This semester, The Boeing Company gave Team Ground Control the mission
to collect five blocks from a maze. To make sure the team was continuously working
and on the right track, weekly meetings were held with a Skype call to the sponsors.
To begin the assignment, the team made sure to understand the mission entirely.
Paired with the UAV team, the two teams had to work together all semester to
complete the mission.

The rover team started the assignment by doing external searches. With a
$1000 budget, the team had to option to purchase a completely different rover
model. However after doing extensive research, it was decided that the provided
rover, Dagu Rover 5, was the best rover for the mission. A new rover was purchased
to give the team fresh motors and threads. From here the team had a nice base area
to work with and create a further design.

A few concept designs were created by the team. These were first hand
sketches. After looking at customer needs and ease of manufacturing, certain ideas
were elaborated and drawn in SolidWorks. These ideas were then discussed with
our sponsors after the team presented the PDR. After this meeting, the team knew
the design to further pursue.

This design included a claw made of hard plastic attached to an 8.5”
aluminum arm that connects to the base of the rover. At the end of the claw is a
triple axis magnetometer that has the ability to sense a magnet inside a block at any
direction. As advised by the sponsors, the team utilized the budget to purchase all of
these parts rather than manufacturing them by hand. Once all the parts were
purchased and in possession, the team was able to begin putting the rover together.

The longest part of manufacturing the rover included the wiring. The
controller purchased was a Spektrum DX5e. This controller has five different
channels that controls functions of the rover. Therefore it took time to wire the
servos and the channels. Two operational servos were wired for the movement of
the arm and the claw. The linear actuator was also wired to push the bin forward to
release the blocks. Once the wiring was complete, the rover was ready to operate
and compete.

On the day of the competition, the Boeing sponsors had both teams meet at
the multisport complex in the early morning. The rover was finally ready to operate
having some wiring issues the night before. When the competition started the rover
and hexacopter successfully flew over to the landing zone. The maze was large
enough that the rover was easily able to maneuver. Issue arose with the
magnetometer. It was not detecting the magnets and therefore the rover was unable
to correctly identify. Only one block was identified. The rover successfully picked it
up and put it in the bin. After thirteen minutes of searching, the team had to go back
to the start. The mission was deemed a success.

The showcase was shortly after that. It was a nice opportunity for the team to
show others what was going on all semester. There were some demonstrations of
the rover’s ability to those who asked and a nice layout of the project on a 32” x 40”
poster board. Overall the class was a great chance to utilize the engineering skills
that the team has been learning while here at Penn State.