

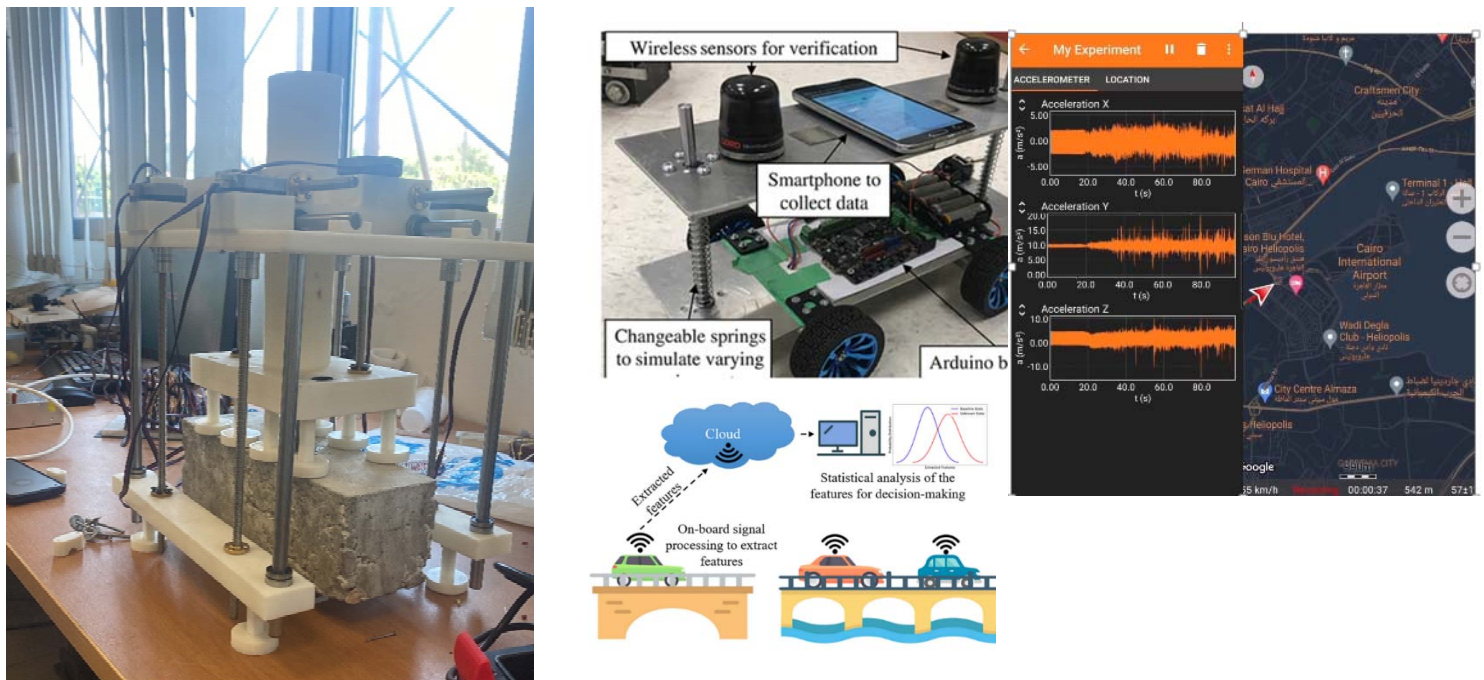
Bachelor's Thesis, Term Project

## Bridge Health Mentoring Based on Smart Embedded Mechatronics Sensing Technologies

**Main Advisor(s):** (Assoc. Prof. Dr. Eng. Amir Roushdy, Prof. Dr. Eng. Moustafa Baraka from Civil Engineering Department and the Dean of EMS)

**Co-Advisor(s):** (Eng. Malek Mahmoud)

Infrastructure systems are subject to aging with time, e.g. bridges. Such systems deteriorate performance wise and physically get damaged; the two translate into reduced service life and increased safety concerns of the infrastructure. This has been noted with due concern over the years and various monitoring and damage detection measures have been put in place. Narrowing down to bridges, bridge health monitoring has become a hotbed of inquiry owing to the high cost of construction, thus proper maintenance being the best alternative to lengthen the service life of such structures. As such, vibration-based health monitoring techniques have achieved promising progress thanks to the breakthrough in data analysis techniques and rapid development of wireless sensor networks. **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 the damage detection technique at the ARATronics Research Center

For more details please contact:

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### Project description and objective:

A novel framework for indirect bridge health monitoring by utilizing data from smartphones in a large number of vehicles. In the proposed approach, smartphones were used as sensors from which the data collected was used to detect damage in bridges. In order to collect the data smoothly, we will develop an android app that can collect acceleration data and GPS information simultaneously. The data will be collected from the sensors on smartphone and stored remotely on the web database. The student will get a real reading from a new and old bridges in New Cairo and in the old Downtown.

### 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 "SolidWork and Arduino".
- 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

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