

Sensor Package for Vibration Based Structural Health Monitoring

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⁵ **Abstract:** Paper will cover: Sensor package parameters and development, FRF, PCB design transfer
⁶ function, means of deployment and field testing.

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⁸ **Keywords:** keyword 1; keyword 2; keyword 3 (List three to ten pertinent keywords specific to the
⁹ article; yet reasonably common within the subject discipline.)

0. Introduction

Structural health monitoring:

1. Current process
2. Results of existing process
3. Challenges and flaws in existing process

Sensor Package:

1. Proposed solution
2. Previous work
3. Overview of the solution attempt

1. Materials and Methods

Hardware:

1. Microcontroller (Teensy 4.0)
2. SCA3300-D01
3. NRF24L01
4. Memory Module
5. Electro permanent Magnet
6. Power system

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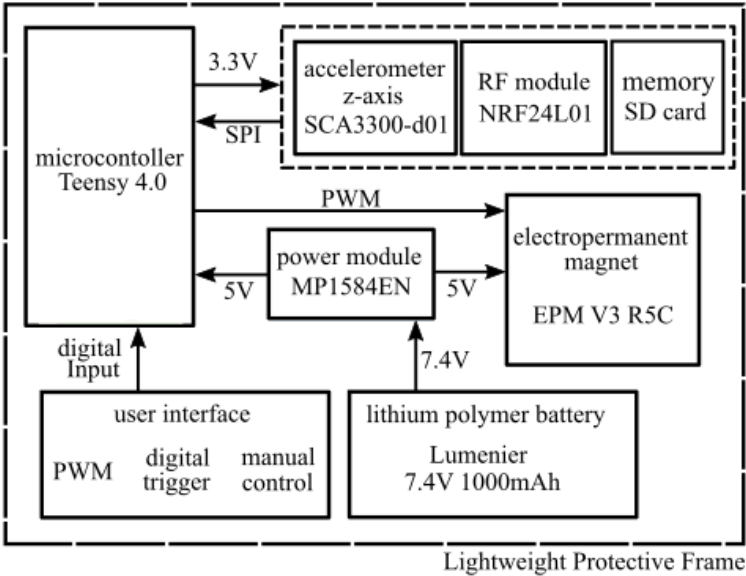


Figure 1. Block diagram shows sensor package systems.

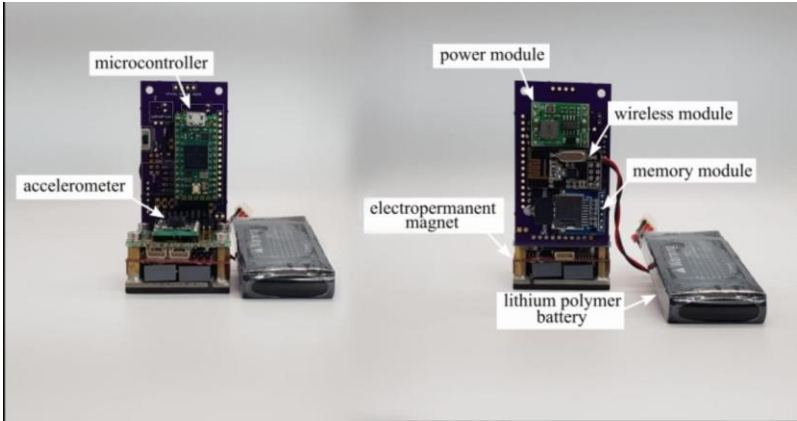


Figure 2. sensor package PCB.

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Software:

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1. Arduino IDE code Overview

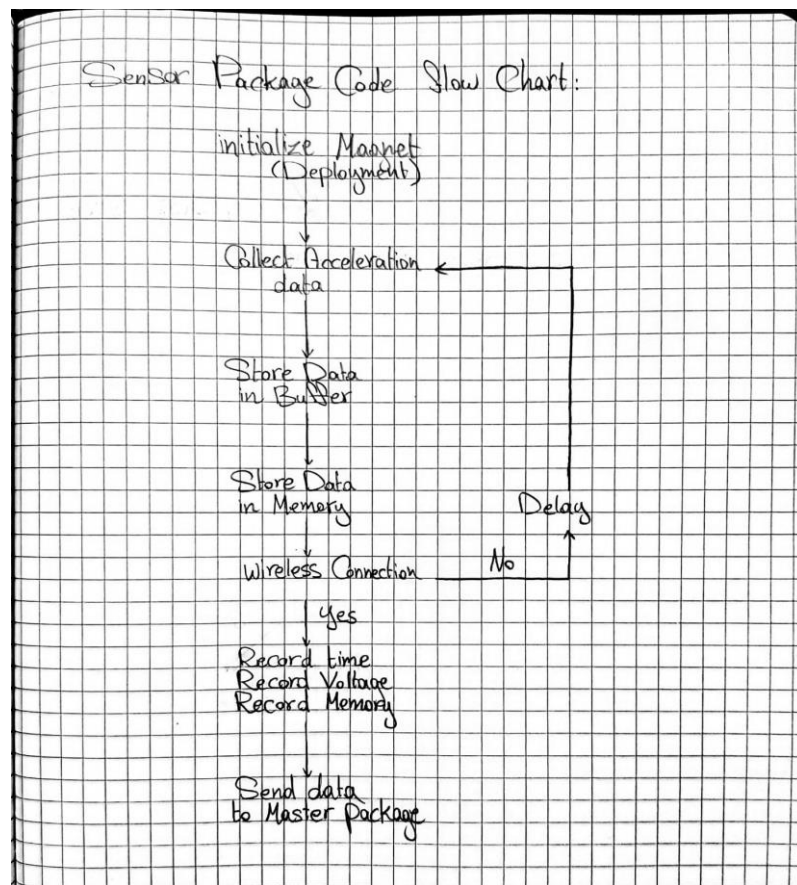


Figure 3. sensor package code flow chart.

Tests and validation:

1. FRF
2. PCB transfer function
 - A. Theoretical and simulation
 - B. Experimental
3. Aerial deployment
4. Manual deployment

2. Results

Test Results:

1. FRF

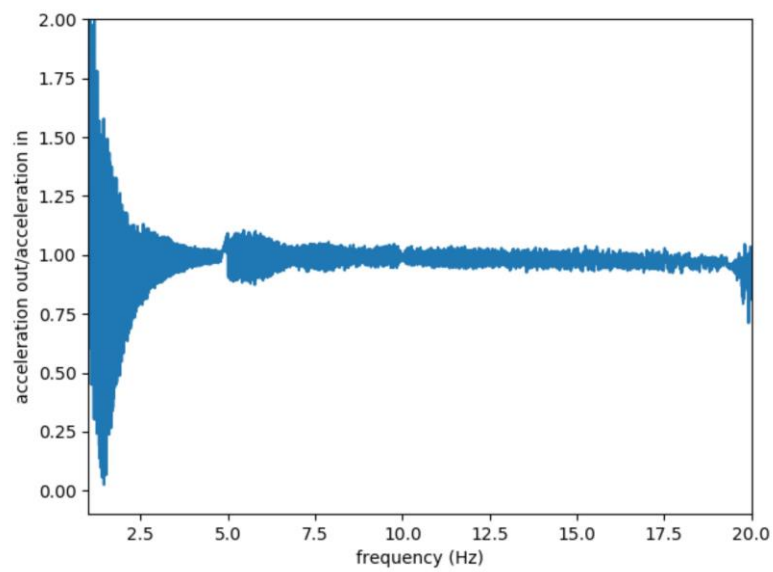


Figure 4. Frequency response function of the sensor package.

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2. PCB transfer function

A. Theoretical and simulation

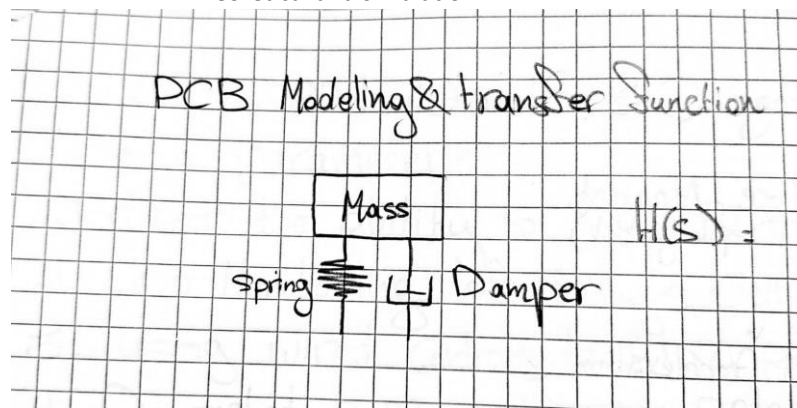


Figure 5. sensor package modeling.

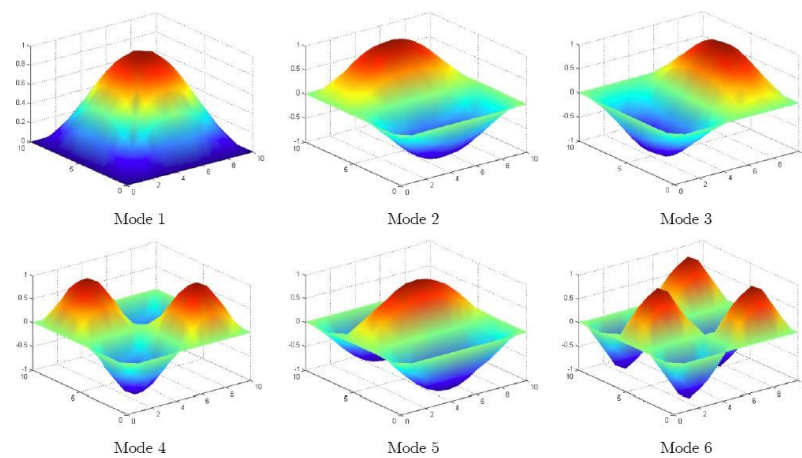


Figure 6. sensor package mode shapes.

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B. Experimental

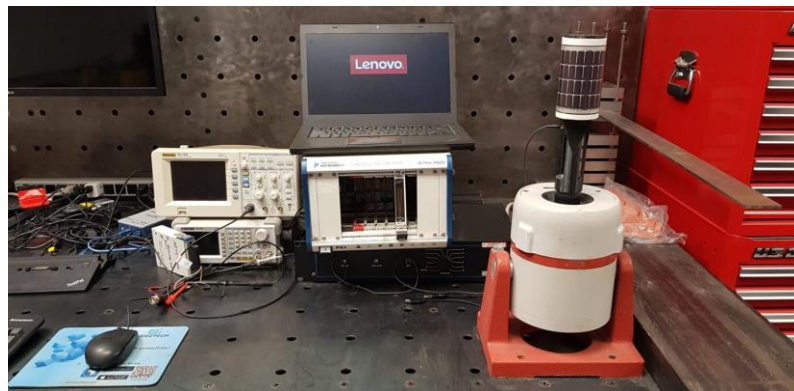


Figure 7. sensor package transfer function experimental setup.

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3. Aerial deployment

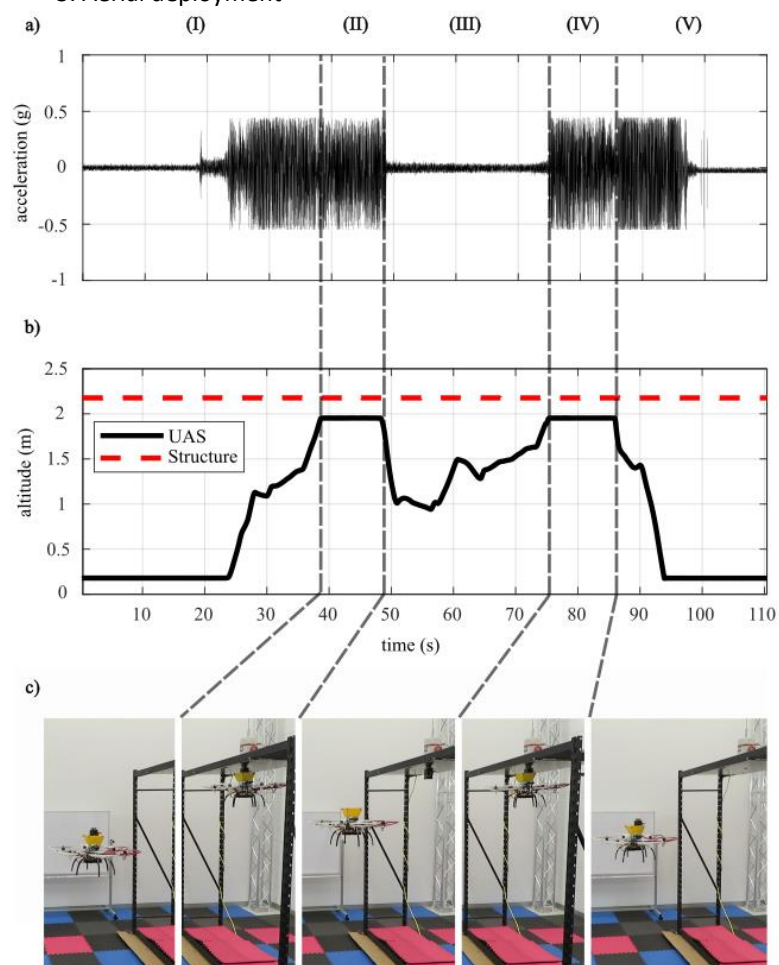


Figure 8. figure shows the deployment of a sensor package by a UAV.

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4. Manual deployment



Figure 9. sensor package deployed under a bridge.

39 **3. Discussion**

- 40 1. Test results discussion
41 2. Capabilities of sensor package and means of deployment

42 3. Flaws and further improvements with steps to get there

43 **4. Conclusions**

44 Overview:

45 1. SHM and current challenges

46 2. proposed sensor package and solutions it offers

47 3. further research and development

