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## Active Filter Design Using Matlab

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At one time or another, you'll probably need to design an analog filter. Despite an abundance of digital filter design tools (for example, the excellent FDATool bundled with Matlab's Signals toolbox), there are few general-purpose GUI tools for synthesis of arbitrary active analog filters.

To help students and the engineering community, I developed Analog Filter Design (AFD), an intuitive active analog filter design tool. Four universities currently use it as a teaching tool. AFD lets you design, analyze, and simulate Bessel, Butterworth, Chebychev I and II, and elliptic filters up to the 8th order of arbitrary passband gain using more than 10 different circuit topologies (see **figure**). It runs under one master GUI as a Matlab toolbox.

AFD simulates the frequency and time-domain responses of the filter built with both idealized and standard-value components to a variety of standard test waveforms. It can also load a sampled user waveform and simulate its time-domain and frequency-domain performance both pre-filtering and post-filtering.

A free Matlab application lets you design and analyze active analog filters.

To facilitate stage-by-stage debugging and tuning, you can independently analyze each filter stage in the frequency domain and in the time domain. You can compute the sensitivity of filter characteristics to changes in component values. Although it can implement the filtering stages using a variety of circuits, the program suggests the circuit most suitable for the particular stage's gain and Q.

The AFD download (a .zip file) includes a full user manual and installation instructions. You can download the AFD tool from [academics.vmi.edu/ee\\_js/](http://academics.vmi.edu/ee_js/) (click "research" then on "Active Filter Design for Matlab" to download the program).