Y1Project 2023: Video Presentation of Exhibition Displays — Submission Form

(deadline 2pm, Friday 23rd June)

1. Select your team's three-letter code *

   WV9

2. Description for the Video (same as the Abstract for your Write-Up + any corrections) *

   Copy over the Abstract from your Write-Up; you may reformat this (e.g., for line breaks) or make any corrections as necessary to ensure it is appropriate as the Description for your Video Presentation.

This project embarked on an in-depth exploration of two core characteristics inherent in a gyroscope: first, the rigidity of the spin axis, and second, the motion of precession. These investigations served as a foundation for designing and assembling two innovative devices: a gyro-pendulum that demonstrates damped oscillations, and a self-balancing tumbler equipped with reaction wheels, both designed to showcase potential applications of a gyroscope as a damper and stabilizer.

The creation of the gyro-pendulum commenced with a comprehensive analysis of the dynamics in a generic gyroscope, followed by the application of Lagrangian mechanics to the gyro-pendulum in the scenario of nonconservative torque. A system of dynamic equations was systematically resolved via Python, incorporating parameters akin to those used in the actual design process. The outcomes verified that with the application of nonconservative torque, such as accelerating the flywheel's rotation, the amplitude of nutation oscillation progressively diminishes. Subsequently, using this foundational knowledge, a handheld stabilizing apparatus was designed and partially assembled. This prototype demonstrated a tangible damping effect, thereby affirming the theoretical basis and the results deduced from the simulations.

The self-balancing tumbler leveraged the principle of angular momentum

3. Title of your video *

We expect this to be similar to the title for your Write-Up and the Project itself, but you are free to modify it to suit the tone of your video. Once again, capitalise as is usually done for a title; according to the Imperial College House Style Guide, that is to **"capitalise the first word of the title and all other words except articles, prepositions and conjunctions".**

For the Write-Up, most of you were able to capitalise properly, but I did also have to manually correct some that were submitted in ALL-CAPS, no capitals etc., so please do follow the instructions.

Gyroscopic Mechanical Stabiliser and Damper

4. Upload your Video Presentation File, after saving it to your computer with the file name format "**ABC.mp4**" etc., replacing the "ABC" with your three-character team code in capitals and numerals, and "mp4" with the original file extension for your video (.mov etc.). The system will add your name automatically after uploading, but the file that you select should just have three alphanumerics, a full stop and an extension. (非匿名问题ⓘ) *

This form does not allow me to enforce the filename format, so I have to rely on you. **Please do ensure that the file name format above is followed.** No "SummerProject .mov" etc. please! Incorrect formats result in additional manual interventions which can delay processing; not

something the markers will be happy with!

The system imposes a 1 GB limit on file sizes, which should be plenty for a 10-minute video, but *if* your video is bigger, please compress it, or otherwise process it, so it fits in 1 GB. No 8K resolution videos please!

If you have any technical issues when you upload your file, first, do not worry! **Take a screenshot of your attempt to upload, which will demonstrate that you have been trying, as well as a screenshot of a listing that shows the file size, and post them to the Teams chat that I have been having with your team and supervisor** (where I initially announced the supervisor allocation), **@tagging me.** I will be notified and will be able to help you out.

WV9.mp4

5. The Video Presentations may be shown to people outside of College, especially if they win a prize. Please let us know if you would rather restrict your video to not being seen by those who do not belong to Imperial. *

We very much hope you will choose the first option!

We do not wish enforce restrictions on wh...