Signal Generator

CAG 2024-2025 MATLAB Project

Documentation

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# About

Visualize harmonic signals and how they can be used to create a resulting harmonic - essentially generate any waveform, composed of a sum of simple equations.

# A screenshot of a computer Description automatically generatedScreenshots

Figure - Home Page

A screen shot of a graph

Description automatically generated

Figure - Generator Page, with 3 harmonics used

# Usage

* Select “Open Generator” from the main page
* At this point, the generator will only have one “default” signal/harmonic:
* A screenshot of a computer

  Description automatically generatedTo add a new signal, populate the fields on the left bar
  + Amplitude
  + Frequency
  + Phase

A screenshot of a computer error

Description automatically generated

* Once ready, click “Add Signal”
  + *Note that you will receive an alert if you attempt to add a signal that is invalid*
* Suppose you add the signal :

A graph with blue and orange lines

Description automatically generated

See how the graph will show:

* The resulting harmonic in blue
* The composing signals in different colors.

You can always see what signals are being used by looking at the legend (top-right corner)

* A screenshot of a computer error message

  Description automatically generatedIf you now want to remove a signal, select it from the list on the left and click “Remove Selected Signal”
  + *Note that at least one signal is required at all time, so if you try to remove the last remaining signal, you will get an alert.*

# Folder Structure

* main.m – handles scaffolding the program
* /pages – contains the page layouts & logic
  + homePage.m – home page, view docs & open generator
  + generatorPage.m – generator page, create the signals & view plot
* /lib – miscellaneous pieces of logic & resources
  + openGenerator.m / openDocs.m – utilities to open the generator page & documentation
  + createHarmonic.m – takes in the params of the equation, and builds it using the previously defined formula
  + createHarmonicString.m - builds the pretty representation of the equation so it can be shown in the UI
  + createHarmonicFromString.m - reconstructs the value of the equation, starting from the pretty representation. Used to rebuild the used equations so they can be plotted individually.

# Repository

The project’s progress was tracked using git, and the repository is hosted on GitHub:

[github.com/davidp-ro/matlab\_signal\_generator](https://github.com/davidp-ro/matlab_signal_generator).

# Credits & Citations

* CAG 2024-2025 Resources
* Mihaela Cirlugea, Paul Farago
* The image used on the main page:
* stevenvh (https://electronics.stackexchange.com/users/2064/stevenvh), What exactly are harmonics and how do they "appear"?, URL (version: 2012-05-21): <https://electronics.stackexchange.com/q/32314>
* Code snippets
* OpenAI. (2025). ChatGPT [Large language model]. <https://chatgpt.com>, Prompts:
  + “how to set the argument of a function in matlab to be a string”
  + “and how can I check the string's value (if it matches a known one)”
  + “how can I make a figure be non-resizable?”
* The MATLAB Answers forum
* © 1994-2024 The MathWorks, Inc.