

OXSU 2024 Team Description

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Abstract. Oxsy team has been founded in July 2002 as a graduation project of one student, Sebastian Marian, in the field of Multi-Agent Systems [1] Lucian Blaga University (Sibiu - Romania). After graduation he continued the work on this project and eventually Oxsy team was born. As we started from scratch [2] our ideas, concepts and beliefs, have been implemented year by year, and today, we are happy to see our evolution, as our team was growing in these years, much more than we have expected from the beginning. If we will qualify for this year competition, we will reach at the 20th consecutive participation, in RoboCup [3] Soccer Simulation League.

Keywords: RoboCup, 2D Soccer Simulation, AI, Multi-agent Systems, Neural Network.

1 Introduction

In July 2003 at the RoboCup competition, which was held in Padua - Italy, we won the first round and for us it was a good surprise for the first year of participation. Then, in the next year, we participated in Lisbon - Portugal for the second time, and again we obtained a good result (11th place). In 2005 in Osaka – Japan, we participated for the third time and finally we entered in the first 8 teams of the Soccer Simulation League, as we won (8th place). In the following years, 2006 Bremen – Germany (7th place), 2007 Atlanta – Georgia (U.S.A) and 2008 Suzhou – China (5th place), our team has achieved better results. Finally, in 2009 in Graz, we entered in the first 3 teams in the Soccer Simulation League, as we won the (3rd place). The same result was achieved in 2010 in Singapore. In the following years our team has participated in every 2D Soccer Competition, achieving good experience but also very good results like: 2011 Istanbul - Turkey (4th place), 2012 Mexico City, 2013 Eindhoven – Netherlands (6th place). In 2014, in João Pessoa – Brazil, we stepped on the stage for the third time in our participation history, as we won the (3rd place) again. Good results came in the following years like: 2015 Hefei – China (4th place), 2016 Leipzig – Germany (5th place). In 2017 we came back from Nagoya with (3rd place) for the fourth time in our participation history. Then 2018 Montreal – Canada (4th place) and the first online competition, due to pandemic situation, held in 2021 (6th place). Also good results have been achieved in the following years like: 2022 Bangkok – Thailand (4th place) and 2023 Bordeaux – France (4th place). This year, the competition will be held in Eindhoven - Netherlands. As we already have a very good experience in 2D Soccer Simulation League, we hope that our new ideas and

improvements will be also reflected in the competition, where other tactical pieces developed will be tested as well.

2 Improving the defensive phase

The objective of the defensive phase [4] is to win the ball. A team's defensive and offensive phases are closely connected. The better a team's defense is at winning the ball, the more opportunities the team will have for a quick and decisive counterattack by the offense. Just as on offense, the defense needs a team strategy, through which, players could move in a coordinated way.

The necessary steps to winning control of the ball are shown in (Fig. 1.):

- Forcing the opponent's action towards certain zones of the field.
- Intercepting the ball using marking pressure and offside trap
- Adapting to the new situation [5]

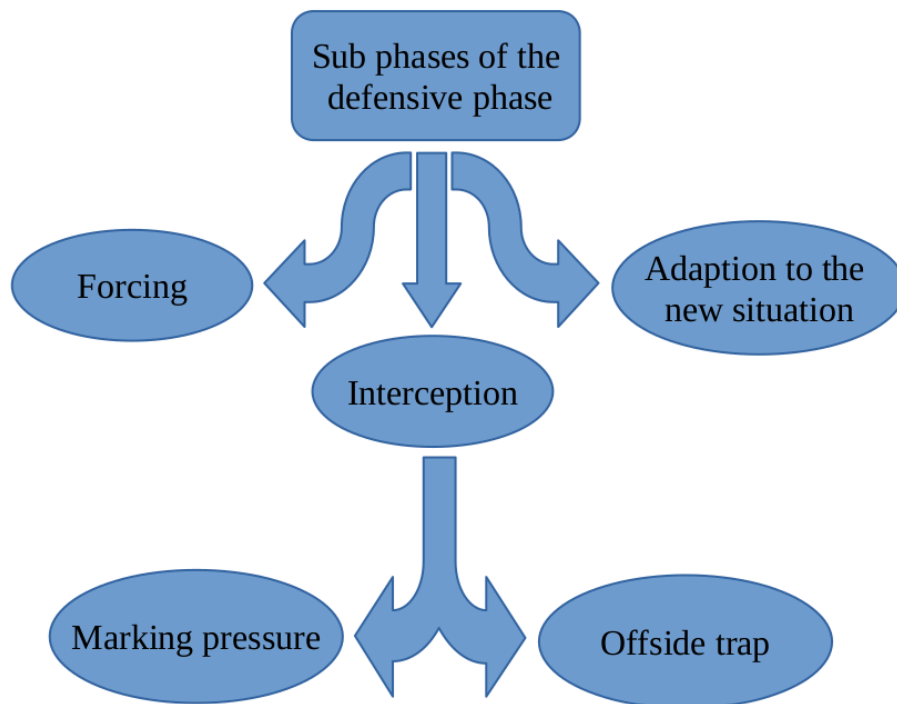


Fig. 1. The defensive sub phases

2.1 Definition and objectives of the defensive sub phases

Forcing: this refers to a movement which, by attacking the ball, aims at forcing the opponent either to play in a certain zone of the field, or to pass it at a certain time, that is, when the team is ready to intercept the ball. An example of forcing movement is when the offender attacks the opposing defender who has the ball, so as to force it to play the ball on the wings, where it is easier to double-team the receiver (with subsequent creation of a “weak side” on the other side). Other examples of forcing movements are when the defender plays for time while waiting for a teammate to double-team the opponent with the ball, and when the only space the defender leaves the opposing offender to dribble or pass is an unfavorable one.

Interception: after forcing the opponent’s action, the team and the individual player must be ready to get the ball control by intercepting it, either after a mistake done by the opponent controlling the ball or by intercepting the ball while it is being passed by applying individual marking, thus creating great pressure for the opponent attacker having the ball and by using offside trap in some certain situations.

Adaptation: after the defense intercepts the opponent’s action, there is the adaptation phase, with a counterattack if the control of the ball is won, or a return to one of the previous phases if the control of the ball has not been won yet.

2.2 Individual marking

Marking is the control of an attacking player carried out by a defender. He must place himself so that he can see both the ball and his direct opponent, making sure that the offender cannot receive the ball in depth. This is a defender's first essential target. Another important objective is to place himself in such a position, that he can attempt to anticipate and regain the possession, in case when the ball has been passed to his direct adversary. We make a classification of the ways in which marking can be carried out: [\[6\]](#)

- “T” marking;
- marking in the cone;
- marking in anticipation.

“T” marking. In “T” marking the control is fairly elastic. This type of marking is carried out on the weak side, on the player far away from his team mate in possession. The “T” is a useful way of subdividing the part of the playing field that separates the defender from the offender, so as to make a theoretical distinction between the area nearest to the defender and that nearest to the offender. Theoretically speaking, the “T” can help us understand in what part of the field the offender might receive the ball and where the defender will be able to contrast him. (Fig. 2.)

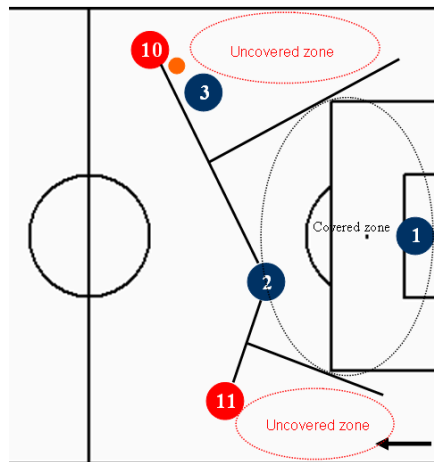


Fig. 2. The “T” marking for offender number 11 is right, because the closing line is outside the dangerous zone. Also the defender has a good position for covering offender number 10.

Marking in the cone. This type of marking refers to the position taken up by a defender, who is placed inside an imaginary triangle (or cone), which has as its base the goal line and its summit the offender who is to be controlled. This position allows the defender to stand between the offender and the goal he is defending, so that the offender cannot receive the ball in depth, but the defender can try to anticipate the ball if it is passed to his direct opponent. In any case, this placement will allow the defender to block the offender's way, even if he would receive the ball. (Fig. 3.)

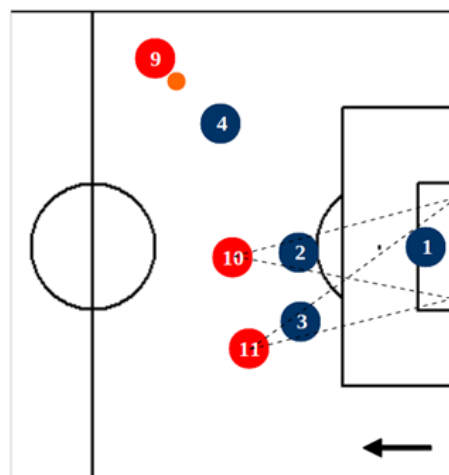


Fig. 3. Defenders number 2 and 3 marking in cone offenders 10 and 11.

Marking in anticipation [7]. This type of marking refers to the position taken up by a defender, who is placed between the offender who is to be controlled and his teammate who has the ball. In this way, he can anticipate a direct pass to the offender, but he must be sure that the offender can not receive the pass in depth.

Contrasting. When a defender faces an adversary in possession, we can say that he is “contrasting the ball”. We must also note that the defender doing the contrasting can:

- bide his time without putting too much pressure on the opponent in possession;
- making sure that the opponent in possession does not carry out certain plays;
- try to regain the possession.

When the opponent in possession enters in the zone of contrast, the defender must accompany the offender for a while, so as to 'tune in' on his speed. It is very important for the defender to follow the offender's movements briefly. At the same time, however, he must take the initiative.

Doubling up [8]. Doubling up is an intervention made to help a teammate, which already is occupied in contrasting an opponent in possession. Doubling up is not a movement made by two players attacking at the same time an adversary in possession, but is the movement of one player who goes to contrast an opponent in possession, who is already under pressure controlled by a teammate, to create a two against one situation. The minimum aim of doubling up is to make it difficult for the opponent in possession to move forward. The principle aim of doubling up, however, is to regain the possession of the ball. It is important that one of the two defenders should be trying to stop the opponent's forward movement towards the goal, while the other should be contrasting on the ball in order to get it back.

Covering. Tactically speaking, covering is a very important task. The defender can cover an opponent in possession or one without the ball. Covering can be carried out by a defender who is marking his adversary at the same time (Fig. 2.), or by a defender who is not marking. Covering a player in possession serves a double purpose. A defender in coverage can, as necessary, regain possession from a forward pass made by the opponent, or intervene in cases where the offender has got past a defender who was contrasting the ball.

2.3 Off-Side trap

In the general strategy of the team, the off-side trap could be defined as all these actions aiming at regaining possession of the ball, which can take place in two specific ways [9]:

- By receiving an indirect free kick;
- Taking the ball away from the opponents thanks to the application of pressure.

If we opt for the application of the off-side trap, the simultaneous application of pressure is absolutely essential. When applying an off-side trap, one of the two central defenders must “lead” the offside, calling the time of its execution even with a password. As we have already said, the off-side trap needs a simultaneous application of pressure; to leave the opponents off-side without applying pressure on the player with the ball, would mean to “invite” the latter to perform a single action, with a high chance of success.

(Fig. 4.) shows as a counter-attack by the opponents in conditions of numerical inferiority of defenders. Player “A” moves quickly forward with the ball, supported by offenders “B” and “C”. Given the numerical inferiority, the team applies the off-side trap as shown in the example.

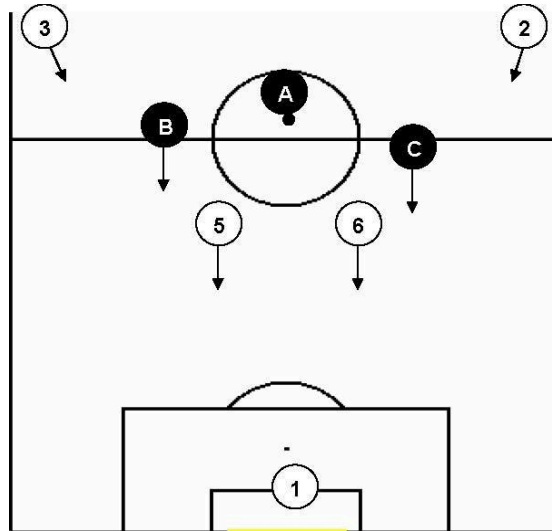


Fig. 4. Shows a counter-attack by the opponents in conditions of numerical inferiority.

From (Fig. 4.) to (Fig. 5.), we can see that number 5 and 6 playing for time and at the same time shorten their distance from the player with the ball. Besides giving other teammates (in this case, number 2 and 3) the time to return, the two central defenders aim at placing themselves along the same line.

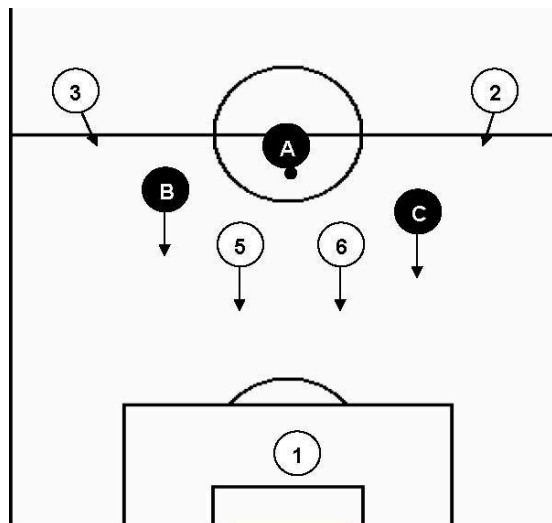


Fig. 5. We can see that number 5 and 6 are playing for time and at the same time shortening their distance from the player with the ball.

As soon as they are along the same line, the two defenders apply the off-side trap and at the same time apply pressure on the opponent "A" which controls the ball (Fig. 6.).

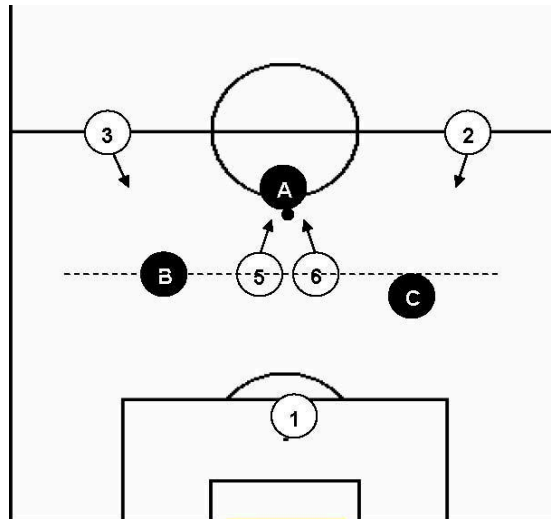


Fig. 6. The two defenders apply the off-side trap and at the same time apply pressure on the opponent "A" which controls the ball.

(Fig. 7.) shows the situation resulting from pressure aiming at leaving the opponents in off-side. It should be noticed that when the two central defenders apply the off-side trap, the goalkeeper is ready to get out of his penalty area.

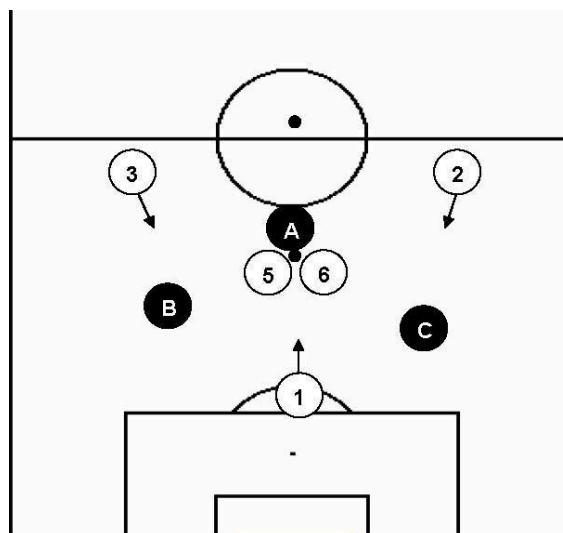


Fig. 7. Shows the situation resulting from pressure aiming at leaving the opponents in off-side.

3 Future work

For the next future, we want to continue the improvement of our defending and to pay more attention to all defensive sub-phases. In this way, we will analyze the role of the player(s) facing an opponent who has the ball, but at the same time we should not leave aside the importance of the players not facing the opponent with the ball. If we want to make each player to be extremely helpful to the whole team in the defensive phase, we must do a specific analysis of each defensive sub-phase as well. We should give special attention to the following: “How to tackle the opponent”, then we must define “Possible options when tackling the opponent who has the ball”, and also “When to give space”. Then we should throw an eye as we said, also on the players not facing the opponent with the ball and define their roles too. They could have any of the following tactical tasks: “The passive player”, “The player active in marking”, “The player active in intercepting the ball” or “The player active in tactical work”. Actually, we should reconsider all the necessary tactical steps needed to defend our goal, keeping in mind that individual actions are enhanced by well-organized team play.

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