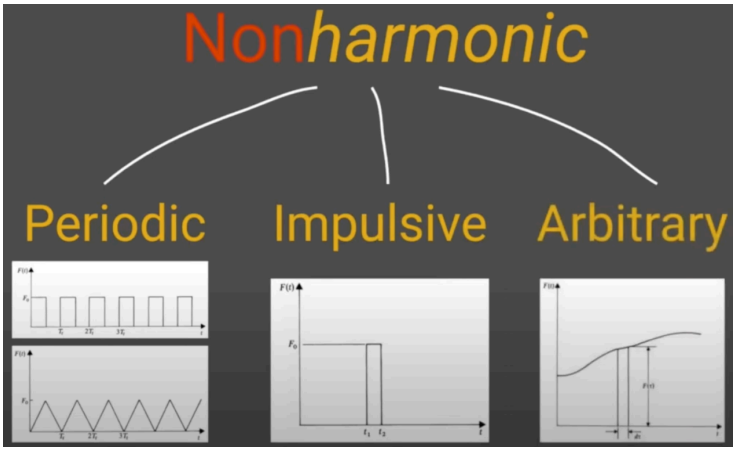
Project 4: Real-Life Vibration due to Nonharmonic Excitation

Present a real-life vibration of a 1-DOF damped system subject to a nonharmonic excitation via an experiment and theoretical analysis



Description:

In either (a). a written technical report no more than eight pages long or (b). a video no longer than 120 seconds:

- Identify or design a 1-DOF forced vibration of an object in or around your house, where the external excitation is a ***nonharmonic*** forcing function, and where the damping is known
- Explain the phenomenon and the vibration behavior by:
    - Conducting a simple experiment to
        - track the motion of the vibrating object
        - visualize the real-life vibration in a displacement vs time plot

    and:

    - Performing a theoretical analysis and visualizing the solution in a displacement vs time plot
- Compare the experimental and theoretical results, discuss sources of error, validity of your assumptions, and future improvements, and provide insight into why theory and real life do not always match up
- Reflect on your journey of working on this project

Deliverable:

Present your work in *one* of the following formats:

- An technical report, 8 pages or shorter, written solely by you (and your teammates), in PDF
- A video, 120 seconds or shorter, produced solely by you (and your teammates), uploaded to YouTube

Rules and Formatting:

- This project may be done individually or in teams of up to three students*
- If you choose the written option:
    - All rules from Projects 3 apply here
- If you choose the video option:
    - All rules from Projects 2 apply here

* Teams must be pre-approved in PPP 4

Submission:

Submit your PDF or Youtube URL in Gradescope only. Submissions by email or other means will be disregarded.

Due on Dec 6, 2024 (Friday), at 11:59 pm CST.

Late submissions, unless accommodated, will be subject to the “half-life” reduction policy according to the syllabus.

Grading Rubric:

	Fluency			Scaling	Max Possible
	2	**1**	**0**		
Technical Rigor	Appropriate object is used to illustrate the vibration type; experiment is well constructed; observed data accurately collected and plotted; theoretical analysis is accurate	Some obvious details missing	Farfetched, or missing most details	1	2
Professionalism	[Video] Video has good quality visuals, clear audio, smooth "flow" and editing; educational and fun; a joy to watch [Report] Presentation of work is logical, legible, and easy to follow; format is well-structured; free from grammatical or typographical errors; a joy to read	Some issues with the overall look and feel of the deliverable	Full of errors, hard to follow; illegible or unwatchable	1	2
Justification, Lessons Learned, Reflection	Thoughtful and authentic; a comparison of experiment and theory is clearly made; acknowledges limitations/inaccuracy and suggests future (self-)improvements; discusses your learning and self growth	Insubstantial or vague	Missing altogether	1	2
				Max Possible:	6