Development of a Helical Path Tree Climbing Snake Robot

Team 10

Jorge Campa   -   Michelle Maggiore   -   Justin Morales   -   Esteban Szalay

Aim: To develop a remotely operated, helically climbing, modular snake robot that will carry a payload for future iterations.

Project Background

- Every year, there are 200 fatal injuries in tree removal related incidents
- Removal of trees is expensive (up to $2,000) and requires specialized knowledge
- Fallen trees cause over $1 billion worth of damage each year
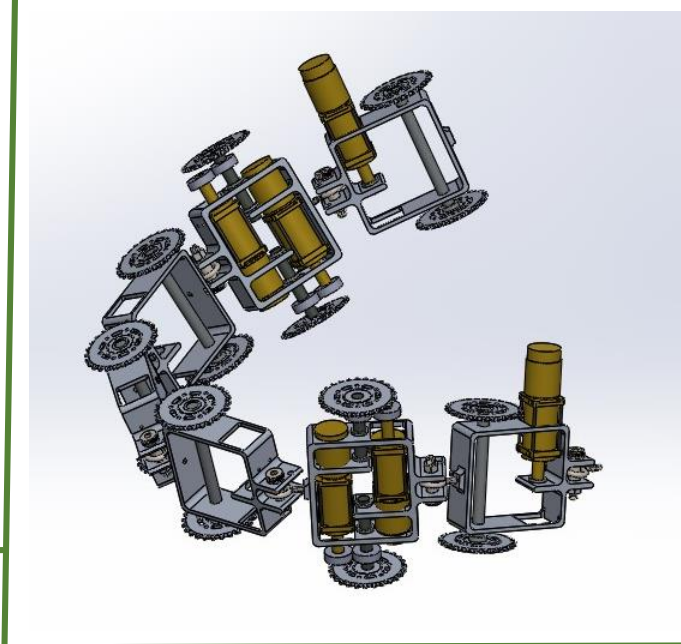
Our Design

Clamping/Body Module:

- Serves to extend length of snake robot
- Doubles as module that aids with clamping by allowing placement of a motor
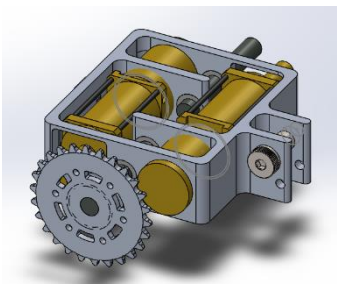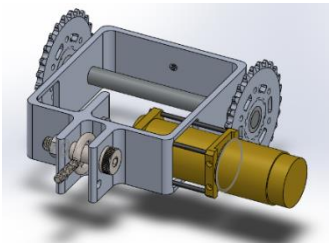
Motor Module:

- Drives the snake robot in the helical path
- Aids with the generation of the helix by reproducing a differential with two motors
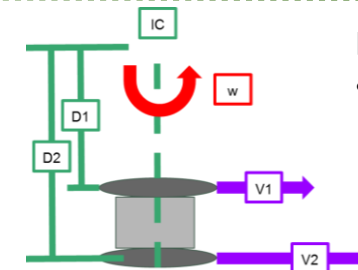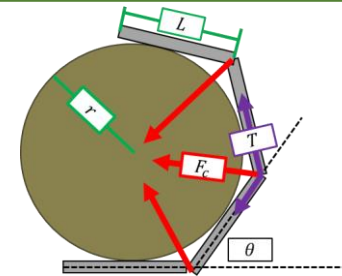

Objectives

Be able to ascend and descend while satisfying the following:

- Tree diameter of 10-30 inches
- Climb in a helical path
- Ascend at a speed of at least 1ft/min
- Provide user feedback through a camera
- Remotely operated

Analysis

Clamping:

- A tensioned wire runs through the system, creating a radial clamping force

Helix – Differential:

- Different wheel velocities cause the system to pivot about an instant center in an arc-wise motion

Future work

- Implementation of payload
- Refinement of design
    - Lower weight/torque through redesign
    - Implementation of control systems