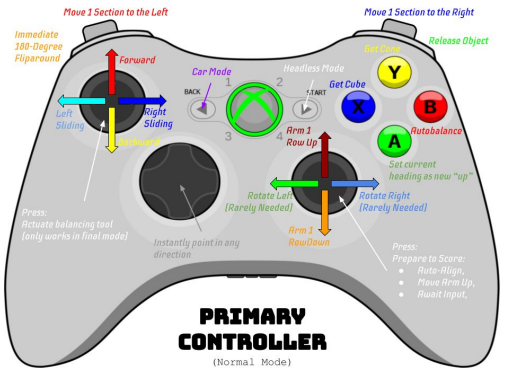
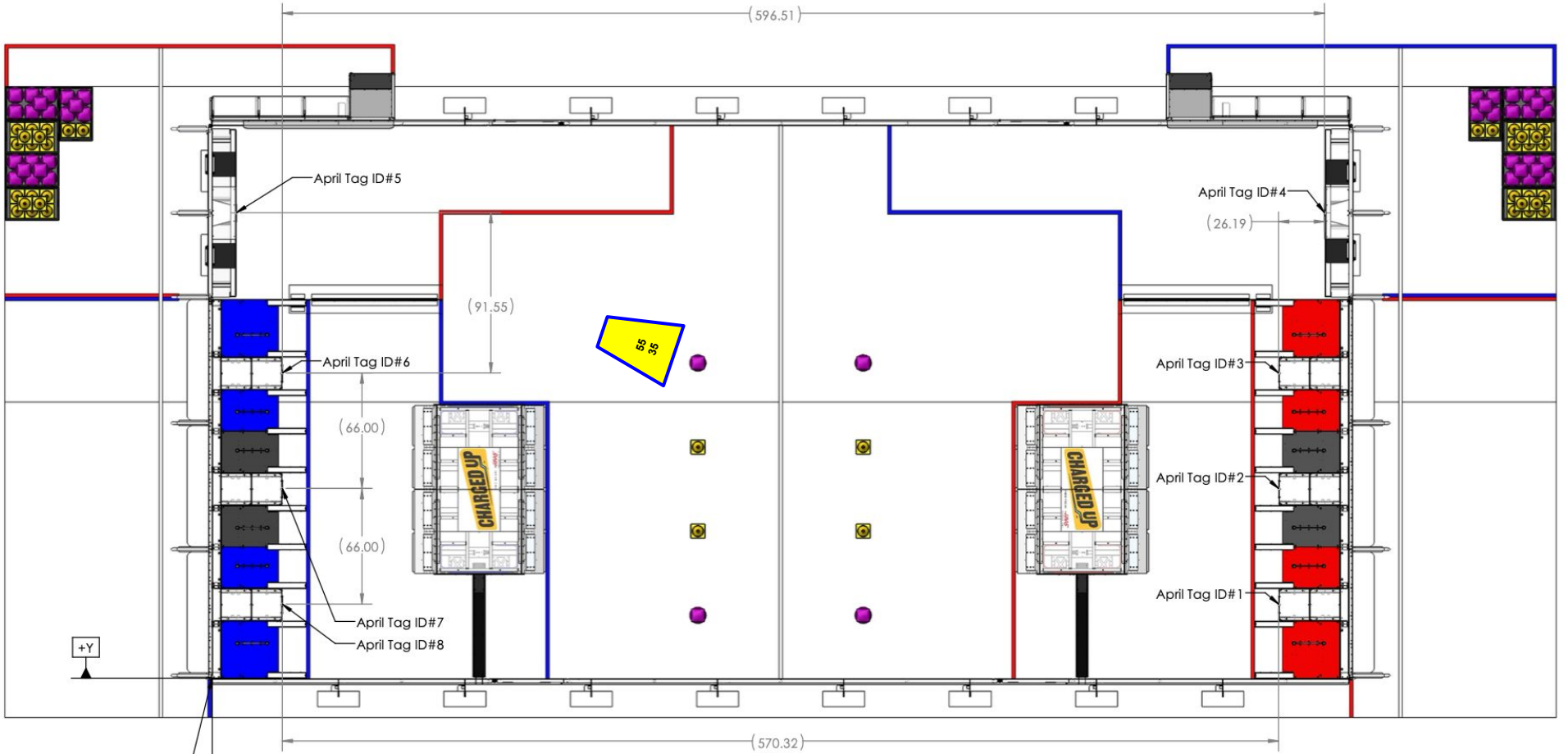
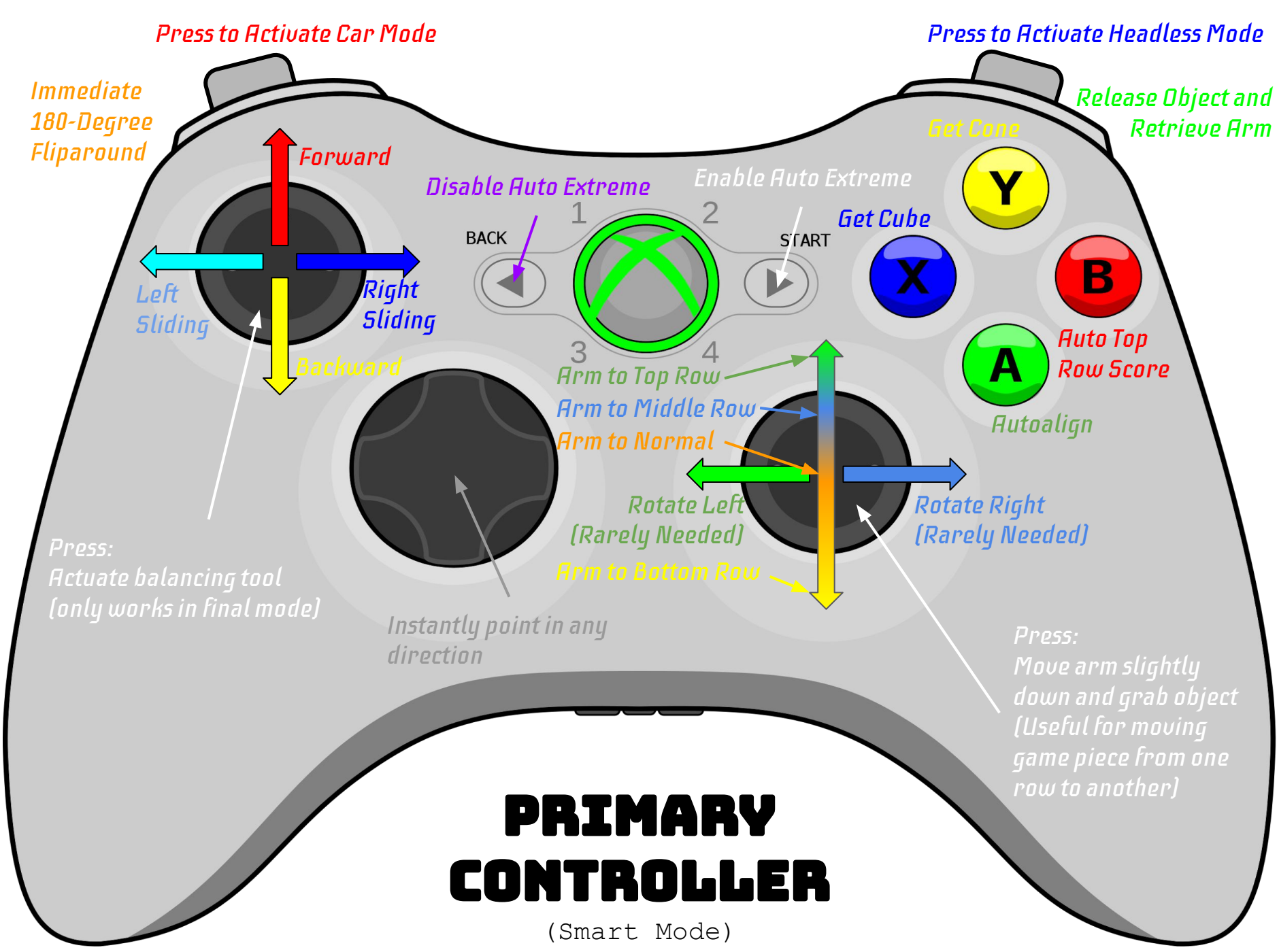


Robotics 2023 Programming Plan

Version 7

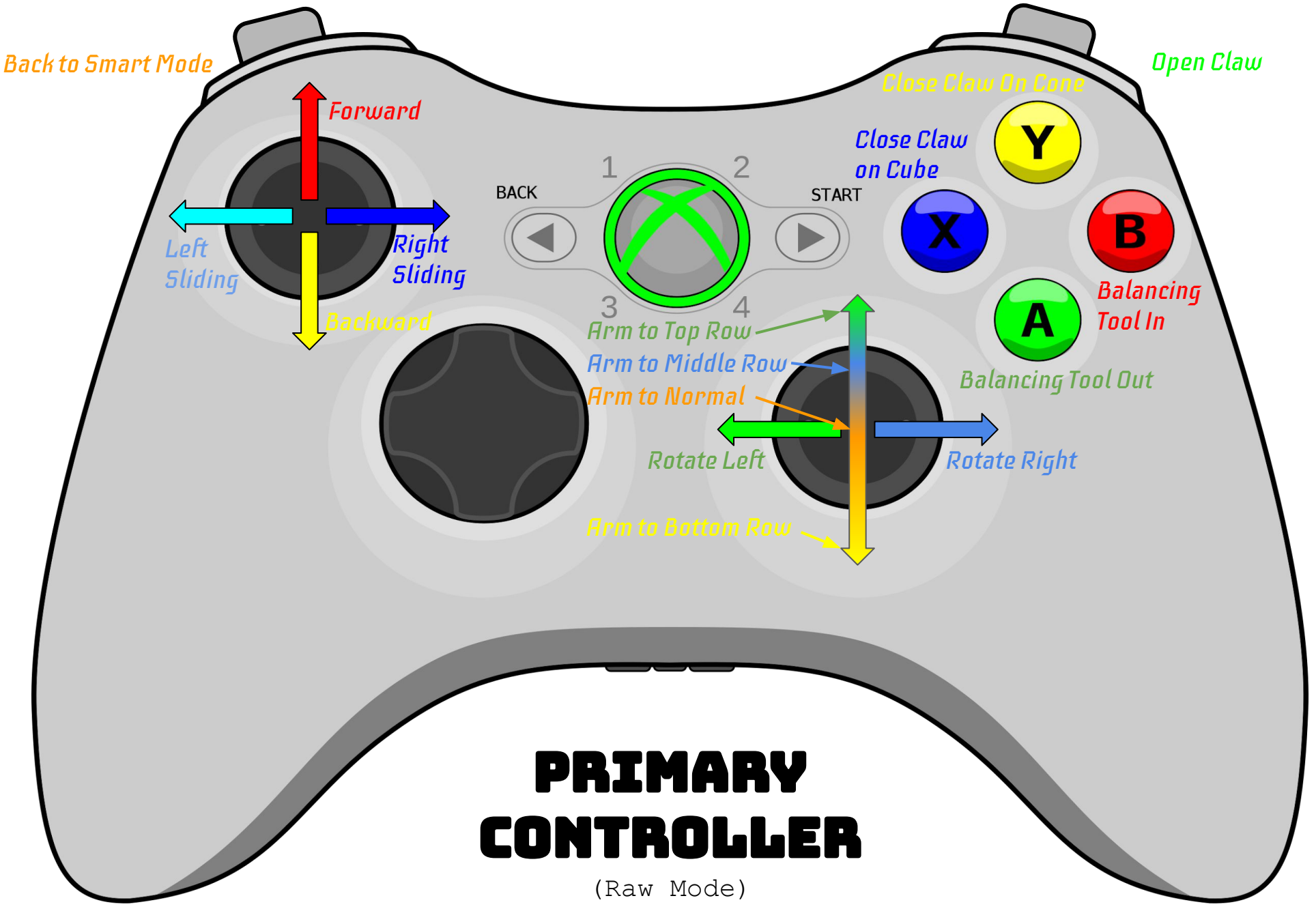
Scan QR code to view most recent version online or visit tinyurl.com/5535-2023-plan





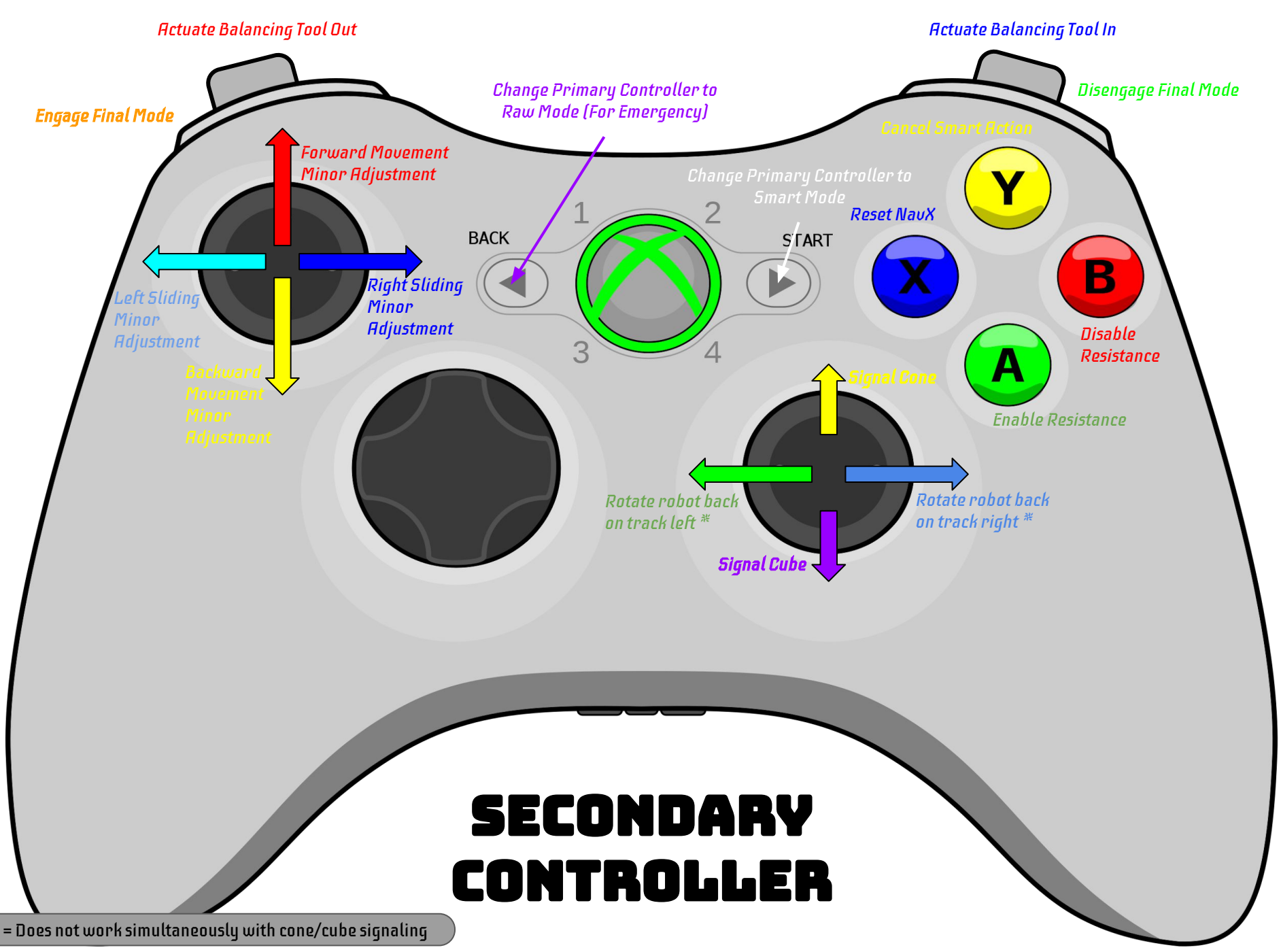
PRIMARY CONTROLLER

(Smart Mode)



PRIMARY CONTROLLER

(Raw Mode)


Actuate Balancing Tool Out
Actuate Balancing Tool In
Engage Final Mode
Change Primary Controller to Raw Mode (For Emergency)
Disengage Final Mode
Cancel Smart Action
Forward Movement Minor Adjustment
Change Primary Controller to Smart Mode
Reset NavX
BACK
START
1
2
3
4
Y
X
B
A
Left Sliding Minor Adjustment
Right Sliding Minor Adjustment
Disable Resistance
Backward Movement Minor Adjustment
Signal Cone
Enable Resistance
Rotate robot back on track left *
Rotate robot back on track right *
Signal Cube
SECONDARY CONTROLLER
* = Does not work simultaneously with cone/cube signaling

THINGS THAT COULD GO WRONG AND HOW TO SOLVE THEM

Problem	Solution
Wheel on robot is not pointed in the right direction.	The person with the secondary controller can also use the SmartDashboard on the computer. They will see values that say "A offset", "B offset", and so on. These values can be edited to adjust each of the wheels' angles on the robot. "A" is the front-left wheel, and the rest of the wheels continue clockwise around the robot from "A". Later on, replace the CANCoder and/or the rotation magnet that pairs with it, or you will see this issue again. Set the new CANCoder to absolute position with the Phoenix Tuner, restart the robot, find the new rotational offset for this wheel, and then enter it into the actual robot programming where Weswerve is added to robot.java.
Wheel on the robot is spinning in reverse.	Add 180 to the reversed wheel's offset value. See the solution above for more information on adjusting a wheel's offset value.
Robot is rotating left and right over and over again, getting more off angle each time.	The automatic rotational resistance is overworking itself. Turn off automatic rotational resistance by pressing B on the secondary controller.
Robot is spinning very fast in one direction.	The NavX came unplugged or stopped working. You will have to work without the NavX. Press B on the secondary controller to disable NavX-driven resistance, and press BACK on the primary controller to enter car mode.
Robot gets off course or points slowly in the wrong direction.	This is the most likely issue to occur. The NavX yaw value is slowly drifting. The person with the secondary controller should be primarily focused on this, and they should use the right stick on their controller to get the robot back on course.
Robot is skippy because battery is very low.	Drive the robot much slower. Do not accelerate or decelerate quickly. If this is not enough, try using raw mode by pressing BACK on the secondary controller. Use your remaining power to get to the charging station, and DO NOT try to move the robotic arm any higher than it already is. In this situation, if another robot plays defense against you as you are going to the charging station, play dead. Eventually, the robot will leave you alone. Be in no hurry when on low battery.

AUTONOMI SYSTEM

SELECTION 1: STARTING POINT

1. POINT Q
2. POINT W
3. POINT E
4. POINT I
5. POINT O
6. POINT P

SELECTION 2: WHAT TO GET FROM WHERE AND TO WHERE

Enter a string of text containing the following characters:

- v = Get cone
- o = Get cube
- O = Put on floor (Note: this is a zero, not a capital O.)
- 1 = Put on shelf 1
- 2 = Put on shelf 2
- a, s, d, f, = Where to search for object

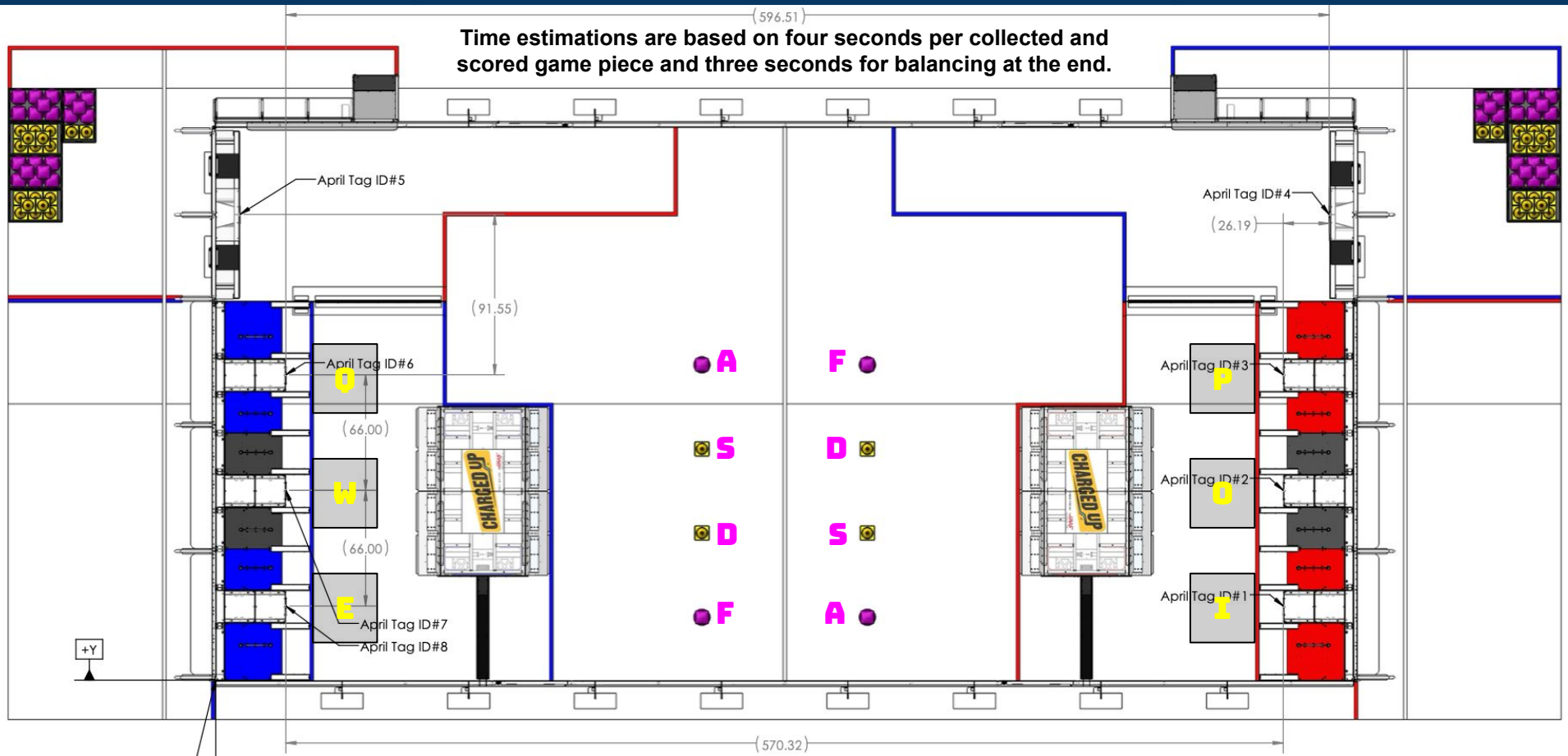
Example: "av2so2doO" = Cone from A to shelf 2, then cube from S to shelf 2, then cube from D to floor.

SELECTION 3: BALANCE AT END

0. NO
1. YES

Robot will interrupt its ordered execution if time is running out (12/15s) and this option is enabled. If this option is disabled, robot will continue to run commands from selection 2 until autonomous ends.

Time estimations are based on four seconds per collected and scored game piece and three seconds for balancing at the end.



EXAMPLE AUTONOMOUS 1 - ESTIMATED 8 SECONDS

SELECTION 1: STARTING POINT

1. POINT Q
2. POINT W
3. POINT E
4. POINT I
5. POINT O
6. POINT P

SELECTION 2: WHAT TO GET FROM WHERE AND TO WHERE

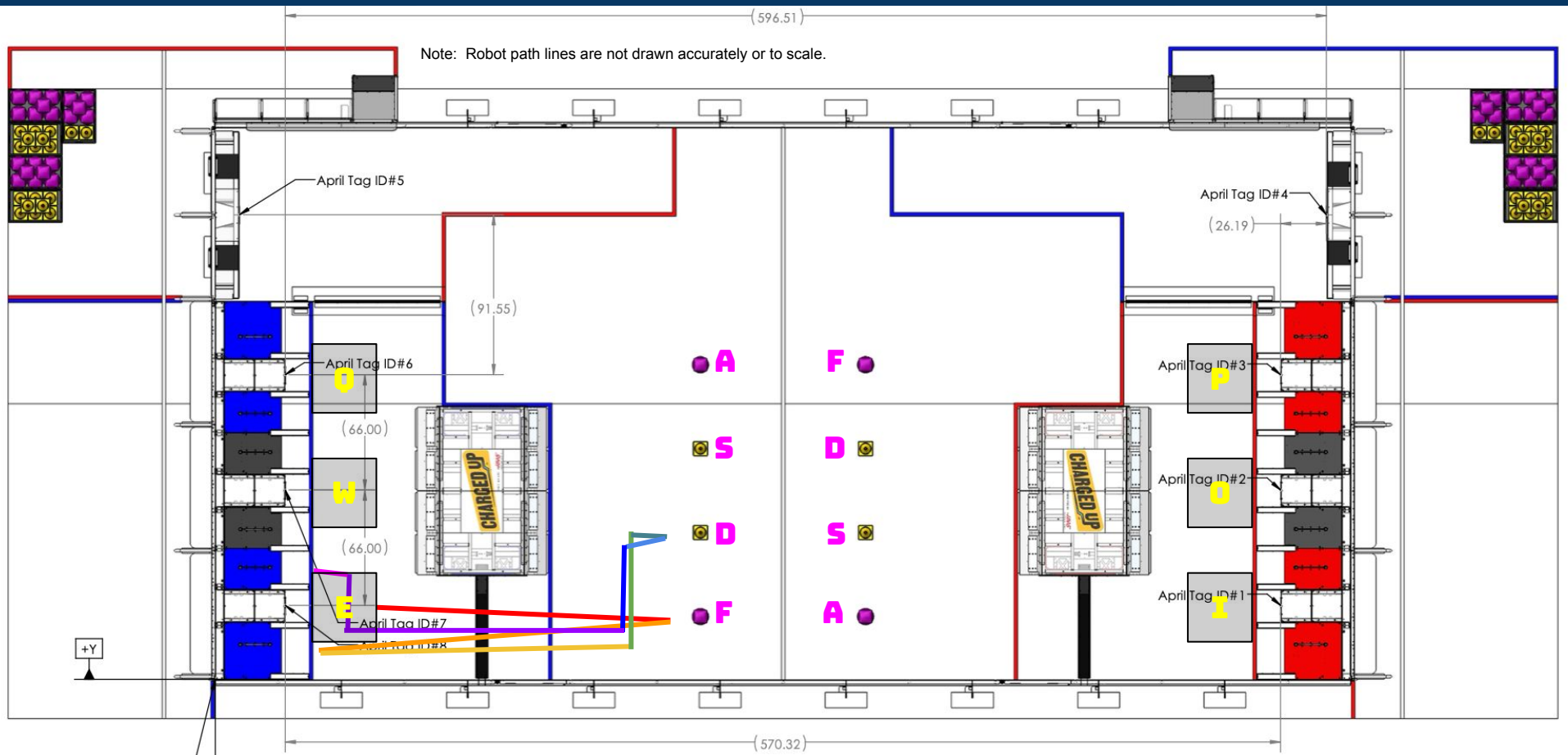
Enter string text containing the following icons:

- v = Get cone
- o = Get cube
- O = Put on floor
- 1 = Put on shelf 1
- 2 = Put on shelf 2
- a, s, d, f, = Where to search for object

fo2dv2

SELECTION 3: BALANCE AT END

0. NO
1. YES



EXAMPLE AUTONOMOUS 2 - ESTIMATED 7 SECONDS

SELECTION 1: STARTING POINT

1. POINT Q
2. POINT W
3. POINT E
4. POINT I
5. POINT O
6. POINT P

SELECTION 2: WHAT TO GET FROM WHERE AND TO WHERE

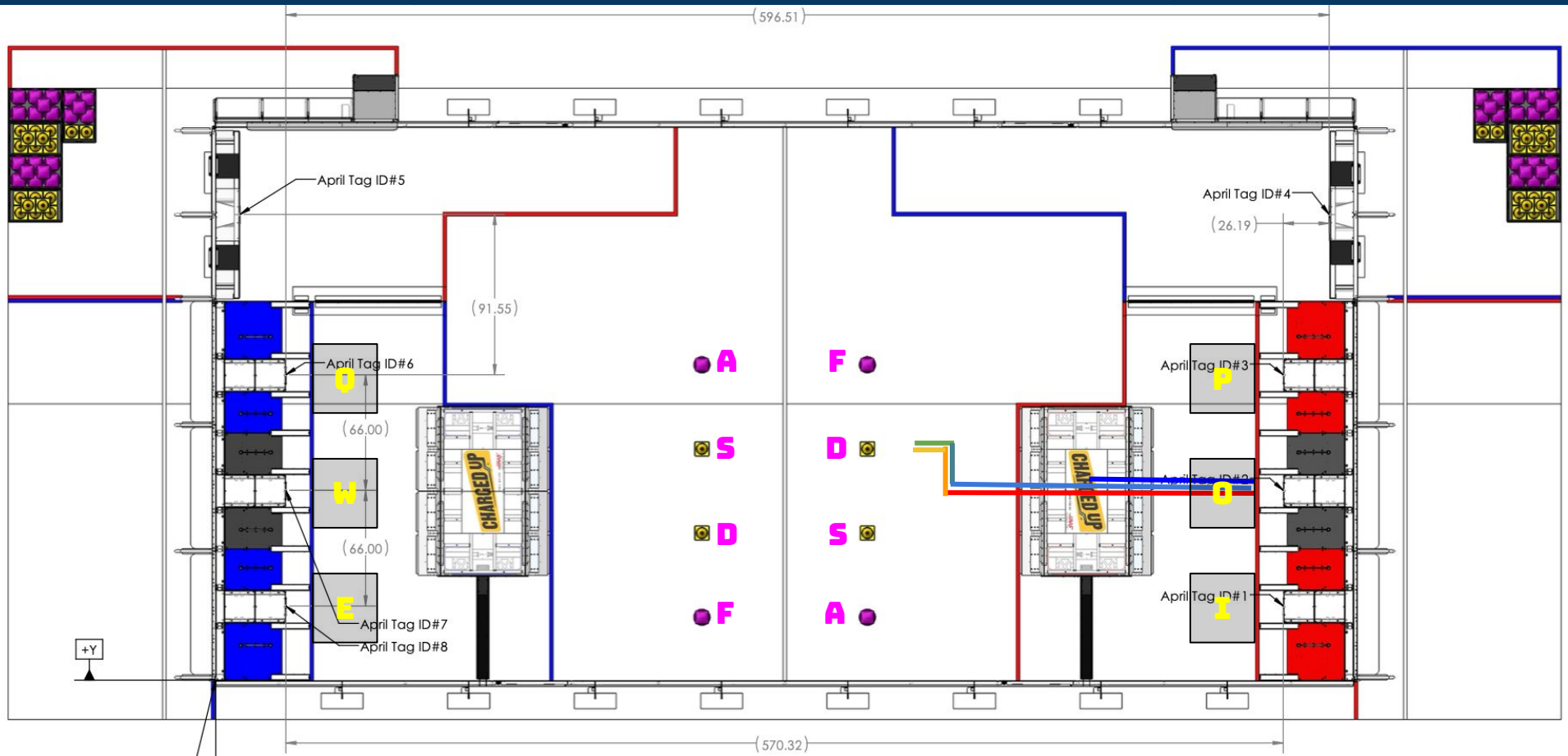
Enter string text containing the following icons:

- v = Get cone
- o = Get cube
- O = Put on floor
- 1 = Put on shelf 1
- 2 = Put on shelf 2
- a, s, d, f, = Where to search for object

dvO

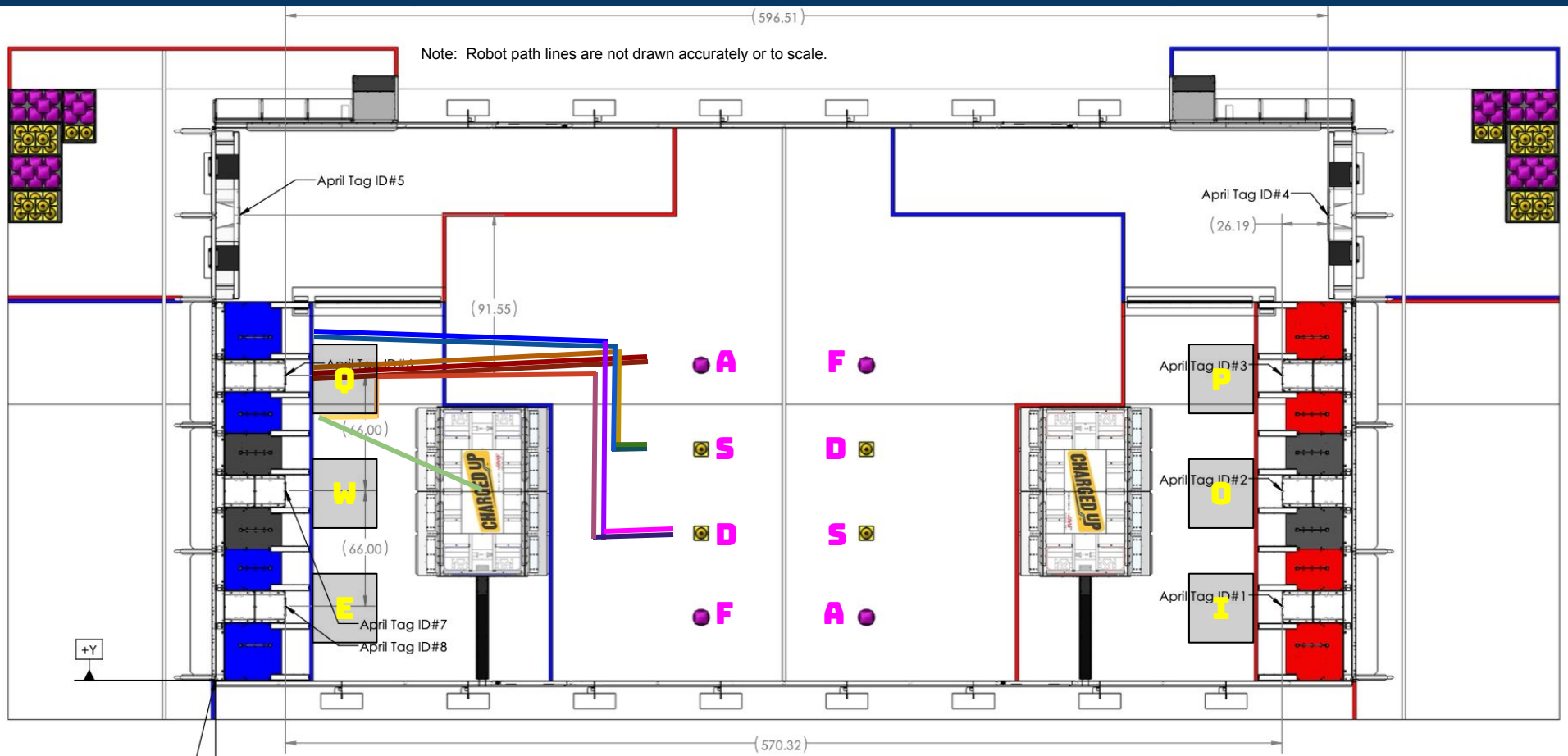
SELECTION 3: BALANCE AT END

0. NO
1. YES



EXAMPLE AUTONOMOUS 3 - BLUE PREFERENCE - ESTIMATED 15 SEC

SELECTION 1: STARTING POINT	SELECTION 2: WHAT TO GET FROM WHERE AND TO WHERE	SELECTION 3: BALANCE AT END
1. POINT Q 2. POINT W 3. POINT E 4. POINT I 5. POINT O 6. POINT P	Enter string text containing the following icons: • v = Get cone • o = Get cube • O = Put on floor • 1 = Put on shelf 1 • 2 = Put on shelf 2 • a, s, d, f, = Where to search for object av2sv2do2	0. NO 1. YES



EXAMPLE AUTONOMOUS 4 - RED PREFERENCE - ESTIMATED 15 SEC

SELECTION 1: STARTING POINT

1. POINT Q
2. POINT W
3. POINT E
4. POINT I
5. POINT O
6. POINT P

SELECTION 2: WHAT TO GET FROM WHERE AND TO WHERE

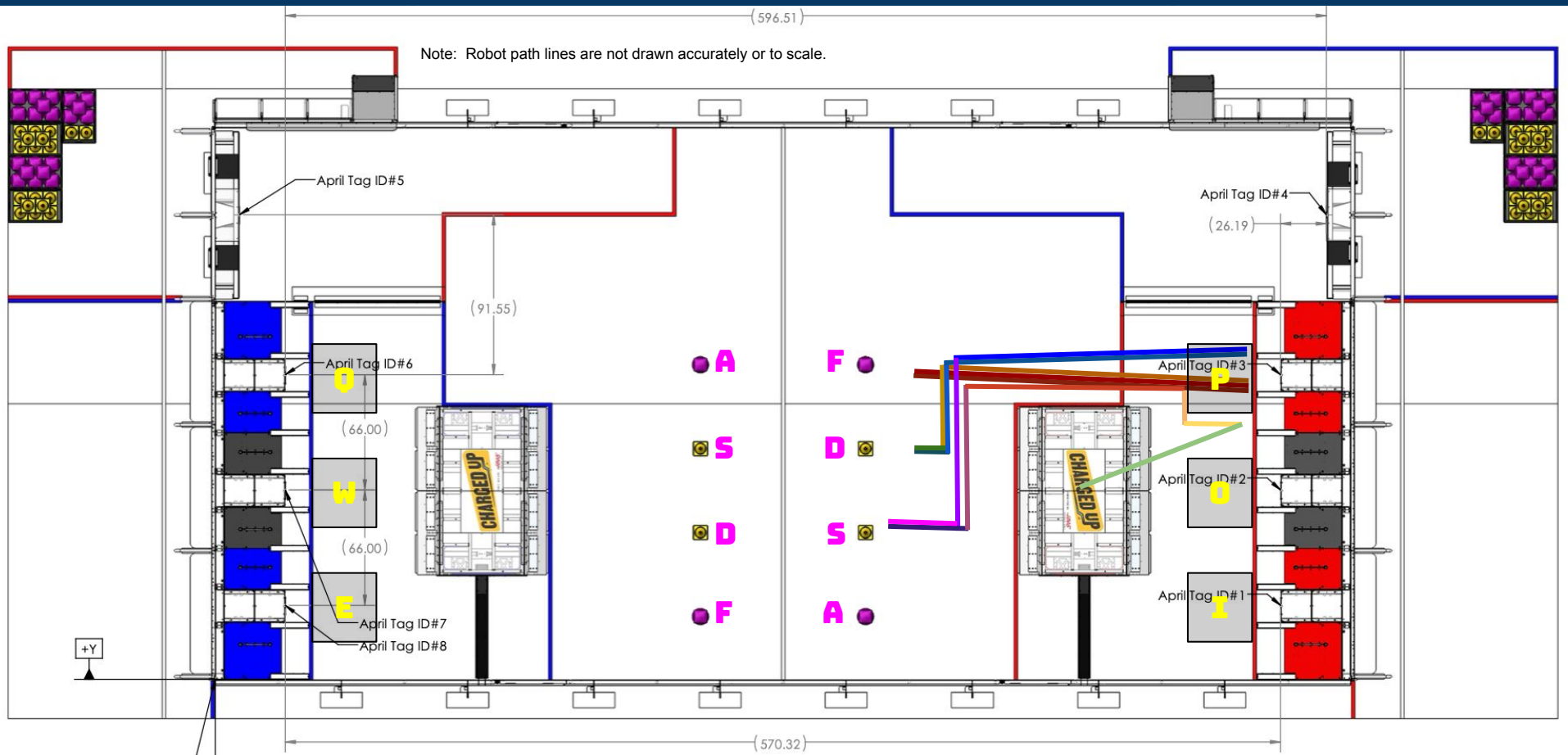
Enter string text containing the following icons:

- v = Get cone
- o = Get cube
- O = Put on floor
- 1 = Put on shelf 1
- 2 = Put on shelf 2
- a, s, d, f, = Where to search for object

fv2dv2so2

SELECTION 3: BALANCE AT END

0. NO
1. YES



GENERAL STRATEGY

Award	Awarded for...	AUTO	TELEOP
MOBILITY	each ROBOT whose BUMPERS have completely left its COMMUNITY at any point during AUTO	3	
GAME PIECES	scored on a bottom ROW	3	2
	scored on a middle ROW	4	3
	scored on a top ROW	6	5
LINK	3 adjacent NODES in a ROW contain scored GAME PIECES.		5
DOCKED and not ENGAGED	Each ROBOT (1 ROBOT max in AUTO)	8	6
DOCKED and ENGAGED	Each ROBOT (1 ROBOT max in AUTO)	12	10
PARK	Each ROBOT whose BUMPERS are completely contained within its COMMUNITY but does not meet the criteria for DOCKED.		2

ROBOT SETUP

Because the robot needs to know some things about its position when it is first turned on, the robot has been programmed to think that it is starting with the following criteria met:

- Robot is facing the grid and pressed against it.
- Robot is perfectly horizontally aligned with a cube node.
- Robot is starting in the position specified by the first autonomous selection [see slide 6].
- Robot arm is down in starting config, with alpha at 0 degrees and beta at 37.
- Robot is squeezing cube tightly.

TELEOP

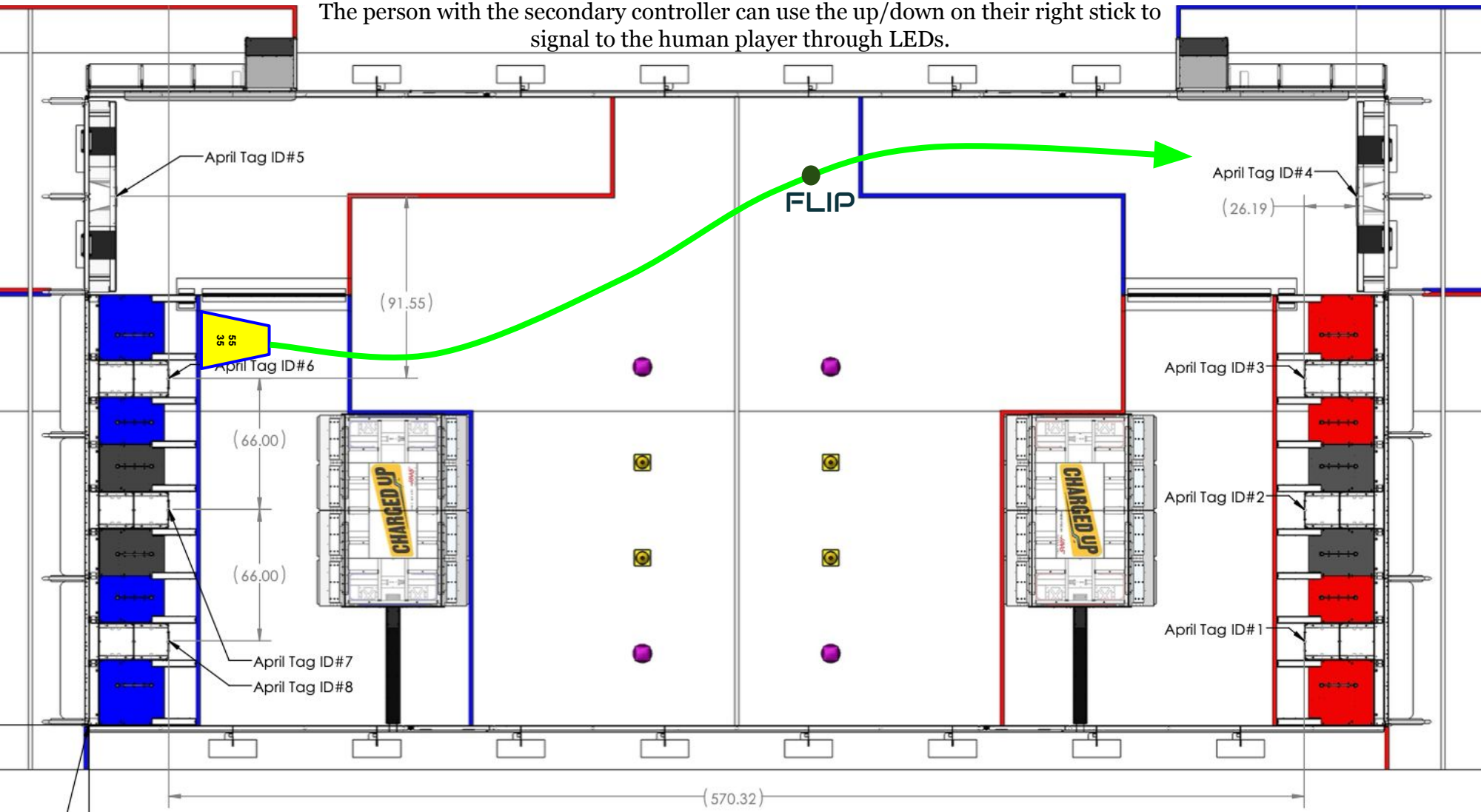
You shouldn't have to worry much about driving because the robot does most of it for you. Simply drive the robot to the nearest game piece, press a button, drive to the grid, and press another button. It's that simple until endgame or until something goes wrong and the secondary controller has to change something.

AUTONOMOUS

Our robot's autonomi will be much better than most teams' autonomi. Because of this, it will be best for our alliance if we can do as much as possible during this time. When discussing the plan with other teams, make sure that other robots will not be in our robot's path. Additionally, make sure that we don't start at point W or point O if we are not balancing at the end – Our robot will use the charging station as a pathway when starting at these points.

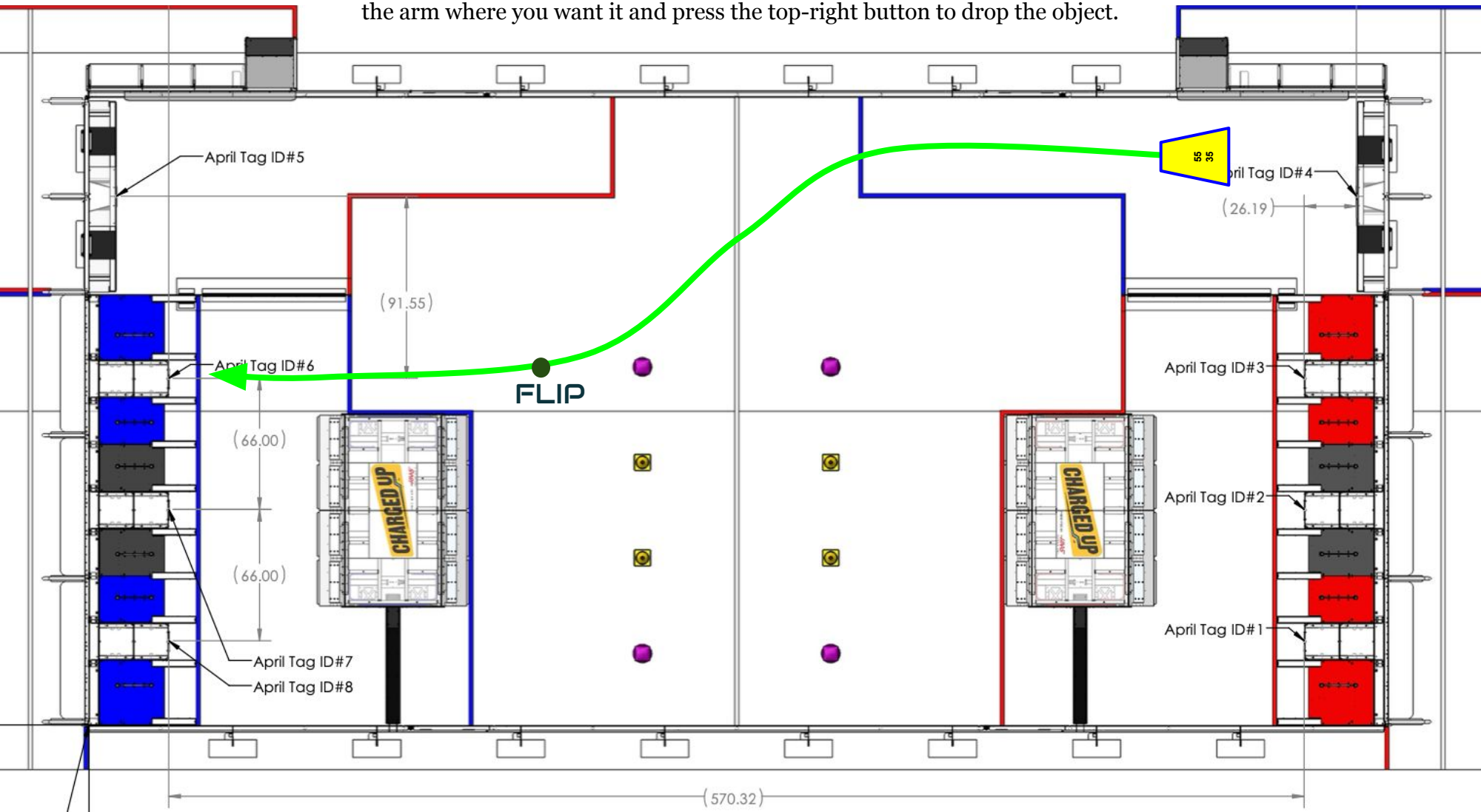
General Strategy - Specific Intention of Driving Functions and Smart-Features - Part 1

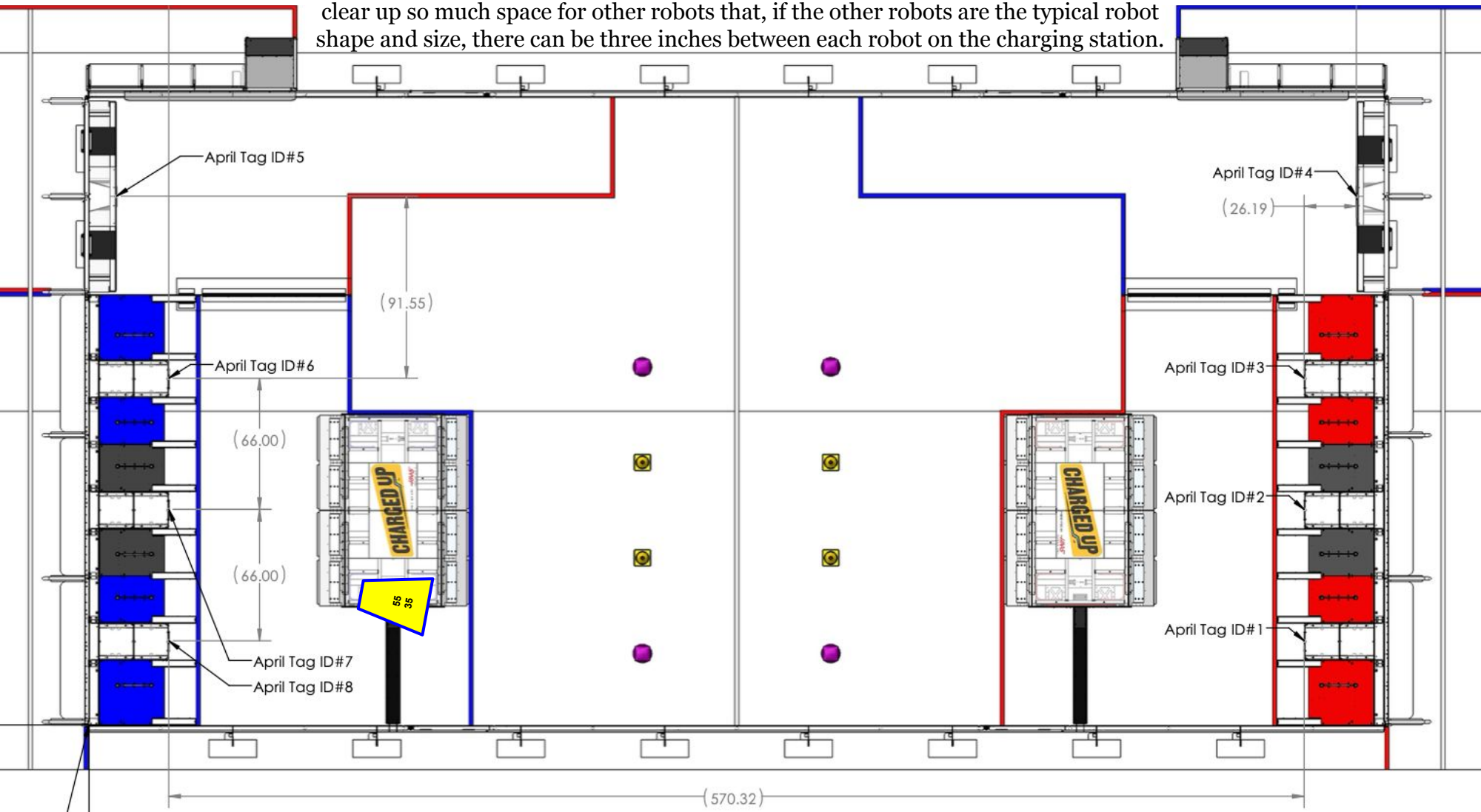
At full speed, charge to the nearest game piece on the field or, if needed, the loading zone. Around the point labeled “FLIP” on the map below, press the top left button to immediately turn the robot 180 degrees while driving. “FLIP” is so far down the line because you will want to travel shortest-side first when bolting across the field. If AUTO EXTREME is enabled, the robot will automatically signal to the human player which game piece is needed and it will collect the game piece when it sees it. Otherwise, you will have to press X to get a cube in sight or Y to get a cone. The person with the secondary controller can use the up/down on their right stick to signal to the human player through LEDs.



General Strategy - Specific Intention of Driving Functions and Smart-Features - Part 2

After collecting an object, drive at full speed to the grid. Again, you will want to press the top-left button at the "FLIP" point to turn the robot around 180 degrees while driving. If AUTO EXTREME is enabled, your robot will automatically align with the grid that you stop in front of, score the collected game piece in the top row, back up about 1 foot from the grid, turn around 180 degrees, and be ready to drive again. If AUTO EXTREME is not enabled, you can press B to immediately score in the top row or you can press A to auto-align and then use the right stick to move the arm where you want it and press the top-right button to drop the object.



General Strategy - Specific Intention of Driving Functions and Smart-Features - Part 3

When time is running out and you are about to get on the charging station, the person with the secondary controller should press their top-left button to engage final mode. Final mode will slow down the robot so you can have more driving accuracy. It will also disable scoring and enable the release of the balancing peg. Finally, drive onto one edge of the charging station, release the balancing peg, wait for the "Peg" box in the SmartDashboard to turn green, rotate so that one wheel hangs over the edge, and drive almost over the edge of the charging station. This will clear up so much space for other robots that, if the other robots are the typical robot shape and size, there can be three inches between each robot on the charging station.