

LIGERBOTS

FIRST® Robotics Team 2877

Newton North and South High Schools



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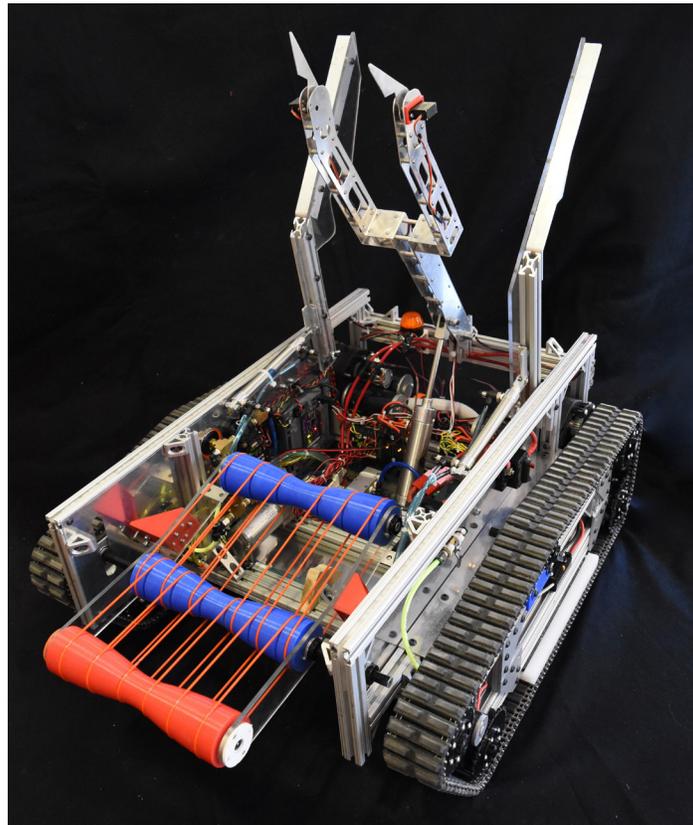
info@ligerbots.com ■ www.ligerbots.org

#FRC2877 ■ The LigerBots

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TALOS

Vision Control System



Talos, the LigerBots 2016 robot, is named after the automaton from Greek mythology that protected the island of Crete by throwing boulders at invading ships.

LigerBots Puma and Panther Level Sponsors

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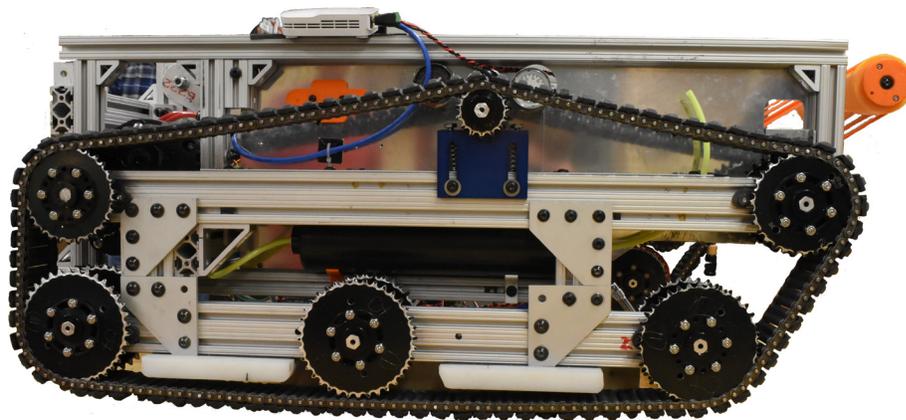
Reliable 20-Point Autonomous

- Consistent 20-point autonomous
- 75 unique defense crossing combinations selectable from the Driver Station Dashboard
 - 5 starting positions
 - 7 starting defenses
 - 3 targets
- Autonomous shots work anywhere from a 4' to 10' radius of the target



Closed Loop Driving

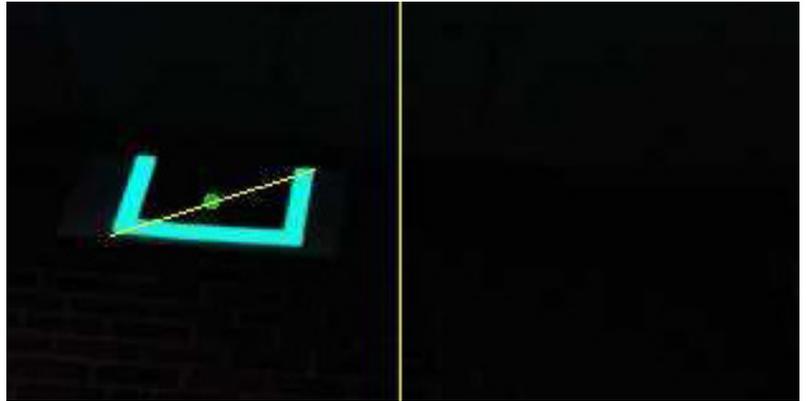
- Position tracking—the robot always knows where it is
 - Encoders for precisely measured drive distance
 - Gyroscope for precise robot rotation
- Two-speed drive train
 - High gear for longer drives when not crossing defenses
 - Low gear for power over defenses and for precision



Vision Assisted Shooting

■ Hardware and software

- Wide-angle (74°) USB web camera with LED ring illuminates retro-reflective tape
- Vision routines are written in C++ using NI Vision
- Software runs entirely on the roboRIO, no co-processor



■ Computation

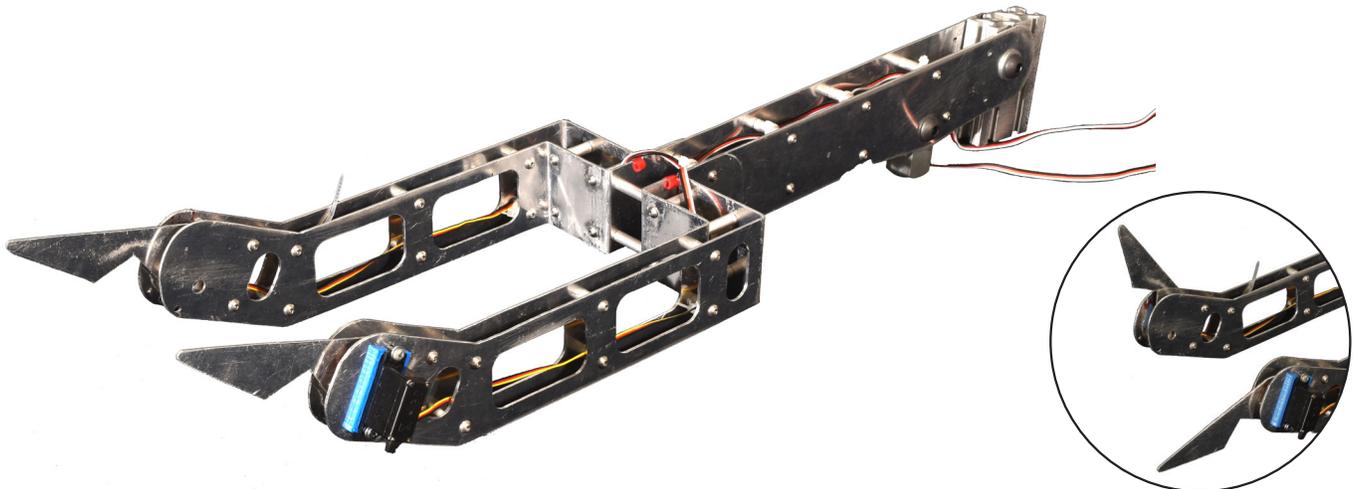
- Computes distance to target, based on vertical angle to target
- Automatically adjusts the tips of the catapult shooter for the computed distance
- Computes angle to target:

Version 1: Rotates robot to center on the goal

Version 2: Differentially adjusts shooting tips for off-angle shots

■ Advantages

- Vision and adjustable tips allow for highly accurate shooting
- Vision allows for quick repositioning of robot when pushed off shot by defense
- Off-angle shooting with differentially adjustable tips speeds up the shot by allowing for less robot repositioning before shot



Controls

- Dual controller system: Xbox controller and Saitek button panel for:
 - Automatic shooting using computed distance
 - Center and shoot
 - One-button ball intake and position to shoot
 - Manual override
- Switchable camera feeds
 - First USB camera assists in shooting
 - Second USB camera assists in picking up balls
 - USB cameras assist in dual-direction driving
 - Camera select buttons on Saitek allow for quick switching between the two camera feeds
 - Custom software gives more reliable network streaming and better control over camera settings



Safety Interlocks

- Robot uses gyroscope to prevent robot tilt over 45° when driving too slowly over defenses
- Software retracts intake before shooting to prevent damage from catapult
- Software makes sure shooter tips are in a safe position before using intake

