia