THE NOTRE DAME ROCKETRY TEAM

Payload Senior Design Proposal

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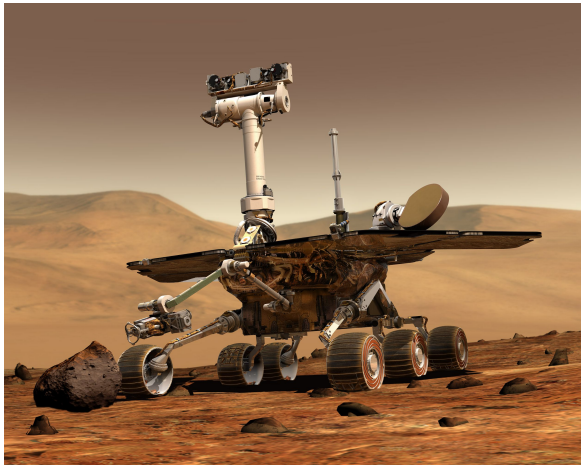
Introduction

- Support the Notre Dame Rocket Team's electrical design for the 2019-2020 NASA Student Launch competition payload
- Design for the rover
  - Communications
  - Controls
  - Power
  - Software
- Rover will retrieve a simulated ice sample



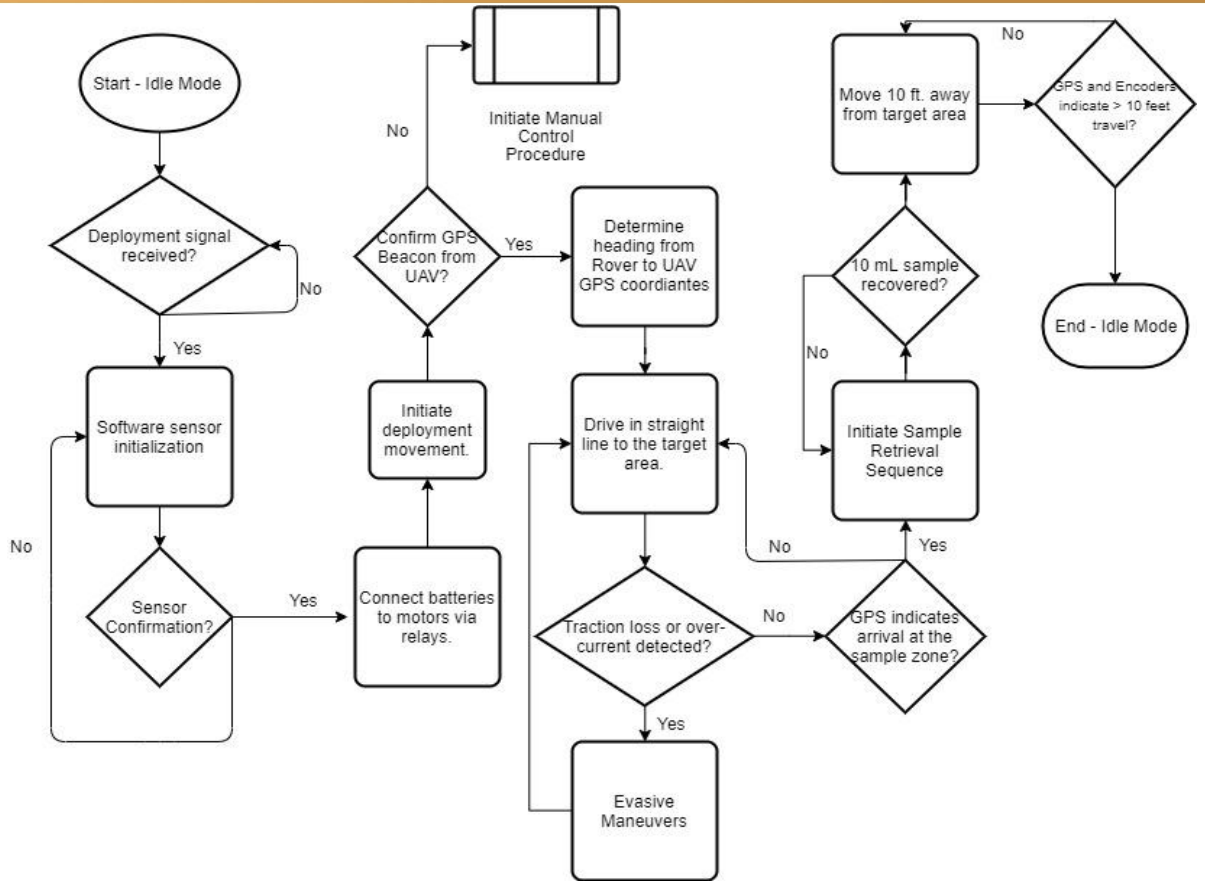
Problem Description

- NASA project outline
  - Autonomously exit the rocket after safe landing
  - Travel to one of 5 sample locations
  - Collect 10 mL of sample
  - Move 10 ft. away from the sample area
- Special Considerations
  - All UAVs must abide by FAA regulation and registration
  - All communications must abide by FCC regulations
  - Launch fields often wet

Proposed Solution

- Mechanical Design
  - Eccentric crank design to better traverse corn fields
  - Deployment mechanism to remove the nosecone
- Electrical Design
  - “Satellite” UAV gathers GPS info for Rover
  - Rover autonomously deploys, travels and collects sample
  - Sensors used to control and monitor direction, speed, traction, and power delivery to motors
  - Manual control system for emergencies and baseline competition operation

Proposed Flow Diagram



Demonstrated Features

- Power Distribution
- Radio Communication
- Manual Control (Bluetooth/Radio)
- Directional Control
- Traction Control
- Sample Retrieval
- Associated Software Algorithm Testing
- Vehicle Integration- Retention and Deployment

Available Technologies

- PIC32 Microcontroller
  - GPS
  - Accelerometer
  - Magnetometer
  - Motors & Encoders
  - Radio modules
  - Bluetooth modules
- Power Distribution components

Conclusions

- Accelerated schedule for NDRT
- Interdisciplinary Team Experience
- Integration with NDRT
- NASA Technical Reviews
- Industry exposure