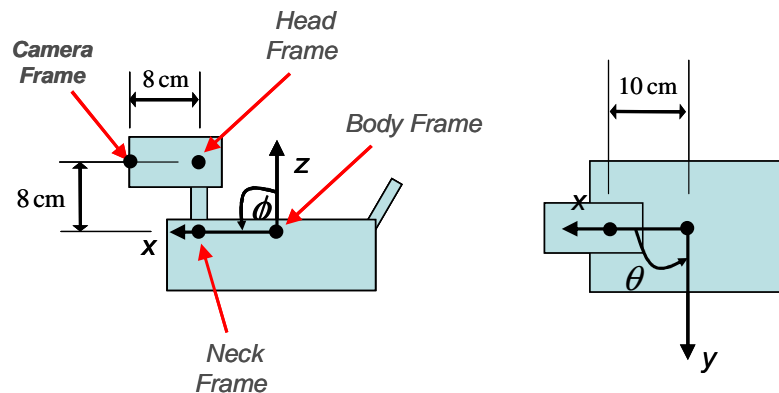


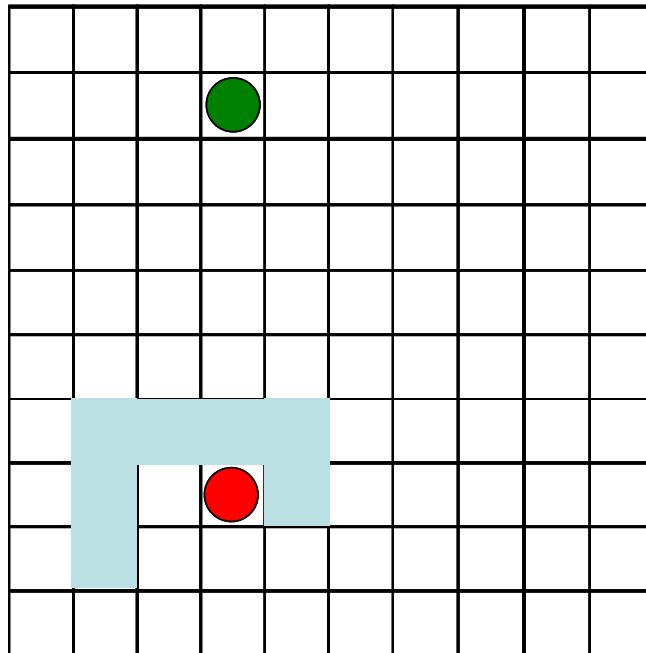
Sample General Knowledge Questions:

1. You decide to implement the potential field approach for your attacker Aibo where the ball is the goal and other robots are modeled as obstacles. As your Aibo approaches the ball, it encounters a defender in its path and freezes in place. Your implementation is correct. Explain what happened.
2. Your team stays up until 4AM to get its localization code working perfectly. However, when they return for the 11AM challenge, the robot is incapable of localizing. Assuming that the code implementation is correct, how could this have happened?
3. In the visibility graph method, the shortest path from the start to the goal can be found using _____.
4. Explain in your own words the meaning of GDOP.
5. Explain two (2) methods by which the Aibo can estimate the distance to the ball using its camera? Show relevant equations where applicable.

Sample Algorithm Questions:



1. The Aibo's head is nodded down at an angle of 30 degrees, and its neck is tilted down at an angle of 60 degrees. Using the dimensions above, determine the position of the camera frame with respect to the body frame. You MUST show all transformations.
2. For the configuration space below where the red dot is the current robot position and the green is the goal position, show the optimal path using Wavefront propagation for motion planning. Show all work:



3. Your Aibo is using range measurements to beacons to estimate its position on the field. It measures the distance from to the top pink-yellow beacon as 1.5 meters and to the top pink-blue beacon as 2.5 meters. Using a navigation frame centered on the field as shown below, what is your estimate for the Aibo's position? What additional information would be required to estimate its orientation?

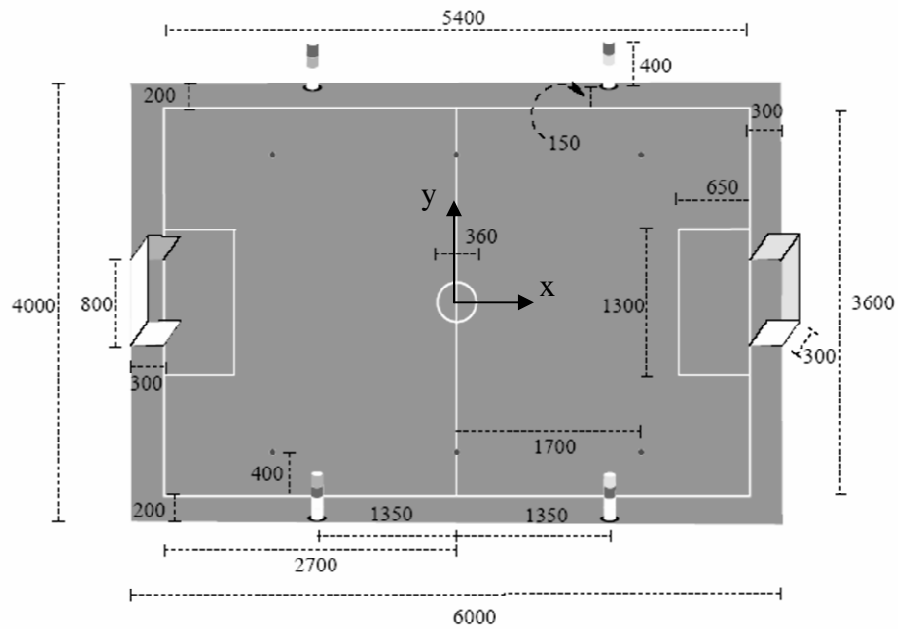


Figure 1: Field dimensions in mm.