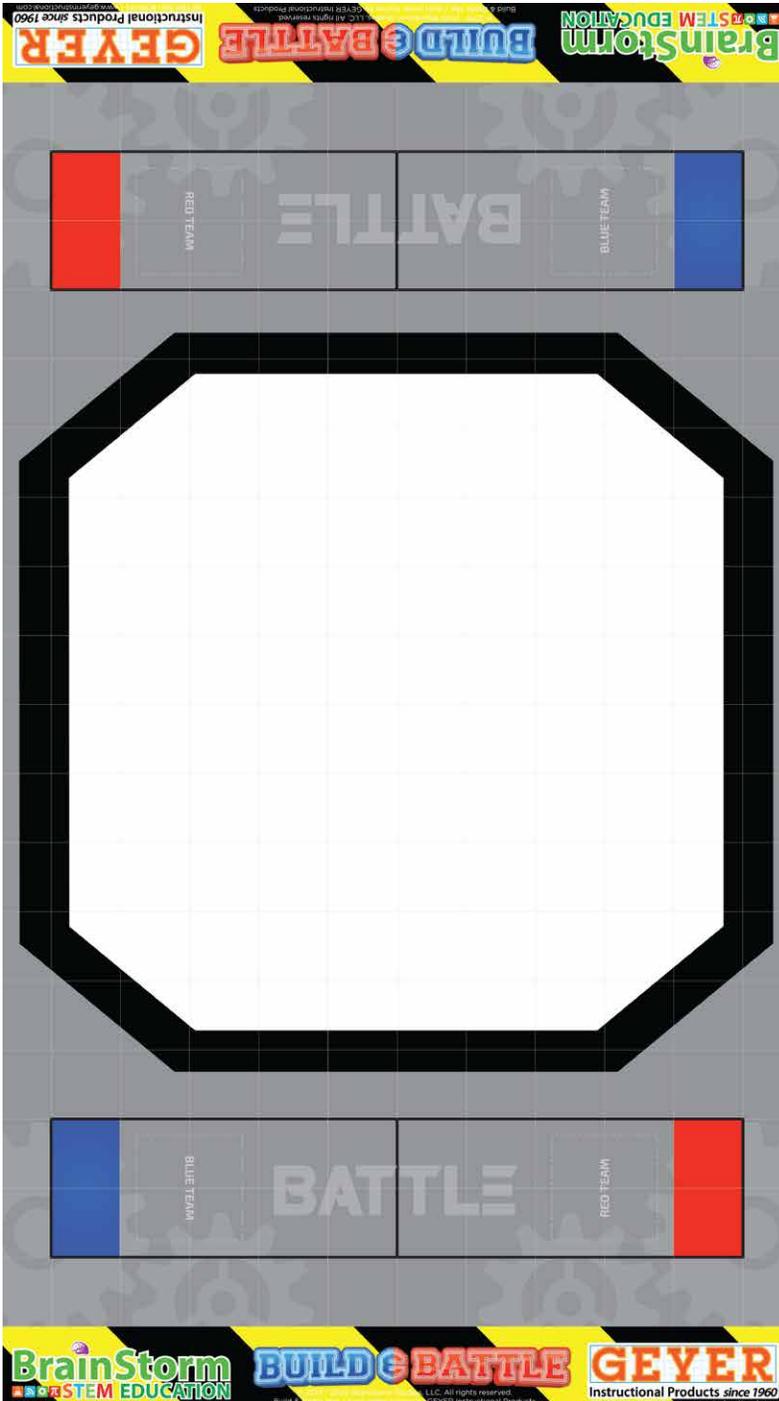


### ROBOTIC ACTIVITY MAT

# BUILD & BATTLE



**Summary:** The Build & Battle mat is a great way to introduce concepts of engineering to students. Building is emphasized within the activity and allows students to have creative freedom to explore engineering, programming, and inventing, as kids go head to head to be the last bot standing.

**Features:**

- Fits up to eight students
- 1 Large scale battle arena
- 2 Smaller scale arenas
- Remote control or programmable controlled gameplay

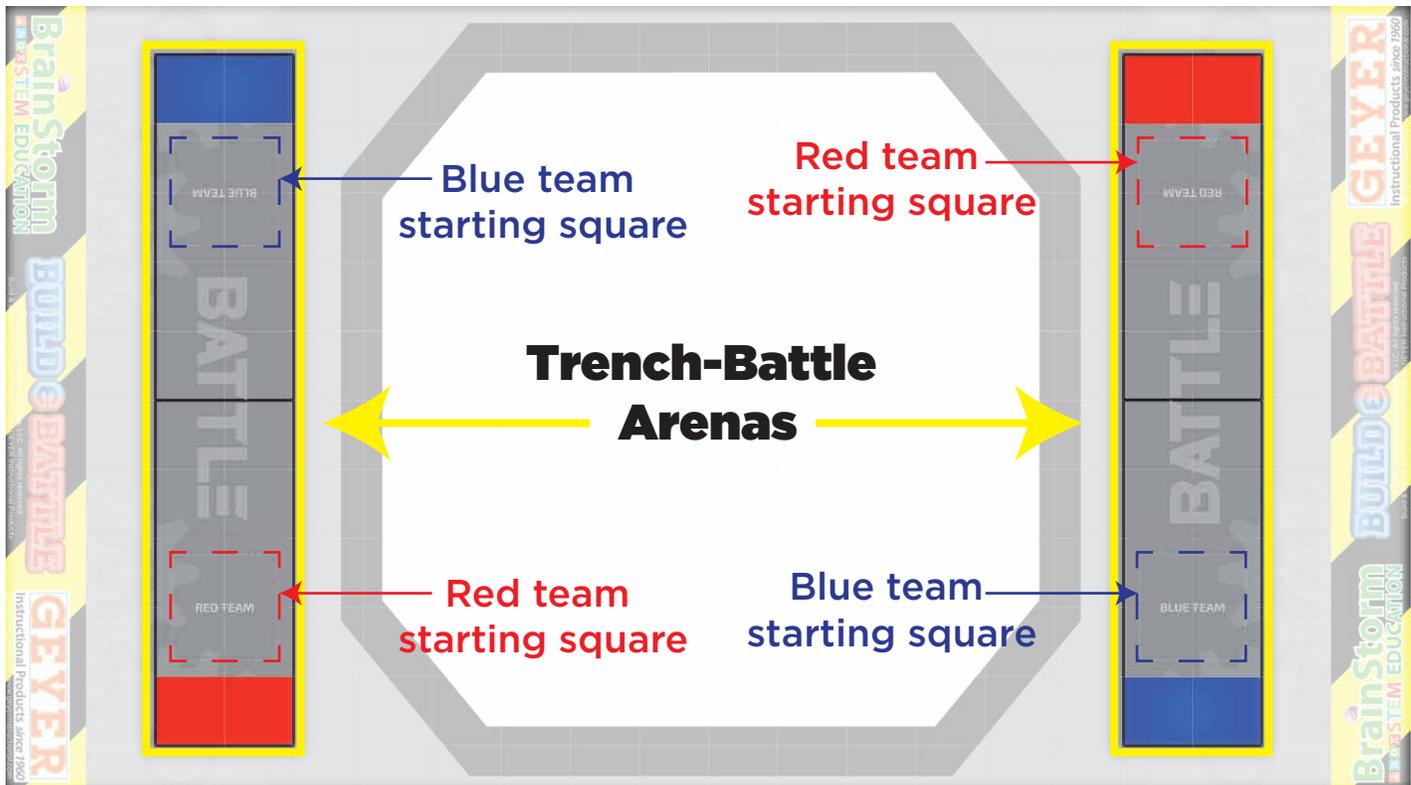
**Objective:** Students will use their creativity, engineering skills, and sheer determination, as they battle head to head, to be the last robot standing.

**Skills taught:** Students will learn programming, problem solving, team-work, critical thinking and engineering.

# Activity 1: Trench battles

### Objective:

Using coding and engineering, program and prepare your robot for the trench-battle arena. Be the first to push the other robot out of the arena or be the first to disable the other robot by flipping it over to win the battle.



### How to Use:

1. Robots will start in their team-colored squares located near the corners of the mat.
2. Teams will program the robot with code that enables it to drive forward indefinitely upon start, or use preprogrammed robots.
3. If allowed, teams will build attachments on their robot to better help during battle.
4. Place each team's robot in their starting square and together, simultaneously execute the programs.

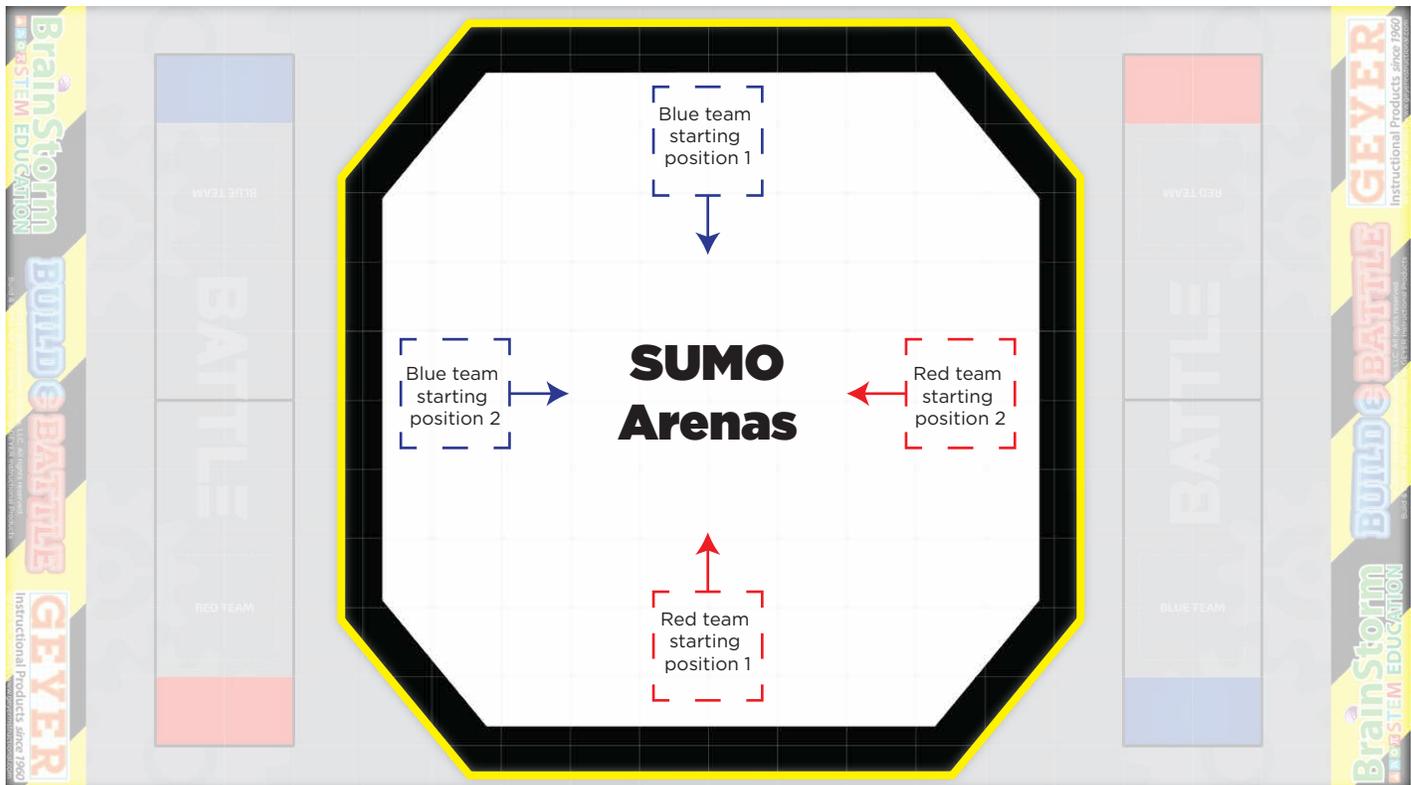
### Rules:

- Students must begin their programs at the same time to ensure a fair battle.
- A robot must be more the 50% pushed out of the arena to be considered eliminated.
- A robot that is flipped over is considered eliminated.
- In the event of a tie or uncertainty, teams will reset and or refer to the instructors ruling.
- Complexity of robotic attachments are acceptable based upon the instructors discretion.
- Unsportsmanlike behavior can result in a penalty and or disqualification.

### Activity 2 : Sumo Battles

#### Objective:

Using coding and engineering, program and prepare your robot for the sumo battle arena. Be the first to push the other robot out of the arena or be the first to disable the other robot by flipping it over to win the battle.



#### How to Use:

1. Robots will start inside the center arena, on opposite ends, and face towards each other.
2. Teams will program the robot with code that enables it to sense, think, and act against the opposing robot.(See page 4 for more information)
3. Allow teams to build attachments on their robot to better their chances during battle.
4. Place each team’s robot in a starting position(as seen above) and together, simultaneously execute the programs.

#### Rules:

- Students must begin their programs at the same time to ensure a fair battle.
- A robot must be more the 50% pushed out of the arena to be considered eliminated.
- A robot that is flipped over is considered eliminated.
- In the event of a tie or uncertainty, teams will reset and or refer to the instructors ruling.
- Complexity of robotic attachments are acceptable based upon the instructors discretion.
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### Activity 2 continued:

#### Sensors and Logic:

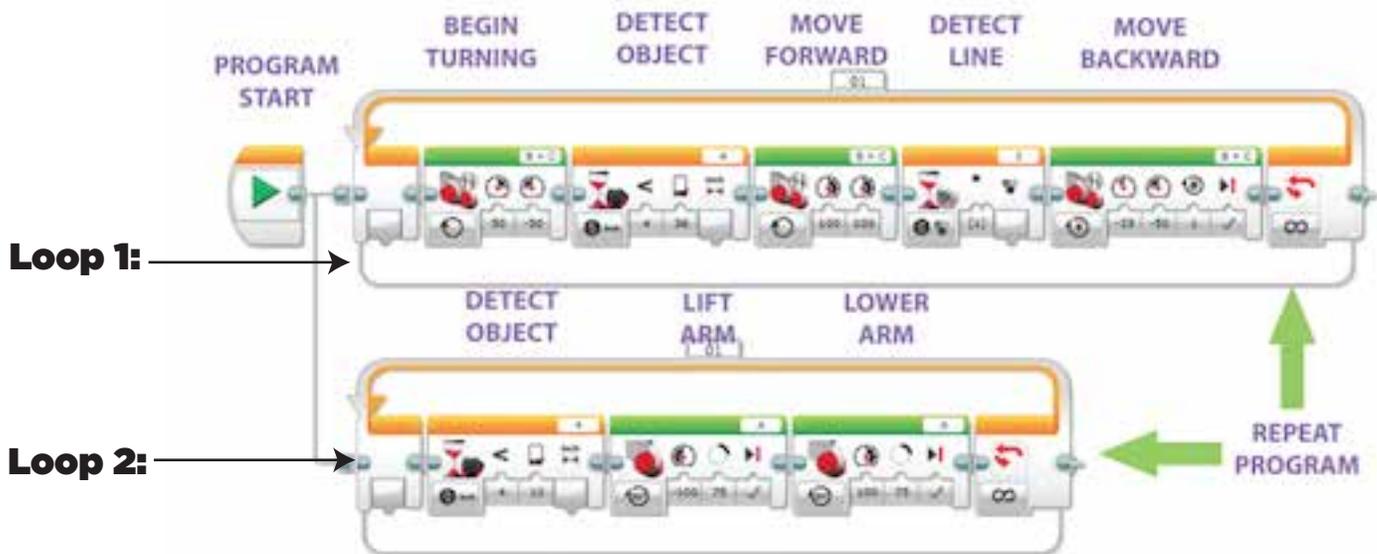
This page will briefly explain the programming and sensors used on most robots to help you understand how they detect things and the logic behind the robots code.

#### Distance Sensor:

The most popular type of distance sensor used for battling other robots is the ultrasonic sensor. As the name indicates, ultrasonic sensors work by measuring distance between itself and the robot by emitting an ultrasonic wave.

#### Logic:

The basic programming of Arena Battles is based around two separate loops:



This program seen above can be replicated in most program capable robots that have an ultrasonic sensor.