# ABSTRACT

ALMEIDA, Julio Henrique Lopes de. **Convolutional neural networks applied in the monitoring of metallic structures**. 2018. 101f. Dissertação (Mestrado em Engenharia Elétrica) - Faculdade de Engenharia, Universidade do Estado do Rio de Janeiro, Rio de Janeiro, 2018.

This work presents an intelligent structural monitoring system. It consists of two steps: the first one is a non-destructive test using electromechanical impedance and the second one, an impedance curve is classified by a deep learning algorithm, Convolutional Neural networks. The experiments were performed using two different ways of handling on the input vector: keep it one-dimensional and convert it into a two-dimensional array. The electromechanical impedance test was performed through using a PZT transducer coupled with 1020 carbon steel plates, which simulate the turbine vane with different damages. Unlike the related works, the fixation was non-permanent with aid of a custom-made support with springs, instead of the common method, which consists on a permanent fixation of the sensor, with a high-strength adhesive. The purpose of this study is to identify the mechanical condition of the steel plates from the electrical impedance curves extracted from PZT transducer. The Convolutional Neural networks were compared with the K-nearest neighbors classifiers, a support vector machine, logistic regression and submitted competitive results.

Keywords: Classifiers; Deep Learning; Gas turbine vanes; Structure Monitoring; Electromechanical Impedance; Intelligent Systems; Metallic Structures.