Kick Optimization in Robocup Standard Platform League
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Kicking in any robocup league can be broken down to what kicks are available to a robot to choose from and how well can a robots choose an optimal kick. Since migrating to humanoid robots (Aldebaran Nao) in the Standard Platform League in Robocup the Northern Bites have developed multiple different kicks that a robot can execute while remaining fairly stable. However, the kicks a robot can perform limits its options during game time situations, so having a variety of kicks a robot can choose from can be the difference between a robot making a poor play or an excellent one. The method used to determine the optimal kick has varied between only utilizing vision data, and only relying on localization data.

My research this summer essentially involved creating additional kicks that the robot could utilize during games as well as improving older kicks. This consisted of finding better balance points for the robots while they where kicking, trying to make the kick take less time, making kicks more powerful, and creating parameters for the kicks that could improve their accuracy. As in real soccer, we want the robots to be able to kick the ball before an opponent, not fall while they are kicking, and kick to their intended target.

I first created a stable balance point that all kicks could be based off of. I then altered old kicks to use this improved balance point so that the kicks had increased flexibility for potential dynamic adapting to ball position. I then created some new kicks that were more accurate and faster than old ones, such as the sidekicks. Next I began to work on including ball adjustments into the kicks and added checks into the kicking code that confirmed the ball location before kicking. This work contributed to Northern Bites’ first goal at the World Championships where a back kick was utilized for a shot.

After the world competition I began researching new calculations to determine kick decisions. I experimented with potential fields most extensively and determined that the calculations required did not make potential field kick decision worthwhile. Current work is being done on using gap-scanning functions as a basis for a new kick decision as well as creating kicks from defensive positioning and posture. Future work should be directed to using gap scanning as an immediate constraint to limit the search.

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Funded by Faculty Research Grant