# Marking using Prioritized Role Assignment

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This presentation gives an overview of a system for marking or covering players on an opposing soccer team so as to best prevent them from scoring. A basis for the marking system is the introduction of prioritized role assignment [2], an extension to SCRAM [1] dynamic role assignment used by the UT Austin Villa RoboCup 3D simulation team for formational positioning. When performing role assignment (assigning interchangeable agents to target positions on the field to move to), SCRAM prioritized role assignment recursively minimizes the longest distance that any agent has to travel (minimizing the makespan) to higher priority targets (e.g. target positions for marking opponents) while avoiding collisions.
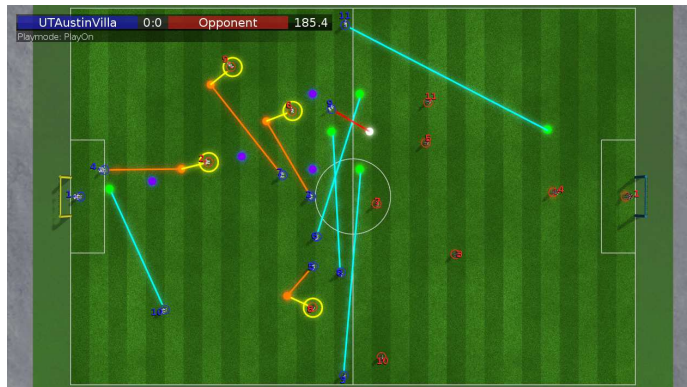
The marking system implemented by the UT Austin Villa team is a sequential process encompassing the following three steps shown in the above figure.

1. Decide *which players to mark* based on which opponents are in dangerous offensive positions. Opponent agents selected to be marked are circled in yellow.
2. Select *which formation roles to be replaced* with roles for marking. Green dots represent target formation positions with purple dots representing formation positions that have been selected to be replaced by the orange dot marking positions.
3. Use *prioritized role assignment* to assign players to positions. Orange lines show agents assigned to marking positions, light blue lines show agents assigned to target formation positions, and the red line shows the agent assigned to go to the ball.

The marking system has shown close to an order of magnitude decrease in goals against [2]. A demo of the marking system is included in the presentation.[1]

1. P. MacAlpine, E. Price, and P. Stone. SCRAM: Scalable collision-avoiding role assignment with minimal-makespan for formational positioning. In *Proceedings of the Twenty-Ninth AAAI Conference on Artificial Intelligence (AAAI)*, January 2015.
2. P. MacAlpine and P. Stone. Prioritized role assignment for marking. In *RoboCup 2016: Robot Soccer World Cup XX*, Lecture Notes in Artificial Intelligence. Springer Verlag, Berlin, 2016.

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[1] Videos of the marking system in action: `http://www.cs.utexas.edu/~AustinVilla/sim/3dsimulation/AustinVilla3DSimulationFiles/2016/html/marking.html`