



ME/MET CAPSTONE BATTLE-BOTS COMPETITION

Spirit of the Competition:

The MIE Capstone Battle-bots competition is intended to showcase student design innovation in a challenging, fun and entertaining event. The objective during combat is to disable the opponents Battle-bot while surviving to fight another round. Student groups will create original designs consisting of unique primary structure and weaponry, with either new or re-purposed motors, batteries and drive system components. It is anticipated that robots will be controlled using off-the-shelf wireless communications systems, although original communication equipment designs are acceptable. The ability to integrate purpose-built parts with off-the-shelf components is the key to a successful entry.

Design Rules and Constraints:

- The completed device in final fighting configuration must not weigh more than 25 lbf. Peripheral equipment such as wireless joystick controls or laptop computers running remote control software will not be counted towards this weight limit.
- The completed device in final fighting configuration must fit within an 18 inch cube. It is permissible to incorporate extendable arms, flails, chains, clubs, batons, etc. - but any such device must stow within the specified 18 inch cube.
- The following weapons limitations will be enforced:
 - No Flames or flaming liquids,
 - No chemical weapons such as strong acids or bases,
 - No untethered projectiles,
 - No explosives or explosively-driven weaponry (e.g. no cartridges)
 - No blades, spears, or edged weapons.
- The minimum radius of any exposed edge – including frame elements, weapons, etc. is 1/8 inch.
- Cost must be under \$1000. This cost is defined as actual expenses, and will be determined from purchasing receipts that must be retained and submitted as part of the design report.
- The use of re-purposed components or equipment is encouraged. Scrap materials or used components must be listed in the design report parts list and actual costs must be accounted for – even if cost is \$0.
- No pre-assembled robot, remotely operated vehicle, toy, or device of any kind may be used as primary structure 'parts'. (e.g. It would be considered a violation of the spirit of the competition to simply armor an off-the-shelf remote-control vehicle.) It is however permissible to re-purpose control systems from such vehicles or devices for use in an otherwise original design.
- A design review will be held prior to the match to ensure conformance with all rules and the spirit of the competition.
- Each Bot must contain a remotely-operated master power disconnect switch. When activated, all power to all electrical systems must be disconnected. This switch should ideally be controlled via a channel on the remote control unit.

Judging:

- The course instructors and TEAM faculty advisors will serve as the judges for all phases of this competition. Any rules clarifications or declarations will be the responsibility of the judges, whose decisions are binding.
- Requests for rules clarifications should be submitted via email to all design judges as early as possible, ideally well- prior to purchase or fabrication of materials or parts.
- Judges will also judge the match, as defined below.

The Battle: *The battle is modeled after amateur boxing match, with a few modifications*

- The battle consists of three 3-minute rounds, separated by 5-minute breaks
- All participating Bots will be placed in the ring simultaneously.
- A referee will be present to officiate the bout, award points, declare Knockouts, Technical Knockouts, monitor Bot & Team activity, and rule on any other items as they come up.
- Any unsportsmanlike conduct by teams such as intentional sabotage or other shenanigans will be penalized. Severe cases will result in team disqualification. The Bot of a disqualified team will remain in the ring un-powered, to be utilized as an obstacle for the remaining Bots.
- During the match the referee's word is final.
- At the end of each round of fighting, the judges (four team advisors and instructor) will award the round to one of the four Bots, determined by the majority of judges. Draws are possible in the case of no clear winner.
- A Knockout (KO) will be declared by the referee at the conclusion of a round if during the round a Bot is rendered "unconscious" – immobile and unresponsive to commands. A Technical Knockout (TKO) will be declared at the conclusion of a round if during the round a Bot becomes semi-responsive but incapacitated and unable to continue fighting; helpless. In either case, the round will not be stopped by the referee: Rather, the round will be allowed to continue for the full 3 minute duration. Any bot suffering a knockout or TKO will lose that round.
- If a Bot suffered a KO or TKO cannot be repaired during the 5- minute inter-round break, and cannot continue with the match, it will be declared a loser but must remain in the ring for the duration of the Battle to serve as an obstacle for the remaining, functioning Bots.
 - A Bot may be ahead on rounds but still lose the fight in cases of a KO or TKO.
- Rounds and breaks timed by stopwatch with a bell to indicate end of each round.
- At end of each round, bots must cease fighting and return to corner (if still mobile)
- Operators will be permitted into the ring only between rounds, and may perform any repairs possible in the 5-minute time.
- Switching of battery packs, changing weapons, refilling, etc. is permitted only between rounds.
- Ring is square plywood enclosure, 20' X20', with 4' high walls and covered with a wire mesh containment screen, located outdoors on an asphalt parking lot or concrete walkway and may contain obstacles such as large rocks, blocks of wood, cinder blocks, broken Bots, etc. Active obstacles such as moving hammers, flails, and other devices may be present. The obstacles will be placed so that maneuvering around them is possible, and climbing over obstacles is optional. These obstacles are intended to force maneuverability provisions in robot design, and to provide temporary shelter for the robots during the match.
- The match will progress without regard for weather conditions including rain, snow, hail, etc.
- In the event that the score is tied at the end of 3 rounds a 4th 'Battle to the Death' round will be initiated, in which the Bots will go at it without breaks or intervention until one BOT emerges victorious.