

## ECE Senior Design Weekly Report

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Team Name: The Globetrotters

Lab Section: 4

Week's Task: Test all the new hall effect sensors that come in. Hook them up to the differential amplifier and record the values.

Results: The new set of hall effect sensors we are using came in and I tested each one to make sure they were all in working order. Since we want to have the two hall effect sensors cancel out the electromagnetic field that the coils are producing we have to hook them up to a differential amplifier. We don't have enough ADC channels to have all eight sensors going into the PIC24 at once. So the differential amplifier cancels the field produced by the coils and lowers the channels needed to only four. I set up differential amplifiers with four INA122P. I found that we need to orient the hall effect sensors exactly the same position on the electromagnet to ensure the least amount of noise from the coils.

I then hooked up the hall effect sensors over one of the coils and increase the current to see what the hall effect sensors would read. I found that when there was no current in the coils there was a difference of approximately .15V. I increased the current in the coils by .25 A increments. I expected the change in the magnetic field to remain the same since both hall effect sensors are sensing the same field and are the same sensors but this did not happen. The difference in the hall voltages increased as the current through the coils increased. I also tested the hall effect sensors with both the magnet and electromagnets contributing to the hall

voltage. I found the with no gauss the difference was .15V for 0.5A and .16 for 1A. Then at max gauss (magnet fully on the plexiglass) the change in hall voltage was .752 for 0.5A and .819V for 1.0A