Researchers NASA Challenges

- As propulsion systems get more advanced, there becomes a need to navigate deep space while also being able to return home.
- One method of navigation involves using radio waves as a beacon to guide spacecrafts back to earth. While this method is viable for navigation close to earth, in deep space there is too much electromagnetic interference.
- By expanding on the radio beacon method though, one could create a chain of beacons between earth and the spacecraft. Yet, an issue arises if even one of the beacons were to go down, which could cause the entire system to go down as well [1].

How would nature solve the NASA challenge?

- Within nature, the Many-Headed Slime (Physarum Polycephalum) forms the shortest and most fault-tolerant path between food sources through constant adaptation of the connective networks to create an efficient pathway. (Shown in right image)

- A design principle that can be derived from the Many-Headed Slime is an algorithm that can seek out and find relevant data points and then determine the shortest distance between points that is fault-tolerant if a certain path becomes unavailable. (Visually shown in left image)

Final Design

- These design principles can be applied on earth through integration into an algorithm. To the right is a visual example of an algorithm that can be used to determine the most ideal routes for transportation.
- This algorithm constantly searches and optimizes its suggested pathways based upon relevant parameters.
- Applying the algorithm when determining locations for radio beacons in space can create the most ideal configuration to lead astronauts home.

Figure 1: Challenges and strategies diagram