

Newton North and South High Schools



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Prometheus

Intake/Hopper

Prometheus' over-thebumper intake uses two sets of rollers and a set of polycord pulleys to intake Cargo. With a center row of Mecanum wheels, Cargo are automatically centered in the hopper before being brought into the chute. The intake consists of a four-bar linkage that is light, strong, and flexible, allowing the intake to bend instead of snap when the robot is impacted from the side.

Chute

Prometheus' chute reliably feeds Cargo from the intake to the shooter. The chute uses a set of polycord conveyor belts to quickly transport Cargo from the intake to the shooter with zero preshot spin. The hopper and chute can hold two Cargo at once.



The LigerBots 2022 robot, "Prometheus," is named for the Greek Titan god of fire.

Shooter

Prometheus uses a two-wheeled shooter at a fixed angle to score in both the Upper Hub and the Lower Hub. The wheels are each powered directly by a Falcon motor. Independent adjustment of the flywheels allows Prometheus to make shots from close to the Hub to well beyond the Tarmac.

Climber

Prometheus uses two elevators and two rotating arms to do a Traversal Rung climb with no swing. After grasping the Mid Rung with its telescoping arms, it pivots a second set of arms to latch onto the High Rung and then the Traversal Rung.

Vision

Prometheus' vision system employs an ODROID single-board computer that uses the Hub's retro-reflective tape to orient itself on the field. Prometheus automatically adjusts its shooter speed for the right distance, using a pixel-perspective distance algorithm.





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Features of Prometheus

Intake/Hopper

- Cargo are lifted from the ground by compliant wheels, centered by Mecanum wheels, and then brought into the hopper by polycord pulleys.
- Passively deployed four-bar linkage stows intake vertically to minimize its footprint.
- Polycarbonate construction is flexible and durable.
- Polycord pulleys bring Cargo into the chute.
- Prometheus intakes Cargo from anywhere along the bumper.

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Chute

- The chute has a rigid frame to minimize shooter vibration.
- Dual belts feed Cargo into the shooter with no spin.



Vision

- Vision system has two Logitech C930e cameras mounted on the shooter.
- Vision is powered by an ODROID coprocessor.
- Image processing is in Python with OpenCV.
- Dynamic ellipse feature-matching finds the opening of the Hub.

Shooter

- Independently powered flywheels are used to control spin on the Cargo to reduce the likelihood of Cargo bouncing out of the Upper Hub.
- Prometheus can shoot into the Upper and the Lower Hub with a range from close to the Hub to well beyond the edge of the Tarmac.
- Two Falcon 500 motors provide enough power to shoot two Cargo in rapid succession.



Climber

- Single-stage telescoping elevator features a modified Thrifty Bot kit.
- Rotating arms stay hooked until Prometheus' center of gravity is below the next rung, to eliminate swing.
- Deep hooks prevent Prometheus from falling off the Rungs.
- Retainer plate holds arms securely during match and automatically releases when elevators are raised.
- Modular gearbox design allows efficient maintenance between matches.

