Team 15:
Tree Limbing and Harvesting ROV

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Hazards of Tree Cutting

- Workers in the lumber industry have a 3 times higher fatality rate than the average U.S. worker[1]


[2]


[3]

- Large trees can be dangerous to private and public infrastructure

Objectives

- **Project Scope:** Design a Remotely Operated Vehicle (ROV) modeled after a total tree harvester head that will:
  - Climb a tree
  - Delimb the tree
  - Section a tree

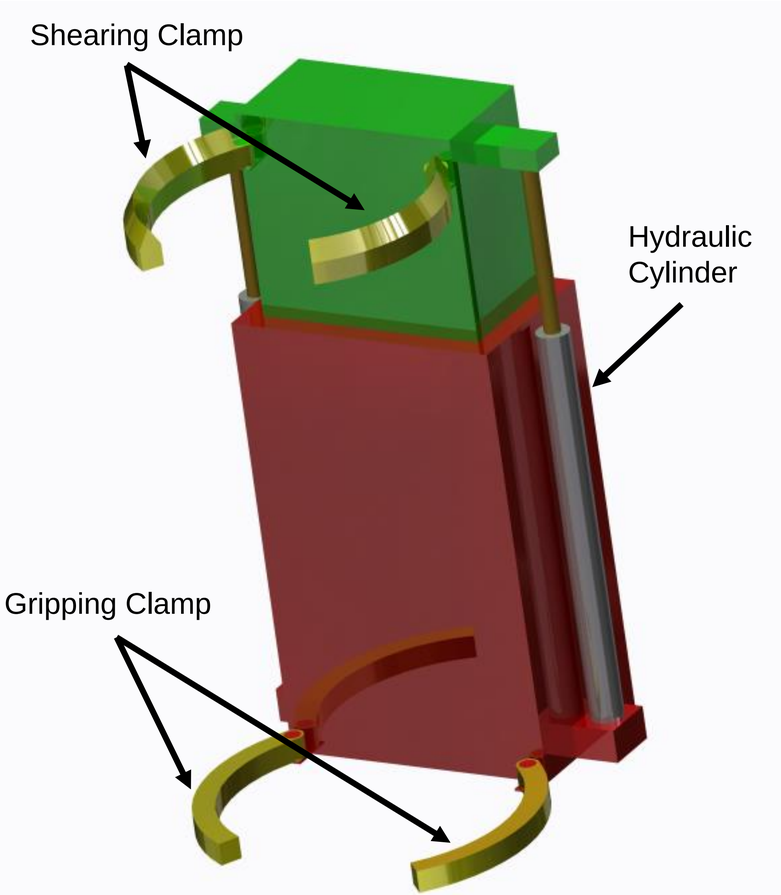

Hydraulically Driven[4]


Motor Driven[5]

Targets

Maximum tree height	60 ft
Opening width	8-25 in
Maximum weight	200 lbs
Maximum clamping pressure	790 psi
Force to shear limbs	5,171 lbf
Minimum holding force to shear limbs	5,371 lbf

Design

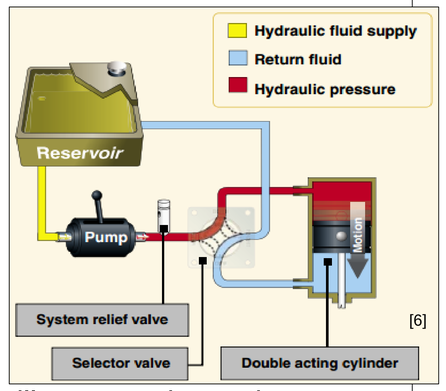


Design Description

- Uses a bear hug clamping method for climbing
- Utilizes a hydraulic clamping system
- Two clamps are connected by a prismatic joint to climb the tree
- A shearing blade de-limbs by the hydraulic prismatic joint
- Chainsaw will be attached to section the tree

Hydraulics

- Hydraulic cylinders use pressure from a working fluid to exert a force over an area
- One compressor and one reservoir will be used to supply the hydraulics' fluid



[6]

- The hydraulic clamps will use a spring acting cylinder instead of the double acting cylinder shown in the diagram above

Potential Challenges

- Fluid leaks on hydraulic lines (brake locking)
- Change in pressure as ROV climbs the tree
- Fail-safes for malfunctioning systems
- Attaching a sectioning chainsaw component

What's Next

- Mechanical Design
  - Hydraulic system
  - Material selection
  - Prototype testing
- Control System
  - Electronic connection to controller
  - Controller type
  - Programming ROV

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