



ORCHARD PRUNING AND PICKING MACHINE

PICKER ENHANCEMENT ROVER FOR CAREFUL HARVESTING



engineering • design
expo 2014

University of Idaho
College of Engineering

PROBLEM

Fruit picking is an inefficient and labor intensive process. Data shows that 31% of working time spent by orchard pickers is committed to tasks other than picking. This wasted time includes positioning the orchard ladders, climbing up and down the ladder, and unloading picked fruit from picking bags into fruit bins. Safety is also a major concern for pickers due to the current nature of the labor. Dangerous falls occur every year because 50 pound capacity picking bags are worn on the chest of pickers. The steep slopes of Pacific Northwest orchards are also prohibitive of other current picker positioning machines.

To effectively make a new design, several points need to be addressed:

- Leveling
- Picker Positioning
- Fruit bin management
- Transportation of fruit

PROJECT GOAL

To design a machine that will aid orchard workers in safely and efficiently picking apples and pears on flat ground and on a slope.

- Allows 1-2 picker to safely harvest fruit from height of 6-13 feet
- Is self-propelled and can work independent of a tractor
- Transports fruit bins to minimize time dedicated to delivering fruit to the bin
- Includes leveling technology to allow use on grades up to 25 percent

PROJECT LEARNING

The team visited local orchards to immerse themselves in the picking process and find problems with current design.

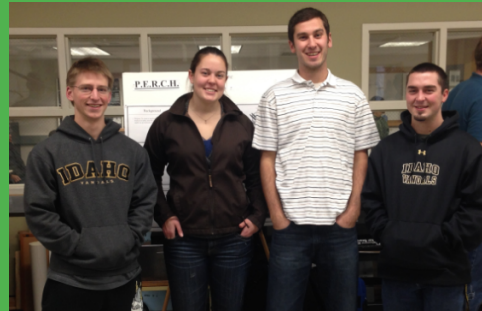


Down-scaled scissor lift was tested for stability when subjected to different moments.

Roller bearing in platform was found to be a potential point of weakness.



TEAM MEMBERS



Spencer Marquis, Sydney Osterloh, Jordan Schwerts, Cole Lewis

Sponsor: Joe Rumble-Rumble Orchards in Monitor, WA

WORKING PROTOTYPE

The working prototype proved our design concepts with the following features:

- Hand cranked trailer jacks allow for bi-directional leveling
- Scaled down scissor lift provides vertical action
- Manual rendition of bin mechanism allows bin collection

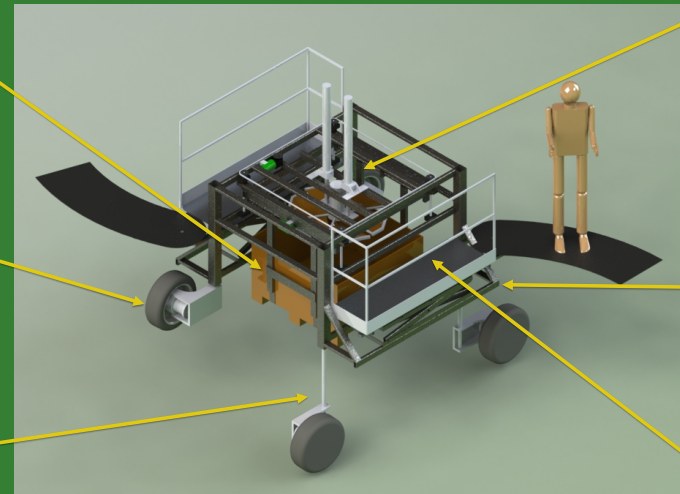


FINAL DESIGN

Dual-forked mechanism picks up and carries standard fruit bin

Independent motor powers and rotates each wheel for tight maneuverability

Automatic leveling piston at each wheel accommodates a 25% grade



Rotating fan evenly distributes fruit into bin

Platform raised by scissor lift with rotating arm gives picker access to fruit on multiple sides of the tree

OSHA standard sized guard rail for safety