**Objectives**

There is a significant body of work on how radiation causes faults in electronics and embedded systems [1]. However, there is no quantitative data on how common RF (radio frequency) emissions in the range of 1 MHz to 5.5 GHz (inclusive) affects clock drift in an internal RC (resistor-capacitor) oscillator found in many microcontrollers. Usually, a clock source for a microcontroller is selected based on known factors, such as required accuracy, cost, availability of board space, and expected temperature level and variation. Without any data on the effects of RF radiation, selection of an appropriate clock source is limited to a conservative approach to this unknown. Therefore, in order to remove any guesswork associated with this unknown, the main objective of this experiment is to collect data on the effect on the dependent variable, the microcontroller’s internal RC oscillator clock drift, due to the independent variables of common frequencies and corresponding power densities of RF emissions.

The implications of new data will affect the viability of the internal RC oscillator in embedded systems. Quantitative data on the effects of RF emissions will determine the viability of internal RC oscillators in applications where heavy RF emissions are expected to be present. Since RF emissions are extremely common due to the communications industry, designers will be able to understand how their systems will be affected by RF emissions for the first time. In addition to new data being collected, we hope to answer whether frequency or power density has more of an effect on clock drift.

* Primary Objective
  + To gather data on microcontroller internal RC oscillators exposed to RF emissions by recording the frequency of oscillation every second for an hour, totaling 3600 data points per chip.
  + To test 6 units of 5 microcontroller part numbers from each of the 4 vendors (20 different microcontrollers with a total of 120 parts in all). Out of the 6 units for each part number, 3 units will make up the control and test groups each.
  + To apply treatments of RF emissions of 7 common frequencies in the range of 1 MHz to 5.5GHz inclusive and 4 power densities per frequency based on the power densities received at different distances from the source.
* Secondary Objectives
  + To present the data collected in terms of the percent drift of the final frequency relative to the nominal frequency for each unit tested. These values will be grouped to their part numbers, and an average and standard deviation will be given to both control and test groups for each part number.
  + To present the data collected graphically for each part number with time as the independent variable and the frequency recorded at that time as the dependent variable for each set of data points from the 6 devices tested.

[1] Velazco, Raoul, Pascal Fouillat, and Ricardo A. L. Reis. Radiation Effects on Embedded Systems. Dordrecht: Springer, 2007. Print.