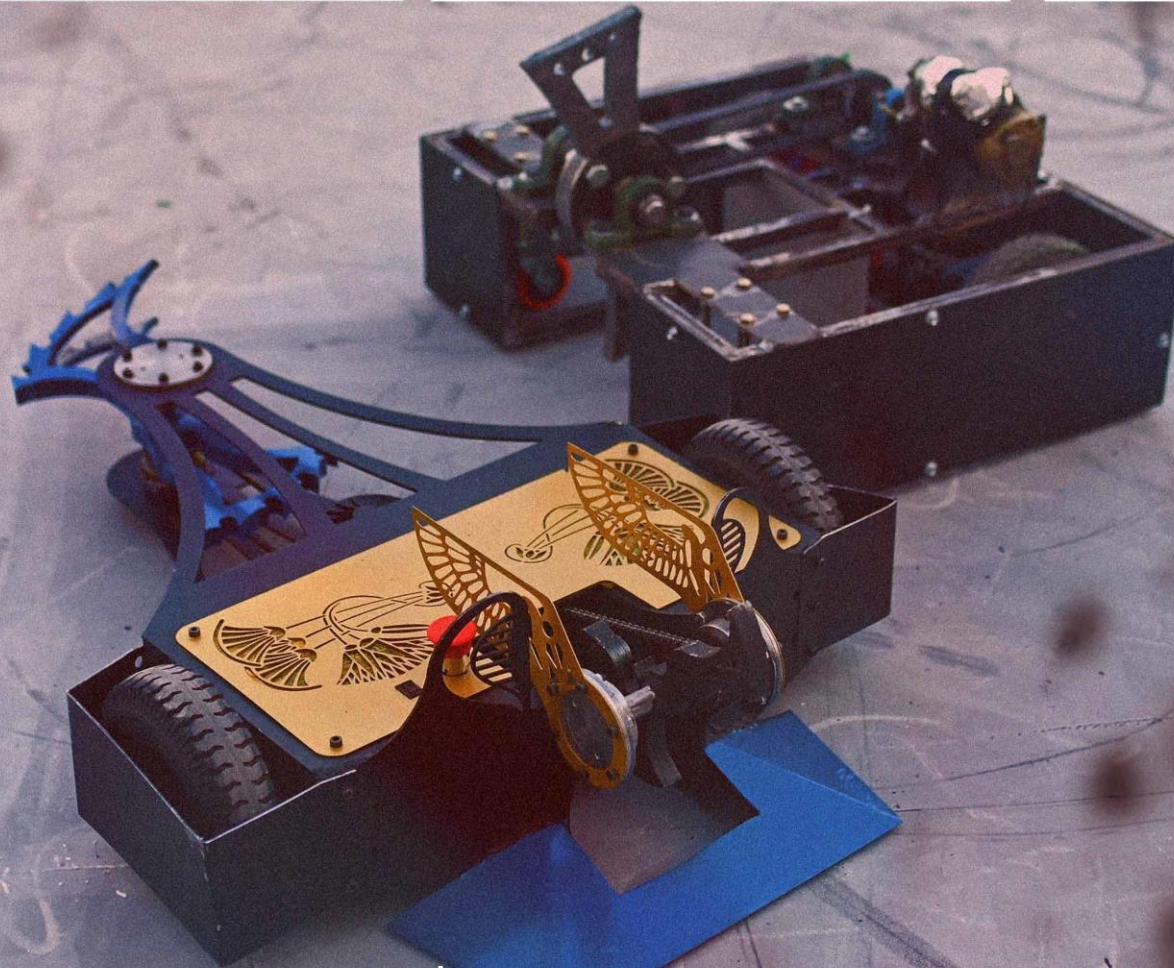


METAL
MONSTERS

Mini Fight Game
Rulebook 2022

Edition
Maker Faire Cairo



22nd October 2022

Smart Village Club, Smart Village, Giza

About Metal Monsters

Metal Monsters Fight (MMF) is the MENA region leading robot fight League since 2017, that runs a mid-weight, light-weight robot fight competition cup, show and a game, to spread out knowledge of robotics and technology among non-technicals via means of an entertaining show. And to encourage contestants to build robust reliable robots so as to enhance and develop their technical skills and abilities.

MMF Show

It is an entertaining robot fight show event where contestants can showcase and show off their robots that is held more than once a year.

MMF Cup

It is the mega annual event of the robot fight competition that gather all the pro contestants in one occasion.

MMF Game

It is an occasional light weight robot fight interactive game for amateurs where you can find in, clubs and gaming zones.

MMF TV

It is the online website series for several fight shows and competition highlights that are live streamed or recorded.

About The Contest – MMF Game Mini Edition “MMFG 1st

This competition is organized and prepared by Robocon Egypt in collaboration with San3a Tech and hosted by Maker Faire Cairo with their partner in Delta Group.

This version of Metal Monsters Fight Game (MMFG) 2022 is a light weight robot fight competition that contains only one arena activity for the contestants to perform dual fights.

Dual Fight Rounds

It is the fight round qualifying matches for the competition finals where only 2 opponent robots compete together. It is considered a double-sided game match that is contested by two teams at once and lasts for 2 minutes.

Quick Guide

Contest Theme "***Fight Till The Last Screw*** "

Contest is consisting of a number of matches. A match is contested by two teams at once and lasts for 2 minutes. Each team consists of 2 members at least and 4 members maximum. Each team should participate with only one robot, which is manually operated via means of wireless control.

Any one can participate in the MMFG from any age or any educational background. The registration starts from 1st of October to 15th of October 2022.

A robot can be built from different materials such as wood or acrylic and weighs 4 kg max with a maximum dimension of 40cm X 40cm X 20cm height.

Importance of Safety

Safety is the most important elements in the development of the Metal Monsters.

The safety of the designed robots is the first and foremost issue for the safety principle 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 by all people involved in the contest including officials, participants and spectators in all circumstances.

Teams are required to pay sufficient attention to the safety of their robots before applying to take part in the contest.

CONTENT

About Metal Monsters	1
Content	5
Types of combat robots	6
1. Registration & Timeline	11
2. Terms & Definitions	12
3. Games procedures	13
4. Teams	14
5. Robot design aspects	15
6. Robot control	16
7. Robot personality & theme	17
8. Weaponizing	18
9. Robot design restrictions	19
10. Winners	20
11. Evaluation	21
12. Disqualifications	23
13. Judges	24
14. Game field "Arena"	25
15. Awards	27

Types of combat robots

Robots can be classified into various categories according to weapons, playing strategy or even construction and mechanisms used. Throughout these types of competitions there have been a various number of designs, but there are some basic designs that always popup, and those are what is mentioned below.

- **Wedge**

A wedge is a combat robot that is designed with an incline plane on the front of it. The whole point of a wedge is to give the robot the ability to pick up its opponent and drive them into the wall of the arena or some other hazard.



- **Spinner**

The spinner combat robot is considered the perfect one to offense and defense assuming it stays alive. To classify a robot as spinner one the outside of the robot spins, or the entire top spins. The reason why this robot is perfect to offense and defense is because its offense is its defense. While hitting a spinner one your robot is also going to take damage unless it can get under the spinner, making the wedge robot the spinner robots kryptonite. Spinner bots are also destructive to themselves, so the team should be prepared and bring a lot of spare parts.



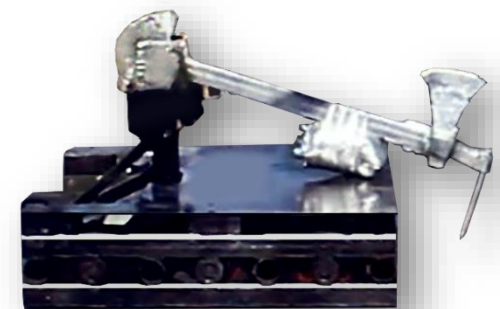
- Drum

Drum bots are the heavy hitter's types. The way a drum robot works is it has a huge rotating mass on the front. If the drum is designed correctly it will have the capability of throwing other robots up into the air or into the side of arena's wall. However, due to the heavy mass rotating at a high rpm, these robots can be difficult to control. The reason for this is because the high moment of inertia will make the robot want to flip over as it turns.



- Crusher

The crusher robot has a vice like crusher designed to hold and possibly bend the other robot's frame. If a team decided to design one of these types of bots, then they should spend a lot of time practicing their driving. Since not only will they have to be able to drive well but they will need good timing to catch or grip the other bot. Also, they need to become acquainted with the match's rules, since METAL MONSTERS competition has limits according to rules below organizing the amount of time a robot can hold opponent one before it let it go. Finally, during the design process the team needs to consider the weight of their crusher system since it will need to deliver a large amount of force, but can't go over the weight limit.



- Flipper

The flipper robot has an arm normally tied to a powerful pneumatic system that is used to flip opponent's robot over. Similar to the crusher a team will need to have a good driver that has good reflexes to operate this bot. If a flipper operates off of a pneumatic system then the operator also needs to realize that he will have a limited amount of time he can use the flipper arm before the air tanks run out of air. Finally, if the arm isn't durable enough it could easily be torn off by a spinner or a drum robot, leaving it defenseless if that was its only form of offense.



- Hybrid

Hybrids combine the styles listed above. By doing this a team would be giving their robot added design features that could be used as secondary weapon. The biggest issue of doing this is it will increase the time for their design process, and they will have to pay more attention to their weight. Also, it is difficult to put and secondary features on a spinner.

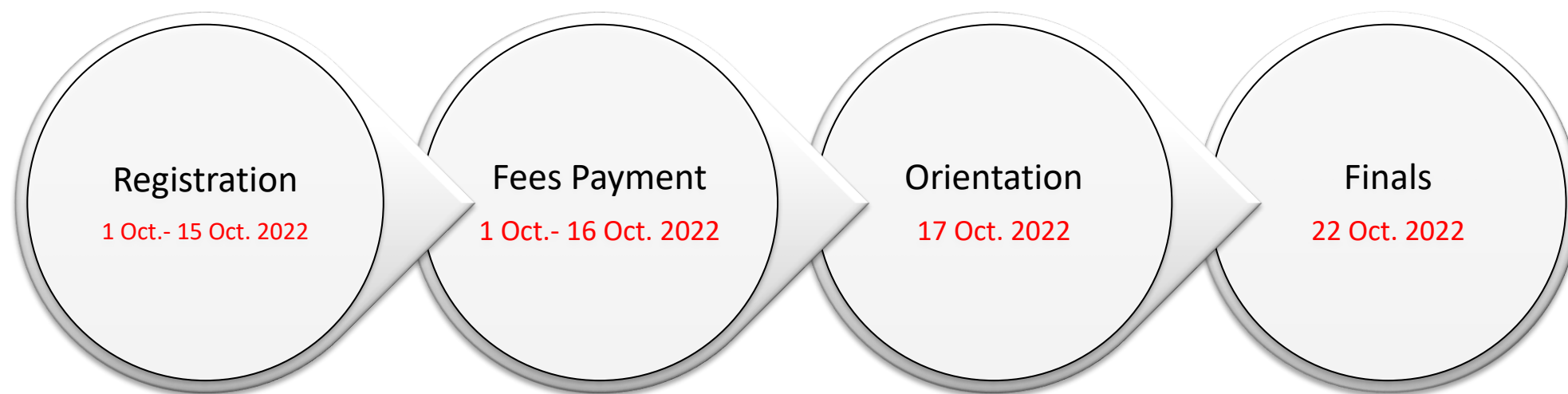


- Others

Types mentioned above are not the only designs that can be used when creating a combat robot. They are however the most common. As it is mentioned at the beginning it is possible to create the best fighter according to team vision and skills, and there are limitless ideas that could come up with. Also, as organizers for the METAL MONSTERS competition, we actually like to see this creativity.



1. Registration & Timeline



2. Terms & definitions

Game	When mentioned, it refers to the whole game time including setting time and competing time "match time".
Match	When mentioned, it refers to the competing time which is 2 minutes after the setting time.
Setting time	30 seconds are given before the match time to set and place robots at their specific start zones.
Organizers	Metal Monsters crew members and their partners.
K.O.	When a robot is totally smashed and disabled by the opponent's robot it is said to be K.O – Knocked Out.
W-W	Weapon to Weapon attack, when a robot tries to attack opponent's robot weapon.

3. Game procedures

Once the game has begun, each team has to follow the following sequences:

3.1 Setting of robots

- 3.1.1 30 seconds are given for setting and deployment of robots in the arena before the match starts.
- 3.1.2 Code uploading to robots is allowed during the "Setting time"
- 3.1.3 AC plugs and electric power sources are not allowed to be used inside or around the arena.
- 3.1.4 At the end of the setting time, Arena referee whistles and the team members should leave the arena immediately.
- 3.1.5 Any team that fails to complete setting of the robots within setting time should leave the arena immediately, it is prohibited to complete setting after the start whistle.
- 3.1.6 Only two team members from a team are allowed to set robot within the setting time.
- 3.1.7 Only the two team members are allowed to operate and control the robot during the match.
- 3.1.8 Team members and the pit crew members are not allowed to get into the arena during the match.
- 3.1.9 It is not allowed to operate a robot during the setting time.

3.2 Game procedures

- 3.2.1 Game begins after a permission from the arena referee, each team should get into the field and place their robot on their specific start zones
- 3.2.2 Arena referee whistles to start two minutes setting time, team members should begin setting and preparing their robots for the match.
- 3.2.3 Robots must be set at their specific start zones.
- 3.2.4 At the end of the setting time the arena referee whistles, and team members should evacuate the battle field immediately.
- 3.2.5 All team members take their places outside around the arena waiting for the whistle of the arena referee to start the match.
- 3.2.6 Each match lasts for 2 minutes.
- 3.2.7 Teams are allowed to operate their robots only after the arena referee whistle of the match beginning.
- 3.2.8 After the start of the match teams should fight to decide the winner and it is prohibited to get into the arena during the match time.

4. Teams

- 4.1 Team consists at least of two members and at maximum four members.
- 4.2 Players in one team may be from different ages and different backgrounds.
- 4.3 The team consists of two main players called "team members" that can participate during the game at the game field.
- 4.4 Other team members aren't allowed to participate during the game, they are allowed to assist in outside before the game, and they are named "pit crew".
- 4.5 Only the team members are allowed to participate to set the robot during the setting time.

5. Robot design aspects

- 5.1 Each team has to build one manual remotely controlled machines.
- 5.2 All robots must have an attractive appearance of design and colors.
- 5.3 All machines must be safely activated and deactivated.
- 5.4 Robot can be divided or split into sub-units or connected by flexible cords.
- 5.5 Robot dimensions must not exceed (40X40X20) cm (Width X Length X Height).
- 5.6 Robot total weight must not exceed 4Kg.
- 5.7 Robots must be manually operated via means of wireless remote controllers.
- 5.8 The voltage of the power sources used is DC and has no voltage limitation.
- 5.9 Readymade robots are allowed to be used like robot kits, self-built robots by team members.
- 5.10 For safety issues mechanical emergency master switch is required to directly shut off electric power of the whole robot system.
- 5.11 More than one emergency button is also allowed as long as it is reachable and easy to use by any of the operators.
- 5.12 Jumper plugs can be also used instead of a switch as an alternative to either type of switches.
- 5.13 All batteries and terminals should be isolated and protected well from any direct or indirect short circuit.
- 5.14 All wires and electrical system must be inside the robot.
- 5.15 A robot chassis / body must be built totally from wooden or plastic materials.
- 5.16 Using pneumatics or hydraulics is not allowed, *"Dampers are allowed"*.

6. Robot control

- 6.1 Each robot must be controlled via a reliable remote controller e.g. commercial RC controller.
- 6.2 It is preferred to use commercial RC controllers due to its high reliability as we recommend to use RC system that uses a form of Digital Spread Spectrum DSS communication with automatic pairing between the transmitter and receiver.
- 6.3 All automatic moves and functions are allowed provided you are able to remotely disable or override those functions at any time.
- 6.4 There is no prohibited control technique, but your control system should be reliable and stable.
- 6.5 All of readymade controllers, their peripherals and shields are allowed to be used.
- 6.6 Using mobile phone as a controller is also allowed.

7. Robot personality & theme

- 7.1 Each robot must have its own unique personality.
- 7.2 Robot personality can be inspired from nature, animals, manmade elements, etc
- 7.3 Personality must be shown clearly in the mechanical design, colors, and decoration of the robot.
- 7.4 The robot theme must be original.

8. Weaponizing

A weapon is that part of the robot that is powered to fight other robots, crash and smash them. Robots must have real weapon so as to compete at the METAL MONSTERS as following:

8.1 Spinners

Spinners must be safe enough so it should follow the following rules:

8.1.1 Must have a mechanical emergency stop switch or a reachable fail/safe mechanism that shuts the power off.

8.1.2 Switch may be upside or downside the robot.

8.1.3 Spinners must be able to reach zero speed from maximum speed within 30 seconds.

8.2 Flippers

A METAL MONSTERS robot can flip using any of the allowed mechanisms and techniques mentioned before such electric motors driven mechanisms.

8.3 Hybrid or multiple weapon

A METAL MONSTERS robot may include more than one weapon beside that the ability to use modular interchangeable weapons within robot design limits and is considered as a spare part.

9. Robot design restrictions

All of these restrictions below were tailored for our safety and not to cause any harm for any one during the game day.

- 9.1 Drones are not allowed.
- 9.2 Hydraulics are not allowed.
- 9.3 Pneumatics are not allowed.
- 9.4 Projectiles are not allowed.
- 9.5 Radioactive materials are prohibited.
- 9.6 Toxic metals, liquids and materials are not allowed.
- 9.7 Organic substances and materials are not allowed to be used except wood and its products.
- 9.8 Robot jamming and EMPs are prohibited.
- 9.9 Liquid pouring or liquid weapons are not allowed beside glues, grease, etc.
- 9.10 Any weapon or a way to harm any of the people outside the arena like smoke generators, bright lights and LASER are forbidden and is considered a disqualification.
- 9.11 Internal Combustion Engines are not allowed to be used.

10. Winners

A team is said to be winner in one of these cases:

- 10.1 Team can win by K.O., it occurs when knocking out the opponent team by Incapacitating their robot for 10 seconds.
- 10.2 If any of the teams failed to win by K.O., Then the winner is determined by score points. The team that gets higher score is the winner.
- 10.3 In case of drawing, the team who has the highest score points is the winner.

11. Evaluation

All of the following evaluation methods and calculations are only applied if one of the two contestant teams fail to knock out the opponent team "K.O.", score points will be classified and calculated as following:

11.1 Hitting

11.1.1 Move is considered a hit when is caused by a robot or one of its weapons with an intention of pushing away the opponent.

11.1.2 Hitting type is determined by two factors (Power of the hit – Reaction of the opponent's robot – effect of the hit by the opponent's robot) and decided be field judge.

11.2 Aggression & Meekness

11.2.1 A robot is awarded +ve score for its aggressive attitude & -ve points are deducted for its meek attitude.

11.2.2 Aggression is the intention to attack the opponent robot with high frequency of trials at time

11.2.3 A robot is described to be aggressive when trying to attack an opponent using a powered weapon.

11.2.4 Meekness is the intention to withdraw, run, and avoid opponent attacks without an intention to maneuver or to respond to the attack.

11.2.5 A robot is described to be meek when not trying to attack the opponent.

11.2.6 A meek robot has a low attack frequency of average 10 seconds between each attack trial evaluated by the field judge.

*All score points, hits, flips points are decided and estimated by the field judges.

Hitting					
Soft	Soft hit occurs when causing trivial damage to the opponent's robot				+1
Hard	Hard hit occurs when causing serious damage to the opponent's robot				+4
Weapon	Weapon-to-Weapon hit occurs when attacking opponent powered/broken weapon				+6
Aggression & Meekness					
Aggression			Meekness		
Normal Attack	The robot tries to hit the opponent	+1	Escape	-ve 1 point is deducted for a low freq. meek robot for each escape	-1
Powered Attack	Trying to hit with a powered weapon	+2	Stop	-ve 2 points are deducted every 5 secs. for a stopping robot	-2
Powered W-W Attack	Trying to hit opponent weapon by a powered weapon.	+6			

12. Disqualifications

A team is said to be disqualified and out of the contest if it commits any of the following:

- 12.1 Intention of harming the arena walls, ceiling and floor.
- 12.2 Causing any types of harm to the people outside the arena is considered a disqualification.
- 12.3 A robot without proper protection is not allowed to participate.
- 12.4 Remote control interference with others is an acceptable reason for disqualification.
- 12.5 A team that fails to pass the technical inspection (*Weight-Dimensions-Safety*) is considered to be disqualified.
- 12.6 A team that fails to obey safety rules and guidelines during the game days is out of the contest.

13. Judges

Chief Judge the Head Judge is responsible for all other judges and make sure that all of process going straight. and decide in the case of a tie between the Judges.

Field Judges There are 2 Judges for each Match. Two judges, one for each team to calculate team score. And the third judge (Organizer) for timing and any violations during the matches like: Starting Matches, Stopping Matches early, Declaring a win by KO , Declaring and administering Timeouts and Watching for safety violations.

13.1 Judges' Duties

1. Deciding the outcome of matches that do not end in early termination.
2. Provide information to Metal Monsters officers regarding the disqualification of teams and their robots
3. Fulfill all documents required and provide it to Metal Monsters Officers.
4. Perform the needed robot internal inspections and functional tests

14. Game Field "Arena"

Gamefield is mainly consisting of two main areas (Arena– Operators Area)

14.1 Arena

14.1.1 It is the ground where robots are supposed to compete and smash.

14.1.2 Arena is a plain square area with an internal dimension of 3m length and 3m width.

14.1.3 Arena ground floor and fencing is constructed from wood.

14.1.4 Arena surrounding fence height is 20cm.

14.2 Safe area

14.2.1 It is the area between the outer fencing and inner fencing which is almost 1m.

14.3 Operators' area

14.3.1 It is the area around the arena where robot operators control their robot with a width of 1m.



15. Awards

All of the top 3 winning teams are free to participate in the ARC 2023 Metal Monsters without enrolling to the filtration system.

- 1st place winner is exempted from registration fees & gets paid accommodation & essential components kit at ARC 2023.
- 2nd place winner is exempted from registration fees & gets paid accommodation & essential components kit at ARC 2023.
- 3rd place winner is exempted from registration fees & gets paid accommodation & essential components kit at ARC 2023.