



## SENIOR DESIGN SYNOPSIS-SPRING 2014

### NASA ROBOTIC MINING ROVER

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Space Exploration is an international objective that joins the greatest minds in the world, in both the science and engineering fields of work. One of the ways organizations such as NASA search for innovative ideas and people is through competitions such as the Robotic Mining Competition. The M.E.C. Panthers is a multi-disciplinary joint effort between mechanical, electrical and computer engineers to compete in the competition. Each discipline specializes in different components of the rover; therefore, the final design is the integration of these components into one system.

The objective of M.E.C Panthers is to use the multidisciplinary knowledge to design and build a rover that will be able perform to NASA standards and show innovative approaches to a given problem. Unlike usual designs, this design is based on a track driving system to navigate challenging terrain. Due to potential reliability issues, most teams decide to use the conventional wheel drive system, but the M.E.C. Panthers are determined to prove that these issues can be resolved and that the track drive system is the superior mobility system. The collection mechanism is another component that will stand out. Mechanisms involving scoops have been used, however, the M.E.C. Panthers will implement a bucket elevator type system where the buckets are connected to a chain and move together like a conveyer belt rather than scoops being connected to an actual conveyer belt. In doing so, the goal is for the lunar rover to collect regolith at a high rate while minimizing weight through the use of composite material. The collection unit is also capable of moving up and down through the use of linear actuators. For the dumping unit, two separate pulley systems control the movement of the bin as well as the opening and closing of the bin door to release its contents.

The collection/dumping and mobility system along with the building of a lightweight frame was the responsibility of the mechanical members. Along with designing and assembling of the mechanical components, the mechanical team also undertook the programming of a manual control. The computer engineers are responsible for programming the autonomous function of the rover. The autonomous program includes the communication and integration of all the components on the rover, some of which include infrared sensors and tracking cameras. Finally the electrical engineers completed the circuitry and organized connections within the available space, necessary for the computers to communicate with the rover to function. Ultimately the integration of the three disciplines will determine the success of the M.E.C. Panthers at the NASA Robotic Mining Competition.