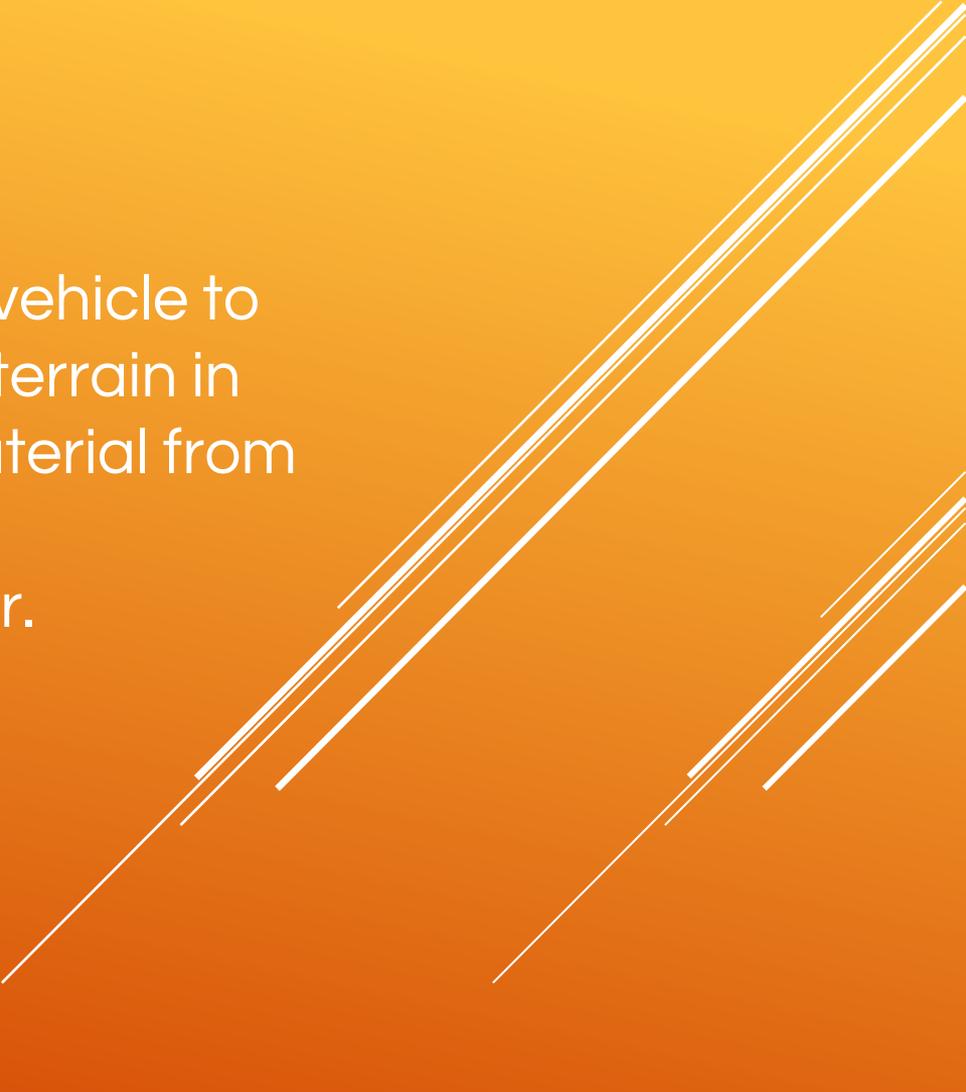




# Mars Mining Robot Team

## Goal and Motivation:

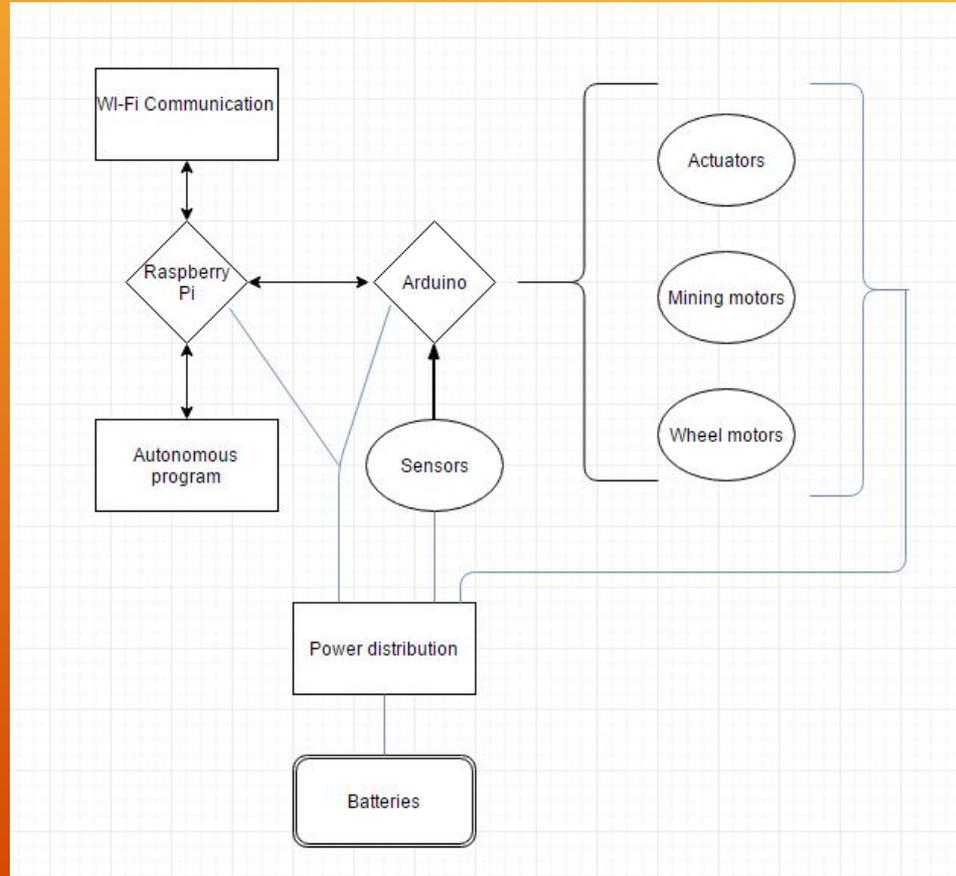
To create software to enable a vehicle to traverse the simulated Martian terrain in order to mine the necessary material from the simulated ground and to communicate with the controller.

The background is a gradient of orange, transitioning from a lighter shade at the top to a darker shade at the bottom. On the right side, there are several sets of parallel white lines that create a sense of depth and movement, resembling a stylized landscape or a series of paths.

## Approach:

- Overall operating system will be needed in order to interact between the hardware and software. The team will be working with Raspberry Pis and/or Arduinos so the operating system must not be too complex. The kernel must also have the ability to be controlled autonomously if needed.
- The team will need to monitor and control their vehicle during the simulations. Communication must be accomplished through a wireless network. Any communication over 50 kilobits/seconds will cause the team to lose points.
- Software will be needed to control the hardware. This will be needed to communicate between the different levels of the system ie GUI, kernel, and hardware. The software should be able to be controlled autonomously if the team goes that route.

# System Architecture



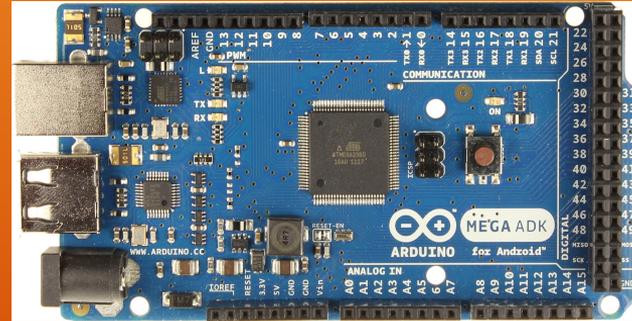
# Electronics

Motors and Controllers	Locomotion and mining
Sensors	Data collection and support autonomous functions
Batteries	Power the robot
Power Distribution	Distribute the power to components and report power usage
Data Logger	Show power usage
Actuator	Lowering to mine



# Software

Raspberry Pi	Linux based computer with autonomy program
Programming	In Python and C/C++
Arduino	Controls motors and sensors
Autonomy	Autonomous operation



# Communications

Wi-Fi on 2.4 Ghz	Connection safety, high speed
Using Raspberry Pi	Integrated Wi-Fi
Two way data transmission	Manual controller for backup



## Technical Challenges:

- One optional challenge will be to make the vehicle autonomous. Depending on how much of the vehicle is autonomous, the team will earn points. If the vehicle is fully autonomous, then one can earn 500 points.
- Networking will be a possible technical challenge due to the amount of bandwidth the vehicle is required to operate on. 1 point will be deducted for every 50 kilobits/seconds used during the competition.
- A technical challenge will be designing lower level software to operate the vehicle. Each added weight onto the vehicle will be a deduction of points. The less memory on the vehicle the better. Therefore, lower level, smaller programs must be created in order to keep the weight used by devices with more memory down.

## Milestone 1 (October 3, 2017):

- Research different networking techniques to communicate between the controller and the robot.
  - Research possible software to operate the vehicle on.
  - Research possible operating systems to act as the kernel between hardware and software on the vehicle.
  - Create Requirements Document
  - Create Design Document
  - Create Test Plan
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## Milestone 2 (October 31, 2017):

- Start designing, implementing, and testing networking approaches.
  - Start designing, implementing, and testing software that will interact with the hardware.
  - Start designing, implementing, and testing the operating system.
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- A decorative graphic consisting of several parallel white lines of varying lengths, slanted upwards from left to right, located in the bottom right corner of the slide.

### Milestone 3 (November 28, 2017):

- Begin researching ways to possibly make the vehicle autonomous.
  - Continue to design, implement, and test networking approaches.
  - Continue to design, implement, and test the software that will interact with the hardware.
  - Continue to design, implement, and test the operating system
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- A decorative graphic consisting of several parallel white lines of varying lengths, slanted diagonally from the bottom right towards the top right, set against the orange gradient background.