



PRESENTS

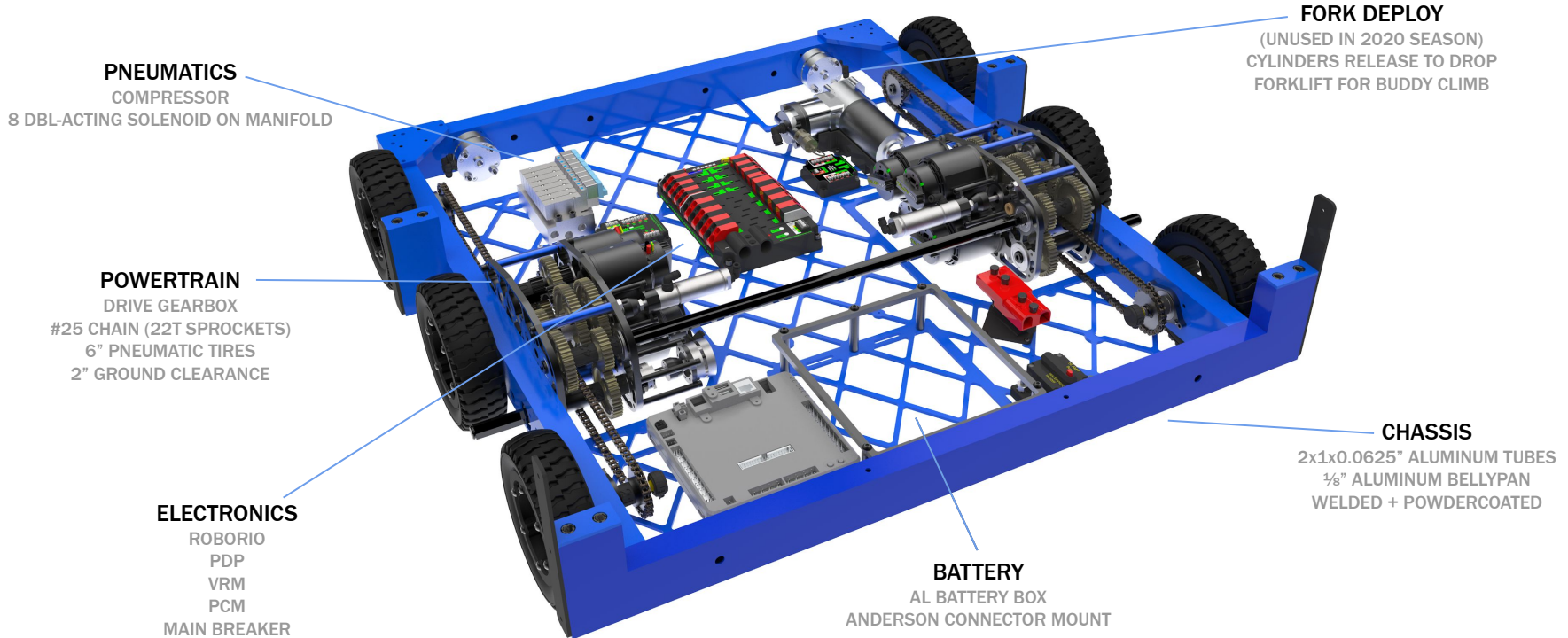
DREADNOUGHT

2021 INFINITE RECHARGE AT HOME PRESENTATION

Pranav, Diego, Abhinav, Krishna, Alex

DRIVEBASE

DRIVE OVER OBSTACLES AND QUICKLY CYCLE.
ROBUST AND LOW CG BASE



PNEUMATICS

COMPRESSOR

8 DBL-ACTING SOLENOID ON MANIFOLD

POWERTRAIN

DRIVE GEARBOX

#25 CHAIN (22T SPROCKETS)

6" PNEUMATIC TIRES

2" GROUND CLEARANCE

ELECTRONICS

ROBORIO

PDP

VRM

PCM

MAIN BREAKER

FORK DEPLOY

(UNUSED IN 2020 SEASON)
CYLINDERS RELEASE TO DROP
FORKLIFT FOR BUDDY CLIMB

CHASSIS

2x1x0.0625" ALUMINUM TUBES

1/8" ALUMINUM BELLYPAN

WELDED + POWDERCOATED

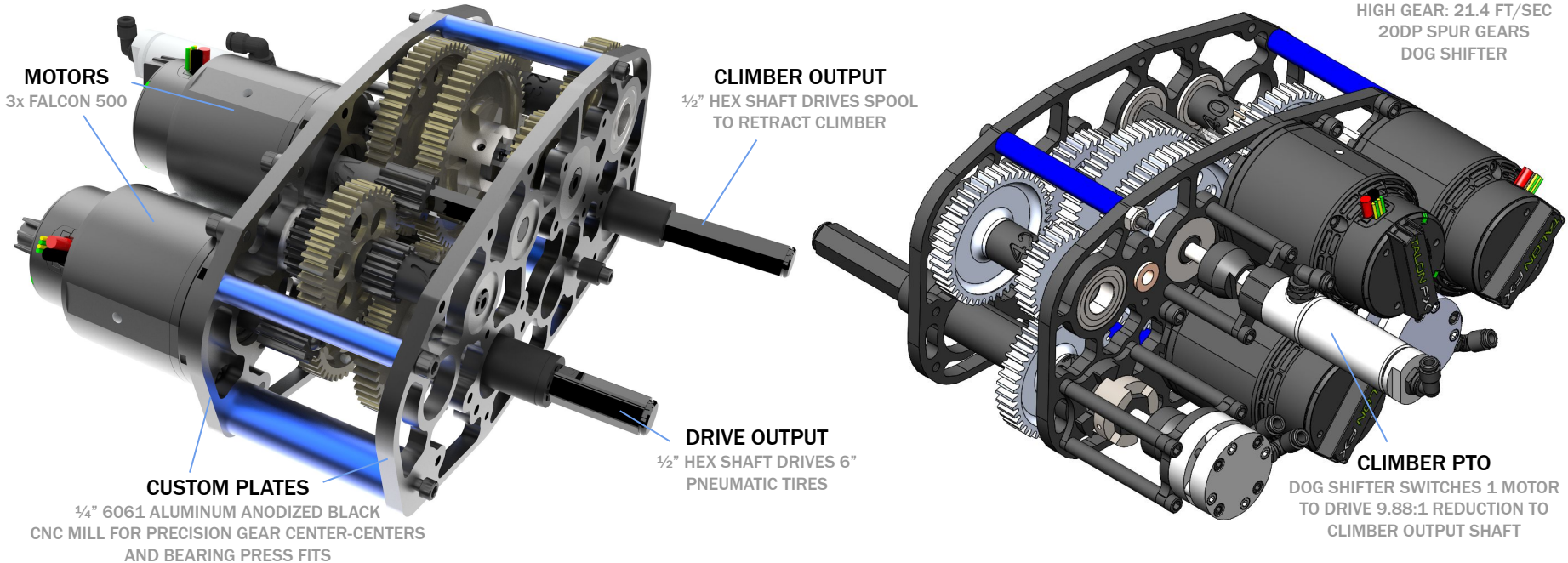
BATTERY

AL BATTERY BOX

ANDERSON CONNECTOR MOUNT

DRIVE / CLIMBER GEARBOX

OUTPUT 2-SPEED DRIVE AND RETRACT CLIMBER



MOTORS
3x FALCON 500

CLIMBER OUTPUT
1/2" HEX SHAFT DRIVES SPOOL
TO RETRACT CLIMBER

DRIVE
LOW GEAR: 13.2 FT/SEC
HIGH GEAR: 21.4 FT/SEC
20DP SPUR GEARS
DOG SHIFTER

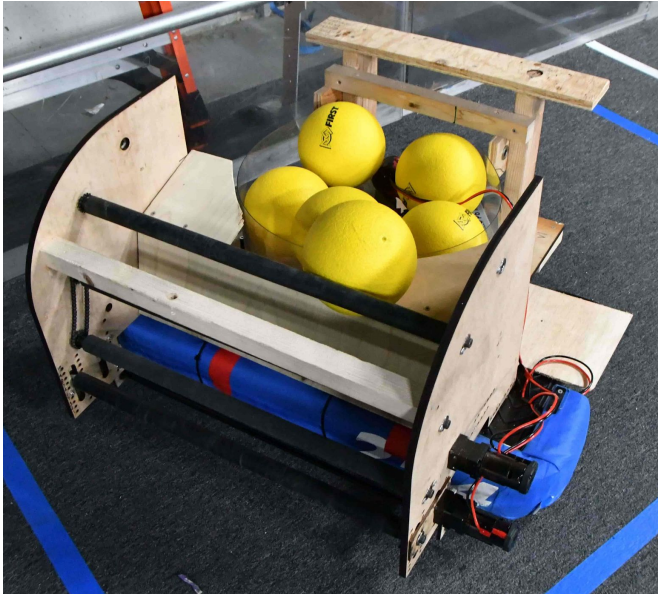
CUSTOM PLATES
1/4" 6061 ALUMINUM ANODIZED BLACK
CNC MILL FOR PRECISION GEAR CENTER-CENTERS
AND BEARING PRESS FITS

DRIVE OUTPUT
1/2" HEX SHAFT DRIVES 6"
PNEUMATIC TIRES

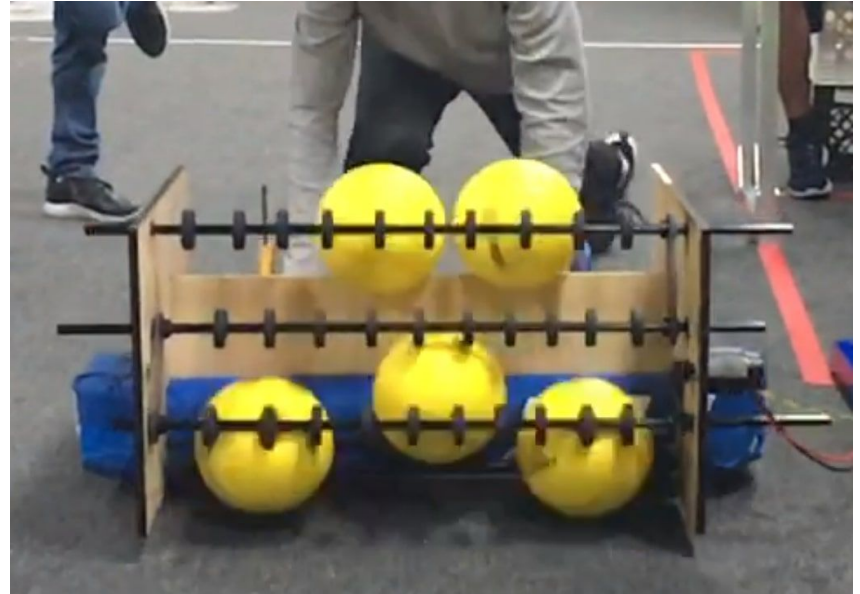
CLIMBER PTO
DOG SHIFTER SWITCHES 1 MOTOR
TO DRIVE 9.88:1 REDUCTION TO
CLIMBER OUTPUT SHAFT

INTAKE

“TOUCH IT, OWN IT”



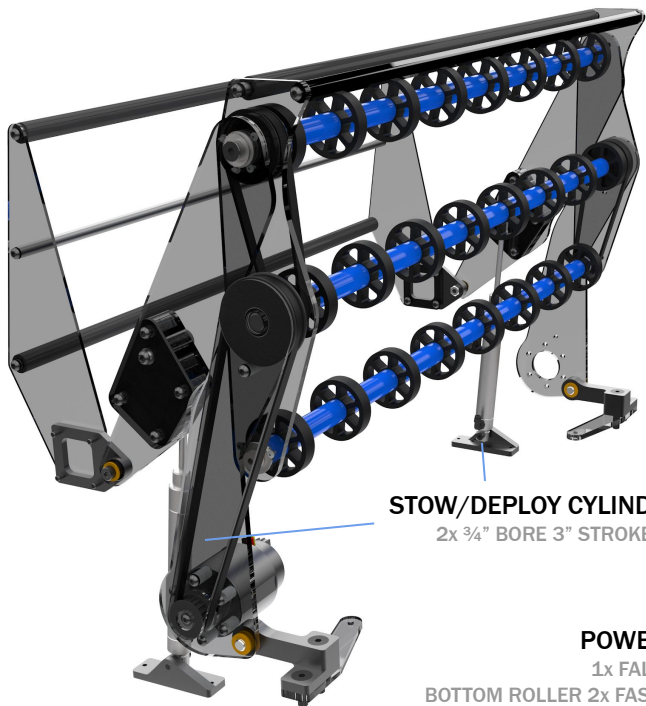
VARIABLE COMPRESSION, ROLLER PROTOTYPE (V1)



FLEX-WHEEL PROTOTYPE (FINAL)

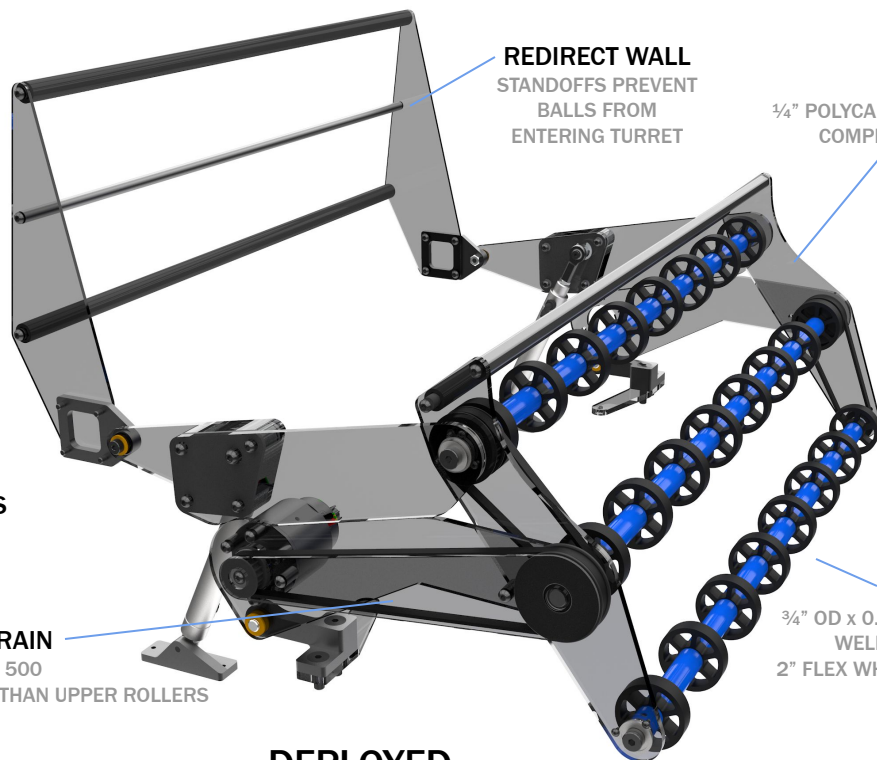
INTAKE

PULL BALLS UP FROM GROUND AND ACCEPT FROM FEEDER STATION



STOW/DEPLOY CYLINDERS
2x 3/4" BORE 3" STROKE

STOWED



REDIRECT WALL
STANDOFFS PREVENT
BALLS FROM
ENTERING TURRET

PLATES
1/4" POLYCARBONATE ROBUST AND
COMPLIANT TO IMPACTS

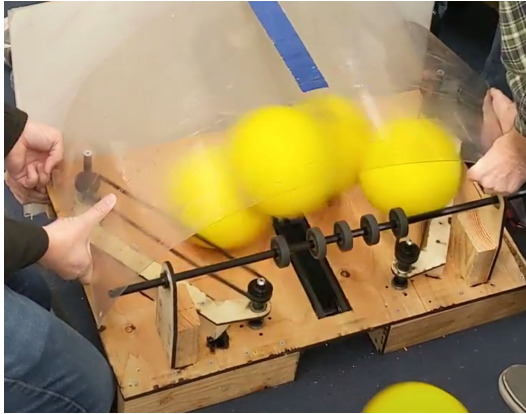
POWER TRAIN
1x FALCON 500
BOTTOM ROLLER 2x FASTER THAN UPPER ROLLERS

ROLLERS
3/4" OD x 0.03" WALL STEEL TUBES
WELDED-ON ENDCAPS
2" FLEX WHEELS STRETCHED OVER

DEPLOYED

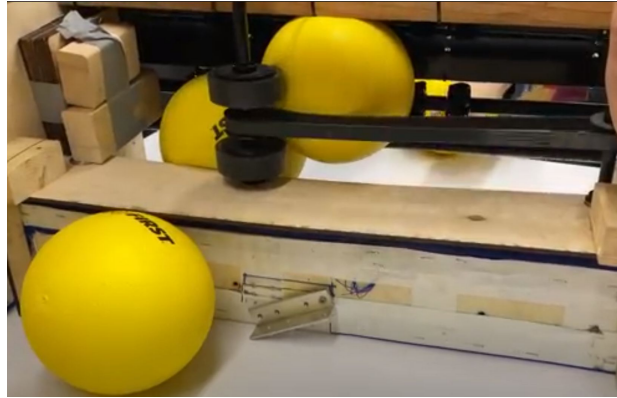
SERIALIZER

STORE 5 BALLS WITHOUT JAMMING, FEED QUICKLY AND CONSISTENTLY INTO SHOOTER



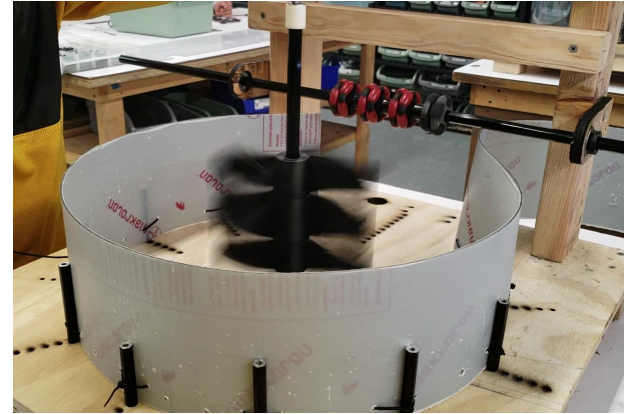
PINBALL

COUNTER-ROTATING BELTS



SNAKE

LINEAR BELT RUNS

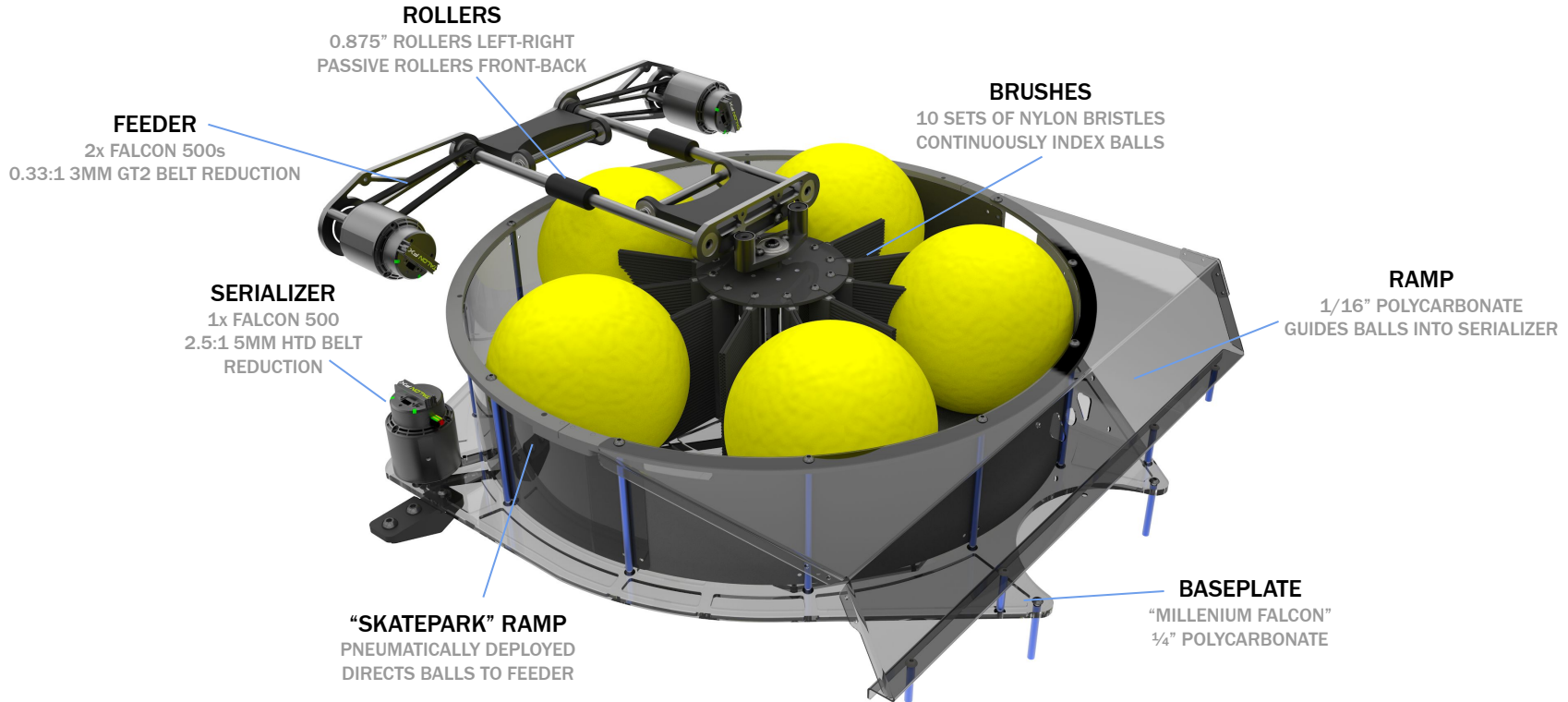


WASHING MACHINE

ROTATING BRUSHES

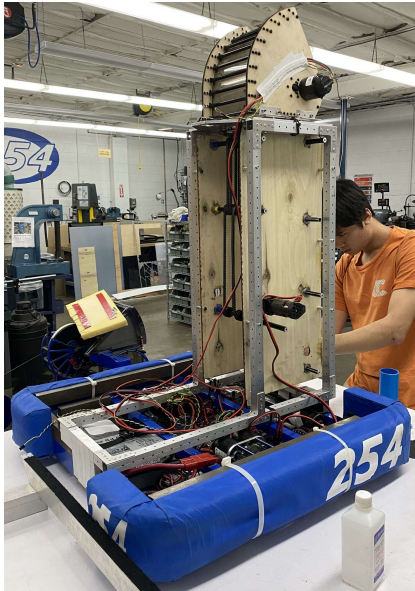
SERIALIZER/FEEDER

SERIALIZE AND STORE BALLS BEFORE FEEDING TO SHOOTER

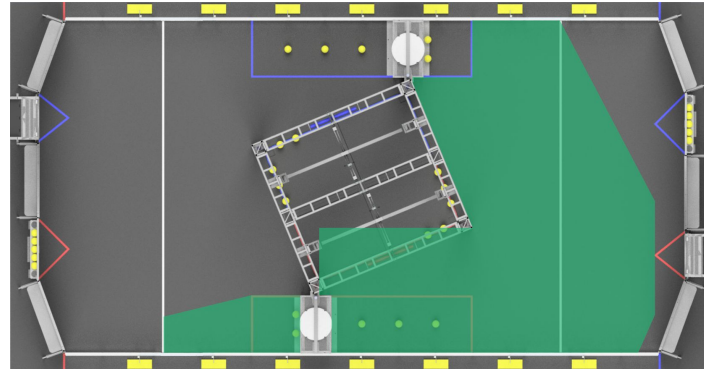


SHOOTER/TURRET

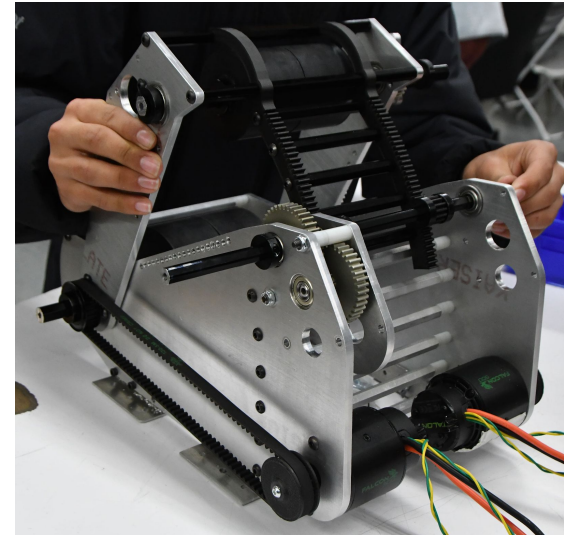
ACCURATELY AND QUICKLY SCORE BALLS FROM MAXIMUM LOCATIONS



SKYSTALKER
SHOOTER/TURRET
PROTOTYPE



SHOOTING LOCATIONS
~45% OF FIELD



SHOOTER PROTOTYPE
DOUBLE FLYWHEEL METAL
PROTOTYPE

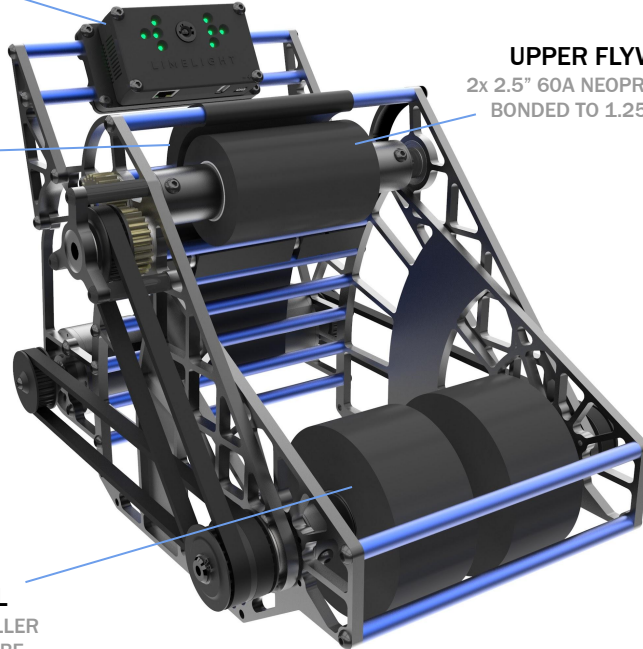
SHOOTER/TURRET

ACCURATELY AND QUICKLY SCORE BALLS FROM MAXIMUM LOCATIONS



LIMELIGHT

VISION ASSISTANCE
FOR AIMING SHOTS

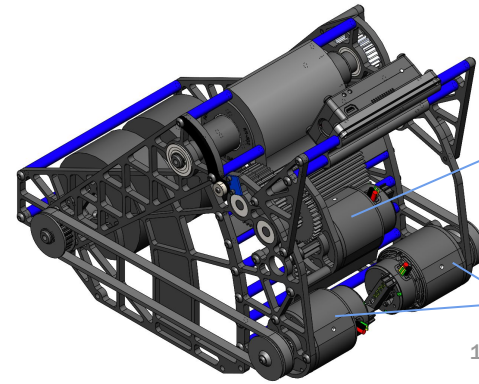


HOOD

3D PRINTED GEARS
45° TO 70° RELEASE ANGLE
HALL EFFECT SENSOR TO ZERO

UPPER FLYWHEEL

2x 2.5" 60A NEOPRENE ROLLER
BONDED TO 1.25" AL TUBE



HOOD POWER

1x FALCON 500
310.5:1 GEARED REDUCTION

FLYWHEEL POWER

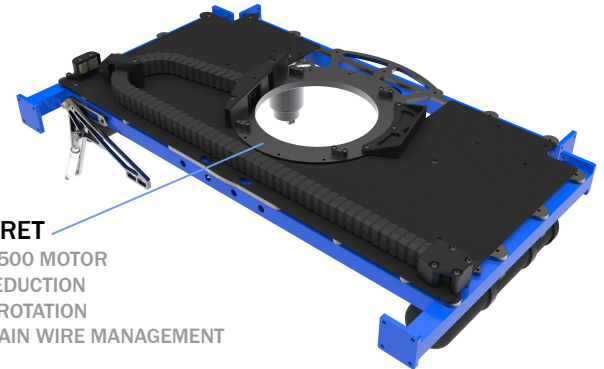
2x FALCON 500s
1:1 5MM HTD BELT REDUCTION

LOWER FLYWHEEL

2x 4" 60A NEOPRENE ROLLER
BONDED TO 1.25" AL TUBE

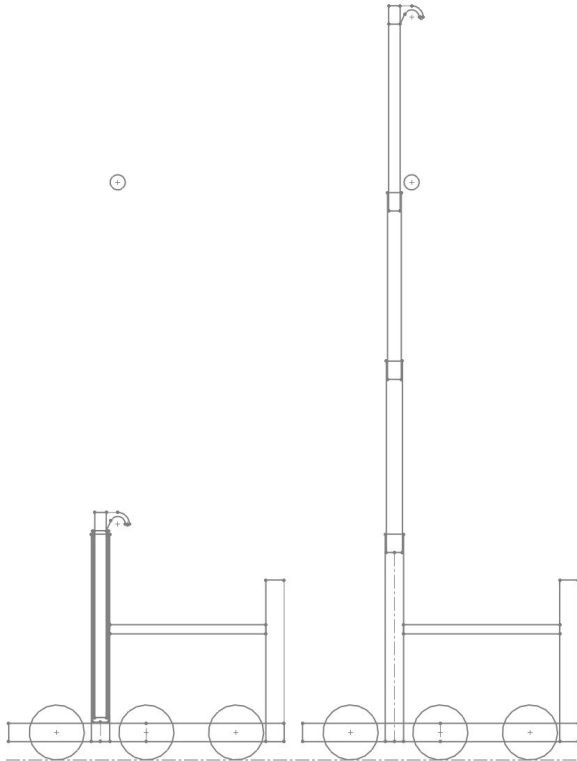
TURRET

1x FALCON 500 MOTOR
51.4:1 REDUCTION
360° OF ROTATION
BIDIRECTIONAL IGUS CHAIN WIRE MANAGEMENT



CLIMBER

RAISES ROBOT 40" AT END OF MATCH



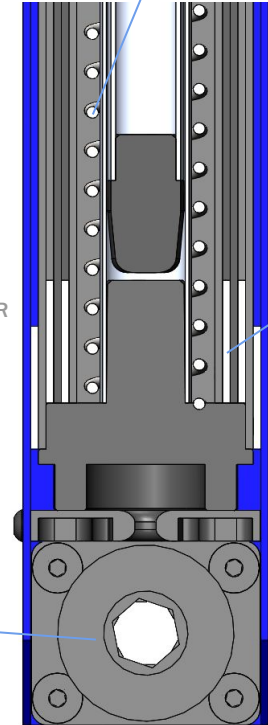
HOOKS
3/16" AL PLATE

TUBES
6061 ALUMINUM
2" x 2" x 0.0625"
1.5" x 1.5" x 0.0625"
1.75" x 1.75" x 0.0625"
1.25" x 1.25" x 0.0625"



STAGE 1 EXTENSION
3/4" BORE 18" STROKE CYLINDER

STAGE 2 & 3 EXTENSION
1" x 36" x 0.092" COMPRESSION SPRINGS

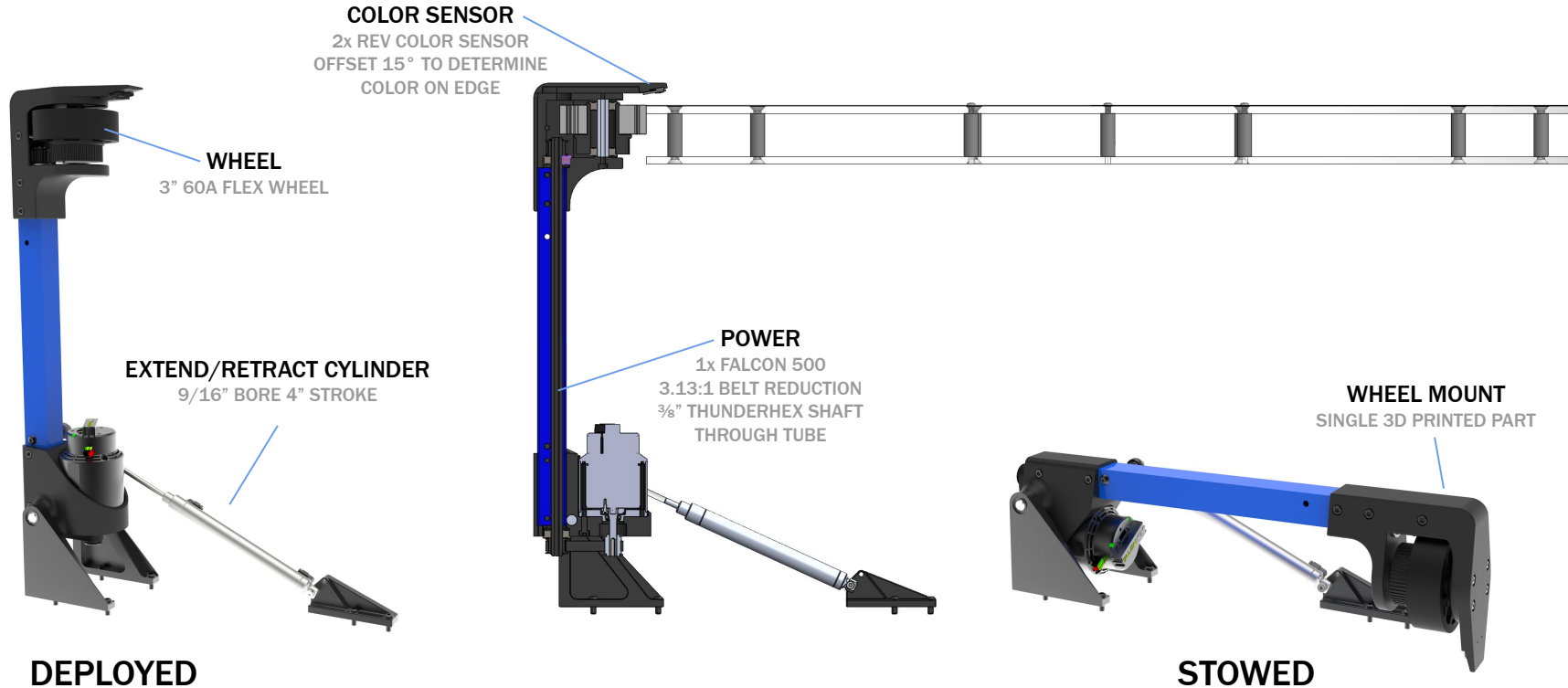


LOW FRICTION SLIDERS
3/16" PTFE

RETRACTION SPOOL
6061 ALUMINUM
0.6875" x 1.5"

WOF MECHANISM

AUTOMATICALLY SPINS CONTROL PANEL WITH COLOR SENSORS



AUTONOMOUS MODES



10 BALL AUTO

TRAJECTORY GENERATION WITH QUINTIC HERMITE SPLINES
RAMSETE NONLINEAR AUTONOMOUS FEEDBACK CONTROLLER

QUESTIONS?



SHOOTER

LIMELIGHT CAMERA
DUAL FLYWHEELS
ADJUSTABLE HOOD

WOF

"WHEEL OF FORTUNE"
SPINS CONTROL PANEL
COLOR SENSOR

CLIMBER

3-MOVING-STAGES
NESTED TUBES

TURRET

360° IN 1s

SERIALIZER AND FEEDER

HOLDS AND INDEXES 5 BALLS
RAPIDLY FEEDS 5 BALLS IN 2s

INTAKE

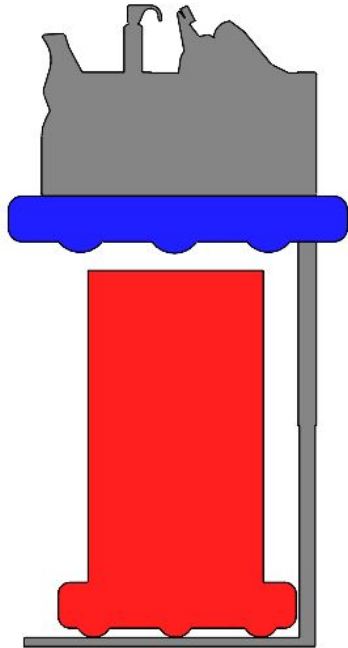
3-BALL-WIDE ROLLERS
4-BAR LINKAGE STOW/DEPLOY

DRIVEBASE

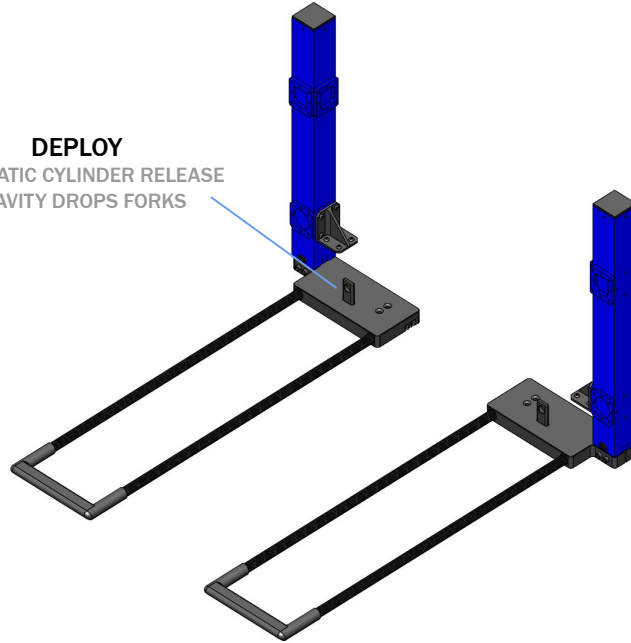
DRIVE GEARBOX
ELECTRONICS
PNEUMATICS

FORKS

LIFT PARTNER ROBOT AT END OF MATCH

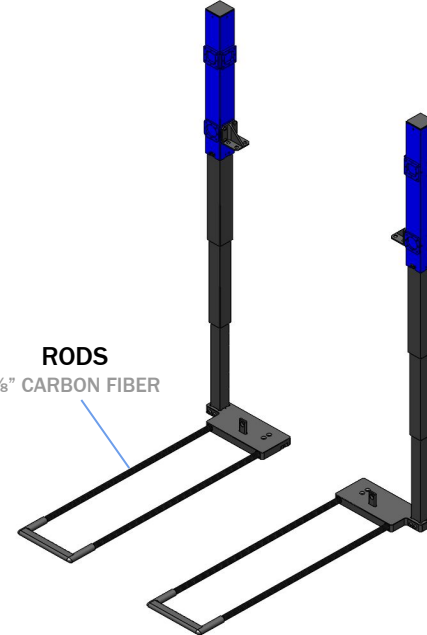


DEPLOY
PNEUMATIC CYLINDER RELEASE
GRAVITY DROPS FORKS



RETRACTED

RODS
5/8" CARBON FIBER

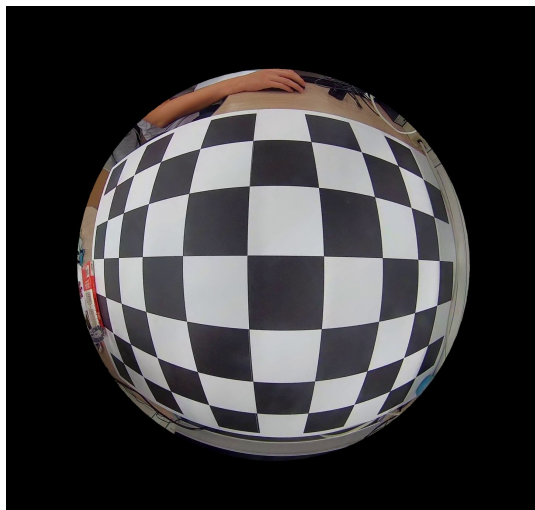


EXTENDED

TUBES

- 6061 ALUMINUM
- 2" x 2" x 0.0625"
- 1.5" x 1.5" x 0.0625"
- 1.75" x 1.75" x 0.0625"
- 1.25" x 1.25" x 0.0625"

COORDINATE UNDISTORTION



FISHEYE LENS
SEVERE DISTORTION



LIMELIGHT
STILL SOME DISTORTION

```
public double[][] loadCol000() { return new double[][]{{0.012,0.012},{0.012,0.016},{0.012,0.020},
public double[][] loadCol001() { return new double[][]{{0.015,0.012},{0.015,0.016},{0.015,0.020},
public double[][] loadCol002() { return new double[][]{{0.018,0.012},{0.018,0.016},{0.018,0.020},
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public double[][] loadCol015() { return new double[][]{{0.057,0.012},{0.057,0.016},{0.057,0.020},
public double[][] loadCol016() { return new double[][]{{0.060,0.012},{0.060,0.016},{0.060,0.020},
```

PRECOMPUTED COORDINATE
UNDISTORTION MAPS

