

Bachelor's Thesis, Term Project

Control and damping the Vibrations on the buildings using a novel Tuned Mass Damper (TMD) system

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Co-Advisor(s): (Eng. Ramy Mahmoud, Eng. Malek Mahmoud)

In this project we present a novel approach for controlling and damping vibrations on buildings using a tuned mass damper (TMD) system. The proposed TMD system is designed to reduce the amplitude of structural vibrations caused by external excitations such as wind or earthquakes. The TMD system consists of a secondary mass that is connected to the primary structure via a spring and a damper. The mass, spring and damper are carefully tuned to resonate at the same frequency as the structural vibrations, effectively reducing the amplitude of the vibrations. The proposed TMD system is designed to improve the dynamic behavior of the building and reduce the risk of damage or collapse. The system is evaluated through simulations and experiments on a test building, showing significant reduction in the amplitude of vibrations. The proposed TMD system is easy to install and can be retrofitted to existing buildings. This work highlights the potential of TMD system for improving the safety and performance of buildings in the face of dynamic loads. **There is a Master's student from Mechatronics Engineering Department, Senior Researchers from ARATRONICS also available to help and advice and The Lab Engineer from ARATRONICS, guiding and directing the student with Assoc. Prof. Dr. Eng. Amir Roushdy.**

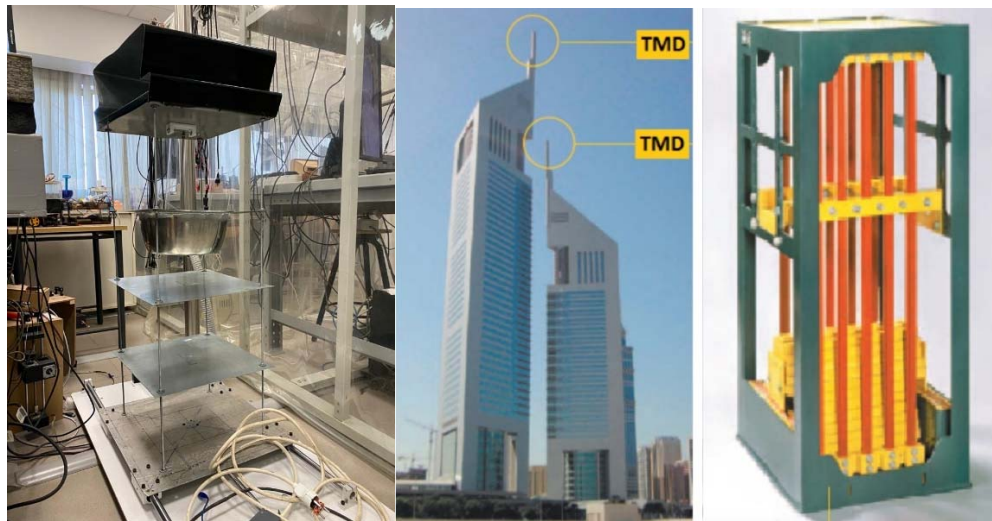


Fig.: Overview of model for the buildings using a novel Tuned Mass Damper (TMD) system at the ARATRONICS Research Center

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Project description and objective:

The student need to collect a data and to work with the team to finalize the objectives which mentioned in the above abstaract.

Research focus of this project:

- Literature review on the project should be studied properly.
- Not only, creating a software control system for the project but also the hardware.
- Experiments using the gadget and control system should be built properly.
- The outcomes must be documented.

Requirements:

- Passionate to learn more about, Internet of things, 3D Printing design, Robotics and control.
- Prior mechatronic design expertise is desired like "LabVIEW, SolidWork and Aruino".
- Enthusiasm for completing actual practical work with 3D printing staff (design fabrication and construction).
- A method of working that is both structured and self-contained.

General tasks of the project:

- The complete methodology is already available in the ARATRONICS Lab, so we will discuss it from the first day to start the automation process for it
- Fabricate the robot/system using 3D printer/CNC machine (small parts).
- Assembly all parts of the Robot.
- Changing the working variables and see the effect on the locomotion of the robot.

Other notes:

- A weekly meeting with the advisors will be required for this project, as well as weekly progress updates (*The meeting could be more than once during the week based on your progress and based on your achievements*).
- You should to be in the Lab two days per week (*It could be more than two days based on your progress and based on your achievements*).
- All reports must be prepared in the style of a research paper.
- The outcome of this research will be published in one of the coming international Conferences and , or Journal