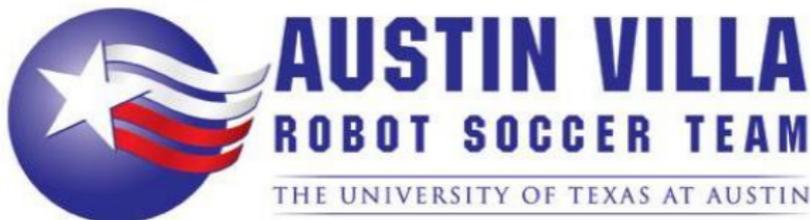


UT Austin Villa: Marking using Prioritized Role Assignment

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RoboCup 2016

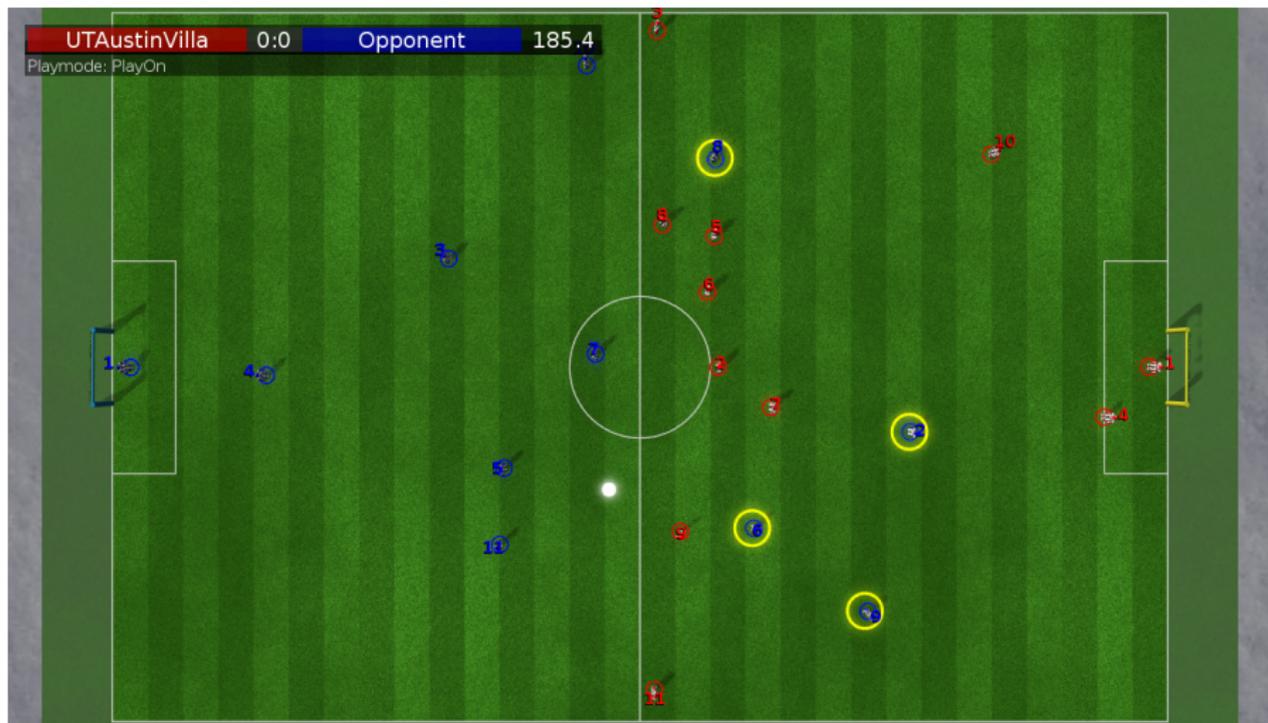




Video

Marking is needed to defend against set plays in the RoboCup
3D simulation league

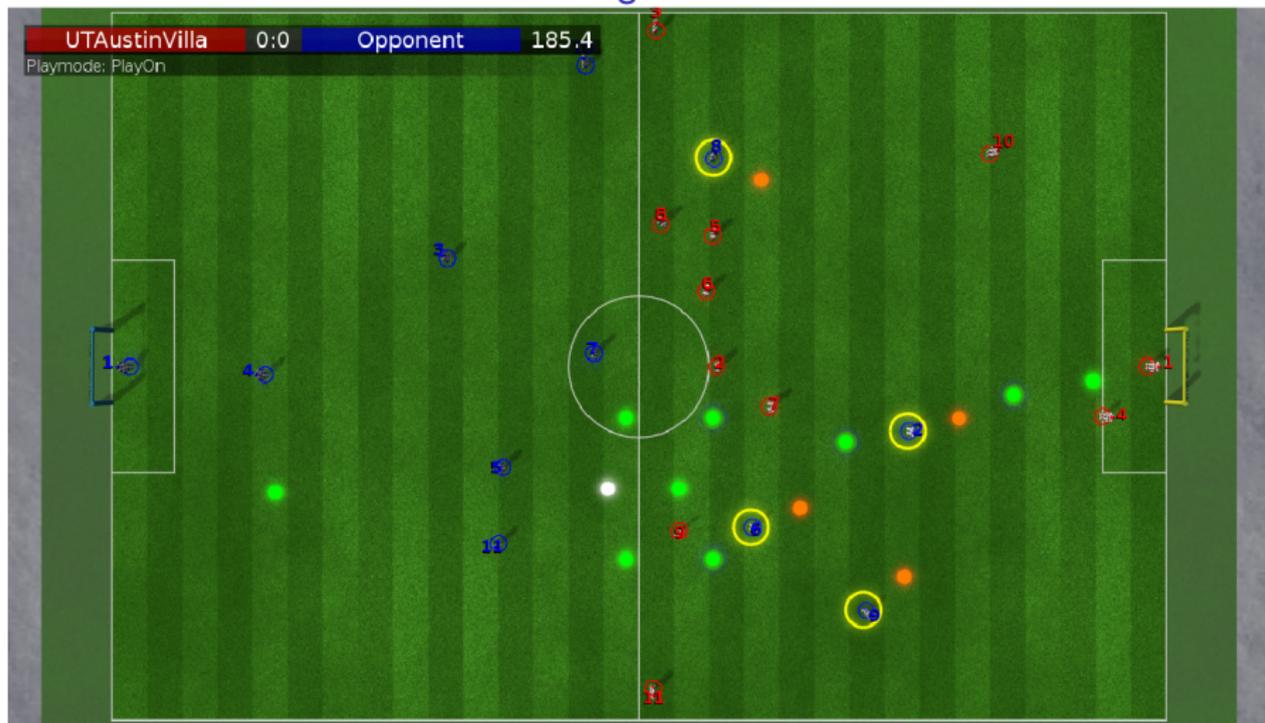
1. Select Opponents To Mark



Opponents selected to be marked circled in yellow

- Mark opponents in dangerous offensive positions based on heuristics

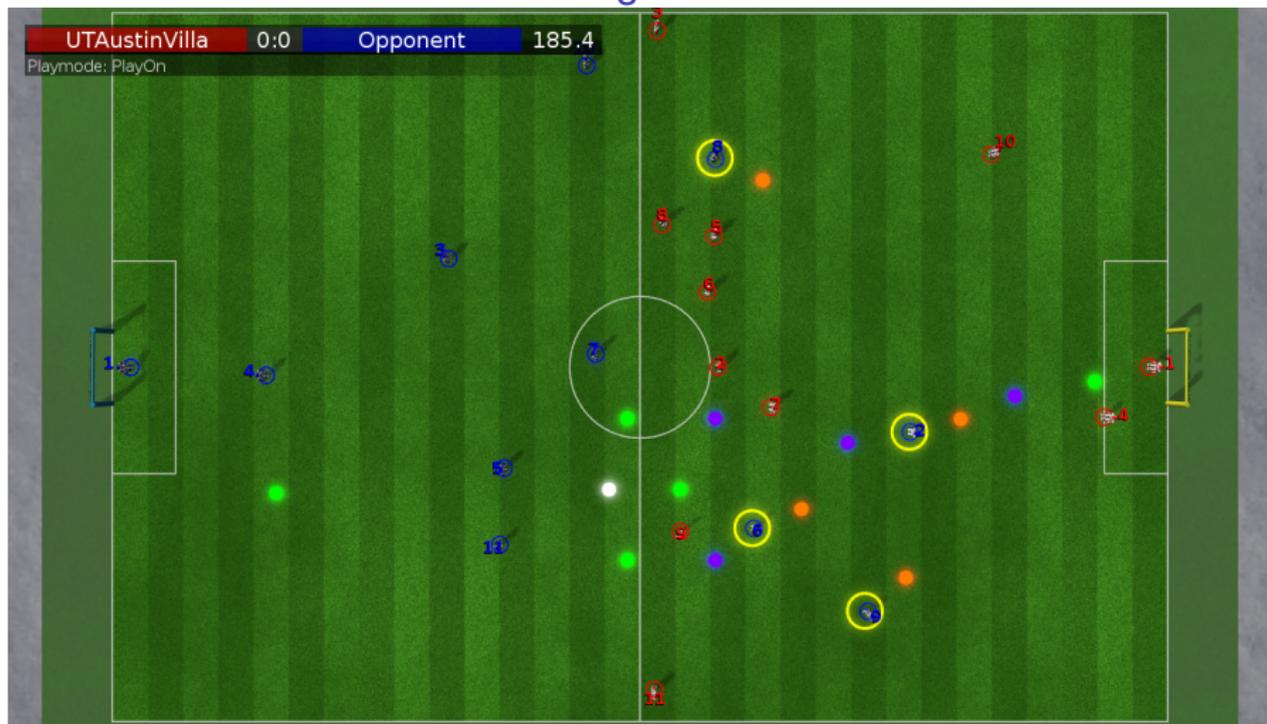
2. Select Role Positions for Marking



Dots: orange = marking, green = formation

- Select set of formation positions to replace with marking positions that minimize sum of distances between marking positions and the positions they replace (Hungarian algorithm)

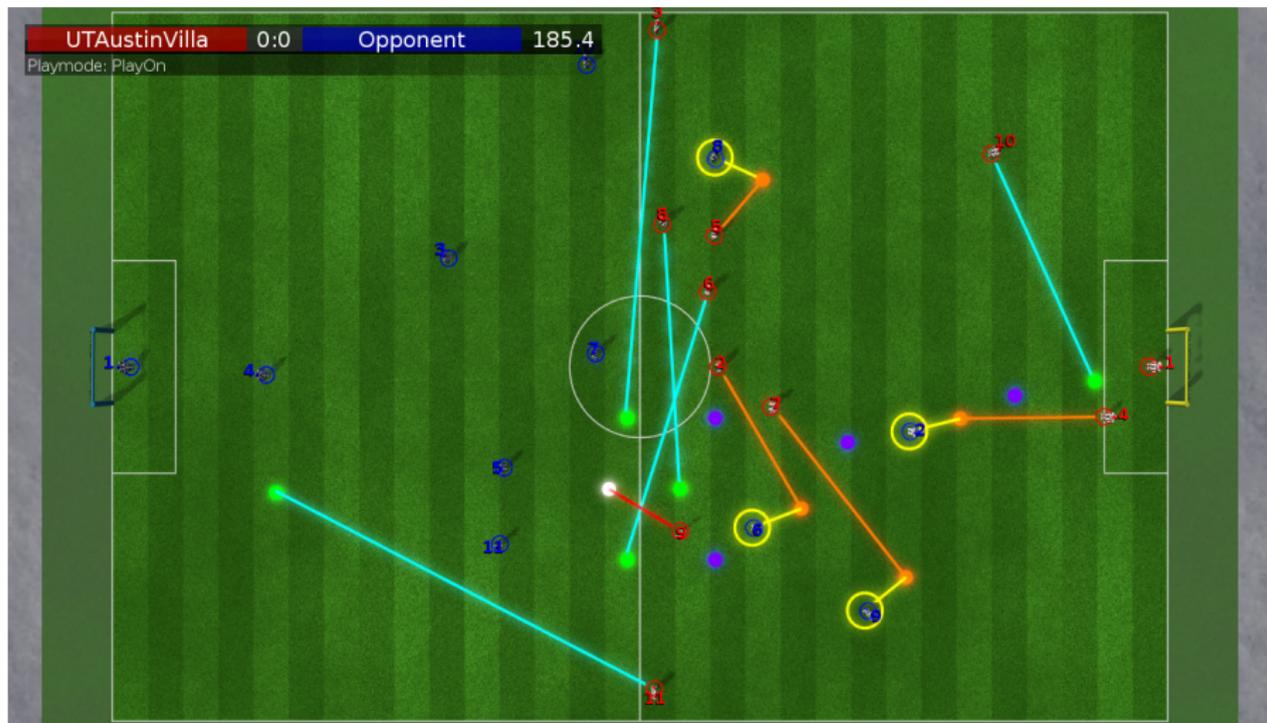
2. Select Role Positions for Marking



Dots: orange = marking, green = formation, purple = replaced

- Select set of formation positions to replace with marking positions that minimize sum of distances between marking positions and the positions they replace (Hungarian algorithm)

3. Assign Players to Target Positions



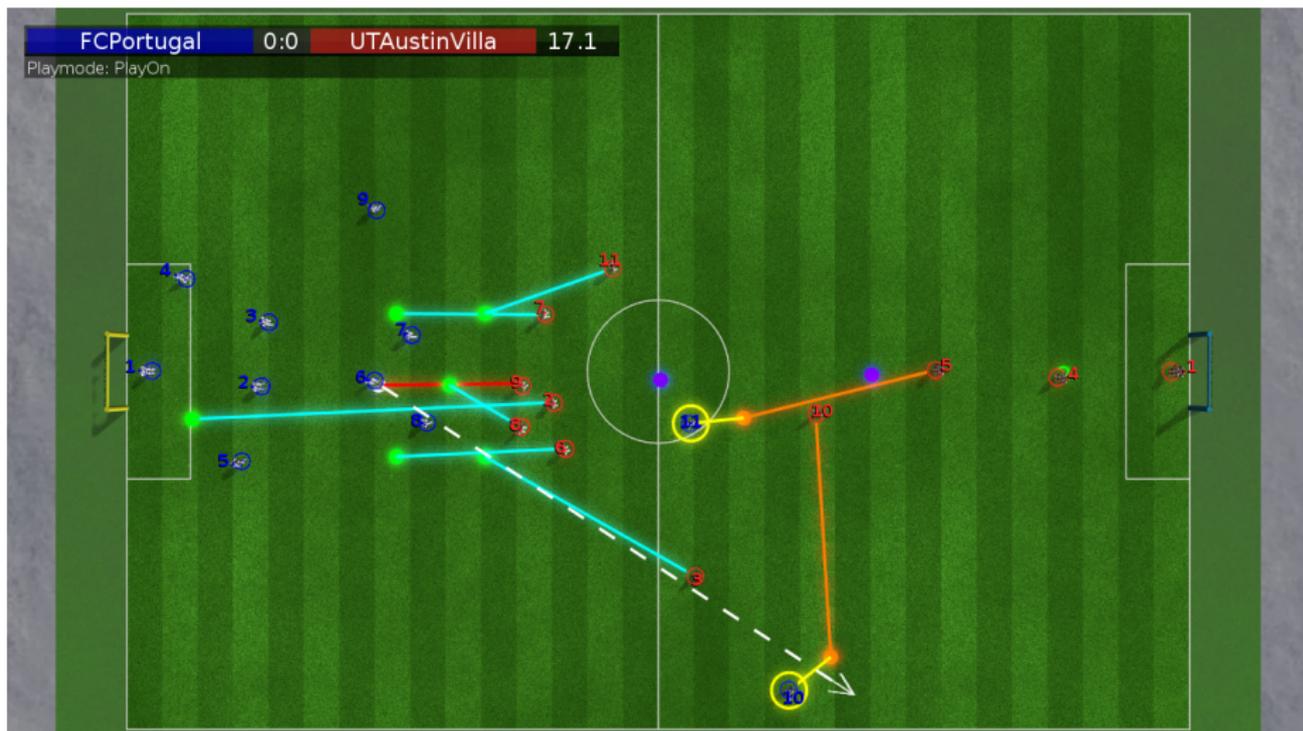
Lines: orange = mark, light blue = formation, red = ball

- Select assignment that recursively minimizes the makespan with SCRAM role assignment



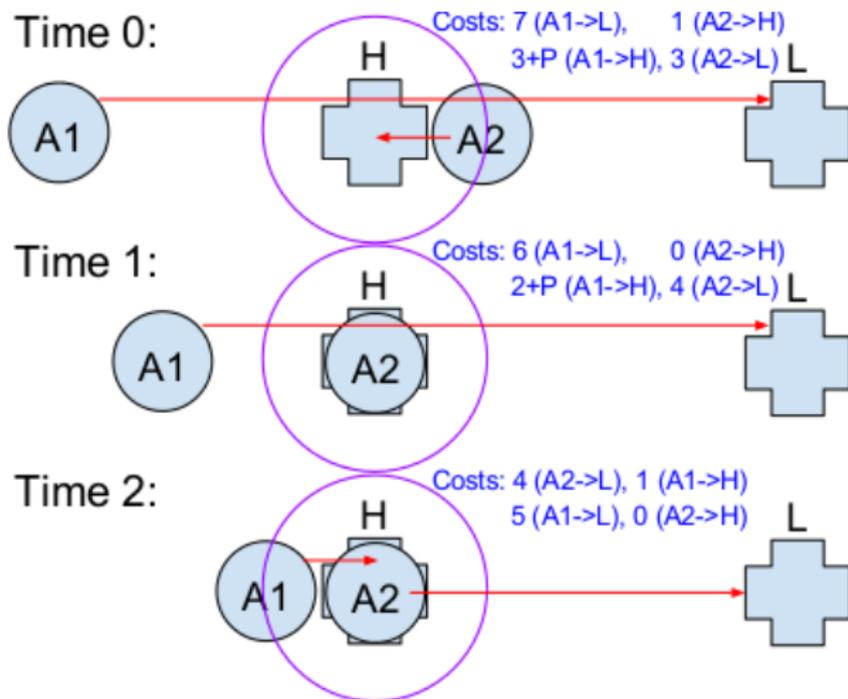
Video

Marking Against FCPortugal Kickoff



What went wrong?

SCRAM Prioritized Role Assignment



Large **priority value P** added to the costs of reaching high priority targets (H) for any agents outside the **priority distance** of H (purple circle).



Video

Results of Marking

Number of goals against when playing 1000 games against the released binaries of UTAustinVilla and FCPortugal from RoboCup 2015.

Opponent	No Marking	Marking No Prior.	Prior. Marking
FCPortugal	230	40	37
UTAustinVilla	1525	336	319

Scoring percentage of opponents' set plays when playing 1000 games against the released binaries of UTAustinVilla and FCPortugal.

Set Play	No Marking	Marking No Prior.	Prior. Marking
FCP Kickoff	6.22	0.06	0.06
UTA Kickoff	48.31	0.16	0.16
UTA Corner Kick	15.97	12.31	7.59

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Marking big improvement

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Marking big improvement, Prioritized Marking even better!



Video

Homepage: www.cs.utexas.edu/~AustinVilla/sim/3dsimulation/

P. MacAlpine and P. Stone. "**Prioritized Role Assignment for Marking**," in Proceedings of the RoboCup International Symposium (RoboCup 2016), July 2016.

P. MacAlpine, E. Price, and P. Stone. "SCRAM: Scaleable Collision-avoiding Role Assignment with Minimal-makespan for Formational Positioning," in Proceedings of the Twenty-Ninth AAI Conference on Artificial Intelligence (AAI), January 2015.