Competition Guidebook

Event Overview: Welcome to the Robot Competition! Teams from schools and clubs across **Makoni District and surrounding areas** will showcase their engineering, programming, and strategy skills. This event promotes STEM education through hands-on robotics challenges.

Note: All scoring details will be mainly based on time to completion and penalties, further explanation will be provided on tournament day.

1. General Description

Teams: Up to **4 students (or fewer)** per team. Design, build, and program **up to 3 robots** for three challenges:

- **Line Following** - Make your robot follow a **black line on white background** from start to finish
- **Maze Solving** - Get your robot from start to finish through walls
- **Capture the Flag** - Grab flags from the center of the arena and bring to your side

2. Robot Specifications

- **Start Button**: Robots **must have start button or switch** to activate.
- **Size**: ≤ $18 \times 18 \times 18$ cm (Capture the Flag: ≤ $20 \times 20 \times 15$ cm)
- **Safety**: No sharp edges, spinners, or abrasives. **Batteries must be properly secured and insulated.**
- **Weight**: **No limit** - heavier bots might have stability issues.
- **Control**: Autonomous only (no remotes) **except Capture the Flag: wireless or wired control allowed.**
- **Power**: **LiPo cells, AA, AAA batteries, or power banks only which must be attach properly and have safe connections to the rest of the electronic system.**
- **Hardware**: Microcontrollers only (Arduino, ESP32). No Raspberry Pi.

Pre-Event Inspection: **Approx 3 min** per team.

3. Gameplay Rules and Team Structure

- **No Interventions**: Code locked post-start **of a round till the end of the teams turn.**
- **Timeouts**: Captain requests **<3 per round**.
- **Team Roles** *(Captain and Bot Handler)*:

ROLE	DUTIES
CAPTAIN	Leads team, speaks to referee, handles appeals/timeouts.
BOT HANDLER	Sole person to touch bot during play.

- **Prep**: Submit form **10+ min** pre-game. **Arrive at least 30 min early to the event**.

4. Line Following Challenge

Arena: White mat. **19 mm wide black line**.

Track Features:

- Expect **T-junctions**
- **15 cm radius curves**
- **60° sharp turns**
- Single path from **START to FINISH**

How to Play:

1. Place bot at START, press **start button/switch**
2. Timer starts when robot moves from start line
3. Navigate to FINISH autonomously
4. Timer ends when robot passes FINISH line
5. **Derail Penalty**: Bot leaves line >5cm → handler resets at derail point (+10sec penalty)

5. Maze Solving Challenge

Arena: **6x6 grid** (each cell **30cm square**, **15cm high walls**).

How to Play:

1. Maze revealed pre-round (teams finalize code)
2. Handler places bot at start (facing forward), press **start button/switch**, referee starts timer
3. Bot navigates autonomously using sensors
4. **Stuck Rule**: No movement → handler rescues (same cell, rotate to face forward)
5. Max 5 rescues, 6th = round ends
6. Game time 5min

6. Capture the Flag Tournament

Arena: Green carpet Centerline **divide**, 80cm deep zones each side.

Setup:

Flags: 3x 10cm plastic poles (General dimension, colors are red, yellow, blue).

- **Start Boxes**: Base line on each team's side.

Game Flow (best-of-3 rounds):

1. Rush center, grab flags (drag into the homebase zone marked on each team's side)
2. Dogfight opponent's zone (steal flags back)
3. Game ends when all flags on one side or game time ends

Legal Moves:

- ✓ Push opponents (no flipping)
- ✓ Flag dragging (any gripper/arm)
- ✓ Zone defense (block steals)
- × No flying, string-pulling, air-blowing

7. Penalties and Disqualifications

VIOLATION	PENALTY	EXAMPLE
CODE CHANGE	DQ	USB plugged mid-round
6+ RESCUES (MAZE)	Round ends	-
UNAUTHORIZED TOUCH	Warning leading to DQ	Non-handler grabs bot
SAFETY VIOLATION	Bot DQ	Sparks, sharp edges
MICROPROCESSOR	Bot DQ	Raspberry Pi found
ARENA DAMAGE	Bot DQ	Grinding mat or maze walls
NO START BUTTON	Bot DQ	Manual power on

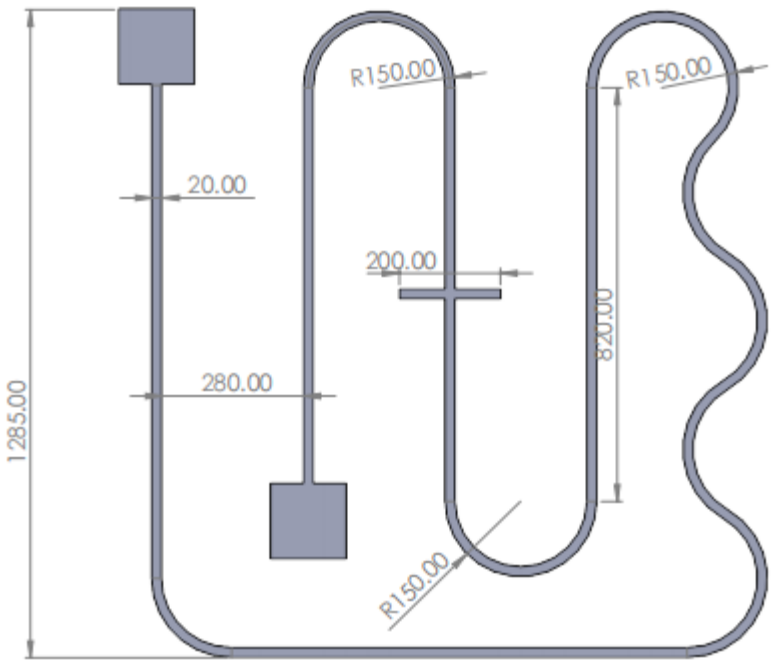
8. Judging and Awards

- **Judges**: 3 per challenge (organizers + teachers)

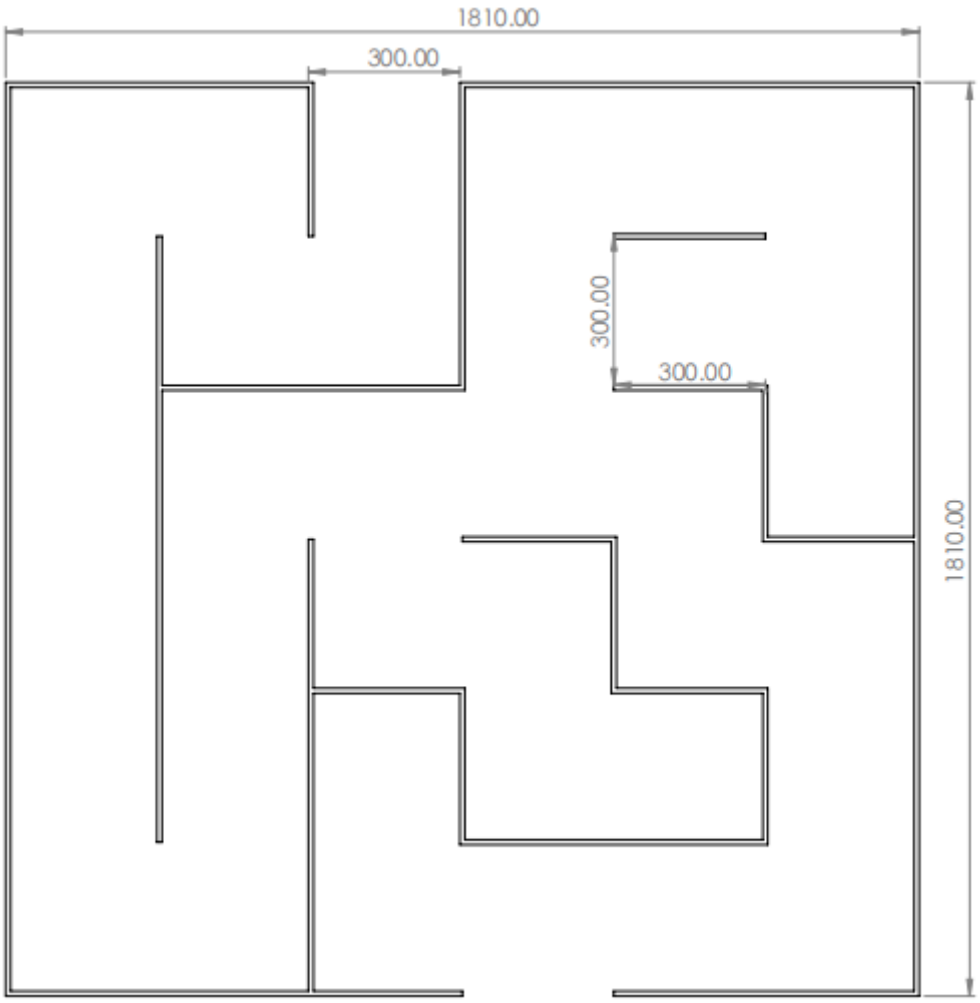
9. Resources

- **Diagrams**: Use these following diagrams as Demos to build and test your Bots.

Line Following Demo Mat



Maze Following Demo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