

Signal Generator

CAG 2024-2025 MATLAB Project
Documentation

David Pescariu | Group 2023 | ETTI UTCN

1. 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 $x(t) = A * \cos(2 * \pi * f * t) + \phi$ equations.

2. Screenshots

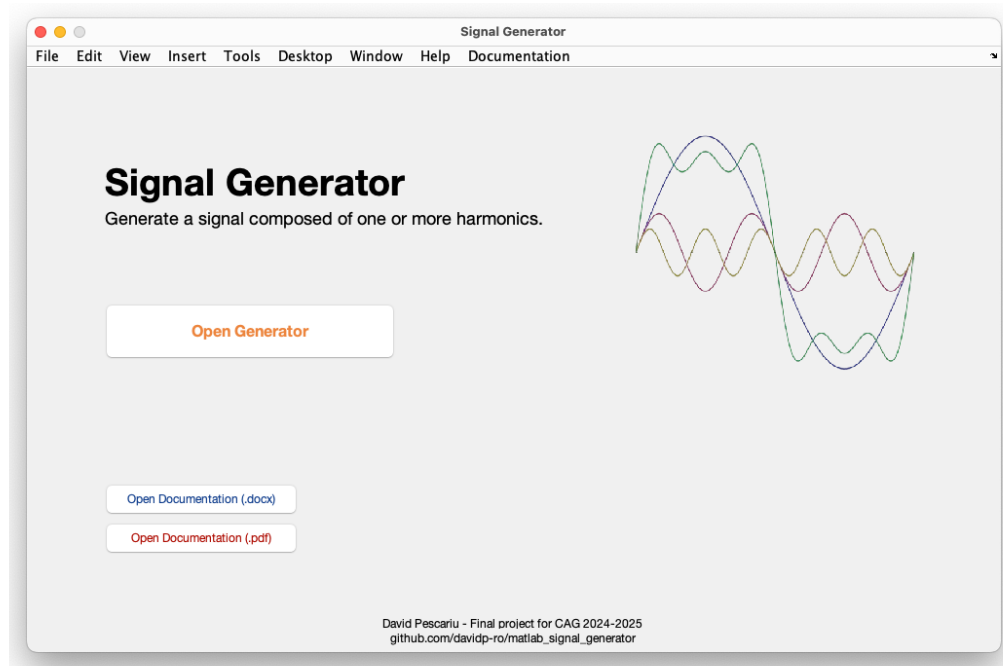


Figure 1 - Home Page

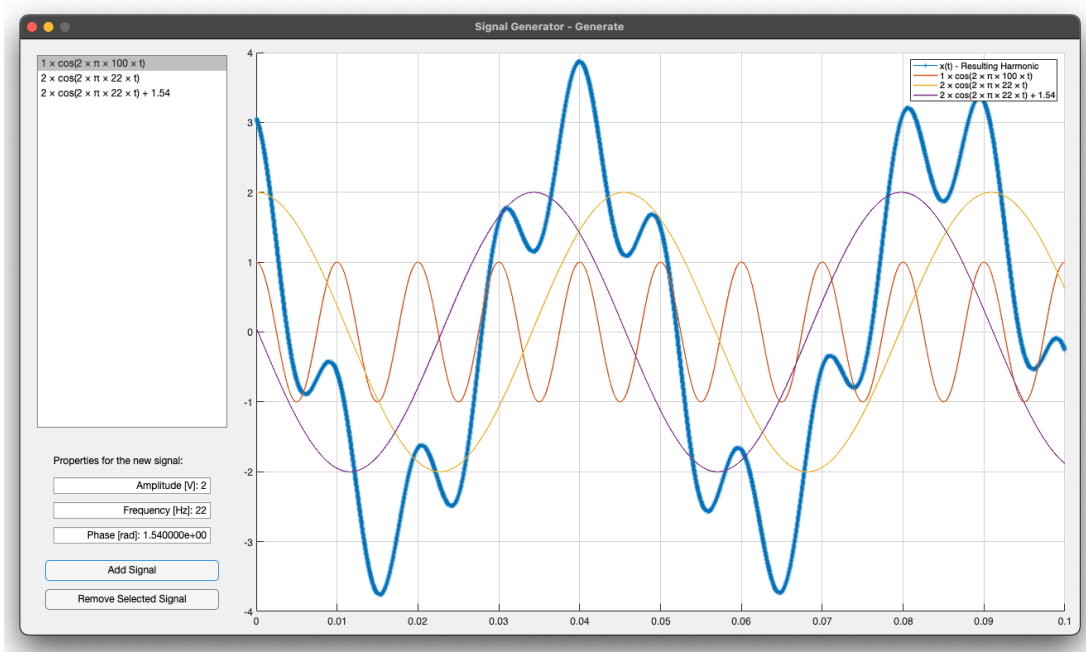


Figure 2 - Generator Page, with 3 harmonics used

3. Usage

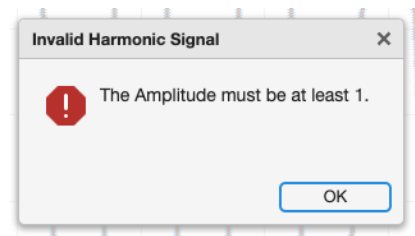
- Select “Open Generator” from the main page
- At this point, the generator will only have one “default” signal/harmonic: $1 * \cos(2\pi 100t)$ [Hz]

- To add a new signal, populate the fields on the left bar
 - Amplitude
 - Frequency
 - Phase

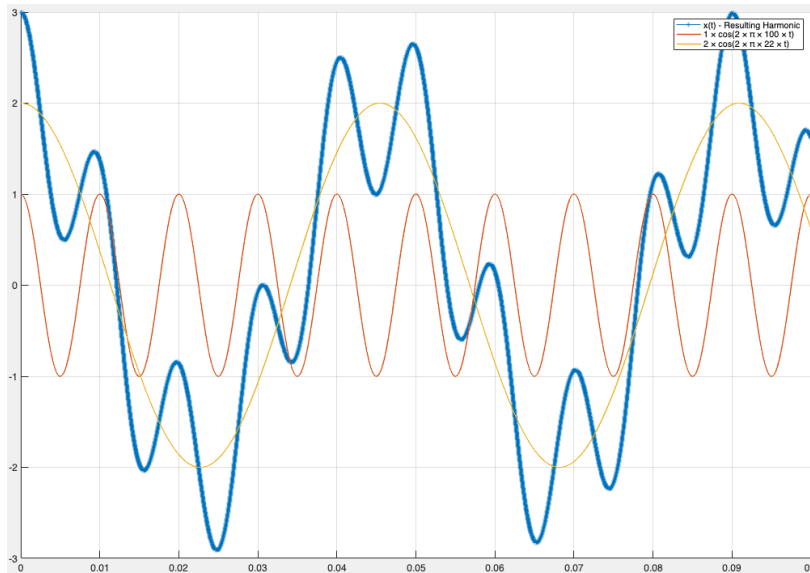
Properties for the new signal:

Amplitude [V]:	0
Frequency [Hz]:	0
Phase [rad]:	0

- 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 $2 * \cos(2\pi 22t)$:



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)

- If 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.*



4. 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.

5. Repository

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

github.com/davidp-ro/matlab_signal_generator.

6. 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.