**747 Project Proposal 2017**

(Due Tuesday, Nov 21, 5 pm, 747 hwk mailbox)

**Velocity and Position Control of a Robot Vehicle and Auger Motor**

Group member names:

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Objectives: The goal of this project is to develop an algorithm that controls the position and velocity of a robot vehicle as it approaches a measurable target position (mining area). A representation of an auger (mining apparatus) will be onboard the vehicle and its rotational speed will vary as the vehicle approaches the target position.

Background and analysis: The LunaCats project aims to have the robot autonomously approach the mining area from the starting location using a non-wall based positioning system. Upon reaching the mining area, the auger mining system will be deployed and begin mining operation. The robot should reach the mining area as quickly as possible while not overextending into the mining area since mining is allowed as long as the mined materials are from the designated area. The auger would be velocity controlled in order to detect when the mining apparatus is digging the top level fine Martian simulant and when it is digging the lower level target material of gravel.

A mechanical and electrical model of the vehicle with a PID controller will be developed and implemented for the vehicle’s movement towards the mining area. The mining auger’s velocity will be controlled with the same velocity sensor feedback data for the purpose of this project but will be adjusted to measured values for the mining of sand versus gravel for the LunaCats project.

Experimental approach: An existing robot will be refitted to incorporate PID control. An ultrasonic sensor will be used to provide position data and a timer will be incorporated to generate the velocity data used for the feedback control. The auger motor speed will adjust according to the position of the vehicle. The vehicle will be designed to approach a wall and stop within 10 cm from the tip of the robot. The robot’s speed will decrease linearly or more extravagantly (if time permits) as it approaches the wall, starting at a reasonably high speed such as 0.5 m/s, slowing down to 0 at the stopping point. The auger will begin at 0 rotational speed and accelerate up to a reasonably high speed such as 60 - 120 rpm.

Equipment needed: Does not need special equipment. Typical tools such as DMM would be needed for part measurements. A tachometer capable of measuring high velocities would be preferred for the auger, but it is optional.