

## Requirements:

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- 1- User can place different zeros and poles
  - 2- Modify placement of zeros and poles by dragging
  - 3- Delete zeros and poles by clicking
  - 4- Clear options (all zeros, all poles, everything)
  - 5- Options to add conjugates or not for the complex elements
  - 6- A plot that shows the corresponding frequency response for the placed elements :
    - 1 graph for magnitude response
    - 1 graph for phase response
  - 7- Option to apply the filter on a lengthy signal (min 10,000 point) as if it is a real-time filtering process
  - 8- A graph should show the time progress of the signal
  - 9- Another graph to show the time progress of the filtered signal (upon applying the difference equation on the points one by one)
  - 10- The user should be able to control the speed of the filtering process
    - example: the filter can process 1 point/sec or 100 points/sec or any number in between via a slider
  - 11- An option to correct for the phase by adding some all-pass filters
  - 12- The user can pick the suitable all-pass through a library available in the website
  - 13- website should have the following features:
    - A library of all-pass filter that the user can visualize (its zero-pole combination as well as its phase response), then pick one or more to add to the original design filter.
    - A custom-built all-pass: if the user cannot find a good all-pass in the provided library, then s/he build his own. i.e. provide an arbitrary "a" and the website would calculate its phase response and integrate it with its library.
    - The user can enable/disable the added all-pass elements via a drop-menu or checkboxes group.

## Examples:

<https://www.earlevel.com/main/2013/10/28/pole-zero-placement-v2/>

<https://www.earlevel.com/main/2016/12/08/filter-frequency-response-grapher/>