

VISION GUIDED AI ENABLED ROBOTIC APPLE HARVESTER

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**Nodal
Institute:**



C-DAC Kolkata

**Collaborating
Institutes:**



SKUAST, Kashmir



ICAR-CIPHET



IIT, Kharagpur

Objective:

- Automation of agricultural operations using robots, drones, and autonomous vehicles has benefited from the advancements in Artificial Intelligence and Robotics.
- The objective here is to develop a smart Robotic Apple Harvester Platform to harvest the apples in apple orchards using AI and Robotics.
- The robotic platform will be developed by integrating sensors to capture apple data, designing automation and mechanization architecture for interpretation of the physiological data, and implementing an analytical solution for decision making.



Key Features of the Robotic Platform:

- Accurate identification and localization of the matured apples in the orchard at various times under natural lighting conditions of the day using Machine Vision techniques.
- Safely plucking and conveying the apples to a storage unit without damaging them.
- Six-degree of freedom manipulator of adjustable height controlled by hydraulic or electric power, controlled through AI-enabled Robotic Vision, mounted on a four-wheeled human-operated platform.

Major Parts of the Robotic Platform:

Visual System:

It would be equivalent to the human eyes that identify and locate the apples on the trees that are ready for harvesting and also identifies the obstacles around them.

Robot Arm:

This robotic arm is placed on a vehicle. It is equivalent to the human arm, and the end effector is regarded as a hand for harvesting the target object. The robot arm guides the end effector towards the apple avoiding obstacles like branches, leaves, and other apples, and then plucks and stores it.

Control System:

The system is equivalent to the human brain and nervous system that controls the overall robot.

Slider:

The slider placed on the vehicle helps the robotic arm to move on both sides of the vehicle so that the robot can place apples on both sides.

Challenges:

There are two major challenges in apple harvesting:

- Reduced farm workers
- The increased cost of harvesting.

Increasing farm productivity and reducing the drudgery of farm workers are necessary for the present scenario. The proposed Robotic Apple Harvester intends to address these challenges.

Benefits:

The proposed platform shall improve the quality of the harvest, increase productivity with timely harvesting and reduce the dependence on scarce skilled agricultural workers.

Beneficiaries:

Apple growers and stakeholders in the apple growing industry want to increase productivity and preserve them longer by timely harvesting them without damage.



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