ECE Senior Design Weekly Report

Engineer’s Name: Jake Jabbora Date: 3/9/17

Team Name: The Globetrotters Lab Section: 4

Week’s Task: Research possible control systems to implement in our project.

Results:

There is a position where the force of the system is balanced and therefore should have no current flowing into the electromagnets. This is called the zero-power position. The circuit will drive current into the electromagnets if the object is displaced. We can create a negative feedback loop that adjusts the position of the levitated object to coincide with the zero-average power position. We will set the zero power position as the input and the position of the object as the output. In the forward path we will have the current control circuitry for the electromagnet and the electromagnet. In the feedback loop we will have the position sensor (the hall effect sensors). The Hall effect sensor will measure the displacement of the magnetic field and in return the current control circuitry adjusts the amount of current going into the electromagnets that increases or decreases the amount of force applied to the floating magnet. All resulting in a change in position towards the set zero-average power position. Our design is using one large permanent ring magnet and at least four electromagnets in the center. By placing a Hall effect sensor on the top of each electromagnet we can sense when the levitated object is moving horizontally. As the magnet moves toward the sensor the voltage will increase proportionally. Furthermore that signal is proportional to the amount of current we need in the opposite electromagnet. As one hall voltage increases the current will increase in the opposite electromagnet. We will use the transistors as switches to turn on and off the current as the magnet moves into stability.

Sources:

<http://educypedia.karadimov.info/library/williams_ugthesis.pdf>