

# **Abstract**

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## **Automation of Focusing System based on Image Processing through Intelligent Algorithm**

There are a number of precise measurement and inspection applications, which are based on image processing. Focusing is a major step to accomplish these applications, especially when microscopic images are required. Microscopic manual focusing based on expert's eye could result in misleading decisions since it is subjected to human accuracy, sensitivity and visual capabilities. Therefore, automatic focusing systems have been developed to increase accuracy with better reliability and save time. In this research, an auto focusing mechanical module with integrated software is designed, tested and verified. This system is based on grasping a sequence of images using coarse and fine focusing mechanisms. The most focused image is identified through an algorithm, which encapsulates various focusing approaches. These approaches are Image Curvature (CURV), Tenengrad based algorithms (TENG), Squared Gradient (GRAS) and Gray Level Variance (GLV). The aim of this research is making a comparison between these approaches to Select the best when used with microscopic images of un-etched gray cast iron specimens. The proposed auto focusing module is a step towards the automation of manual focusing systems in microscopes.