

Newton North and South High Schools



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Swerve Drivetrain

The maneuverability of Atlas' swerve drive allows the robot to pivot and strafe to shorten the scoring cycle, easily avoid other robots, and pass through defense. Atlas also packs 25 pounds of steel plates to provide enhanced stability by lowering its center of gravity.

Support Structure and Pivot

A tall, 34" support structure consisting of four box tubes creates a stable mounting platform for the arm and end effector. A pivot gearbox allows the arm to rotate 80° degrees up and down, enabling multi-position pickup of game pieces from the floor and both Substations. Atlas is able to quickly yet precisely rotate the telescoping arm while it is fully extended.

Arm

Atlas' telescoping, 2-stage arm extends 4 feet outside of the frame perimeter, allowing Atlas to easily reach the High Nodes. Cascading rigging and a 10:1 gear ratio allow both stages to telescope at the same time, to a precise length.

Crab Claw

Atlas' powered, compliant wheels enable quick intake of the Cone and Cube. The claw automatically changes the orientation of the Cone for placement on the Nodes. Two pistons work together to firmly hold game pieces.

The LigerBots 2023 robot, "Atlas," is named for the Greek Titan known for his strength and resilience.

Vision System

A global shutter camera, which images all pixels at the same time, plus target recognition and image processing software, allow the robot to know where it is on the field. The use of PathPlanner software enables precise movements, minimizing the need for driver adjustments.







Features of Atlas

Swerve Drivetrain

- Swerve Drive Specialties' (SDS') MK4i L2 gear ratios provide the optimal balance between speed for scoring and the torque necessary for defense.
- Two NEO motors power each swerve module, allowing Atlas to rapidly change direction since one motor powers the wheels and the other one rotates each wheel independently. Compact, 25" x 30" frame dimensions permit three robots to be balanced on the Charging Station.
- Atlas locks its wheels based on feedback from a gyroscope on the drive train so it stays securely on the charging station.
- Twenty-five pounds of steel in the belly pan lower Atlas' center of gravity, helping to avoid tipping, and enhancing defense.



Support Structure and Pivot

- Tall, 34" supporting structure allows Atlas to grab game pieces directly from the Substations.
- An arm pivot system rotates the arm 80° to allow pickup of game pieces from the floor and from the substation regardless of game piece orientation, and allows scoring in all Nodes.
- A custom-designed 500:1 Falconpowered gearbox allows the arm to rotate quickly, yet precisely.



Arm

- Custom cascade arm in a 3 x 3" box tube precisely telescopes to place the game pieces, based on feedback from the vision system.
- Powerful, 3500 foot-pound pivot system enables fast and accurate rotation of the 22-pound arm.
- Four-foot arm extension permits Atlas to reach the High Nodes easily, decreasing cycle time.



Crab Claw

- Piston-driven claw fingers create a secure pinch with constant gripping force.
- High-speed, compliant wheels deform to mold themselves around the game pieces.
- The claw design enables the self-righting of game pieces and touch-and-go pickup: once the claw touches the game piece, the wheels pull the game piece in and correct its orientation. No further action is required from the driver to complete the intake.
- The claw can pick up the Cube and the Cone from the floor and the Shelf Substation. It can also pick them up from the floor during the autonomous period.

Vision System

- A Global shutter camera, using PhotonVision software, captures clear images for the vision system.
- AprilTag vision target recognition allows the robot to know exactly where it is while scoring.
- Multiple pre-programmed options allow the driver to easily orient Atlas to the scoring Nodes and align to the Substations.
- PathPlanner software is used to precisely move the robot to the desired location.

