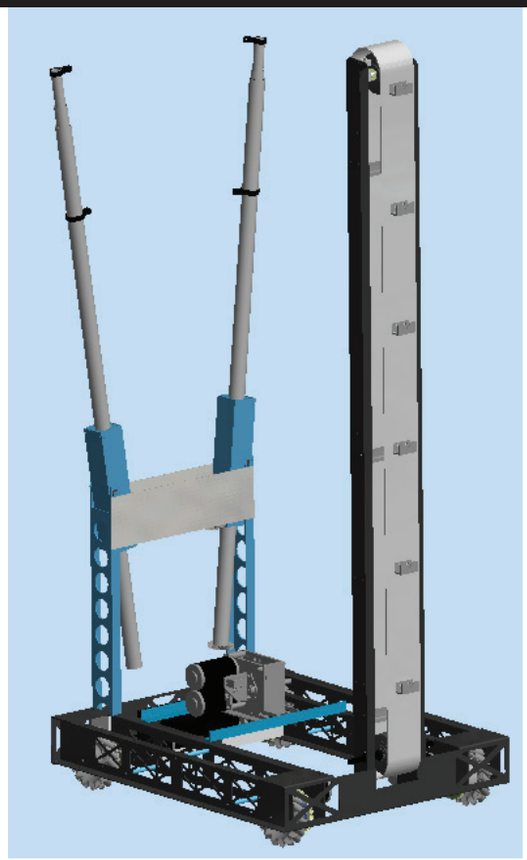
Design Process



Jimmy John (JJ) was designed as a versatile robot that is good at gathering totes and recycling containers and can stack them reliably, with a solid drive train backing up these features. The design decisions for JJ were a combination of previous years' experience plus new approaches for new specifications. The lift and wings are totally new. We focused on making a CAD model of every piece before building to minimize redo, and to enable a better understanding of how the systems would integrate and how our robot would look and function before it was built.

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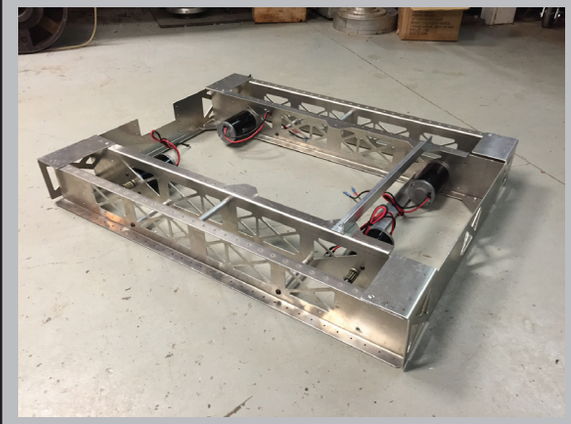
Eagle Imperium

a FIRST Robotics Team
Skyline High School
Ann Arbor, Michigan

Eagle Imperium is FIRST Robotics team based in Ann Arbor, Michigan, comprised of students from Skyline High School. Since 2009, we have competed in the FIRST Robotics Competition in Michigan. From our build season robot to our buffet lunches, we create with the goal to inspire others. Eagle Imperium has continued to be successful largely due to the support from many generous organizations.

Drive Train

•6” Mecanum Wheels
•7:1 gear ratio - 16 Ft/sec @ 4300rpm
•60lb of thrust
•36lb total weight
•Direct gearing for simpler, cheaper and easily maintainable drivetrain

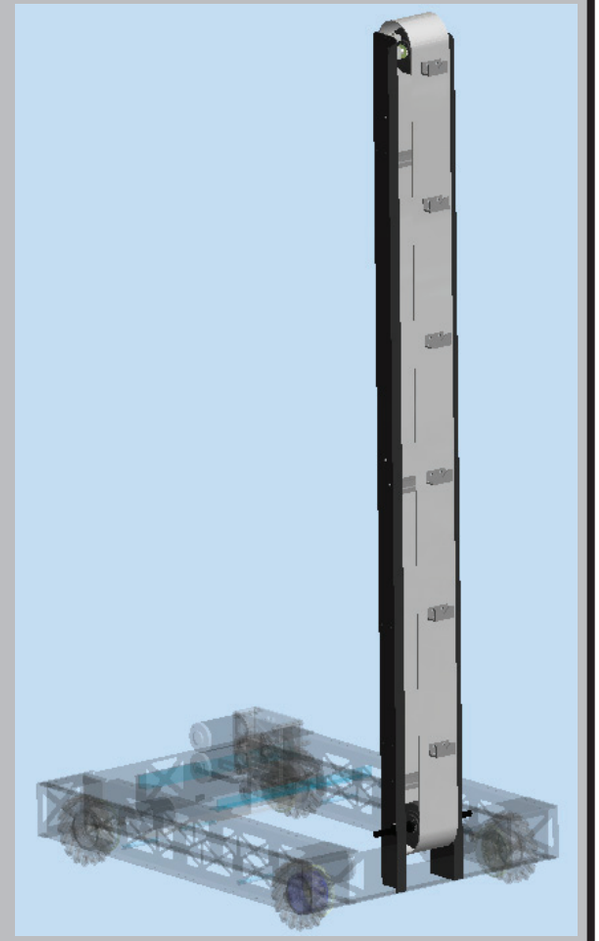


Electrical

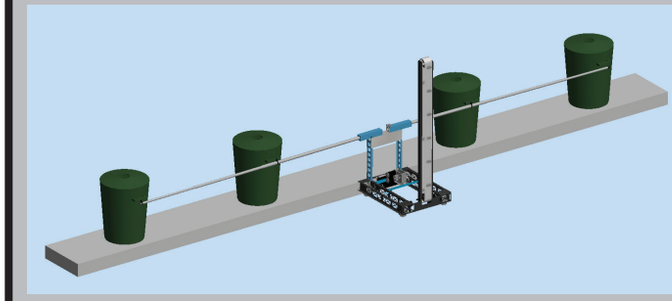
•Limit switch & encoder sensors for lift
•Gyroscope & accelerometer sensors for Auton
•Command based C++ code

Belt-Style Lift

•Belt-style lift used for maximum flexibility of use
•Urethane/cotton flat belting used, sewn together with fishing line
•Special set of hooks for lifting already stacked totes & for optimal recycling container lifting
•Pneumatic assist for placing recycling container on 6 totes
•Can hold up to 5 totes or 1 recycle can and 4 totes
•Can lift a container or tote to max level
•Uses AndyMark Sonic Shifter with 2 CIM motors for gearing
•Final gear ratio: 40:1 in low gear and 10.2:1 in high gear
•250lb lifting force in low gear, 64lb lifting force in high gear
•1.88 feet/sec lift in low gear, 7.4 feet/sec in high gear (@4300rpm)
•Limit switch and encoder used to control and index the lift



Eagle Wings



•18’ total wingspan
•Designed to quickly grab all 4 recycle containers from the center step in Auton
•Rotation driven by 2x BaneBot 775-12 motors with 16:1 BaneBot planetary gearboxes
•1.4:1 custom gears to rotate arms
•50lb fishing line used to retract arms
•Retraction driven by 2x BaneBot 775-12 motors with 4:1 BaneBot planetary gearboxes
•Quick and easy “shaft-collar-winch” used for fishing line
•15lb gas springs used to help raise arms and keep them up in case the fishing line breaks