



Unsealed. Unwrapped. Unstoppable!
The Mummy rises to claim the field.



The Mummy

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Who Is The Mummy

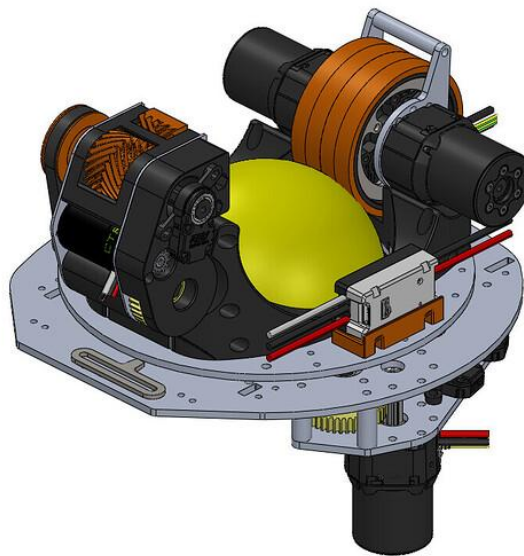
Name Inspiration

“Engineers do not build in silence. We excavate ideas like relics buried beneath the sands, studying what came before us and reshaping it into something new. We may have uncovered a few concepts from teams past, but every bolt, bracket, and line of code was refined and reengineered to become our own creation. This year’s machine is christened The Mummy – an ancient force reborn through modern design. A symbol of resilience, mystery, and unstoppable presence. Through calculations, prototypes, and countless rebuilds, we did not just uncover a legend. We engineered one.”

Inspiration from RI3D, Rembrandts & West Coast Competitive Concept:



From RI3D Cranberry Alarm;
inspired The Mummy's index system.



From FRC 4481 Rembrandts"; Inspired The Mummy's shooter

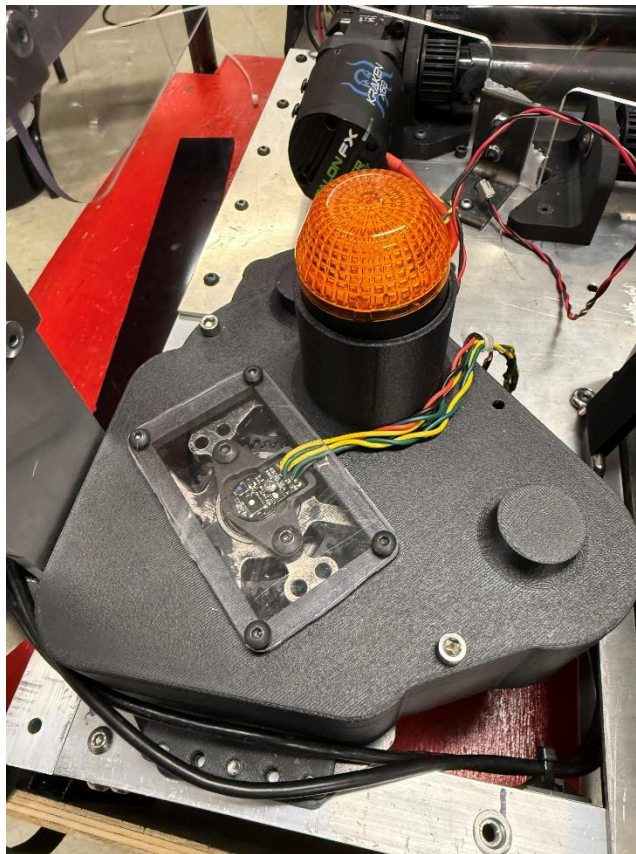


From West Coast Competitive Concept”; Inspired the Mummy’s intake and storage box

Drive Base

Drive Base Components

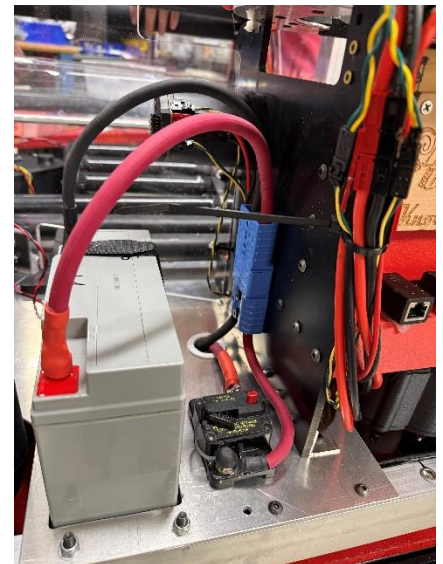
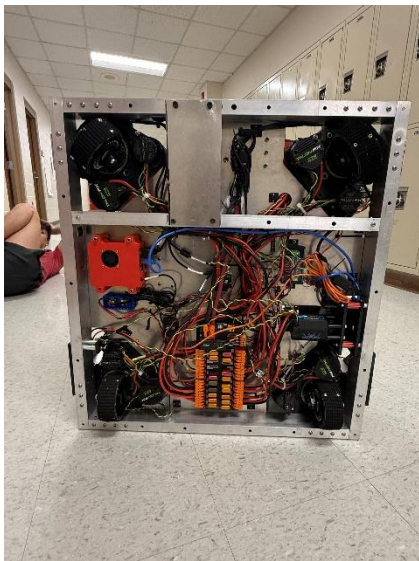
Mummy is running West Coast Product Swerve X Flipped modules. They are powered by Kraken X60 brushless motors for drive and Falcon 500 brushless motors for turning. We designed custom module covers to prevent debris from entering the gears. Our gear ratio allows us to travel approximately 18 feet per second.



Electrical

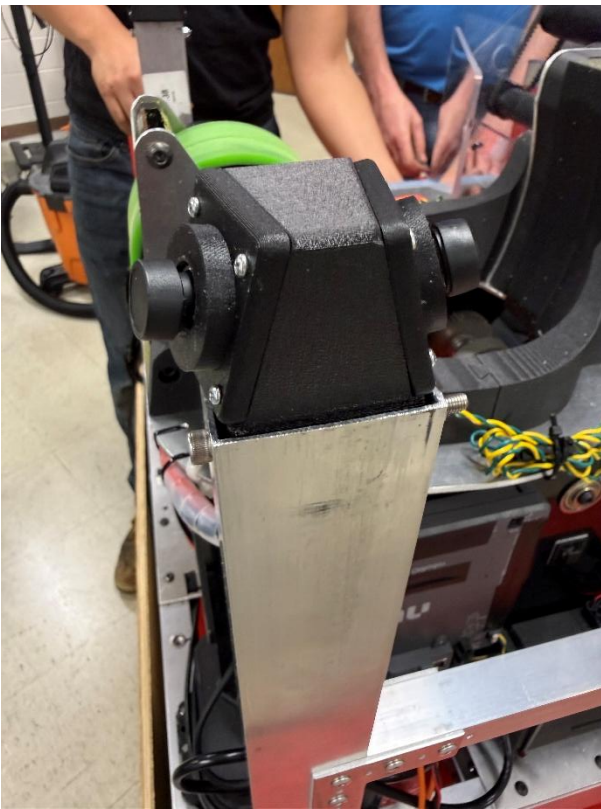
Electrical Components

We are utilizing a CTRE Canivore for our swerve modules which allows us to run a second can bus dedicated to swerve. We use a pigeon located on the absolute center of the Mummy to calculate telemetry to help the robot calculate its location on the field. We have utilized the top and bottom of the belly pan to aid in packaging to allow for a larger index space.



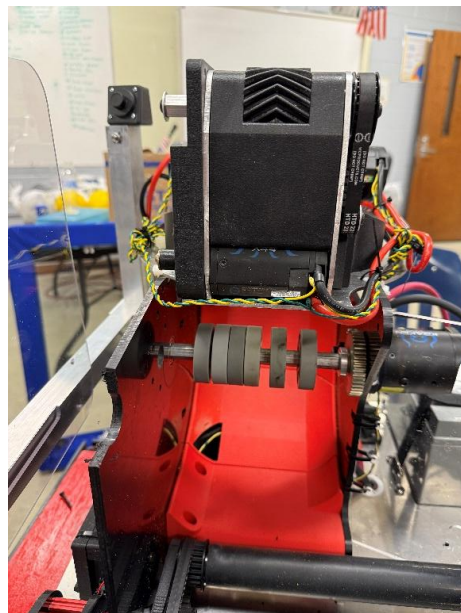
Vision System

The Mummy uses 4 HD cameras for vision. These cameras allow the robot to view the April Tags and triangulate its placement on the field using Photon Vision. These cameras are gray scale cameras that turn the April Tags into colored 3-D images for telemetry data. The images are processed by two Orange Pi 5 microprocessors.



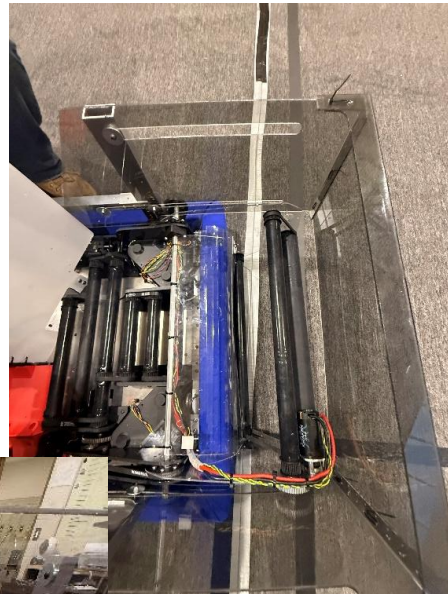
Shooter

We were inspired by FRC 4481 Rembrents shooter. We felt we wanted a short single wheel shooter with a variable hood. Both the feeder and shooter had 3 different iterations, each time making the design more and more simplified. The final kicker uses a single motor and one shaft to roll the ball up the 3D printed chute. The Shooter is mostly 3D printed components with metal plates for structure. After our first comp we decided to add a 2nd shooter to increase fuel volume.



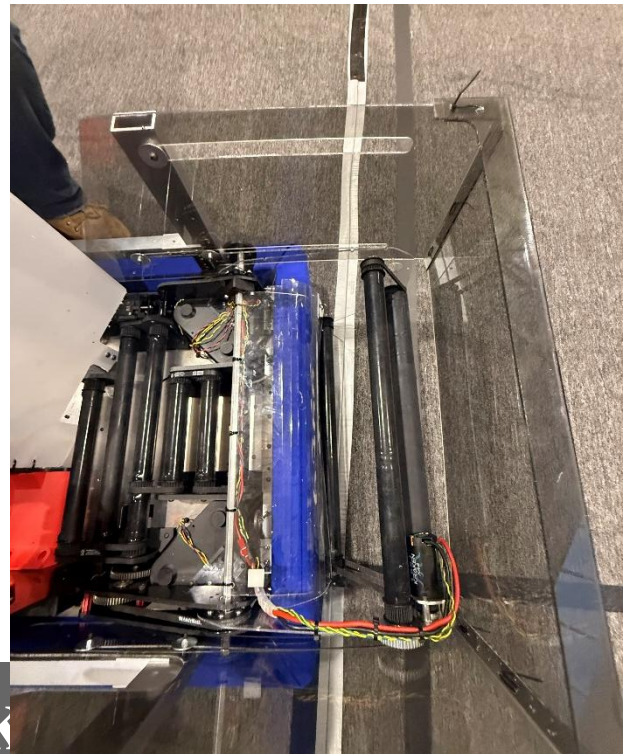
Intake

Our team had several iterations on the intake. The first iteration was a slider style but with packaging and the idea to have the large over the bumper container the team was concerned the slide style intake would not be damage tolerate. The design team then began testing a simple over the bumper style. The design team struggled to find a geometry that consitantly grabbed the balls. The addition of a lower roller and plate against the bumper proved to work well. The third iteration was done to improve durability but keep the geometry and performance.



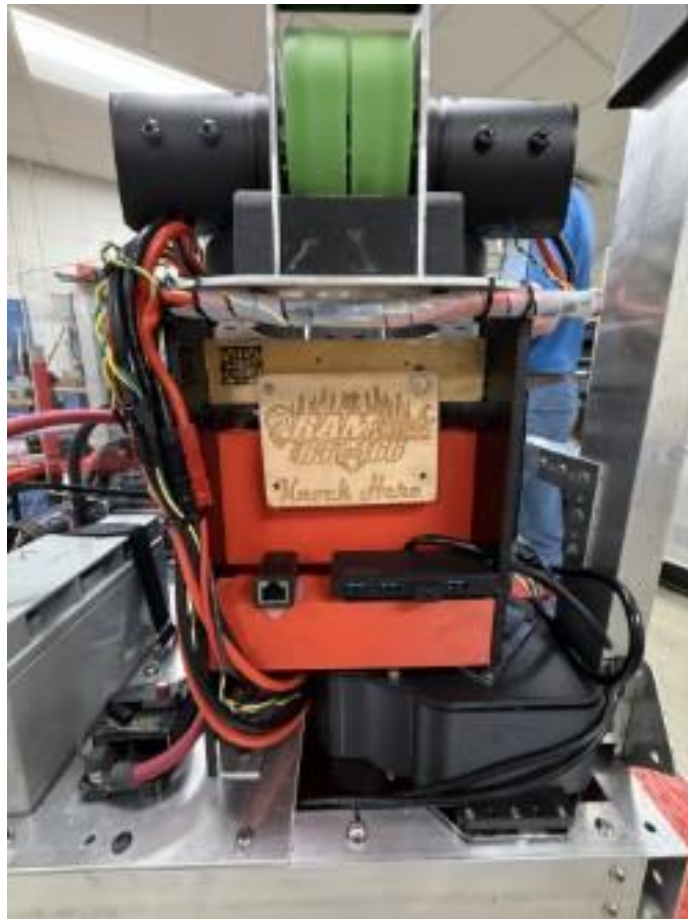
Indexer

While many teams chose to go with a spindexer-style index system, we were inspired by RI3D Cranberry Alarms' simple roller indexer. The rollers are covered with a grippy latex to push the fuel across the rollers and into the shooter/kicker.



Decorative Features

Our team is extremely superstitious and “knocks on wood” frequently. To facilitate ease of knocking, we used a laser cutter to create a “knock here” plate to adorn our robots. This season we reused our plate from Frankenstein to bring us luck this season. Although it provides no engineering function, it has become our good luck charm.



Week by Week

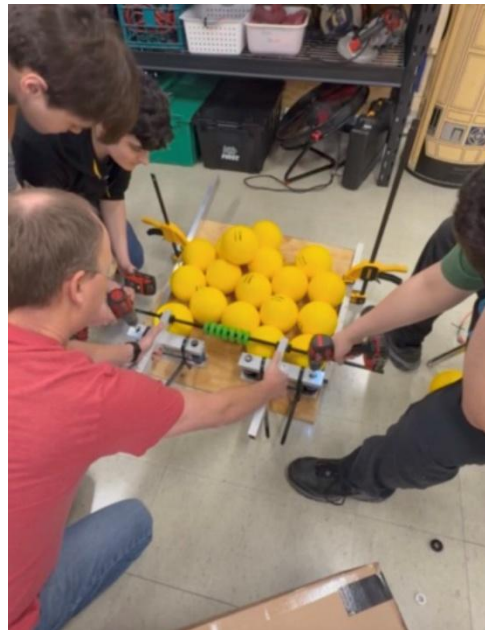
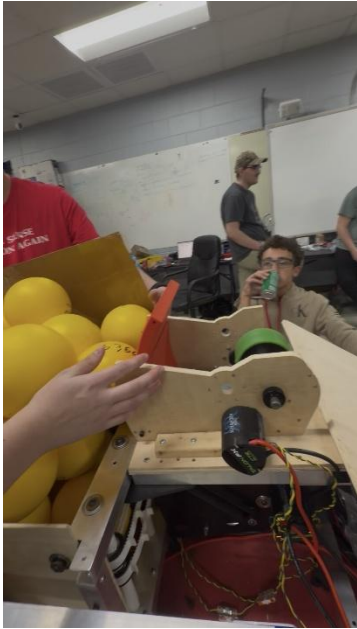
- Week 1
 - Attended the Upstate Kickoff Event
 - Read game rules
 - Broke up into groups to analyze and strategize
 - Created a matrix to establish what we wanted the robot to do, these became our design goals
 - Evaluated RI3D concepts to determine which design would best fit our design goals
 - Started collecting materials and designing field elements



- Week 2
 - Prototyped a intake concept
 - Prototyped a climber concept
 - Prototyped a indexer and shooter
 - Programming utilized last season's robot to begin working on swerve code



- Week 3
 - Continued prototyping concepts
 - Were unable to meet because of snowpocolypse



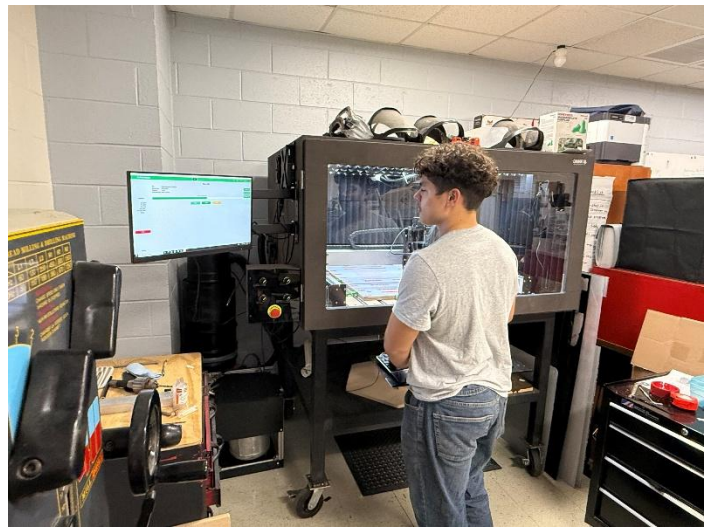
- Week 4
 - Unable to meet because of Snowpocalypse 2.0



- Week 5
 - Hosted FLL West Regional
 - Programming began programming shooter
 - Fabricated first version of the kicker and shooter
 - Designed and fabricated drivebase



- Week 6
 - Fabricated roller mechanism for indexer
 - Redesigned and 3D printed shooter parts
 - CNCed panel components
 - Fabricated belly pan



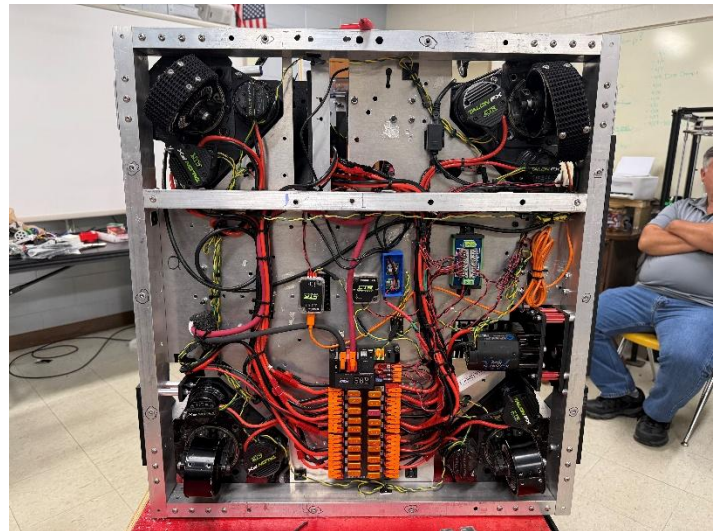
- Week 7
 - Disassembled swerve modules from last season to clean, inspect, and reassemble
 - 3D printed new swerve module covers in a smaller profile to allow for space and access to can coder
 - Built field elements and measured and marked carpet
 - Fabricated intake
 - Wired robot
 - Determined camera placed and 3D printed camera mounts
 - Programming received complete robot
 - Fabricated bumpers
 - Made team buttons
 - Redesigned intake for durability
 - Modified kicker to solve jamming issue
 - Updated pit to reflect this year's theme
 - Selected pit crew and human player
 - Installed cameras



- Week 8 – Week 1 Competition FSC North Charleston
 - How did we do?
 - Finished qualification matches ranked 5th
 - Record of 9-3-0
 - Captain of Alliance 3
 - Eliminated in the Semifinals
 - Failures we encountered
 - Shooter head detached during a match
 - Intake became hung up on the stabilizing/deployment bar
 - CAN wires were crushed between belly pan and battery
 - Programming challenges
 - Feeding issues with the indexer
 - Successes we experienced
 - Human player won a match when our robot wasn't on the field
 - Vision system detected April tags to facilitate auto aiming
 - Intake performed as planned in most matches
 - Programming calculations for auto shooting were accurate and consistent
 - Drive team successfully pushed fuel even on matches where the intake failed
 - Drive team successfully ran defense without causing damage to any robots when necessary

- Week 9 – What do we need to fix?
 - Frame
 - Belly pan requires too much time to remove/reinstall
 - Use bolts instead of zip ties
 - Wiring is messy and causes shorts
 - Completely rewire robot
 - Inspection failures
 - Add skirting to eliminate gap between frame and bumper
 - Intake
 - Guard for the motor creates a pinch point for fuel
 - Bend a lip to decrease the space capable of pinching
 - Increase torque
 - Change motor from a Kraken X44 to a Kraken X60
 - Prevent catastrophic setbacks
 - Create a spare intake for quick change if necessary
 - Add aluminum pivot points for durability
 - Program a pulse to help feed fuel further into the indexer
 - Indexer
 - Increase feed rate and prevent spinning on rollers
 - Increase angle
 - Increase the number of rollers
 - Reduce space between rollers
 - Prevent clogging at the shooter entrance
 - Create a wedge to direct fuel
 - Shooter
 - Increase shot rate
 - Add additional shooter
 - Reduce kicker height to remove the dead spot
 - Drive station
 - Vision over FIRST sponsor panel is obstructed
 - Add a camera to the front of the hopper to see fuel in blind spots

- Week 10
 - Stripped robot down to bare frame and individual subsystems
 - Re-engineer the belly pan to allow for faster access
 - Fabricate additional rollers for indexer
 - Fabricate and mount an additional shooter
 - Make additional buttons
 - Build trench field elements for our practice field
 - Install and program second shooter



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