SapiLineTracer Robot Competition v8.0

Announcement:

Do you have what it takes to build the fastest, smartest, and most precise line-tracing robot?

Put your engineering and programming skills to the test at the SapiLineTracer Robot Competition!

Event Details:

📅 **Registration**: **Mar 31, 2025**

📅 **Date: Apr 15, 2025, 12:00**

📍 **Venue: Sapientia University Aula**

Challenge Overview

Each team must build a robot capable of following a line and compete in two parallel challenges:

- **Speed Challenge**
  - Objective: Complete the track in the shortest time possible.
  - Winner: The robot with the fastest completion time.
- **Agility Challenge**
  - Objective: Detect and display hidden signals along the route.
  - Winner: Determined based on the number of detected signals and completion time, with both accuracy and speed playing a role.

Registration:

To register, please send an email to **zoltan.szanto@ms.sapientia.ro** with the following information:

- **Name, class, and email address** for each team member.
- **Competitions you wish to participate in** (Speed, Agility, or both).

Rules:

1. Each team consists of 2-4 members from Sapientia University.
2. The competition consists of 3 rounds, with each team allowed one attempt per round.
3. Only one robot is permitted on the racetrack per attempt, and only the organizers may enter the racetrack area.
4. Each team will receive a robot kit, see Figure 3: 1x platform, 2x wheels, 2x motor, 1x arduino uno, 1x sensor shield, 1x motor driver, 1x battery holder. This kit must be used during the event. Additional sensors and equipment can be added. Teams may modify their robots during breaks between rounds.
5. Robot dimensions must not exceed the following limits:
    - Width: 20 cm
    - Length: 25 cm
    - Height: 20 cm
    - Weight: 3 kg

    Robots exceeding these limits will be disqualified.
6. The line on the racetrack is white (tape) and varies in width between 2 and 4 cm. It may also include dashed sections with gaps of 2 to 5 cm between the dashes. The ground is covered with black carpet, as shown in Illustration 1.
7. Laser gates will be used to measure the time of each attempt. The timer starts when the front of the robot blocks the laser at the start gate and stops when the front of the robot reaches the stop gate. This timing system is used for both competitions.
8. There are 4 gates positioned above the track, allowing the robot to pass through each one. At the top of each gate, directly above the line, an infrared LED (see Link here) is mounted. These LEDs emit light at specific frequencies using square waveforms of 1 kHz, 2 kHz, 3 kHz, and 4 kHz. The order of frequencies is random, with each frequency assigned to only one gate. The infrared LEDs are oriented downward, pointing towards the ground, and are positioned approximately 25 cm above the line.
9. The objective of the Agility competition is to identify the unique frequencies emitted by the infrared LEDs. A successful detection involves the following steps:
    - The robot stops upon detecting a signal.
    - The robot lights up 1 to 4 LEDs corresponding to the detected frequency (e.g., for 3 kHz, 3 LEDs should light up). Use large, highly visible LEDs (multiple colors are allowed).
    - The robot emits a beeping sound based on the detected frequency (e.g., for 2 kHz, the pattern should be Beep for 1 second, Silent for 1 second, Beep for 1 second, Silent for 1 second).
    - After signaling, the robot continues along the line.
10. Scoring:
    - In the Speed Competition, the fastest time wins.
    - In the Agility Competition, the winner is determined by the most signal detections combined with the shortest completion time.

Figure 1 Sample racetrack

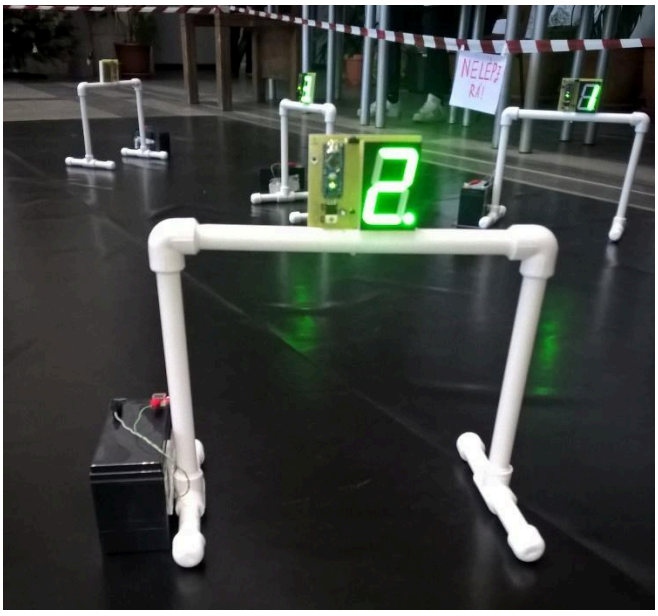

Figure 2 Sample LED gate

Figure 3 Sample kit