

**SÃO PAULO STATE UNIVERSITY**  
School of Engineering of Ilha Solteira

**TITLE**



**Research Report – Iniciação Científica**

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# RESEARCH REPORT

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# 1 INTRODUCTION

Unmanned Aerial Vehicle (UAV) has been used for several applications, such as entertainment, sports transmissions and commercial applications. However, historically, it was primarily designed to achieve military goals, including unmanned inspection, surveillance, reconnaissance, and mapping of inimical areas. Over time, its applications extended to other areas, like geomatics, for data collecting through photogrammetry. This way, collecting images using UAV provides a bunch of applications in the aerial close-range domain, making it a low-cost alternative to the traditional manned aerial photogrammetry for mapping or detailed 3D recording information and being a valid complementary solution to terrestrial acquisitions (4).

In Brazil, UAV is widely used in agricultural situation, therefore, tracking, monitoring and collecting information in real time from remote areas for agriculture and livestock are quite relevant. Abade et al. (1) showed the development and construction of an UAV able to board remote sensing applications with images and radio frequency for this purpose. Still with the same bias, but targeting another aspect, Otake (5) used UAV to generate cartographic products for agriculture purpose. The main goal was to detect failure of planting, the projection of contour lines and the elaboration of use of soil map.

In such manner, the use of UAV equipped with cameras to access places where human access might be difficult is a way to spend less effort in many contexts, decreasing the chances of accident and spare financial recourses. Dadrasjavan et al. (2) considered the use of UAV useful for acquiring reliable information about the pavement of the road and monitoring any kind of crack on it by selecting key frames and generating ortho-image. Non road regions in the scene are discarded and crack elements are extracted. Subsequently, through Support Vector Machine (SVM) classification true cracks are detected. On the other hand, Sushant et al. (6) used a MATLAB® implementation to both localizing the position of the UAV and detect cracks in railway tracks. For the first goal, a Monte Carlo Localization (MCL) method was carried out for the software senses its position and for the second goal, and software method was able to detect the railway cracks comparing the intensity of the color of the image. Lesiak (3) also bring the attention to the inspection and maintenance of railway infrastructure with the use of UAV and its implementation.

Hence, it's clear the demand of UAVs in various sceneries, in special to assist detecting damages in specific types of structures. Not only understand and determine the method is crucial, but also the way that it's implemented and its viability.

## **1.1 Objective**

To develop a process to obtain and analyze aerial images to detect railway cracks.

## BIBLIOGRAPHY

- [1] Abade, A., de Campos, M. D., Porto, L. F., de Farias Coelho, Y., de Moura Sousa, Y. and Nespolo, J. P. (2016), 'A construção otimizada de um drone para aplicações na agricultura e pecuária de precisão', *Anais da Escola Regional de Informática da Sociedade Brasileira de Computação (SBC)–Regional de Mato Grosso* 7.
- [2] Dadrasjavan, F., Zarrinpanjeh, N. and Ameri, A. (2019), 'Automatic crack detection of road pavement based on aerial uav imagery'.
- [3] Lesiak, P. (2020), 'Inspection and maintenance of railway infrastructure with the use of unmanned aerial vehicles', *Problemy Kolejnictwa* .
- [4] Nex, F. and Remondino, F. (2014), 'Uav for 3d mapping applications: a review', *Applied geomatics* 6(1).
- [5] Otake, V. S. (2017), 'Produtos cartográficos gerados a partir de drones e aplicações na agricultura'.
- [6] Sushant, S., Anand, S., James, T., Aravind, V. and Narayanan, G. (2017), Localization of an unmanned aerial vehicle for crack detection in railway tracks, *in* '2017 International Conference on Advances in Computing, Communications and Informatics (ICACCI)', IEEE, pp. 1360–1365.