

TASK HISTORY	TASK TITLE Payload Team	TASK NUMBER 1	PROJECT IREC Payload
TASK HISTORY AUTHOR Augusto Dantas de Oliveira	TEAM LEAD Augusto Dantas de Oliveira		TASK DOCUMENTATION Payload Team Beginning of School Year Summary and Objectives
DATE	MILESTONE	REVIEWER'S INITIALS	
10/08/2018	Payload Selection	AKM	

Why We Did

Decide on a payload for the IREC competition by voting on different challenges to attempt.

What We Did

The IREC competition allows considerable freedom in the selection of a payload. Without a concise set of requirements, other than a minimum weight, it is up to the team to devise a list of requirements by which payload success will be determined.

What Did It

Most members of the team were already in favor of a deployable vehicle as the payload. With that in mind, the payload task decision was divided into 4 distinct parts: vehicle *type*, *deployment*, *locomotion*, and *purpose*. For comparison, the payload for NASA Student Launch was a *rover*, that *deployed from the ground*, *moved 1-dimensionally*, and *deployed a simple solar panel*. The 4 categories each had multiple options and were voted on by members of the payload subteam and the IREC admin. Results are tabulated below.

Table 1 Vehicle Type

Rover	UAV	Either
8	0	4

Table 2 Deployment

Aerial	Ground	Either
6	2	0

Table 3 Locomotion

1D	2D	Either
0	13	0

Table 4 Purpose

Nothing	Simple Solar Panel	Soil Sample Collection/Analysis	Landing Site Analysis	Solar Panel Drop	Anything
0	0	3	9	5	2

However, with last year's challenge in mind, these four challenges together are extremely demanding, especially aerial deployment and landing site analysis. Thus, the two challenges were declared mutually exclusive and the payload subteam and IREC admin voted again on which challenge to attempt and which to discard.

Table 5 Mutually Exclusive Challenge Decision

Aerial Deployment	Landing Site Analysis	No Preference
7	4	0

With the previous favorite purpose gone, the payload meeting on Friday, October 5th 2018 focused on deciding a new purpose and writing concrete requirements by which to judge payload success. With the low turnout of that meeting, the new payload purpose was evenly split 2-2 between soil sample collection and solar panel drop. The rover purpose shall be put to another online vote among the payload subteam.

The requirements for the payload were written with either of the two purposes in mind:

1. The payload shall be at least 8.8 lbs.
2. The payload shall fit within a tube diameter of 6 inches.
3. The payload shall be a deployable rover that can drive independently of the rocket vehicle.
 - a) The rover shall stay within the rocket body until the predetermined deployment altitude.
 - b) The rover shall be outfitted with a GPS system independent of its other electronics.
 - c) The rover shall be able to operate for 15 minutes once it reaches the ground.
 - d) The rover shall deploy from the rocket at 1,000feet +- 100ft.
 - e) The rover shall operate completely autonomously.
 - f) The rover shall move ___ft away from its landing site.
 - g) The rover shall be capable of making a 180 degree turn.
 - h) IF SOIL SAMPLE: The rover shall collect at least two soil samples in different locations.
 - i. Each soil sample shall be at least 10mL.
 - ii. The two samples must be collected at least 10ft apart from each other.
 - iii. The rover shall collect soil moisture data and store the data for later analysis.

- iv. The two samples shall be collected within 15 minutes of the rover reaching the ground and beginning its normal operation.
- i) IF SOLAR PANEL DROP: The rover shall drop multiple solar panel nodes along its path of motion.
 - i. The rover shall drop at least 3 solar panel nodes.
 - ii. The rover shall collect voltage data from the dropped solar panels for later analysis.

More requirements are set to be written in the future, as well as a concrete number for rover movement decided.

Lessons Learned

When presented with multiple possible challenges to choose from, the most interesting challenges are often the hardest. Unfortunately, not all interesting challenges could feasibly be attempted.

Getting a representative sample of people to vote in a timely matter is more difficult than it should be.

Impact Statement

With a payload goal and requirements mostly decided upon, creation of the payload proper shall begin in full swing now. All members of payload are very excited for this competition and to see what the subteam manages to create.