Understanding Your Code: Correcting C2 Calculation

1. Your original C2 calculation:
   C2 = 2 * MyDampingFactor * (2 * Math.PI) * (1 / (Math.PI * MyFilterRate))

2. Issue with the Original Formula:
   - MyFilterRate represents the natural frequency f_n where -3 dB cutoff occu
   - The missing factor in the equation is the sampling period T.
   - Correct formula from the paper:
     C2 = 2 * eta * omega_n * T, where omega_n = 2 * pi * f_n.

3. Corrected C2 Calculation:
   - If MyFilterRate = f_n (Natural frequency of filter), then:
     C2 = 2 * MyDampingFactor * (2 * Math.PI * MyFilterRate) * SamplingPeriod

4. Example for a 7-Day -3 dB Cutoff with 1-Day Sampling:
   - Sampling Frequency: f_s = 1 cycle/day -> Sampling Period: T = 1 day.
   - Natural Frequency: f_n = 1/7 cycle/day -> omega_n = 2 * pi / 7 rad/day.
   - C2 Calculation:
     C2 = 2 * 1.0 * (2 * pi / 7) * 1 = 4pi / 7 ≈ 1.795.

5. Importance of Normalization:
   - Ensure the DC gain of the filter is 1 (0 dB).
   - Avoid artificial gain due to improper scaling.

6. Next Steps:
   - Correct the C2 formula in your implementation.
   - Verify the unit step response of the filter.
   - Check the final frequency response behavior.

This document serves as a reference for ensuring a correct implementation of the second-order digital filter for your application.