ECE Senior Design Weekly Report

Engineer’s Name: Piorence Abar Date: 04.13.17

Team Name: The Globetrotters Lab Section: 4

Week’s Task: Winding coils, testing sensors that we currently have

Results: This week I completed the winding of our electromagnets. I found that the bobbins that were purchased from Digikey were slightly too small and did not allow for maximum turns inside the ring magnet. To adjust, I just cut out circles from cardboard and hot glued these to the bobbins to extend the diameter and as a result, make room for more turns. Overall, the coils ended with roughly 300 turns, a resistance of 2.75Ω and inductance of 3.13µH. Because the coils will be paired in series, we would have a total of 5.5Ω resistance and with a 24V supply, and a max capability of 4.4A. However, the ideal situation would be that our coils would not be operating at all times, and when operational would not have enough time to power up to 100% duty cycle. With this information we began testing our coils to see how they reacted with 1A, 2A and 3A of current flowing through. Obviously, we found that at 3A the coils provided the most pull, however, heated up fairly quickly. Within 4 minutes the coils heated up to 200°F and at that point we halted the testing to prevent the cardboard from catching fire. For precautionary purposes, Kevin built replacement circular ends for our bobbins out of materials found downstairs in the ME workshop. Next, we tested these coils in conjunction with our ring magnet and Hall Effect sensors placed at both the bottoms and tops to be able to determine the proper placement we would need in order to provide the best feedback that would be sent to the op-amps and then to the microcontroller.