

The logo for VEX Robotics Competition. The word "VEX" is in a large, bold, sans-serif font, with the "E" in red and the "V" and "X" in grey. Below "VEX" is the word "ROBOTICS" in a smaller, grey, all-caps sans-serif font. Below "ROBOTICS" is the word "COMPETITION" in a bold, red, all-caps sans-serif font. Below "COMPETITION" is a grey rounded rectangle containing the words "TIPPING POINT" in a white, all-caps sans-serif font.

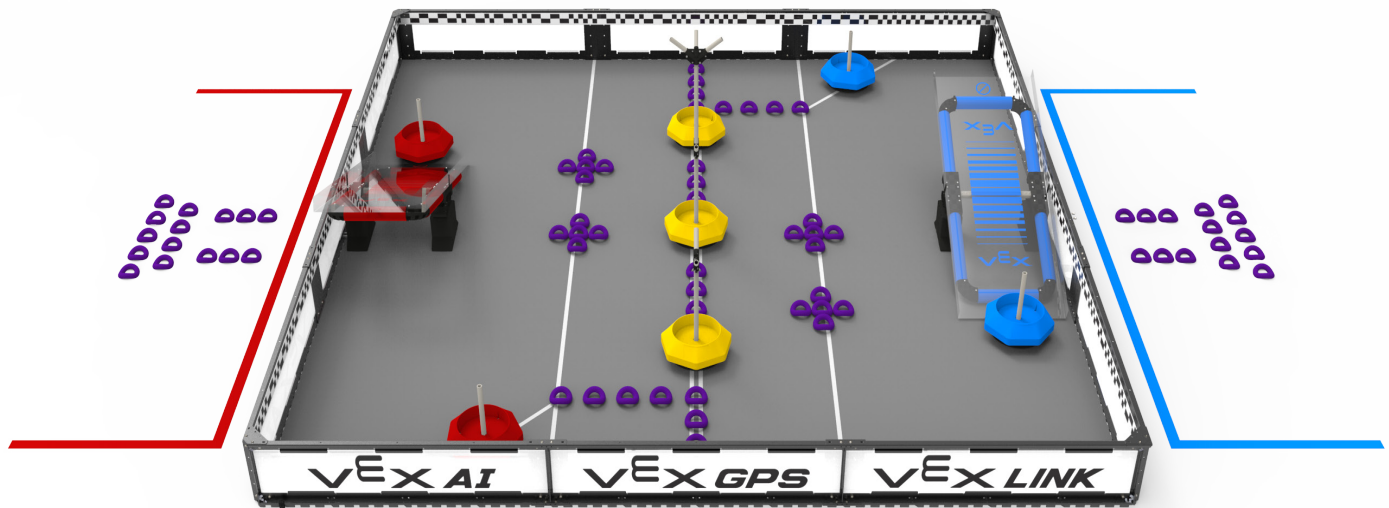
**VEX**  
ROBOTICS  
**COMPETITION**  
TIPPING POINT

2021 - 2022

Appendix D - VEX AI Competition

# Appendix D

## VEX AI Competition



### Introduction

Artificial Intelligence (AI) is becoming a staple in the industry today. The VEX AI Competition (VAIC) gives teams of *Students* a chance to compete in this growing field. With just a few modifications to the field, and with additional sensors permitted on the *Robots*, *Teams* will be playing in one-vs-one *Matches* using two *Robots* per *Team* (i.e. four *Robots* on the field) that are fully autonomous. *Robots* will be functioning without input from drivers and instead are communicating with each other as the *Match* progresses through two minutes.

There will be an VAIC division at the 2022 VEX Robotics World Championship in April 2022. Participating schools will get the chance to prove their abilities in front of thousands of future engineers and show off what truly makes their school remarkable. VAIC is the perfect project-based supplement to many High School and University-level engineering programs and will give students the unique opportunity to demonstrate their real-world AI skills to potential employers (such as REC Foundation sponsors)

### Rule Modifications: Game, Tournament

The VEX AI Competition uses the VEX Robotics Competition Tipping Point field with the VRC Field Position Code Strip and opaque field panels. Anyone that already has a VEX Robotics Competition Tipping Point field can use it for an AI Competition event with these two modifications.

Please consult the VEX Robotics Competition Tipping Point Game Manual for the foundation set of competition details. All the standard Game, Robot, & Tournament rules apply, except for the modifications listed in this document. This Appendix is subject to changes per <G21>.

# Game Definitions

**Interaction Period** - The one minute and forty-five second (1:45) time period that follows the *Isolation Period* after the winner of the *Isolation Period* has been determined. *Robots* react only to sensor inputs and to commands pre-programmed by the *Students* into the *Robot* control system and can interact with the entire field during the *Interaction Period*. The *Interaction Period* replaces the *Driver Controlled Period*.

**Isolation Bonus** – A point bonus of twenty (20) points awarded to the *Team* that has earned the most points at the end of the *Isolation Period*. The *Isolation Bonus* replaces the *Autonomous Bonus*.

**Isolation Win Point** – One (1) *Win Point* (WP) given to a *Team* that has *Cleared* the *AWP Line*, and scored at least one (1) *Ring* on each *Alliance Mobile Goal* at the end of the *Isolation Period*. Both *Teams* can earn this *Win Point* if they complete this task. The *Isolation Win Point* replaces the *Autonomous Win Point*.

**Isolation Period** - A 15-second (0:15) time period during which *Robots* operate and react only to sensor inputs and to commands pre-programmed by the *Students* into the *Robot* control system on their side of the field. This *Isolation Period* replaces the *Autonomous Period* normally found in a VRC Tipping Point Match.

# Game and Tournament Rules

**<AIG1>** Instead of a *2-Team Alliance* format, *VAIC Matches* will be played *1-Team vs. 1-Team*. Each *Team* will use two (2) *Robots* in each *Match*..

- a. *Teams* are allowed to build as many *Robots* as they would like, but only two (2) – one of each size – may be brought from the pit to the playing field for any *Match*.
- b. All *Robots* must pass inspection before they are allowed to compete.

**<AIG2>** Qualification *Matches* will be conducted like normal, in the 1 v 1 format described above.

**<AIG3>** An elimination tournament will be conducted similar to the Middle School & High School tournament. At the end of the competition, one *Team* will emerge as the event champion.

**<AIG4>** All human interaction with *Robots* during the *Match*, including via the Vision Sensor, is strictly prohibited.

**<AIG5>** The *Isolation Period* at the beginning of every *Match* will be 15 seconds (0:15).

**<AIG6>** The *Interaction Period* following the *Isolation Period* will be one minute and forty-five seconds (1:45).

**<AIG7>** Each *Robot* is allowed up to three (3) *Drive Team Members* in the *Alliance Station* during a *Match*, as stated in <G7>. (i.e. Each *Team* is allowed two *Robots* and 3 *Drive Team Members* per *Robot*, therefore, each *Team* is permitted 6 *Drive Team Members* in the *Alliance Station*.)

**<AIG8>** VAIC *Student Eligibility*.

- a. All VAIC *Team* members MUST be matriculated in a High School, Home School or Post-Secondary School.
- b. Professionals not enrolled in post-secondary education are not eligible to participate on a VAIC *Team*.
- c. VAIC *Team* members may only be on exactly one (1) VAIC *Team* for the season, see <G6>.

**<AIG9>** Drivers must disable their *Robot* (i.e. stop their *Robot* from moving) by powering off their V5 Wireless Controller whenever the Referee instructs them to do so in cases of violations that call for disablement.

**<AIG10>** *Match Load Rings* must be placed promptly in the field before the *Isolation Period*.

**<AIG11>** Rules <G11>, <SG4> and <SG5> apply during the *Isolation Period*.

**<AIG12>** - *Robots* are responsible for their own actions, at all times. All rules pertaining to *Robot-on-Robot* interaction still apply in the VEX AI Competition. *Teams* should design their *Robots* and AI programming to mitigate the risk of violating these rules.

- a. When evaluating a possible infraction of <G12>, <G14>, or <SG5>, Head Referees will rely heavily on rule <G13> to make a judgment call, and generally err on the side of the offensive *Robot*.
- b. When evaluating a possible infraction of <SG7> or <G15>, Head Referees will rely heavily on both rule <G13> and the concept of *Match Affecting* to make a judgment call. Head Referees may also ask *Teams* for insight as to their AI *Robots*' intentions, e.g. whether a Trapped *Robot* is attempting to escape or not.

Minor violations of these rules that do not affect the *Match* will result in a warning. Egregious or *Match Affecting* offenses will result in a *Disqualification*. *Teams* that receive multiple warnings may also receive a *Disqualification* at the Head Referee's discretion.

## Rule Modifications: Robot

**<AIR1>** Unless otherwise stated below, all *Robot* rules from Appendix C apply in the VEX AI Competition.

**<AIR2>** *Robot* to *Robot* communication is permitted via V5 Radio(s) and other non-radio forms of communication (i.e. IR, ultrasonic, etc). All other forms of RF communication are prohibited during *Match* play.

**<AIR3>** Both *Robots* must utilize the VEX GPS sensor and VEX AI Camera (i.e. they must be connected to the V5 Robot Brain during a *Match*, even if they are not being actively used by the *Team*'s programming).