

RoboFest 2002 Challenges – “RoboRescuers”

Lego Robot Competition Division

Game Abstract

This 2002 competition will simulate a situation in which robots will rescue people trapped in a burning building. One robot is supposed to carry gas masks to a second robot. The second robot must then climb up a ramp, remove a concrete block in its path, and extinguish the fire, thereby rescuing the people trapped within. The robots must then return to the base.

Game Objectives

The main goal of this robot game is to complete the entire course in the shortest time.

A Sample Playing Field

Fig. 1 is a sample playing field. It is constructed of all-purpose white shelves: two 10”x36”, one 10”x48” for the ramp, and one 12”x36”. One crate is used to support the ramp and one crate simulates a burning building. Please note that the official final shape of the playing field for RoboFest 2002 will be unknown until the day of competition. The official playing field will be constructed of shelves with the above-mentioned dimensions plus one more 10”x36” shelf. There may be extra lamps simulating fire around the playing field. Details about the playing field construction will be described in another document on the website.

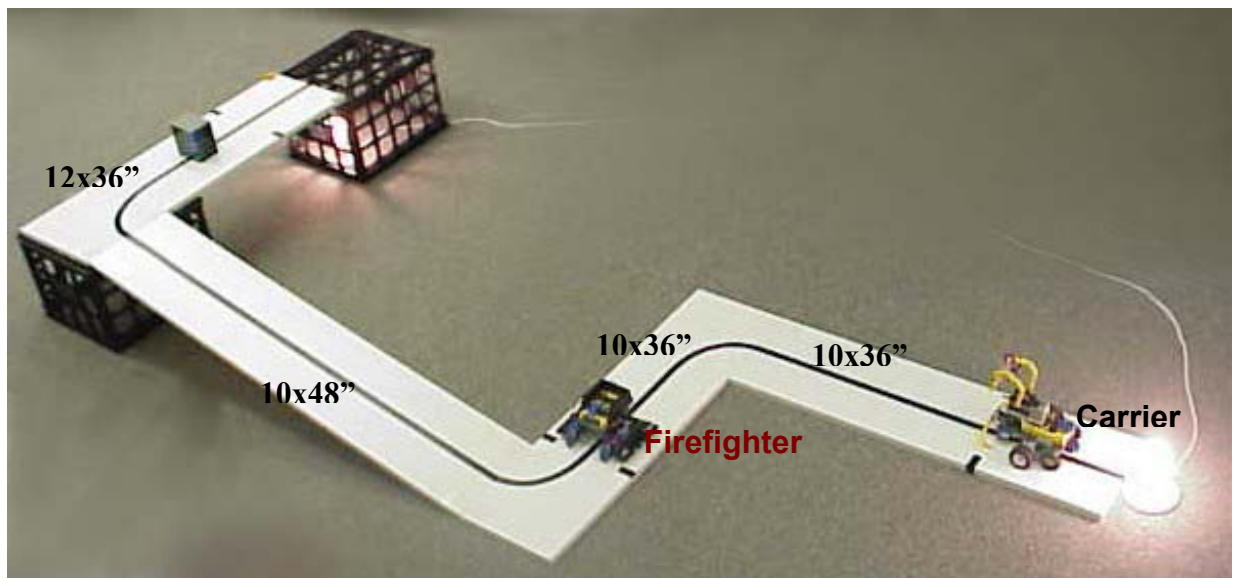


Fig. 1 A Sample Course

Missions must be achieved in the following order

1. One human player is to position a firefighting robot on the track just before the ramp incline. This player then presses the green run button. Simultaneously, another human player is to position the gasmask carrier robot at the base position and press the run button. The firefighter robot must wait in position until it receives the bag of gasmasks from the carrier robot, (shown in Fig 3).
2. The carrier robot can only begin moving when the light (shown in Fig 2) turns on. The start signal lamp will be turned off after one or two seconds.
3. When the carrier meets the firefighter, the carrier must deliver the gasmask bag to the firefighter without human intervention.
4. After delivering the bag, the carrier must return home (otherwise, it will block the return route of the firefighter). Meanwhile, the firefighter travels up the ramp to save two trapped people on the second floor of the burning building. On the second floor (the last 12”x36” shelf) there is a concrete block as shown in Fig. 4.

The firefighter robot must remove it by dropping it to left or right side of the board. Note that two humans must not be touched by the concrete block.

5. When the robot can see the fire source on the first floor (the lamp shown in Fig 5) it must stop, otherwise the robot will fall over the edge. After the firefighter detects the fire, now the firefighter must save the unconscious people trapped in the building. A human player may load the two trapped people onto the firefighter inside the save zone which is delineated by a tape outline on the shelf.
6. While the robot is performing the life-saving mission, the two trapped people at the corner of the board must not be touched by the robot. We can assume the people are protected from toxic gases by the gasmask carried by the firefighter robot.
7. The firefighter robot then descends the ramp and returns to home base safely.
8. When the firefighter reaches home base (both two loaded people passes the start line), the total elapsed time is recorded and becomes the official data which determines the performance winners.



Fig. 2 Start Lamp



Fig. 3 A bag of gas masks

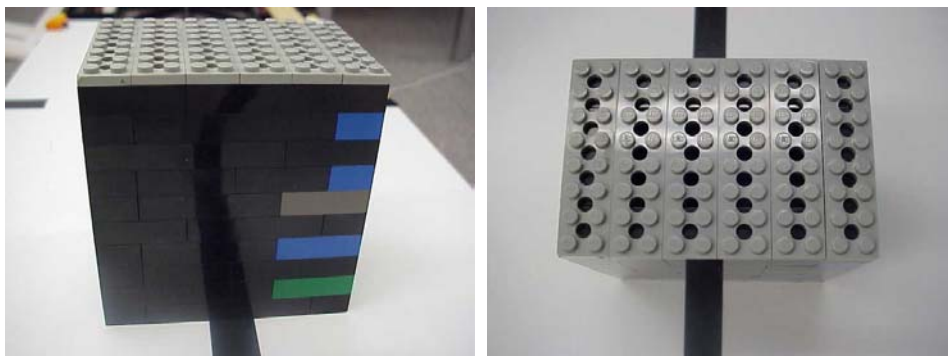


Fig. 4 A concrete block

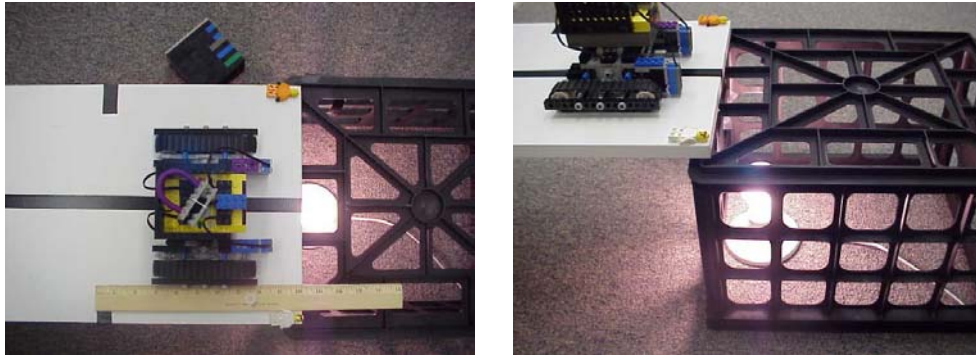


Fig. 5 Burning Building with two trapped people

Game Rules

If the mission fails or a violation is noted by a referee, then the mission must be restarted from the beginning. One game will last 2.5 minutes.

The motionless robot must fit inside a box of dimensions: height 7.5”, width 9.5”, and length 12”. However, during the game, the robot may extend its dimensions.

Only two human players are allowed in the game arena.

In the event that no robots complete the course, the following points will be recorded to determine ranking.

- Carrier makes physical contact with the firefighter: 5
- Carrier passes the gas mask safely to the firefighter: 10
- Carrier returns back home after contacting the firefighter: 5
- Firefighter ascends the ramp: 5
- Firefighter removes concrete blocks completely off the board and onto the floor without falling off itself: 15
- Firefighter saves the people, then begins to follow line: 10
- Firefighter descends successfully and returns home: 10

If the mission is restarted, the score earned before cannot be re-earned.

Tournament Game Rules

- Four robot teams will play the game simultaneously – referred to as a “match”.
- Each team will have three chances (rounds) to play the game.
- The top 8 teams, based on performance (the average of the two best scores), will advance to the semi-finals.
- There will be two semi-final matches. The two semi-final winner teams will advance to the final match.
- The final match will decide the champion team.

Ideas and Tips

- Consider using additional light sensors and motors.
- You are allowed to use more than three sensors on one robot.

Advanced Robot Competition Division

Qualifications

- Can use any robot kit such as Handy Board or
- Can use Lego robots with a high-level programming language such as Java, C++, VB, or NQC .

Game rule

- Exactly the same rules as the Lego robot division described above except there will be a real birthday candle light on the crate at the end of the track as shown in Fig. 6. Note that the location of the candle will be decided after the robot starts. The firefighter must extinguish it using only a fan.
- Teams are required to submit a diskette and a hard copy of the source code to the judge immediately upon checking-in.

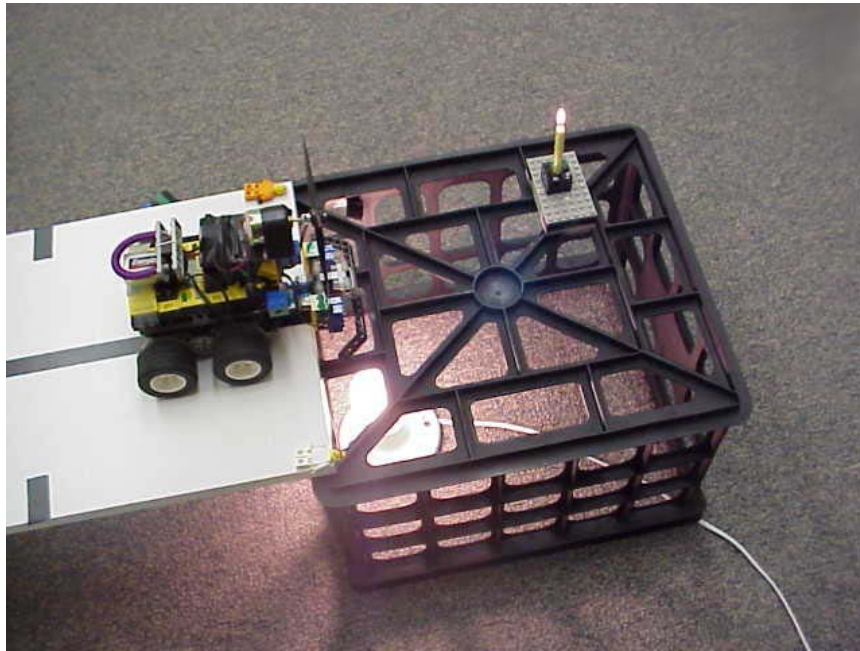


Fig. 6 A candle light on the crate

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