

# Rules of Collegiate Mechatronic Football

## April 6, 2009

This document sets forth the rules for the game of Collegiate Mechatronic Football (CMF). During the 2009 Blue Gold Game of Mechatronic Football, ad hoc rule changes or modifications may be made during the game, but only if agreed upon by the Commissioners and both Squad Coaches.

### 1 Players and Squads

1. The game is played by two Squads of 8 mechatronic machines, referred to as “players”. No more than 8 players from one Squad are allowed on the field during a play. A 5 foot delay of game penalty is assessed against the Squad with the excess of players.
2. A Squad is required to be able to field a minimum of 5 players on the field. Failure to do so results in a forfeiture of the game by the offending Squad.
3. A Squad can have no more than 16 players on its Roster.
4. Players can only be DC powered, with a maximum of 24 volts.
5. Any lead acid batteries must be sealed.
6. For 2009 there are no height or weight restrictions. In future years, no player can weigh more than 20 pounds or extend vertically more than 36 inches above the ground.
7. A coin toss before the game determines initial possession. Each Squad will designate a human as the Squad’s Coach. The Squad Coach will be present for the coin toss. The Squad Coach will act as the sole representative of the Squad in all communications with the Referees.
8. Squads may substitute players between plays and during time outs.
9. Players will be remote controlled using controllers provided by the Commissioners of CMF. Squads may modify their remote controllers as they see fit, however they cannot interfere with the signals broadcast from the opposing Squad *if* the opposing Squad has not modified their controllers.
10. Embedded intelligence and autonomous actions by players is strongly encouraged.
11. Players must incorporate a microprocessor in some significant fashion.
12. To an elevation of 6 inches above the ground, all players must have a 14 inch square footprint. Above 6 inches, the players can have any shape desired, they just cannot exceed the 14 inch square footprint.
13. Force/tackle/agonny sensors (FTA sensors) provided by the Commissioners of CMF must be attached to all players at an elevation 6 ( $\pm 0.25$ ) inches from the ground to their centerlines. The FTA sensors will attach at the periphery of a player’s 14 inch square footprint and will thus extend beyond the machine’s footprint. Any form of tampering with the sensors is prohibited. After the 2009 season, the elevation tolerance is reduced to ( $\pm 0.15$ ) inches and the centerlines of the provided FTA sensors will be marked.
14. All players except the quarterback must be contained within their 14 inch square footprint before the start of play. The Quarterback may reach out from beyond this footprint only to take the ball from the center.
15. Players can have no more than 2 extensible arms
16. Arms cannot extend horizontally more than 18 inches from a player’s 14 inch square footprint. Rule 1.6 limits vertical arm extensions.

17. Arms can consist of only rotational joints.
18. Portions of the arm that extend beyond a player's footprint can have no cross sectional dimensions greater than 3 inches, except for the terminus of the arm, which may be larger, equivalent to the amount a human hand is larger than a human arm. In years after 2009, the terminus is considered the final 4 inches of the arm and that portion is constrained to have a cross sectional dimension no greater than 5 inches.

## 2 The Playing Field & and Ball Positioning

1. The game will be played on an NCAA size basketball court, which is 94 feet long and 50 feet wide.
2. End zones will extend 15 feet past the goal lines.
3. From end to end, the court (the playing field) will be divided into equal  $\frac{94}{3}$  feet (i.e. 376 inch) thirds.
4. At the beginning of each half, or after a touchdown, the Receiving Squad begins play at the one-third mark of their own territory. There is no actual kicking of the ball.
5. A first down is realized when a one-third span of the field is covered within 4 plays.
6. The Offensive Squad is allowed to punt the ball on 4<sup>th</sup> down. On 4<sup>th</sup> down the the Offense's Squad Coach will verbally declare to the Referees what they wish to do, go for 1<sup>st</sup> down, or punt. The Referee will confirm the choice. After confirmation, the Offense may not change their mind unless they use a timeout. The Squad receiving the punt will take possession of the ball at the one-third field mark of its territory. There is no actual kicking of the ball.
7. A player is considered out of bounds when any portion of its 14 inch square footprint is crossing the inside of a sideline.
8. Players can be located anywhere on their designated sideline when off the field of play.
9. Individuals operating remote controllers and Coaches may be located anywhere in the stadium, except during a play, in which case they are not allowed on the playing field.
10. After each play the Referee carries the ball back to the approximate center of the field and spots the line of scrimmage. The Referee indicates the line of scrimmage with a pointed toe touching the ground. This is called a "toe spot". If yardage was gained in the previous play, the new line of scrimmage will be toe spotted at the point of maximum forward progress of the ball. If yardage was lost, the new line of scrimmage will be toe spotted at the point the ball was located when the player was tackled. The Offensive Center will then line up with its leading edge on the line of scrimmage as indicated by the Referee's toe spot, and a human member of the Offensive Squad will place the ball onto the Offensive Center.
11. In the event a player
  - (a) loses their FTA sensor,
  - (b) has an FTA sensor that is not mounted within the specified tolerance,
  - (c) has an FTA sensor that is shielded, or
  - (d) has an FTA sensor that is not energized,
 that player will be tagged and touching of that player by *any other player* (Offensive or Defensive) will constitute a tackle.
12. If a ball carrier loses control of the ball and the ball touches the ground, the ball is considered fumbled. The Squad which first touches a fumbled ball gains possession. The Offensive Team cannot advance the ball past the point of the fumble. If the Defense can pick up the ball, the Defense may further advance the ball until tackled.

13. If the Quarterback should drop the ball or cause the ball to fall to the ground from the center, it is considered a fumble and the ball is live.
14. Any ball that hits the ceiling will remain in play until the ball touches the ground, whereupon it is considered a dead ball.
15. If both Squads are tied after regulation the game will end in a draw.

### 3 Game Timing

1. The game consists of two 20 minute halves and a 10 minute halftime.
2. Running time is used. Clock stoppage occurs when,
  - (a) the ball carrier steps out of bounds, or
  - (b) when there is an incomplete pass, or
  - (c) when there is a change in ball possession, or
  - (d) when a score is achieved, or
  - (e) when a time out is called.
3. Referees may call an official timeout at any time, for any purpose and for any length of time.
4. If a player's FTA sensor is damaged (e.g. it is falling apart), the Referee will call an official timeout so that player's equipment can be fixed. This does not apply to when the FTA sensor falls off a player.
5. After toe spotting the ball, the Referee signals the Timekeeper to start the 25 second clock.
6. A play is initiated the moment the Quarterback separates the ball from the Center. The Center is not allowed to move the ball.
7. The Offense has the 25 seconds from the time when the Referee toe spots the line of scrimmage to initiate play. During this 25 seconds humans from the Offense and Defense are allowed on the field to position and substitute their players. Humans should make every effort to be off the field after the 25 seconds has expired.
8. If a human is not off the field after 25 seconds, the offending Squad will be charged a 20 foot interference penalty *only* if the human should contact any player, or Referee or the ball. The offending Squad will also be charged a time out.
9. Each Squad is allowed 2 timeouts per half. A time out can only be designated by the Squad Coach, by forming a T with their hands. It is advised they attempt to attract the attention of a Referee so the time out can be recognized. Each timeout is of 1 minute duration maximum. The timeout clock starts 25 seconds after the Referee has toe spotted the line of scrimmage. During a time out humans are allowed on the field for any purpose.
10. The Offense must initiate a play before the 1 minute time out has elapsed. After the time out has expired, Rule 3.7 applies for humans still on the field.
11. If a Squad calls a time out after all time outs have been used, that Squad will be charged with a 5 foot delay of game penalty.
12. The Referee may allow whatever time is necessary to remove an injured player from the field.

## 4 Scoring Rules

1. A touchdown is worth 7 points.
2. There are no point after attempts or field goals.
3. A completed hand off is worth 1 point.
4. A completed pass of 5-15 feet is worth 2 points. This is a *short pass*.
5. If a short pass is intercepted, 2 points are awarded to the defense.
6. A completed pass of more than 15 feet is worth 3 points. This is a *long pass*.
7. If a long pass is intercepted 3 points are awarded to the defense.
8. A ball downed in an Offensive Squad's end zone results in a Safety, with 2 points being awarded to the Defensive Squad. The Defensive Squad then takes Offensive possession of the ball on the one-third mark of its territory.

## 5 Offense

1. The game is played using the miniature souvenir football provided by the Commissioners. Alternate balls may be used with approval by the Commissioners.
2. Minor modifications to the ball may be allowed with the approval of the Commissioners.
3. Before the game can begin, each Squad's Offense must demonstrate the ability of the Quarterback to take the ball from the center. If a Squad's Offense is not capable of this, that Squad forfeits the game.
4. Two on one blocking is allowed.
5. Only 1 player in the backfield can be in motion at the snap of the ball and that player must be running parallel to, or away from, the line of scrimmage. More than 1 player in the backfield can initially shift, however all backfield players must be set for 1 second before the player goes in motion. Violation results in a backfield in motion penalty of 5 feet from the original line of scrimmage.
6. All players, including the linemen, are eligible to run down field and catch passes. Receivers can all line up on one side. There does not have to be a balanced wide receiver set.
7. The Quarterback must take the ball from the center.
8. Stiff-arming is illegal in 2009 but will be permitted in all subsequent years.
9. A player carrying/holding the ball must expose at least 60% of the ball's surface. As such the ball is referred to as being "held", otherwise the ball is said to be "contained". The exception to this rule is the Quarterback. During a pass attempt the ball may be contained by the quarterback. When the ball is contained by the Quarterback, the Quarterback will not be awarded any yardage gained by rushing. To advance the ball by rushing, the Quarterback must return the ball to a held position *before* beginning to advance the ball.
10. When the ball is being held by a player, the ball cannot shield the player's FTA sensor.
11. The ball cannot be advanced unless the player has the ball held by the end of the play, i.e. has established possession of the ball.
12. A pass which is never brought into possession by a Receiver and is dropped (due to a hit or for any reason) is considered an incomplete pass.
13. A hand off which is not brought into possession by a Running Back and is dropped (due to a hit or for any reason) is considered fumbled.

14. In 2009, all passes must be forward or parallel to the original line of scrimmage. In subsequent years reverse laterals, pitches or passes will be allowed. If the reverse lateral, pitch or pass is incomplete, the ball is considered live, as in a fumble.

## 6 Defense

1. Full rush is allowed on every down. The Defense may not make contact with the Offensive Center until the Quarterback has taken the ball from the center.
2. Only 1 defensive player is allowed to “Bump and Run” on any given Receiver, and only within 5 feet of the line of scrimmage. Beyond the 5 feet, there should be no *significant* contact between Receiver and Defender. The player guilty of initiating the contact will be charged with Offensive or Defensive pass interference.
3. A player in contact with the ball is tackled when the player’s FTA sensor turns blue. (This corresponds to when a force of 5 lb<sub>f</sub> is applied for a duration of 1 second to the FTA sensor of that player.) A player can be tackled by a member of its own Squad.

## 7 Offensive & Defensive Penalties

1. There is a 4 inch neutral zone on either side of the line of scrimmage. The only player allowed in the neutral zone before a play is initiated is the Offensive Center. A Lineman will be considered offside when it breaks the neutral zone prior to the snap, even if there is no contact made with the opponent. You are not allowed to jump back. The penalty will be 5 feet from the original line of scrimmage and a replay of the down.
2. When a defender makes contact with any ball carrier in a manner that is not deemed as an attempt to either knock the ball loose or to tackle the ball carrier, the defender is guilty of a “roughing” penalty of twenty feet. In the event of such a penalty, if the ball carrier has been damaged, it becomes the discretion of the Referees to either disable an equivalent player on the offending Squad or require the offending Squad to forfeit the game.
3. The Offense and Defense are both required to have at least 4 players on the line of scrimmage at the time of the snap. The 4 players can be anywhere on the field laterally, as long as they are within 1 foot of the line of scrimmage. If either Squad fails to have 4 players on the line at the start of the play, a 5 foot delay of game penalty from the original line of scrimmage results.
4. Defensive pass interference will result in an automatic 1<sup>st</sup> down and 10 foot penalty marked from the spot of the foul.
5. Offensive pass interference will result in a loss of down and 10 foot penalty marked from the original line of scrimmage.
6. Taunting or verbal abuse by humans will not be tolerated. First offense results in a warning to the individual. A second offense by the individual results in a 20 foot penalty for unsportsmanlike conduct. A third offense by the individual results in immediate ejection from the game.
7. Offended Squads may decline penalties.