

## Resource R17 Matlab function `sos2header` for converting controllers to C

The following Matlab function `sos2header` can be used to convert a Matlab controller in second-order sections to a C floating point header file. It is used in [Lab Exercise 08](#) to convert a controller designed in Matlab to a file a myRIO can read and implement in C. A file containing this function, called `sos2header.m`, can be found at [ricopic.one/embedded\\_computing/source/sos2header.m](http://ricopic.one/embedded_computing/source/sos2header.m).

```
function sos2header(fid, sos, name, T, comment)
% Print to the filter definition for
% FLOATING POINT header file.
%
% sos2header(fid, sos, name, T, comment)
%
%- fid      - File identity
%- sos      - Scaled second order sections, from "tf2sos"
%- name     - Name to be given to the array
%           of biquad structures, and
%           associated with the number of sections.
%- T        - Sample period in seconds
%- comment  - comment added at top of header

%---structure form of cascade
fprintf(fid, '/*---%s\n', comment);
fprintf(fid, '/*---%s\n', datestr(now,0));
[ns,m]=size(sos);
fprintf(...
    fid,...
    'int %s_ns' = %d; // number of sections\n',...
    name,...
    ns...
);
fprintf(...
    fid,...
    ['uint32_t timeoutValue = %d; ',...
    '// time interval - us; f_s = %g Hz\n'],...
    T*1e6,...
    1/T...
);
fprintf(
    fid,
    ['static\tstruct\tbiquad, '...
    '%s[]={ // define the array of floating point ',...
    'biquads\n'],...
    name...
```

```
);  
for i=1:ns-1  
    fprintf(fid, '          {'});  
    for j=[1,2,3,4,5,6]  
        fprintf(fid, '%e, ', sos(i, j));  
    end  
    fprintf(fid, '0, 0, 0, 0, 0}\n');  
end  
fprintf(fid, '          {'});  
for j=[1,2,3,4,5,6]  
    fprintf(fid, '%e, ', sos(ns, j));  
end  
fprintf(fid, '0, 0, 0, 0, 0}\n          }; \n');
```

