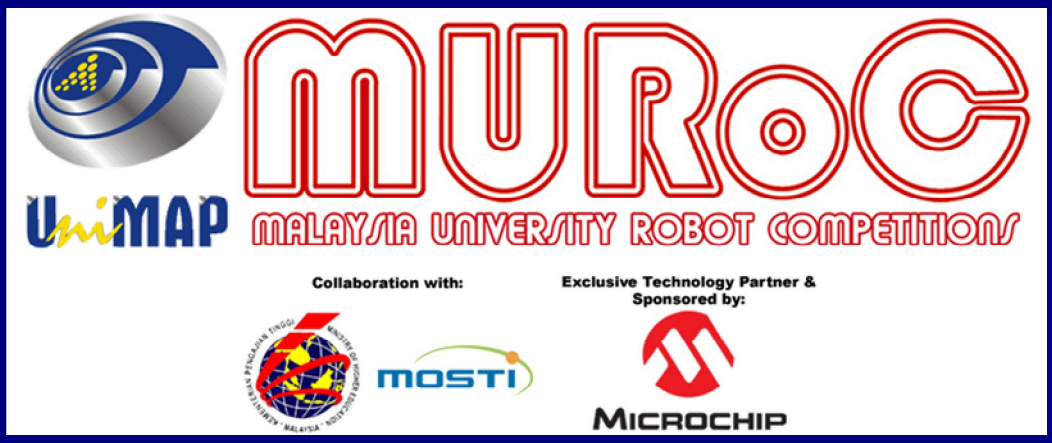


FIRE FIGHTING ROBOT COMPETITION

THEME & RULES

The Importance of Safety

Safety is one of the most important elements in the sustainable development of the MALAYSIA UNIVERSITY ROBOT COMPETITION. The safety of the robots themselves is the first and foremost issue for the safe holding of the contest. The participating teams, as the robot designers, are responsible for the safety of their robots. The teams must work and cooperate closely with the organizers to ensure the utmost safety of the contest. Safety must always be the top priority and it must be considered for all people involved in the contest as officials, participants or spectators in all circumstances. Teams are required to pay sufficient attention to the safety of their robots on this basis before applying to take part in the contest.

Outline of the Contest

Fire Fighting Robot is a game based on an imaginary fireman rescuing the *victims* and extinguishes the *fires*. The *Fire Fighting Robot* will move around the *house* (field) to rescue the victims as much as possible and extinguish the fire in three minutes. The robot is considered completing the task when the robot returns to the starting zone.

Each match is contested by red and blue teams. A match lasts three minutes.

***House*: Structure and Specifications** See Figure 1

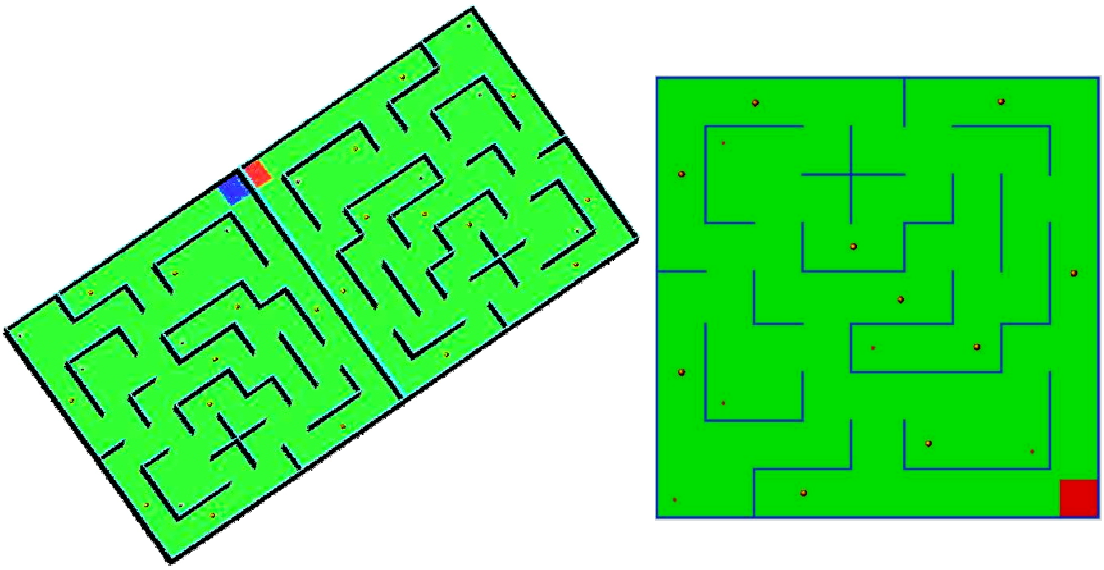


Figure 1

House general dimension = 96 (long) x 96 (width)
Color: Conifer 13339 ICI Dulux Pentalite Matt Wall Finish
White 101 ICI Dulux Pentalite Matt Wall Finish

Note: For detail of *house* dimension, kindly please download CAD files (AutoCAD compatible) from the website, www.unimap.edu.my/~muroc

Specifications for the *Victims* See Figure 2

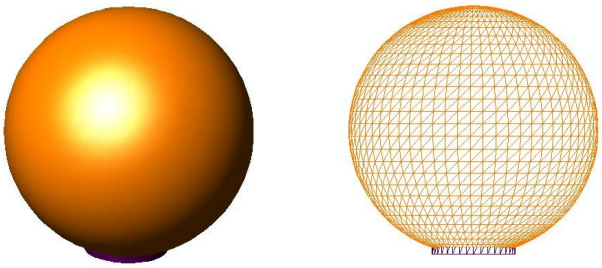


Figure 2

1. The *victim* is a standard ping pong ball with an orange in color.
2. The ball will be placed at the top of standard rubber o-ring with 0.5 outside diameter and 2mm thickness.

Specifications for the *Fire*

1. The fire is a standard emergency candle with 0.6 diameter.
2. The minimum and maximum height of the candle is 2 to 6
3. The candle will be placed on top of the nylon plate with 100mm diameter and 20mm thickness.

Game Procedure

Length of a match

1. Each match lasts three minutes.
2. In the following cases, a match ends even before the passage of 3 minutes.
    a. When the ***Rescue*** is achieved.
    b. In the event of disqualification.
    c. When the referees judge that continuation of the match is impossible.

Setting of robot

1. Only one robot is allowed to enter the game field. However, one reserve robot is allowed if the main robot cannot work before the game (during the setting time) is started.
2. One minute is provided for setting of robot before the start of each match.
3. Two members of each team may engage in setting of robot.
4. Any team that fails to complete setting of robots in one minute shall be able to resume the setting work once the match has begun.

Deployment of the robot and team members at the start of the match

1. The *Fire Fighting Robot* shall be placed in the *Start Zone*.
2. Team member responsible for starting the *Fire Fighting Robot* shall wait near their respective robot. They are allowed to start inside the *Game Area*.

Starting the *Fire Fighting Robot*

1. A team member shall start the *Fire Fighting Robot* by single switch operation.
2. After switching the robot ON, the team member who performs the starting operation shall immediately leave the *House*.

Competition Tasks

Once the match has begun, each team shall complete the tasks as below:

1. The task of rescue the victims (The *Task of Rescue*).
2. The task of extinguish the fire (The *Task of Fire Fighting*).

Task of Rescue

1. The robot shall collect the *victims* around the *house* and transport it back to the starting zone.

Task of Fire Fighting

1. The robot shall identify and extinguish the fires around the house **without touching** the fire source.
2. Water or any other liquid/powder is **not allowed** to be used as a mechanism to extinguish the fire.

How to achieve *Rescue*

1. The *Rescue* is achieved once a team s *Fire Fighting Robot* has collected all the *victims* and extinguishes all the *fires* in the *house*.
2. The referees shall judge whether the fires have been extinguished by inspection the candle fire.

***Retries* for Robots**

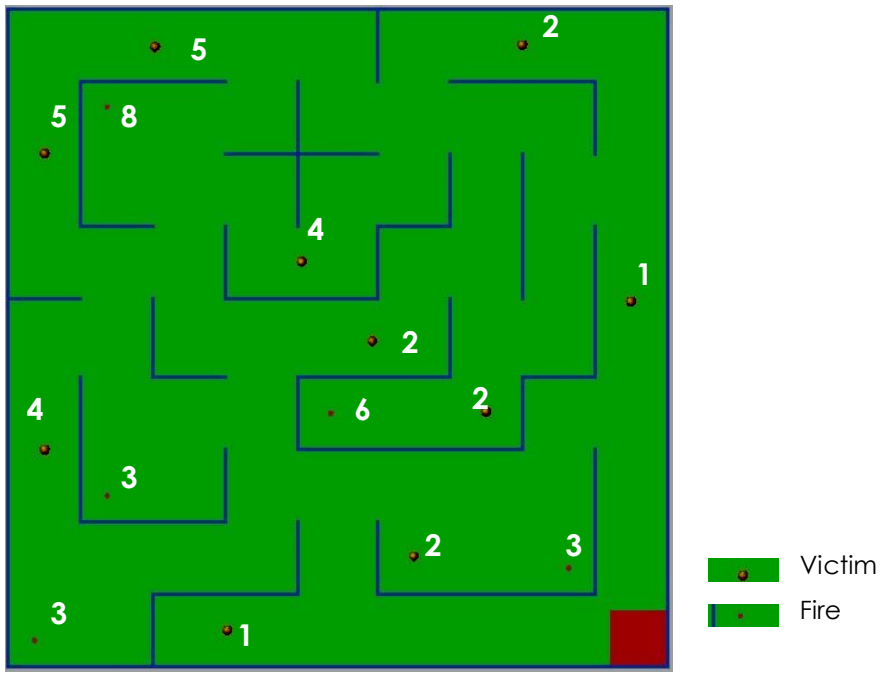
1. In the case of a violation, the referees shall instruct the team to start again (*Retry*).
2. In the case of faulty robot movements, it is possible to start again (*Retry*) with the referees permission.
3. Team members are permitted to touch the robots while preparing for a *Retry*.
4. *Retry* shall be made from the *Start Zone*.
5. At the time of the *Retry*, team members shall switch the robot on to start it. After switching the robot ON, the team member who performs the starting operation shall immediately leave the *House*.
6. Only a single switch operation is permitted for each robot.
7. *Retries* can be made as many times as necessary.
8. Strategies premised on the use of *Retries* are banned.

Deciding the Winner

1. The team whose *Fire Fighting Robot has* completed rescued the victims, extinguish the fires and return back to the starting zone shall achieve the *Rescue* and be the winner. This ends the match.
2. If neither team has achieved the *Rescue* at the end of the 3-minute match, the winner shall be decided in the following order of priority:

a. The team that has collected the greater points of victims and fires is the winner.
b. If the points are the same, the team that has extinguished greater number of fires points is the winner.

3. Points Each victim and fire is represented with specific points (as shown in figure below).



4. If the winner has not been settled by any of the above, the match shall be replayed or the winner shall be chosen by the judges.

Conditions and Points to Watch out for in Designing and Manufacturing Robots

1. Each team shall use only ONE robot. However, reserve robots (1 only) are allowed (during the setup time) if the main robots cannot work before the game started.
2. Each robot **MUST** use **AT LEAST ONE Microchip PIC® MCU** product, as the company is our Exclusive Technology Partner for this event. The construct of the robot should be design to enable easy inspection for the mentioned product at anytime.
3. The robots may not divide into sub-units.
4. No communication between the robot and operator.
5. The robot used in the contest must be handmade by students or staff of the university to which the team belongs.

The *Fire Fighting Robot*

1. The *Fire Fighting Robot* shall move automatically once it has been started by a team member.
2. The *Fire Fighting Robot* shall be started by a single switch operation.

3. The dimensions of the *Fire Fighting Robot* shall not exceed 150 mm (long) x 150 mm (wide) x 400 mm (tall). The robot cannot be expanded more than this dimension.
4. The robot must be powered not greater than 24 Volt.
5. The weight of the robot must not exceed 5kg.

Detailed rules on safety

1. The use of explosives, fire and dangerous chemicals is prohibited.
2. If a laser is used, it shall be of Class 2 or less. In designing and preparing the laser, full care must be taken to protect all persons at the venue from harm during all procedures. In particular, the beams must be so oriented that they cannot shine into the eyes of the spectators.

Examination of the robots

1. Participating robots shall be examined prior to the test run on the day before the contest and again on the day of the contest before it begins. A team that fails an examination shall not be allowed to participate in the test run or contest.
2. Details of what will be examined will be provided at a later date.

Violations

1. If a violation occurs, a *Retry* shall be made by bringing the robot back to the *Start*. The place and method of the *Retry* is laid down in Retries for Robots . 10 marks will be deducted from the final points. The following cases are violations:
   a. Any part of either robot or its operator enters onto the opposing team area or into the space above it.
   b. The any parts of the robot touch the *fire*.
2. Other actions that infringe on the rules without producing disqualification.

Disqualification

A team shall be disqualified if it commits any of the following during the match:

1. The team damages or tries to damage the *House* and/or facilities and equipment or opponent s robots.
2. The team s robot that has entered onto the opposing team *House* or into the space above it comes in contact with an opposing robot.
3. The team performs any act that is not in the spirit of fair play.
4. The team fails to obey instructions and/or warnings issued by the referees.

On the Safety of the Robots

1. All robots shall be so designed and manufactured as to pose no danger of any kind to any person in the venue.

2. All robots shall be so designed and manufactured as to cause no damage to any robot of an opposing team or the *House*.

Teams

1. Each participating university in the contest can be represented by one team only. UniMAP, as Host University, may be represented by two teams.
2. A team consists of two students and one instructor who all belong to the same university. The two students of the team are entitled to participate in the match itself. The organizer defines the term of student is undergraduate and postgraduate student.
3. In addition, a two-member pit crew can adjust the robots in the pit room and help to carry the robots to the *House*, but cannot participate in the match itself. The members of the pit crew must be students of the same university as the team.

Others

1. The legitimacy of any action not provided for in this rule book shall be subject to discretion of the referees.
2. The dimensions, weights etc. of the *House* and other facilities and equipment described in this rule book have a margin of error of plus or minus 5% unless otherwise stated.
3. All questions should be addressed to the official website of the Malaysia University Robot Competitions *(http://www.unimap.edu.my/~muroc)*. A Q&A section will be provided on the site.
4. Notification of any addition and/or correction to this rule book shall be made on the official web site.
5. The referees may demand additional explanations on safety issues when the safety of a robot is deemed to be in question.
6. No contact by means of a radio communication device and/or loudspeaker is permitted between team members and/or team members and any third party during a match.