# Writing Assignment – Lab Notebook

**Enter full schematics of the combined circuit.**

SCAN THIS INTO THE COMPUTER AND PRINT

**In the lab notebook describe what had to be changed to allow the code to be merged.**

We had to switch around variable names and adjust the timer. But given that the three of us were in a group prior to Lab 4, the code was much more consistent in terms of code for the main and helper functions.

**Include a discussion of how the code meets the required timing of the sensors.**

We used interrupts to space out when the car sends pings to prevent the SMBus from overloading. The ranger requires a minimum of an 80 ms delay while the compass requires a minimum of 40 ms delay. However, attempting to ping these devices as often as possible results in the SMBus crashing. We resolved the issue by adjusting the timing delays until the SMBus could continue functioning.

**Make comments about the car performance with both high and low gains.**

High gains have much more sensitive steering across the board. A high ranger gain will cause the car to swerve harshly away from an object, which points it quickly away. This has the effect of removing the object from view of the ranger, making it adjust back to using the compass gain. A higher compass gain makes the car quickly adjust back towards the wall, making it have steery jerking between the ranger and compass fighting each other. Low gains have much more gradual steering adjustments, with the tradeoff of requiring longer to stabilize. Higher gains will result in jerkier steering, while lower gains have smoother steering.

**Determine a usable set of gains for your car.**

The gains used on the car for demonstration were a ranger gain of 30 and a compass gain of 0.5

**Show the calculations used to determine the resistor values.**

**Show the calculation of the expected divide ratio, Vout/Vin based on the ideal resistor values.**

**List the multimeter reading of the battery voltage and the divider voltage, and calculate the actual divide ratio based on the actual resistor values.**

**Do this tomorrow during lab.**

**Calculate the percentage disagreement between the calculations and the actual experiment.**

**Comment on if the actual divide ratio is consistent with calculated when the resistor tolerance is taken into account.**

**Calculate a conversion factor for taking the A/D 8 bit result (Vout) and the equation to find the battery voltage (Vin) from the measured Vout.**