

SELECTED WORK

Murad Malik

Mechanical engineering · Robotics

Purdue University, class of 2030 · Seeking a Summer 2027 internship

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ABOUT

Team lead, design, and programming

Six years on a VEX robotics team in Santa Ana, California, the last as captain. I led the design and programming of our last two robots: I modeled the mechanisms in CAD, made the parts, and wrote the control code.

5

World Championship
qualifications

19

awards across the last
two seasons

#33

world ranking in programming skills, 2025-26

Tools: Inventor, Fusion 360, C++ on PROS and LemLib, laser-cut polycarbonate.

Push Back robot, V5RC 2025-26

Team lead, design, and programming · VEX Team 2147Z

#33

world ranking in programming
skills

Top 8%

of all teams at the World
Championship

6 awards

in the Push Back season



The Push Back robot on the stage at the 2026 VEX World Championship.

Our robot went to the VEX World Championship for Southern California, finished in the top 8% of teams there, and ranked #33 in the world in programming skills.

Subsystems

Chassis

6 × 11 W motors, 600 rpm geared 4:3 to 450 rpm

Designed around the field obstacles for strength, agility, and speed, with 0.500 in × 1.000 in aluminum C-channel. Laying out the whole drivetrain in CAD cut production time and fit the subsystems that came after it.

Lift

Two-bar, polycarbonate spring, 2 × 75 mm pistons

The robot has to squat under the long goals, and the elastic bands had no clear place to mount. A polycarbonate spring pushes the lift up and the pistons pull it down, which kept the footprint small and the air use low.

Intake

Three-stage, custom polycarbonate

Chosen with a decision matrix, with ramp and sprocket angles set from a 2D sketch of the ball path. Pistons were placed with Inventor motion studies, and the plastic construction kept the lift light.

Structure and fabrication

Laser-cut polycarbonate, FEA in Inventor

FEA checked the front drive endcaps and the top intake plate, the two parts most likely to flex. Parts were nested in Deepnest to use as little sheet as possible.

Software

C++ on PROS, LemLib, 20 ms task loop

Each subsystem is its own class, and the intake is a state machine with six states. #33 in the world in programming skills.

High Stakes robot, VRC 2024-25

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13

awards in the 2024-25 season

21

tuned autonomous routines, written with a tool I built



The High Stakes robot on a practice field in April 2025.

Won 13 awards in the 2024-25 season, including 3 Excellence Awards, 2 Tournament Champion titles, and the Design Award that qualified the team for the World Championship.

Subsystems

Chassis

6 × 11 W motors, 36:48, 3.25 in wheels, 6.3 ft/s

A 450 rpm drive won its matrix at 29.3 of 30 for reaching a corner first and still holding it. The center of gravity sat too far back, so we rebuilt it with 30 in rails and 2 more powered omni wheels, 8 points of contact in total.

Intake

Chain run of plastic hooks, optical color sort

Hooks beat a flex wheel, conveyor, and claw on speed and accuracy, 25 of 40. The first test failed 2 of 3 trials. A parameter chart and a raised termination shaft fixed where the ring landed.

Lift

Two-bar linkage, then a two-bar deposit lift

Won at 36 of 40 on weight and ease of build. In December we scored three replacements and chose the deposit lift, 26 of 30. The 1x33 beam that snapped was replaced with a half-cut 3x33 C-channel, and the deposit lift drops a ring straight onto the stake.

Clamp

Pneumatic, distance sensor trigger

A task watches a distance sensor and closes the clamp once a goal is inside. The driver only holds a heading toward the goal.

Sweeper

Actuated 2x22 C-channel arm, single-acting piston

A fixed wedge clears 1 ring per pass against a stack of 4, so the arm is actuated. The robot clears a corner stack instead of losing corners it had already won.

Hang

Passive, two half-cut 3x16 C-channels, latex tubing

Won its matrix at 36 of 40 by using no motor ports and no air. Worth 3 to 12 points in the last 30 seconds.

Software

C++ on PROS, LemLib fork, 20 ms task loops

Each subsystem is its own class with a state machine, and driver control and autonomous share one interface. 21 tuned autonomous routines, and a distanceReset class that corrects odometry drift mid-routine.

MORE ON THE SITE

muradmali.com

01 Push Back robot, V5RC 2025-26

A basket-style robot whose polycarbonate spring lift squats under the long goals.

02 High Stakes robot, VRC 2024-25

A goal-holding robot built from a scored design process. We rebuilt its chassis after the first tournament.

Logo tooling part, Ascent Aerospace

A tooling part printed in ABS, then CNC milled to trim its edges to final dimension.

autoBuilder, a PROS library for writing autonomous routines

A PROS library that prints autonomous code from the robot's live position, rebuilt from my High Stakes tool so another team can use it with its own code.

SSHHand

An open-source tool that lets AI agents run commands and move files on remote machines over SSH. It has 11 tools and 28 tests that run against real SSH connections, and it is on PyPI.

Rent collection platform

Rent collection and tenant management software for a property management company with roughly 50 to 60 tenants.