

# RoboRAVE Greece

Today's Play, Tomorrow's Pay



## Firefighting

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RoboRAVE Greece

Our slogan is : "Today's Play, Tomorrow's Pay."

**RoboRAVE** Greece  
Today's Play, Tomorrow's Pay

**RoboRAVE**  
International  
A Collaborative Robotics Program

# Fire Fighting Challenge

## 1. Overview of Challenge

The Firefighting Challenge simulates scenarios where fully autonomous robots detect and extinguish fires. Teams must design, build and program robots to detect and extinguish 4 randomly placed fires within a time limit.



## 2. Category and Group Requirements

- Firefighting is offered to competitors in the following age categories:
  - 1) Ages 11-14 ( Middle School ) - Born 2012 -2015
  - 2) Ages 15 -18 (High School) – Born 2008 -2011
  - 3) Ages 19+ ( University / Professional ) – Born in 2007 and before.

In the event that there are no more than 5 groups in an age category, then the

categories will be merged. The judging and scoring will be unified.

- 2-4 players per team, with all members aged 18 and under.

### 3. Field Specifications

1. PVC tarpaulin . Dimensions: 3.5 m. (L) x 2.4 m. (W) x 0.03 (H). Width 2.5 cm. A black line delimits the field.
2. Four candles are placed randomly on the field. The positions of the candles change randomly after the robot is placed in the starting area (randomly selected by the referee from the on-site task manual). Each candle is located exactly in the center of a black circle with a diameter of 40 cm . The candles are not fixed to the field.
3. The height of the candles will be announced on site, and will range from 10 to 45 centimeters.
4. The candle closest to the starting area is unobstructed, while the other three candles are blocked by walls 20-35 cm wide and 40 cm high.
  - a. One candle has 1 wall blocked, one candle has two walls blocked, and one candle is made up of three walls blocked.
  - b. The angle of the walls relative to the base is not fixed, and the orientation of the three wall faces is not fixed, as randomly selected by the referee from the on-site work manual.



## 4. Robot Specifications

| Category                  | Specifications   |
|---------------------------|--|
| <b>Robot platform</b>     | Unlimited. Cost < 1,500 euros ).   |
| <b>Robot type</b>         | Fully autonomous robot.  |
| <b>Maximum volume</b>     | $\leq 65,030 \text{ cm}^3$ (pre-activation). Expansion allowed after activation. |
| <b>Controllers</b>        | Multiple controllers are allowed.  |
| <b>Sensors/Disk Units</b> | Unlimited.   |
| <b>Motors/Servomotors</b> | Unlimited.   |

### Fire extinguishing system rules :

- Toxic substances, explosives or dangerous mechanisms are prohibited.
- Hazardous components (e.g. pneumatic/hydraulic systems, propellers) require protective measures (e.g. propeller guards ).

## 5. Rules and Scoring

1. **Time limit** : 3 minutes per attempt.
2. **Starting Position** : Robots are activated from a zone designated by the judge.
3. **Candle arrangement** : Randomized according to the judge's work manual (to be published on the day of the event).
4. **Extinguishing Criteria** :
  - a. **Valid Extinguishment** : The robot enters the black circle of candles (ground marker) and activates the extinguisher. Candle goes out: **Complete Extinguishment Points** .
  - b. **Partial Extinguishment** : The candle goes out because the robot touched the wall: **Partial Extinguishment**.
  - c. **Invalid extinguishing** :

- i. Erasing outside the circle ( *no points* ).
- ii. Candle striking by contact ( *without points* ).

5. **Contact after extinguishing** : There is no penalty for touching extinguished candles/panels.
6. **Boundary Violation** : Judges may terminate attempts if robots exit the arena and cannot continue effectively.
7. **Human Intervention** : Touching the robot ends the attempt . The current score is recorded .
8. Score Table:

|                             | Fire Fighting Rating Table   |            |            |            | Total |
|-----------------------------|--|------------|------------|------------|-------|
|                             | 1st Candle   | 2nd Candle | 3rd Candle | 4th Candle |       |
| <b>Penalty Points (50%)</b> | 50   | 100        | 150        | 200        | 1000  |
| <b>Full Points</b>          | 100  | 200        | 300        | 400        |       |
| <b>Time Bonus</b>           | The time starts at 180 seconds and stops when the 4th candle is extinguished. The remaining time will be added to the total score, 1 point per second. |            |            |            | 180   |

## 6. Robot control

1. **Volume compliance** :  $\leq 65,030 \text{ cm}^3$ .
2. **Safety Check** : Judges can exclude unsafe fire extinguishing systems and require modifications.
3. **On-Site Verification** : Referees inspect the robots during troubleshooting/match.

## 7. Challenge Process

### 7.1 General Procedure

1. **Stages :**
  - **Ranking Round** : 8 attempts; the first 5 scores are added together for ranking.
  - **Tournament** : The top 8 teams qualify (ties may increase participation).

2. **Declaring an Attempt** : Teams must declare to the referees a “try” or “official attempt.” Official attempts are recorded on the score sheets.

## 7.2 Tournaments

1. **Rounds :**
  - a. **Round 1** : The top 4 teams qualify. The rest are ranked based on Points Challenge .
  - b. **Round 2** : The top 2 teams compete for the Champion/Second place. The bottom 2 are ranked.
  - c. **Round 3** : The bottom 2 teams of Round 2 compete for the 3rd/4th place.
2. **Tiebreaks** : Resolved through additional games.

## 8 . It rewards a

1. The prizes are awarded based on the overall ranking of the teams:
  - Champion (1 team)
  - Second (1 team)
  - Third place (1 team)