Boeing Remote Robotic Ground Vehicle – Team 2

Overview
Boeing tasked three teams of students from various majors with developing a robot that could identify five magnetic blocks inside a maze and bring them to a base location. In addition to this base requirement, other requirements for the robot included using a First Person View camera system, being able to navigate low-light conditions, and store the blocks on the robot. Finally, the robot must complete this mission during a competition between the teams in 15 minutes.

Objectives
• Meet the six development milestones set by the sponsor
• Complete the final mission during competition

Approach
• A list of requirements was procured from the sponsor
• Customer needs and further problem clarification were attained through conversation
• Concept generation led to brainstorming components in the functional areas of movement, magnet detection, control, pick-up mechanism, and block storage
• External and patent searches were conducted and helped determine the design of the arm
• Movement of the robot was achieved in time for Milestones 1, 2, and 3
• Models were created in SolidWorks
• FEM analysis of the pick-up mechanism was completed using SolidWorks
• Fabrication began of the storage bin and pick-up mechanism
• Milestones 4, 5, and 6 were completed with Wi-Fi control, functioning magnetometer, and functioning gripping mechanism
• First rounds of testing determined that the pick-up mechanism would not function with one shoulder servo
• The pick-up mechanism was altered to decrease the weight of the gripping mechanism and add another servo in parallel to the original
• Further testing occurred for the pick-up mechanism and magnetometer
• The robot functioned during the final competition

Outcomes
• The team placed second in the final competition
• The robot returned three magnetic blocks
• Failures occurred with the pick-up mechanism and the magnetometer
• The team stayed under budget spending $589.21