Robot Hand Picks Apples Without Bruising

A robotic apple picker being developed by Washington State University (WSU) may solve orchard labor problems. The robot uses pressure sensitive "hands" to harvest the fruit.

"We analyzed how a human hand picks apples, and 3 fingers pulling and twisting the fruit seems to be most efficient," says Manoj Karkee, at WSU's research center in Prosser, Wash. "We studied the force needed with different varieties of apples to harvest without bruising, breaking or puncturing."

Karkee explains that the robotic hand's pressure can be adjusted to the apple variety being picked. Special 3D vision guides the hand to the fruit.

"Any robotic picker has to be able to see the fruit," says Karkee. "Any tree canopy, foliage or branches will block accessibility. It will work best in the new 'fruit wall' orchard design where 90 to 95 percent of the fruit is easily visible."

Other robotic pickers, including one being developed by Abundant Robotics, use vacuum. Past FARM SHOW stories have highlighted several others (Vol. 34, No. 4; Vol. 37, No. 2).

"Vacuum pickers are less complex, needing only a tube and may be lower cost," says Karkee. "However, they have a higher bruising potential. They may work for some varieties that are tougher, such as Fuji, but not so well with others that are more tender, like Golden Delicious and Honeycrisp."

Karkee estimates the hand picker will require another 3 to 5 years of development work.

"Last year it left 10 to 15 percent of the apples on the tree," says Karkee. "This year, we are trying to improve that and improve speed."

Karkee's group has received several patents on the process, and he hopes companies working in agricultural automation will adopt them. Initially he expects the picker to be used on pears as well as apples.

"The sensing technology and 3D localizer used in this picker could be used on any fruit or vegetable picker," says Karkee.

Karkee robotic apple picker uses pressure sensitive "hands" to harvest fruit without bruising, breaking or puncturing it.

Contact: FARM SHOW Followup, Manoj Karkee, Center for Precision and Automated Agricultural Systems, Washington State University, 24106 N. Bunn Rd., Prosser, Wash. 99350 (ph 509 786-9208 or 515 441-2144; manoj.karkee@wsu.edu).

Fruit Picking Machine Perfected At Family Orchard

New York fruit producers Paul and Walter Wafler say that after nearly 12 years of work, their self-propelled Huron Picking Platform is ready for market. Powered by a small GX series Honda engine, it uses just 2 1/2 gals. of gas in 8 hrs. and the Waflers say "it's quiet and has plenty of torque, even on sloping land." Controls allow the platform to move automatically at a certain speed or it can also be operated manually. The Picking Platform hauls up to 10,000 lbs. and is designed for tree rows 11 to 13 ft. apart. Pickers stand on platforms to reach from 5 to 10 ft. on the lower platform and 7 to 12 1/2 ft. on the upper platform. The ground level pickers reach up to 7 ft. into the trees.

The brothers spent many hours tending trees and picking apples as kids. They earned engineering degrees in college, then eventually came back to the family business with the idea to design a machine to simplify their work. They collaborated with Cornell University over the years to perfect the Picking Platform. The design allows 8 workers to pick and fill 5 bins at a time. Three of the 5 bins rest on a sloping platform and 2 more are just above ground level. Four workers stand on platforms at two different levels on either side of the bins and pick fruit in sacks. When their sack is full, they turn about 180 degrees and place the fruit into the "V" at the bottom of their bin. When the bins are full, they're replaced by 5 empty bins from a nearby trailer, which takes only about 5 minutes.

"The apples have fewer bruises because the fruit doesn't bounce around. That means fewer apples have to be used for juice," the Waflers say. "We've been able to increase clean-picking productivity by 30 percent and about 100 percent for spot picking."

In addition to picking, the machine can be used for other orchard maintenance tasks such as pruning, drop wire installation, wire stringing, thinning branches, tree training, and pheromone application.

The Picking Platform has patents pending and sells for $62,500.

The clamp-style trailer straddles 5 bins sitting on the ground, extends its retractable forks under the box edges on each side, and then lifts them off the ground.

An air suspension system on the trailer allows smooth, bump-free transport that minimizes damage to the fruit. The Bin Trailer weighs 2,500 lbs. empty and handles 5 bins that are 42 to 45 in. wide, 46 to 48 in. long and 27 to 32 in. high.

Contact: FARM SHOW Followup, Huron Fruit Systems, 10748 Slaught Road, Wolcott, New York 14590 (ph 585 615-5262; www.huronfruitsystems.com).

Huron Fruit Picking machine can also be used for other orchard maintenance tasks, such as pruning.

Huron's bin trailer can handle 5 bins at a time.

Pruning Platform Mounts On UTV

By John Kocur

One day last winter my dad said he was getting too old to prune the tops of apple trees in his orchard by standing on a ladder with a chainsaw and loppers. So, he got the idea of mounting a metal rack on top of one of my old pickups. After some thought, the idea was shelved because a full-size 2-WD pickup would be too awkward to move around in the orchard.

Later that year, I got a hand-me-down 1993 Kawasaki Mule 4-WD utility vehicle from my father-in-law and we decided to try building a rack on that.

The Mule came equipped with a roll cage and tube bumper on front, so we started there. Dad made two T-shaped pieces out of pipe that slide over each side of the bumper and are used to attach the rack's front support. They allow the rack to hinge forward for removal.

We used galvanized pipe to build the rack's main frame. The floor is made from 2 pieces of pallet rack screen that we bought new. It's made from heavy gauge wire and was inexpensive. Twigs, leaves, and sawdust fall through the floor. We reinforced the wire with some light-duty fence posts in order to make the floor more rigid.

The top railing is made of 1-in. square tubing. I cut square holes in the pipes to slide the railings in, then welded them in place. Four U-bolt clamps attach the rack to the UTV's roll cage. Two pieces of pvc clamped onto the railing act as "holsters" to hold a chainsaw and loppers.

The stairs on back of the rack were made out of metal grates that I bought at an auction. The stair's bottom two steps slide into the Mule's receiver hitch. Two old 100-lb. cylinder heads placed on back of the bed help counterbalance the weight of the rack on front, giving the rear wheels a little more traction.

The rack's platform is about 3 1/2 ft. wide by 8 ft. long and 6 ft. off the ground. It allows a 6-ft. tall person to easily reach up to 15 ft. high and have room to move around, without worrying about balancing on a ladder. The rack also comes in handy for cleaning gutters on our house and shed.

Contact: FARM SHOW Followup, John Kocur, 4869 178th Ave., Carlisle, Iowa 50047 (ph 515 229-7537; cf307aaa@gmail.com).

Working platform is 6 ft. off the ground. Pivoting T-brackets fit over front bumper (left). Two heavy cylinder heads in back help anchor the rear end (above).