Agents Homework

1. Problem 2.4 (in the textbook) JUST SOCCER and BIDDING (the first and the last items in the list of activities): Give a few sentences for each part of the peas model. A little for the parts you find interesting; maybe only one or two sentences for items you think are really obvious.

*Soccer:*

**Performance Measure**: Rules obeyed, balls stolen, maximize goals scored, minimize enemy goals, and minimize balls lost.   
This would be an interesting algorithm. It would have to carefully balance each variable in order maximize the probability of winning a game. For example, break too many rules and you will have no one left to win the game, but focus on not breaking the rules too much and one will never get the ball and score.   
**Environment:** Field, goals, ball, teammates, opponents.   
This would be an interesting environment, given that there are a few elements that are static while others are completely dynamic. For example, the field bounds, goals, ball, number of player and opponents is always fixed, but the positions of the ball and players are constantly changing.   
**Actuators:** Steering, acceleration, force of kick, and kick direction.   
Soccer would require an interesting control in the sense that a player need not be headed in the same direction as which he is kicking. Also there would need to be separate controls to deal the force applied to some arm in which to propel a ball forward versus just to change position.   
**Sensors:** Cameras, sonar, accelerometer, microphone, and inferred.   
A variety of sensors would be needed in order to sense players, field position and goals, the ball, and to take in teammate information and desires. One of the most interesting and potentially difficult tasks would be to interact with team mates and communicate strategies and desired ball passing signals.

*Bidding on an Auctions Item:*

**Performance Measure**: Minimize cost above items actual worth, minimize other bidders involvement, maximize price under items actual worth, and do not exceed budget.   
One of the most interesting parts of this algorithm would be how to minimize the other bidders involvement. Would the strategy to bid high and fast, or incremental and consistent?   
**Environment:** Other bidders, the auctioneer, the item, and the auction room.  
**Actuators:** Bid indicator.  
**Sensors:** Microphone and camera. Sensing the rise in bid and current highest bidder would be one of the hardest parts of this problem. For example, does a simple yell or wave of the hand signal a raise in the bid, or does it just get signaled from the auctioneer?

1. Repeat the problem given above but instead of doing a PEAS description do an agent-model description -- the one that has states, actions, and consequences (see [Another view of agents](http://students.cs.byu.edu/~cs470ta/goodrich/fall2004/lectures/DecisionTheory.html); include some discussion of goals, preferences, and utilities in addition to the states, actions, and consequences).

*Soccer:*

**States:**

Possess Ball, Not in Possession of Ball, Team has Ball, Opposing Team has Ball, Possible to Advance, Possible to Seal, Possible to Pass, Possible to Block, Possible to Score.

**Actions:**

Pass Ball, Block Ball, Steal Ball, Shoot for Goal, Block Player, Run Ball, Run to Goal, Get Open.

**Consequences:**

Ball Lost, Ball Obtained, Shot Blocked, Ball Out of Bounds, Red Card, Yellow Card, Score Goal, Closer to Goal, Farther Away from Goal, Ball Passed, Win Game, Loose Game.

It seems to reasonable that some of the major goals for this agent would be to gain the ball, get closer to the goal, and to score. These feel like the main attributes needed to successfully win a game. Following this same reasoning, winning the game, scoring a goal, and getting the ball closer to goal would also seem to merit high levels of utility. Where as, it would also standard that loosing the ball, letting the ball get farther away from the goal, and loosing the ball would merit low levels of utility.

However, it also seems to make sense that there be a preference to not losing the ball over letting the ball get farther away from the goal. In other words, it’s better to keep the ball and loose some ground than to not loose ground but loose the ball. It might also stand to reason that not blocking a player be preferred over a Red or Yellow card.

*Bidding on an Auctions Item:*

**States:**

Bidding, Got Item, Highest Bidder, Not Highest Bidder, Not Bidding.

**Actions:**

Place Bid, Ignore Higher Bid, Place Higher Bid.

**Consequences:**

Drive the Price Higher, Win Item, Slow the Competition, Loose Item, Hold the Price Low.

One of the major goals for this agent would seem to be to win the item. However, more utility would be gained for winning the item at a lower price rather than a higher price. Another way to look at this would be, letting the price stay lower longer as preferred over driving the price up while maintaining the highest bid. This implies that a lower utility would be obtained from winning an item at a higher price.

Another preference might be to either start the bid high or to start the bid low, with the hope of keeping the bid low while winning the item.