Portfolio

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Skewb (Rubik's cube variant) solver

A 4-motor robotic solver with custom 3D printed hardware and motion control.
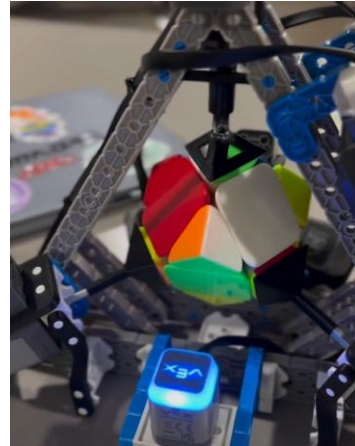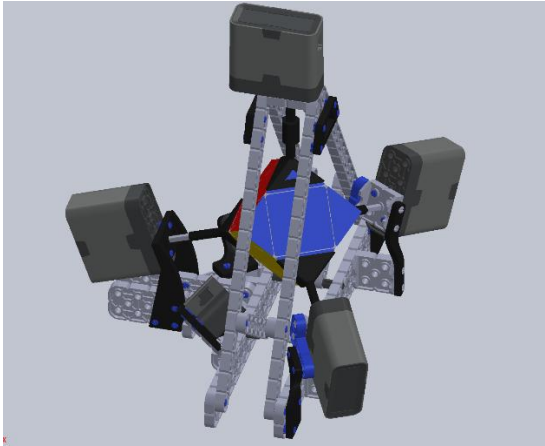

- Designed a 4-motor actuation strategy to reach any cube state using constrained kinematics
- Designed and 3D printed motor mounts and claws, iterated 5+ designs revisions to improve grip strength and improve reliability, yielding a 90% solve rate
- Developed and tuned a PID controller in VexCode C++ to precisely execute corner rotation angles with 95% accuracy under load

FRC 2025 Competition Robot (8729 Spark Youth Robotics)

Lead mechanical designer for a full competition robot with custom mechanisms and swerve drive.
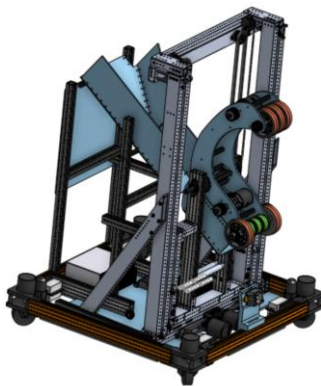
- Led the design, CAD, procurement, manufacturing and integration of all mechanical systems
- Prototyped and refined 2-stage elevator, custom claw and drivetrain and intake systems, resulting in a 100% increase in robot point contributions over two weeks
- Engineered a polycarbonate claw with 2 driven shafts for 90% accurate high-speed shooting
- Integrated 4 independently rotating swerve modules to reduce cycle time by ~30%
- Managed manufacturing workflow (CNC, 3D printing, manual machining)

PARAGON (Python Story Game)
A Python/Pygame open-world learning game with persistence and custom map system.


- Designed a custom a 6400x6400 pixel world map using Tiled Map Editor
- Implemented a smooth map scrolling camera system with AABB collision detection
- Stored player data between instances, including quest progress and academic progress
- Organized code into readable modular components for collaborative epansion

Arduino Binary Counter
A real-time embedded binary counting system built on Arduino using C++.
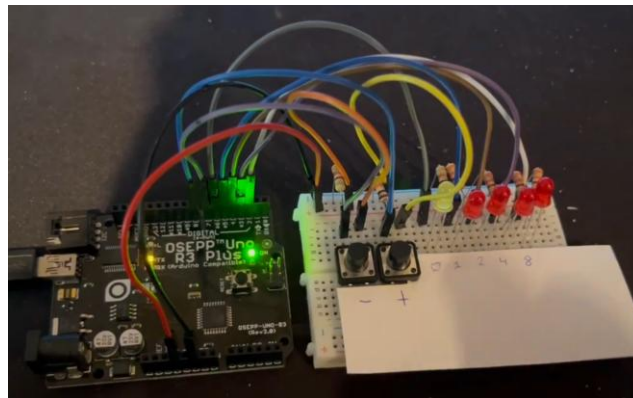
- Engineered C++ firmware with Arduino IDE for an Arduino-based binary counter
- Built a breadboarding layout with appropriate resistors, LEDs, and push buttons
- Implemented a non-blocking timing system and manual/auto incrementing modes