Mithras3D
Soccer Simulation 3D League Free Challenge

June 19, 2014

Inverse Kinematics

We somehow simplify the problem of IK in order to find a good answer between the answers. at first we made a link between the first joint rotation and the Agents real rotation around the Z-axis, so with knowing the proper rotation around the Z-axis we know the first joint angle. Then with the forward kinematic and some triangular equations we find other joint angles in order to move the ankle to the desired possition with the desired rotation. Although the methods which are using derivations and jacobian matrices iteratively may result in more accurate answers, time complexity of this algorithm is very efficient, so we will have more time for more complex computations in other parts, like predicting next cycles in decision making part. Our next goal is to find a method using jacobian matrixes and this method in the same time, to be able to find answers in all the possible positions.

PSO

we use particle swarm optimization method in most of our basic actions to improve their stability and speed.

World Model

Localization: we are able to localize with any number of flags that we have seen or field lines. we calculate body and neck rotation matrices with GYR, then with inverse matrix rotation, we are able to undo the influence of body and neck rotation on the distance and angle of seen objects, so we will be able to localize in the field.

Predicting positions in next cycles

we predict the worst case for next cycles, and then the agents decide what should they do. goali calculates ball path, and then decide how he can catch the ball in current situation, he will also consider that the opponent agents in ball path may kick the ball. we find the nearest players to the ball, according to their distance and rotation in the field, and then we calculate which players are able to kick the ball, and we predict ball position in next cycles.