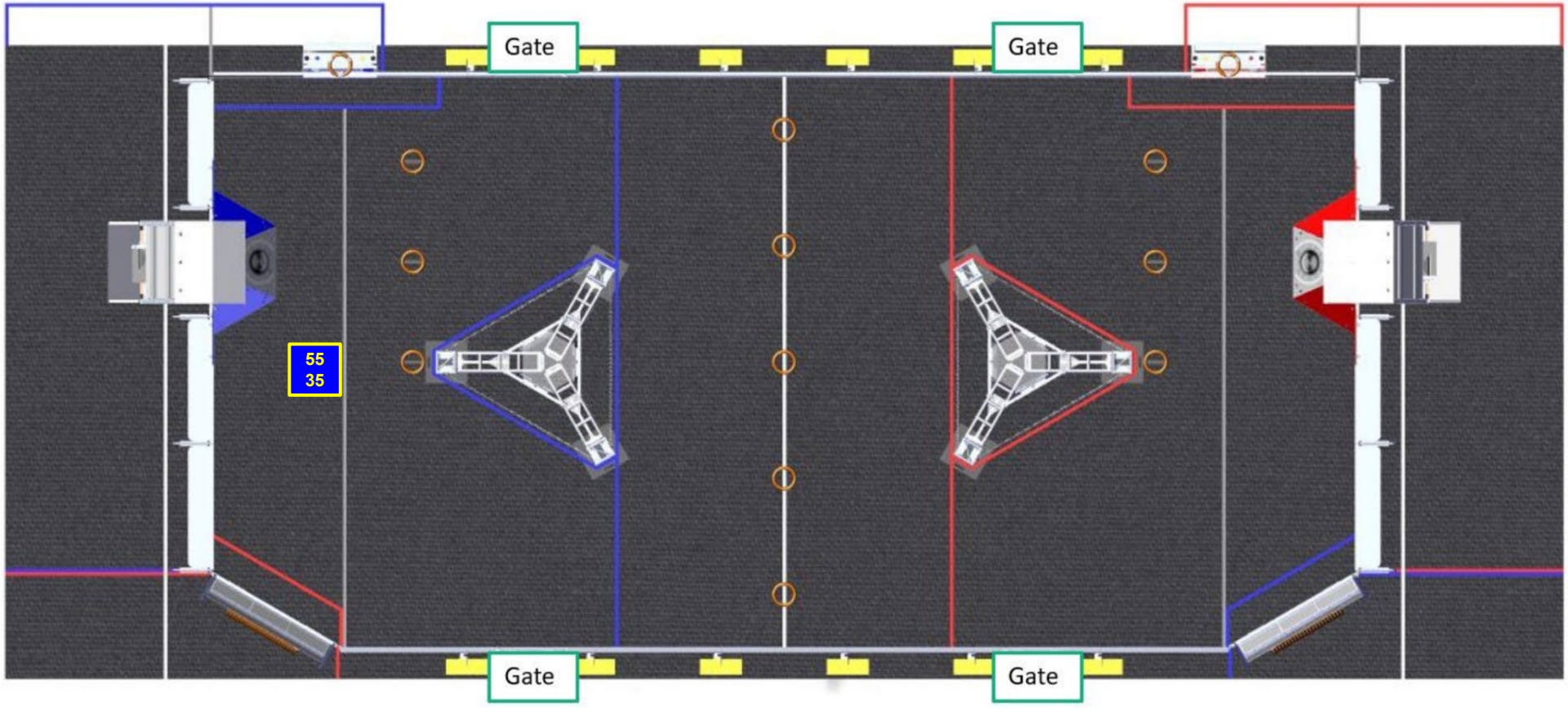
ROBOTICS 2024 CRESCENDO COMPETITION PROGRAMMING PLAN
TEAM 5535



General Strategy

To Get Melody RP without Dependence on Teammates, Autonomous, Cooperetition, or Endgame Time:

6.8 Seconds per Note in Speaker

Realistic Average Time Estimate per Note:

5 Seconds per Note

(23 Notes Total)

General Tip:

Keep Robot Pointed Towards You Until Endgame Climb Time

General Tip:

Drive with Full Confidence; Reluctance may ruin us.

General Tip:

Avoid Traveling to the Loading Zone to Get Notes

Job of Driver:

Run Over Note; Drive By Speaker; Repeat.

Job of Co-Driver:

Watch.

(And be ready for raw mode if something goes horribly wrong)

Endgame Job of Driver and Co-Driver:

Go to Chain with Other Robot; Move Right Stick Up; Drive Over Chain; Move Right Stick Down

About the Amp:

It is worth using when there are plenty of notes in our alliance wing ready to pick up and score; otherwise it is not worth the time.

Human Player:

Please Always Hit the Cooperetition Button When at the Amp

(It's polite to the other alliance *and* it will increase our chance of getting the Cooperetition Award.)

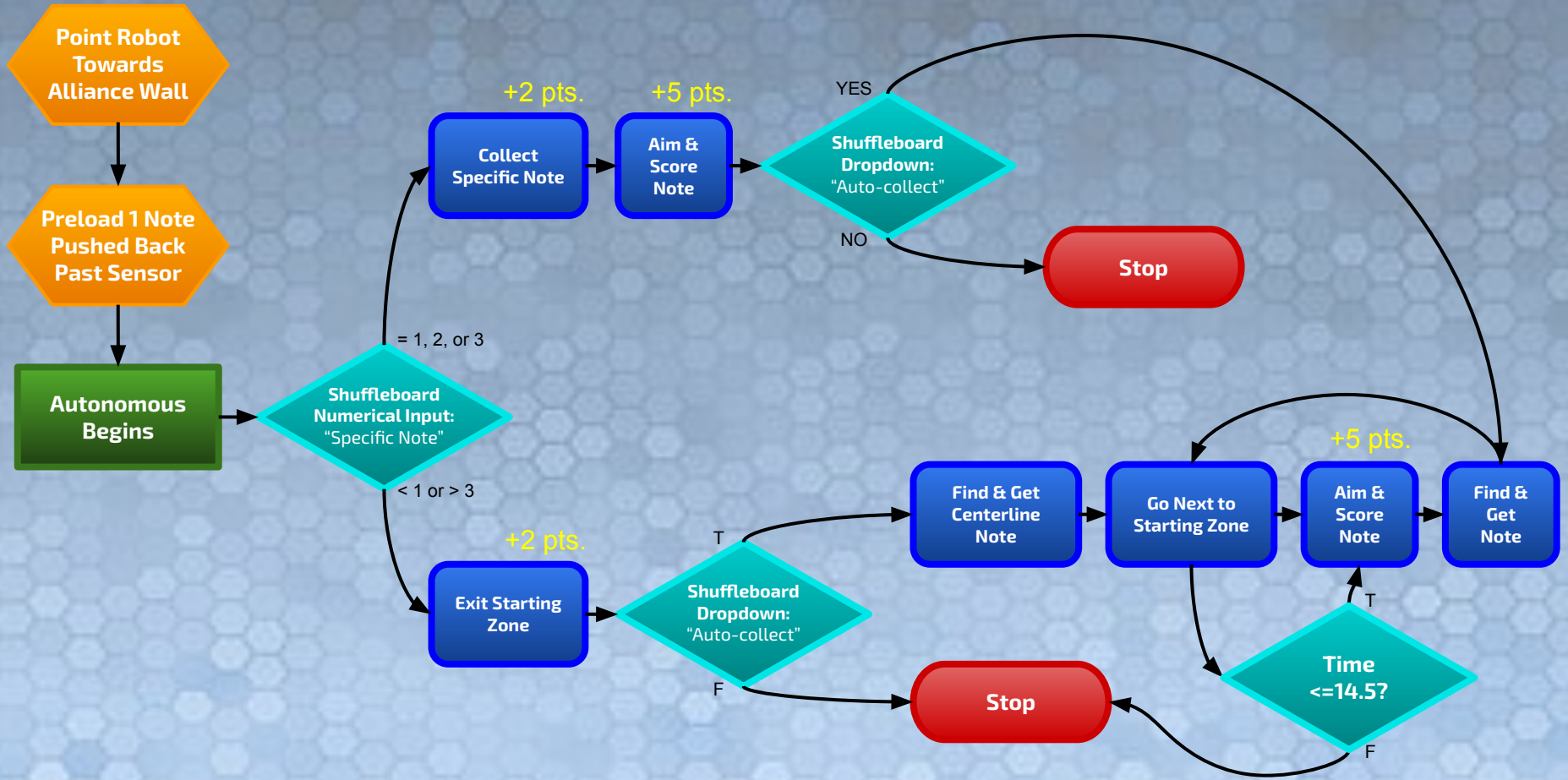
Points Chart

		MATCH points		Ranking Points	*Coopertition* Points
		AUTO	TELEOP		
LEAVE		2			
NOTES	AMP NOTE	2	1		
	SPEAKER NOTE (not AMPLIFIED)	5	2		
	SPEAKER NOTE (AMPLIFIED)		5		
STAGE	PARK		1		
	ONSTAGE (not SPOTLIT)		3		
	ONSTAGE (SPOTLIT)		4		
	HARMONY		2		
	NOTE in TRAP (max. 1/TRAP)		5		
***Coopertition* Bonus**					1
MELODY	At least 18 (15 if *Coopertition* Bonus) AMP & SPEAKER NOTES*			1	
ENSEMBLE	At least 10 STAGE points and at least 2 ONSTAGE ROBOTS*			1	
Tie	completing a MATCH with the same number of MATCH points as your opponent			1	
Win	completing a MATCH with more MATCH points than your opponent			2	

Autonomous Plan Summary

Robot can be placed in any position within the starting zone. While the robot is disabled, it will compute its orientation by using the nearest AprilTag in view. A note should be preloaded into the launcher, pushed back slightly past the sensor. When the match starts, the robot will "swallow" the note (put it into launch position), aim at the speaker and then launch the note. If Shuffleboard says to not grab any specific notes, the robot will simply exit the starting zone; otherwise, if it is configured to get note 1, 2, or 3 it will get the selected note and promptly score it. After either that or simply exiting the starting zone, if Shuffleboard says to go get more notes, it will drive around the alliance's half of the field collecting and scoring any remaining notes, including positioned notes that were missed, notes that missed the speaker, and notes on the centerline. The robot will not launch a note during the last half second of autonomous. When teleop begins, the robot will automatically enable "teleauto", resuming it's previous task at full speed until the driver tries to drive or cancels teleauto with "X" on the primary controller.

Autonomous Plan Diagram



Controllers 1 & 2

Default Controls

Definitions:

- ➔ **Point in Direction** Points in the selected direction, up being towards the local alliance
- ➔ **Launch Sequence** Searches for april tags and aims at alliance speaker while rotating to point robot towards it and firing up the thrusters. When at least 1.1 seconds have passed, launches note when close enough to be sure of hit.
- ➔ **Start Intake** Will most likely not have to be used as the robot will automatically run the intake when necessary, but can be used to manually run the intake system until canceled with “B” or detection of received note. Will put launcher into intake position.
- ➔ **Score In Amp** Move launcher down and then fire as if pressed against amp.
- ➔ **Teleauto** Super-smart super-fast auto mode; see slide 4. Robot LEDs will light up orange when in teleauto or autonomous.

Controllers 1 & 2

Raw Mode

Definitions:

- ➔ **Raw Launch Sequence** Locks position, fires up thrusters, and launches note
- ➔ **Start Intake** Runs the intake system until canceled with “B” or detection of received note. Will put launcher into intake position. If note already detected, assumes sensor error and runs intake until “B” pressed.
- ➔ **Score In Amp** Tilt launcher down and immediately fire note into amp as if pressed against it
- ➔ **Go to Closeup Launch Position** Puts the launcher to the angle at which it should fire should it be directly pressed up against the subwoofer.

Smart Mode Intelligence Systems to Be Aware Of

Automatic Pickup

When you run over a note, the robot will automatically pick it up and load it into the launcher. When the robot knows that you are still holding a note that you have not yet launched, it will not automatically pick up the notes it detects.

Automatic Launch Prep

After the robot has successfully collected a note, it will pull it back a bit and fire up the thrusters. When it is in this process and it sees the center AprilTag on the alliance speaker, it will aim and rotate to face toward the speaker without changing the location that you have it at. It will continue to aim and rotate as you drive until a launch occurs. To cancel launch preparation, simply press “B”.

Automatic LAUNCH

If the robot, while holding a note and preparing its launch, detects that it is close enough to the speaker to make it in for sure, it will automatically launch. If you want to launch from further away, simply press the “Launch Sequence” button to fire the note. This automatic functionality can be very useful for quickly scoring while zooming by the speaker.

Robot LED Color Meanings

What it means when the robot's LED strip is lighting up a certain color

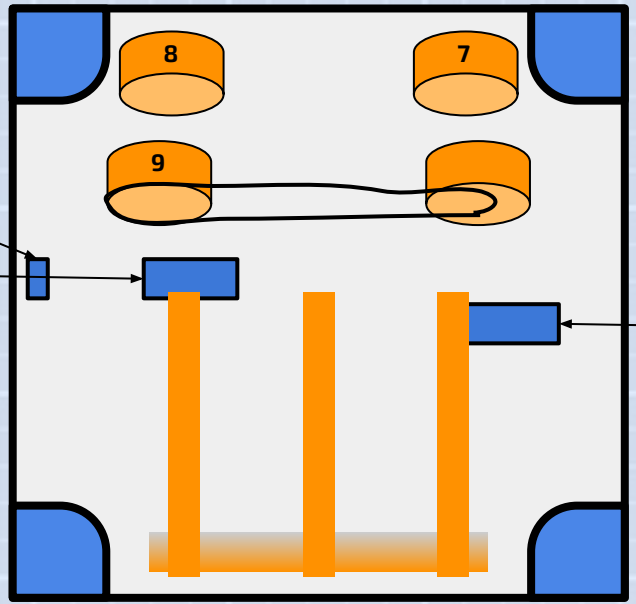
LED Color	Meaning
Orange	*Robot is in **autonomous** mode or running teleauto*
Green	*Robot is disabled and **safe***
Blue	*Robot is in teleop mode while on the **blue alliance***
Red	*Robot is in teleop mode while on the **red alliance***
Turquoise	*Robot is in **final 20 seconds** of match and wants to climb*
Yellow	*Robot is **intaking** a note*
Magenta	*Robot is **E-Stopped** or **A-Stopped***
White	*Robot is in **test mode***

Robot CAN IDs

CAN Coder: 10
Steering: 14
Drive: 20

Front (Launch Side)

CAN Coder: 11
Steering: 15
Drive: 21



CAN Coder for Launch Aim: 25
Motor for Launch Aim: 24

Intake Motor: 5

Robot LED Strip: 30

CAN Coder: 13
Steering: 17
Drive: 23

Back (Intake Side)

CAN Coder: 12
Steering: 16
Drive: 22

Limelight Pipelines

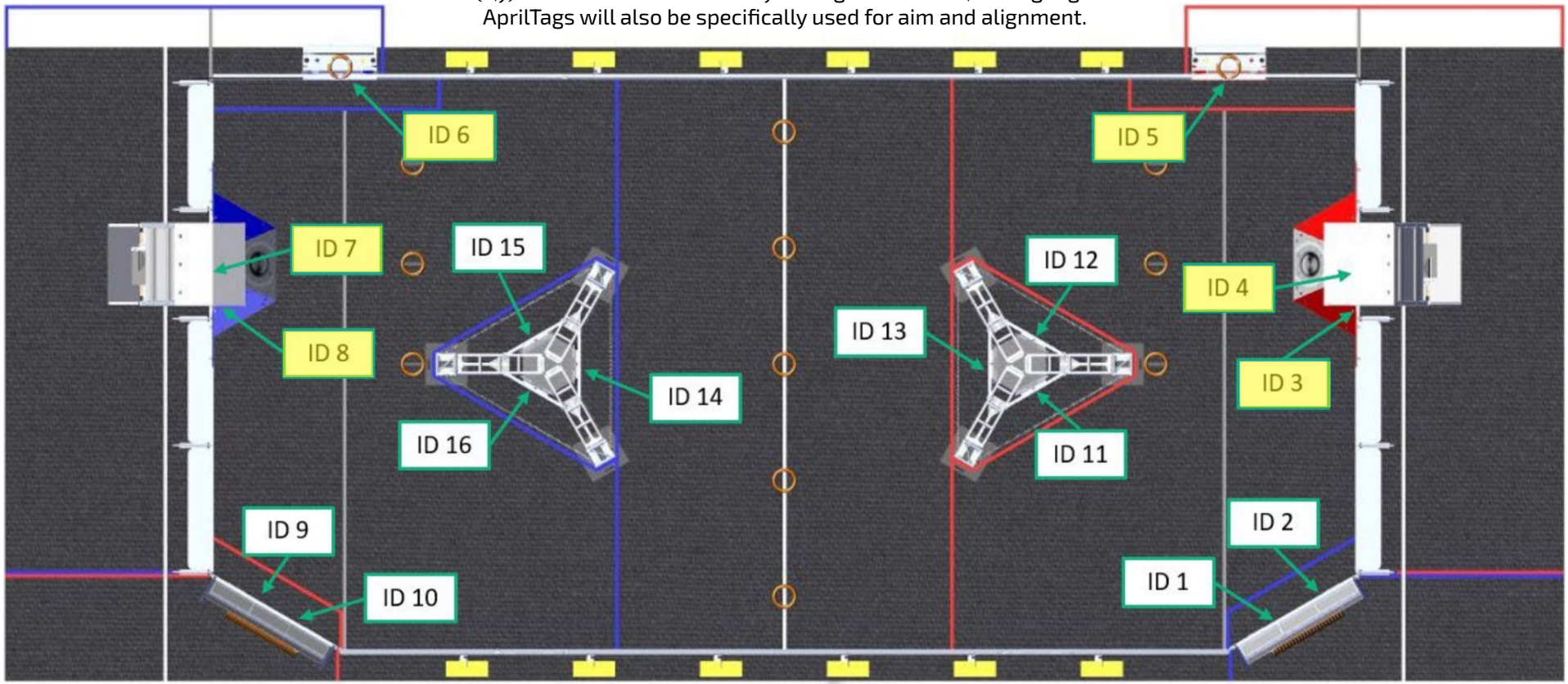
LIMELIGHT

#	Name	Purpose
0	View	For livestreaming the robot's view to the driver; optimal viewing settings
1	General AprilTag	Detects closest AprilTag and returns the ID; to help with location detection
2	Note Detector	Detects the orange notes for autonomous collection purposes
3	Blue Speaker	Detects point to aim at in blue speaker based on AprilTag 7
4	Red Speaker	Detects point to aim at in red speaker based on AprilTag 4
5	Blue Speaker Side	Detects AprilTag on left side of blue speaker (ID 8) for more accurate calculation of robot position relative to speaker
6	Red Speaker Side	Detect AprilTag on right side of red speaker (ID 3) for more accurate calculation of robot position relative to speaker
7	Blue Amp	Detects AprilTag 6 (above blue amp)
8	Red Amp	Detects AprilTag 5 (above red amp)
9	Lighted View	For livestreaming the robot's view to the driver with the limelight headlights on

AprilTag Locations

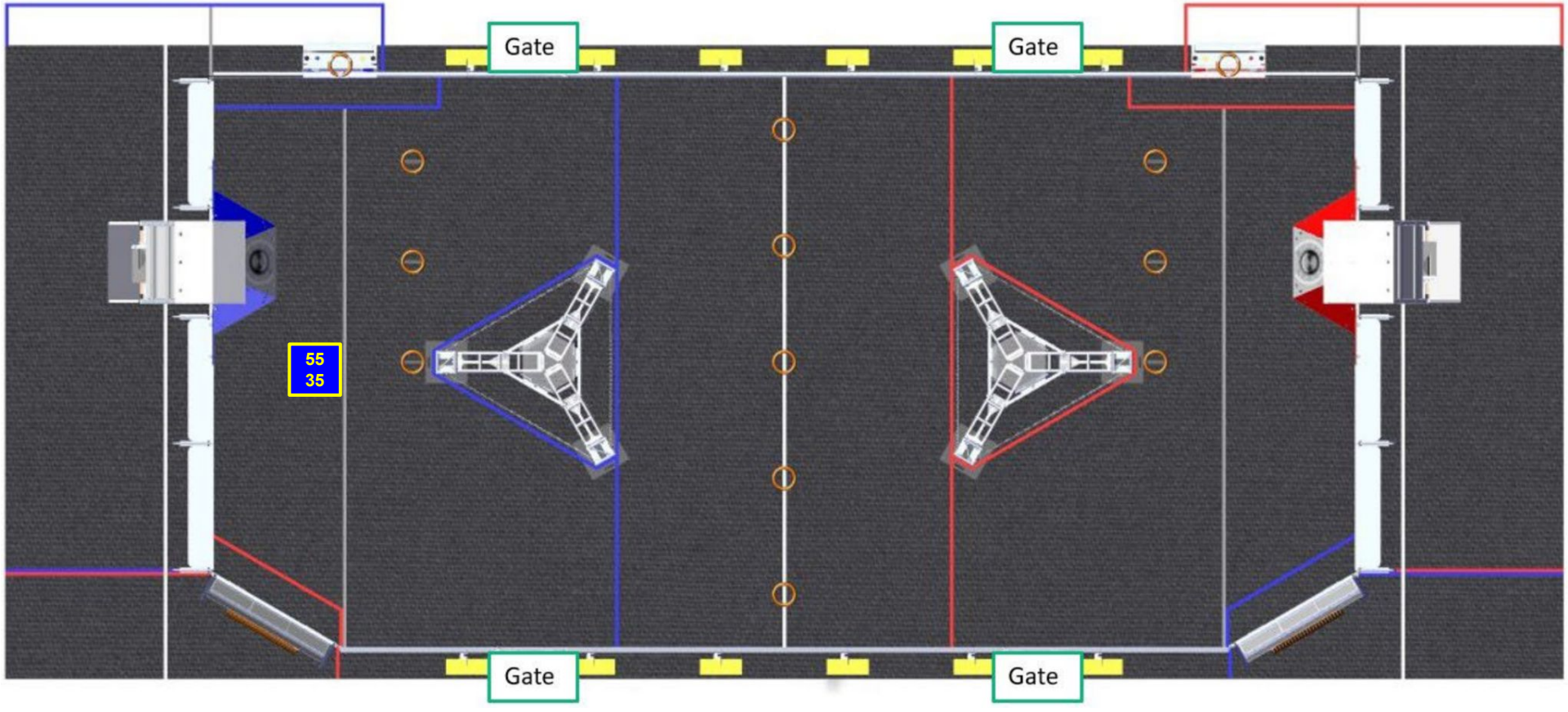
(Most Important Tags Highlighted)

All AprilTags on the field will be utilised by the robot to perpetuously detect its (x,y) location on the field and yaw angle. However, the highlighted AprilTags will also be specifically used for aim and alignment.



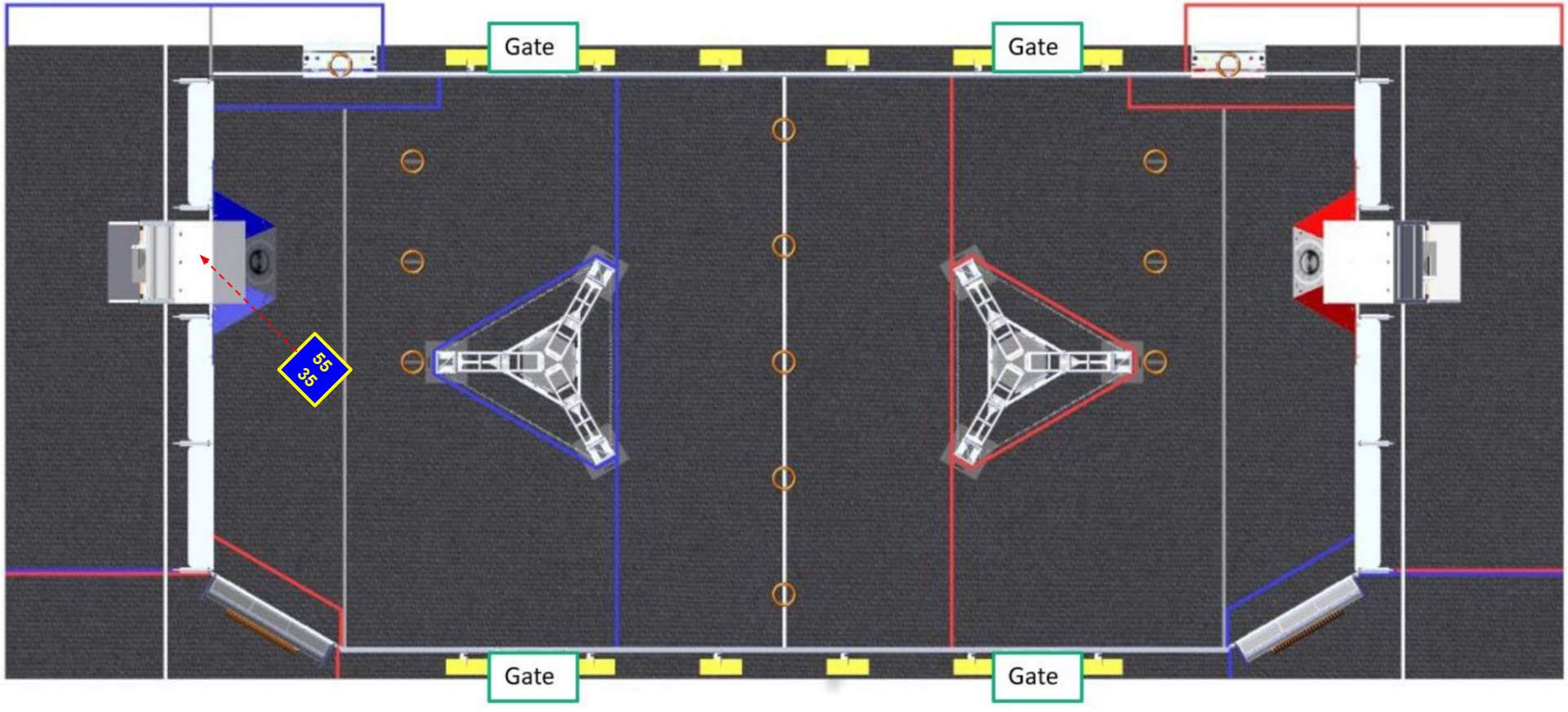
A Typical Autonomous Map

(Example below for if on blue alliance with Shuffleboard saying to get note 3 and continue collecting) (Step 0) 0:00



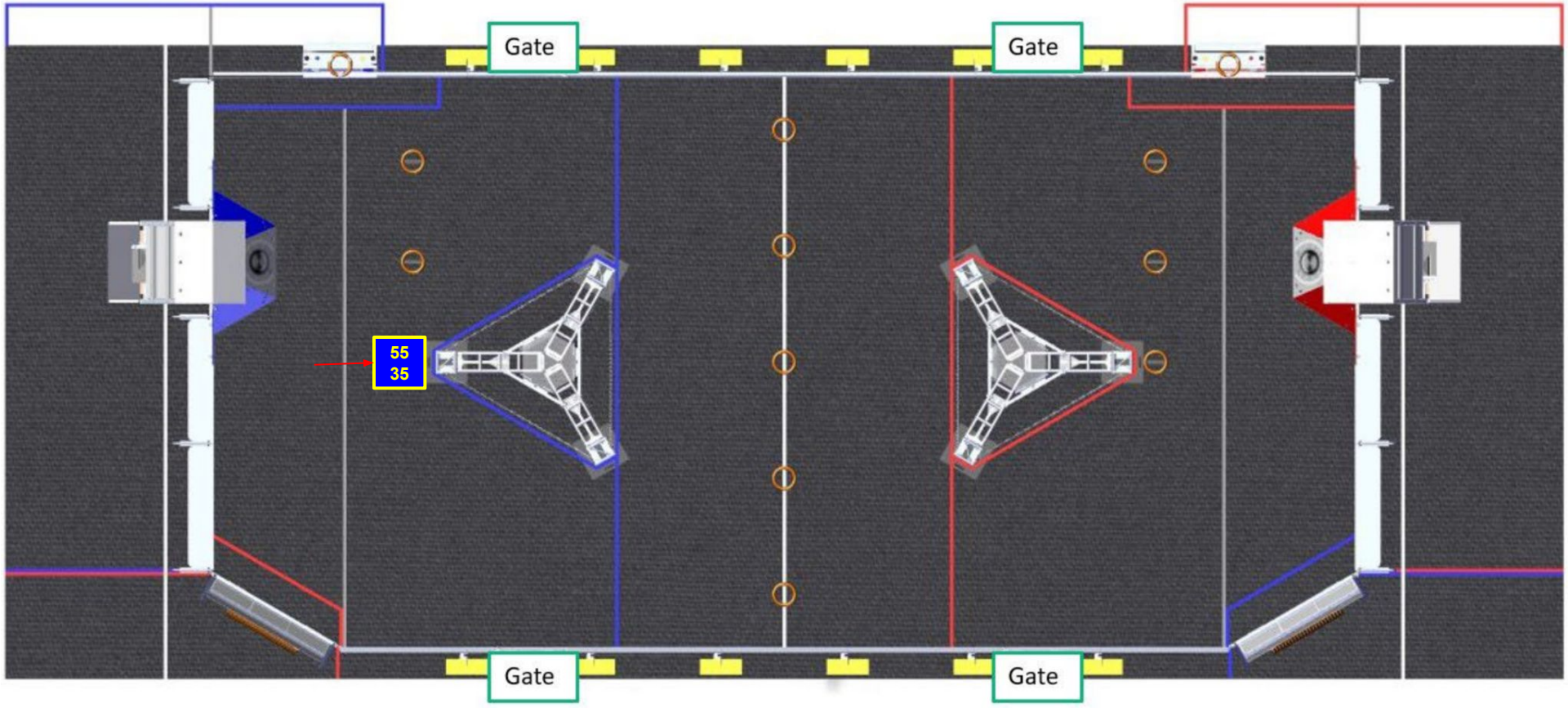
A Typical Autonomous Map

(Example below for if on blue alliance with Shuffleboard saying to get note 3 and continue collecting) (Step 1) 0:02



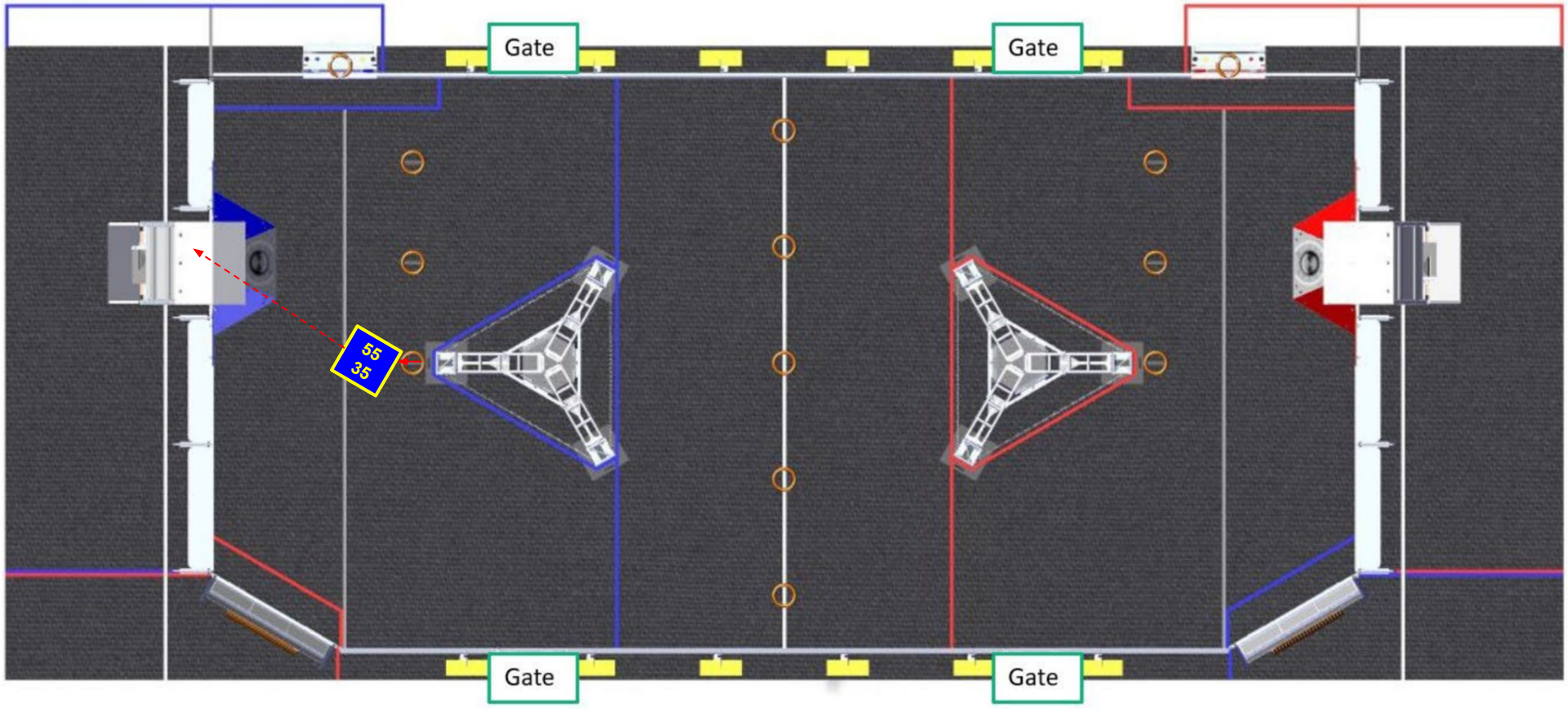
A Typical Autonomous Map

(Example below for if on blue alliance with Shuffleboard saying to get note 3 and continue collecting) (Step 2) 0:04



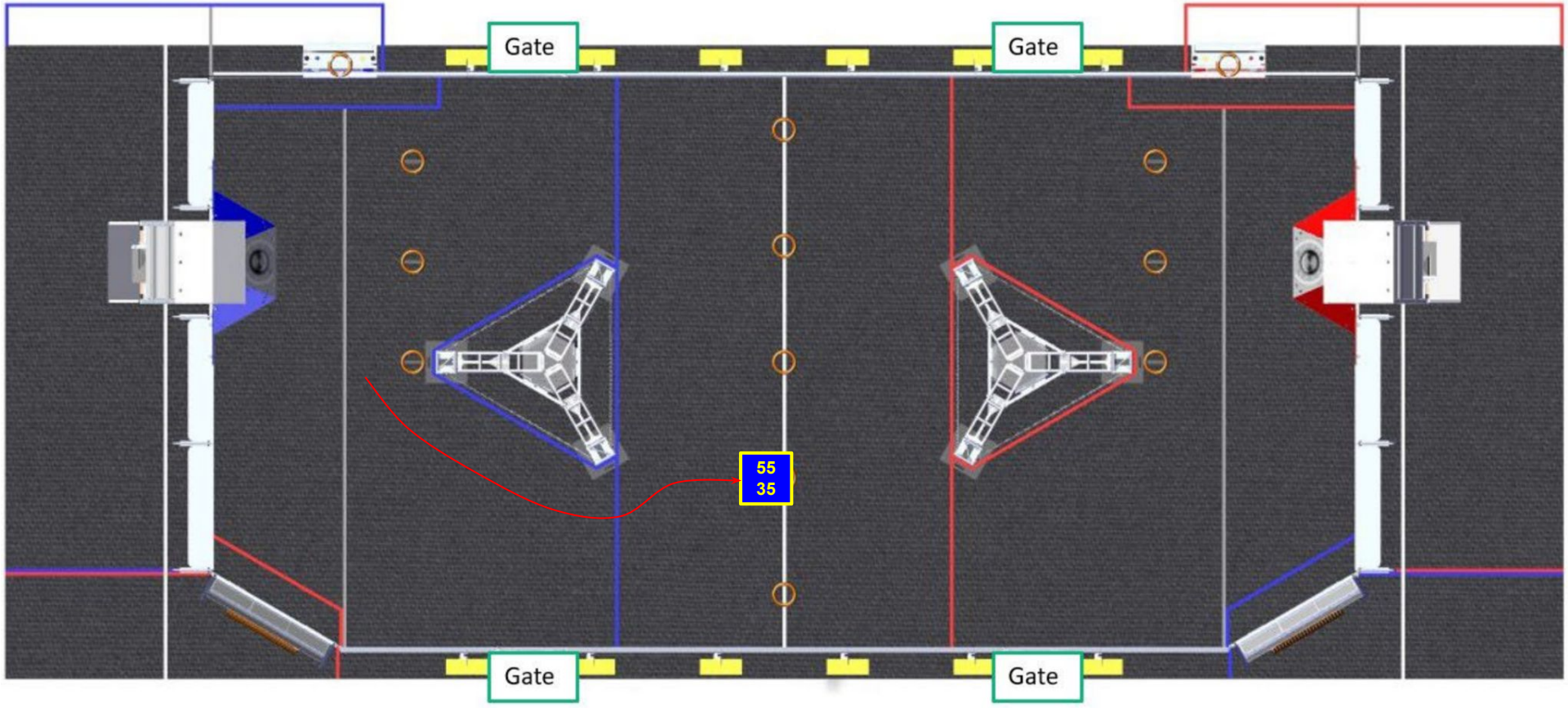
A Typical Autonomous Map

(Example below for if on blue alliance with Shuffleboard saying to get note 3 and continue collecting) (Step 3) 0:07



A Typical Autonomous Map

(Example below for if on blue alliance with Shuffleboard saying to get note 3 and continue collecting) (Step 4) 0:11



A Typical Autonomous Map

(Example below for if on blue alliance with Shuffleboard saying to get note 3 and continue collecting) (Step 5) 0.14s