Mick Zaatra
Item 4

Assumptions & Constraints

In terms of the main materials needed:

- Ferrofluid
- Inductors or coils or magnets
- Encapsulating material for the ferrofluid
- Wires
- Circuit board for controls

These materials are available but the issue arises with the cost of ferrofluid because ferrofluid is quite expensive at $10 per ounce. Considering that some error might occur, a leeway in the amount of ferrofluid needed might be end up costing the most in this project.

Inductors are easy to get and reasonably priced, same thing with the electrical wires and some of the components for the circuitry.

The encapsulating materials could be anything that can ensure that the ferrofluid doesn’t escape from within it. Thinking towards utilizing a 3D printed sphere with a small screw top for filling and draining.

In terms of technological resources, we have readily available most equipment at the lab:

- Function generators
- Oscilloscopes
- Voltage regulators
- Multimeters

Mick Zaatra
Item 4

The equipment mentioned are probably the only equipment that are going to be needed for the creation, maybe some software like Circuitmaker might also be needed.

Financially, I don't think this would be cost more than a few hundred (generously estimated).

Logistics isn't an issue; the availability and mobility of equipment and materials should pose no issues.

In terms of referential resources, the main research that is required is knowing how to control the ferrofluid, that means being able to induce a magnetic field using the inductors or coils and programming them correctly to control the motion relative of which to the ferrofluid.

All in all, availability of resources isn't a real issue that would render this project unachievable.

Realistic Constraints:

In terms of constraints, that would realistically be ran into, is the familiarity of ferrofluid controls using magnetic fields. This would probably be the only constraint that would need to be focused on because the project progress speed would rely on the progress being made with the controls and manipulations of ferrofluid. I certainly don't have much experience with it but mentors should be a great starting point for getting things rolling.

Project completion wouldn't seem to be an issue, once understanding the fundamentals of controls, the process of building the system should be quite easily systematic and analytical.

Large scale implementations would need to consider the amount of power needed to produce greater magnetic fields to control the larger quantity of ferrofluid in the system. The more ferrofluid needed the larger the magnetic fields need to be and a large enough magnetic field may

come to pose interference with other instruments of the spacecraft if they are sensitive to magnetic forces.

Once the task of knowing how to manipulate the ferrofluid and actually successfully doing it, then other technological and mechanical supplements can be added to make the ferrofluid system more beneficial and efficient to the persons needs.

Assuming that programming and circuitry are already going to take a little time as well, they should be more familiarized with already and shouldn’t pose as a constraint in our progress path. The progress made is going to be heavily relied upon the speed of which ferrofluid controls are mastered and implemented using magnetic fields through our materials.