**Technical Description**

**Power**

Currently we will be designing our robot to use a 12V 2Ah sealed lead acid battery since it is known to perform adequately in robotic applications on this scale, it is relatively simple to use and maintain with limited risk to the operator. The main disadvantage of lead acid batteries is their weight which will contribute to a large percentage of the overall robot weight; based on our testing during a previous odometry challenge we found that the added weight can cause the robot to carry too much speed at the end of its movements since it has more momentum. To counter this something we will be looking into is lithium polymer batteries due to their more lightweight nature and their potential for a higher capacity compared to the specified lead acid battery. Using a lipo will also allow us to easily use a voltage monitor to give an indication of remaining charge left in the battery so every round can be started with the same battery charge to reduce any variability in performance; to further this a voltage regulator will allow us to provide the drive system with a constant voltage.

Pb Battery Specifications:

150x20x89mm

0.7kg

**Microcontroller**

All team members are familiar with the arduino UNO microcontroller and the coding language to go with it, it therefore makes sense to use an arduino UNO to control the robot. Ideally we will only need to use 1 UNO since the robot will be designed with the limited I/O of the controller in mind however if it becomes unavoidable then 2 arduino UNOs will be used with the various tasks distributed between them.

**Drive System**

An MD25 dual H bridge motor driver board combined with 2 EMG30 motors. The motors are fitted with hall effect sensors which allow the MD25 to know the exact angular rotation of the motors which can then be translated into distance based on the wheel diameter. The hall effect sensors allow for active distance correction to be implemented by comparing the distance moved to the distance programmed.

If an alternative motor drive system becomes available through sponsorships then they will be looked into since the EMG30's feature a noticeable amount of play and the rate at which the hall effect sensors update could be improved to give a more consistent movement distance. Stepper motors could be a viable alternative which we will also look into further.

**Actuators/Sensors**

Ultrasound sensors will be used to detect the opponents robot, by placing the sensor above the height of the game pieces on our robot it should only detect the opponents robot. Since the playing area promotes the exploration of the other teams side of the board we aim to use an active beacon system to transmit a signal which our robot can use to judge distance and location on the board. The beacons will primarily be used to identify where on the board the opponents robot currently is, however they could also be used to direct our robot if it proves accurate enough.

To spin the ball collector brush a brushed dc motor will be used since they are the cheapest option of motor and the lower efficiency and lifespan compared to brushless motors will not be an issue for this application.

To control the various deployable parts of the robot a combination of servos and motors will be used. If the movement required is a high load then metal gear servos will be implemented due to their higher maximum torque. For all movements which only control a low load, plastic geared micro servos will be used due to their lower power drain and cheaper cost. For anything which requires a larger angular rotation or faster movement either a servo with a larger gear ratio or a motor will be used