ECE Senior Design Weekly Report

Engineer’s Name: Piorence Abar Date: 02-16-2017

Team Name: The Globetrotters Lab Section: 4

Week’s Task: Further research into various methods of electromagnetic levitation for a physical globe (option 2, no projection)

Results: This week my assignment was to focus on methods of levitation when it came to our second option for our project, levitation without project which in terms means the use of a physical globe. This was my assignment because although our team would like to focus on levitation with the use of projection, eliminating the necessity for the globe to physically turn, we still are taking in to consideration the possibility that project will be too far out of our budget and thus, must look into our alternate option. I spent much of my research reading about the pros and cons to electromagnetic suspension (EMS) and electrodynamic suspension (EDS), the feasibility of using superconductors, and the suggestion that Hugh had given us last meeting about having a ring of magnets and having every other magnet be activated which would result in our globe turning. I also delved a little deeper into how Hall Effect sensors could be implemented into our project. I found many projects that utilized electromagnetic suspension (EMS) and found that many of the designs required an arm to be used and to suspend the object from the top. However, in our project it would be more pleasing if we could turn the design upside down and use repulsion instead of suspension and found it is possible but I still have to research further into that. The idea that Hugh suggested to our team last week resembles something found in EMS because of the use of magnets to create a sort of thrust (also found in maglev trains which utilize EMS and not EDS). The problem that comes with these designs is instability and finding a way to stop the rotation of the globe at the desired spot and not continue its unrestricted rotation. As a result, it would be best to utilize a feedback loop often seen in EMS or even the use of Hall Effect sensors. The struggle I have found with the use of Hall Effect sensors/infrared sensors is being able to implement them into our design without obstructing the globe. I also researched superconductors because I found they have a strong, reliable force that is also stable. However, the only downfall is the superconductors need to be cooled with the use liquid nitrogen. I believe the look of the gas at the base of the globe would give it an ethereal look, but overall it seems rather unorthodox and inconvenient to have the need to constantly monitor the cooling of the superconductors with liquid nitrogen.