There are four folders which contain the relevant code for the Global Sensitivity Analysis: Main, ODEs, Data, Visualization

**(1) Main**

Contains the four separate files that conduct the simulation for each of the four circuits (TX, TL, HY-TY1, and HY-TY2). Each individual file contains the corresponding nominal parameter values. The sensitivity analysis uses the Latin Hyper Cube Sampling Approach to perturb each variable, and the MATLAB functions rand and randperm are utilized for that purpose. Each simulations corresponds to parameter perturbation in which the GFP output is generated. The GFP output is taken from the related ODE equation located in the ODE folder. The results from each simulation are saved and transferred into the Data folder for further visual analysis.

**(2) ODEs**

Contains the four separate ODEs functions for each of the four circuits (TX, TL, HY-TY1, and HY-TY2).

**(3) Data**

Contains the generated results from the global sensitivity analysis as mat files which are then used for visualization.

**(4) Visualization**

Contains five files: Nominal\_Plot.m, Successful\_Simulation\_Plot.m, Metric\_Violin\_Plot.m, Parameter\_Distribution\_Violin\_Plot.m, and Violin.m. First, the Nominal\_Plot.m generates and plots the GFP output for each of the four circuits at their respective nominal values. Second, Successful\_Simulation\_Plot.m generates and plots GFP output for 25 randomly selected “successful simulations” taken from the Global Sensitivity Analysis results. Third, the Metric\_Violin\_Plot.m generates the the Violin plot distribution for each of the metrics used in the Global Sensitivity Analysis results. Fourth, the Parameter\_Distribution\_Violin\_Plot.m generates the Violin plot distribution for ever parameter set from the “successful simulations” taken from the Global Sensitivity Analysis results. Finally, the Violin.m contains the code used to generate the Violin plots and is sourced from:

Bechtold, Bastian, 2016. Violin Plots for Matlab, Github Project

<https://github.com/bastibe/Violinplot-Matlab>, DOI: 10.5281/zenodo.4559847