

## **Paddy/Rice Singulation for Determination of Husking Efficiency and Damage Using Machine Vision**

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**Abstract :** In this study a system of machine vision and singulation was developed to separate paddy from rice and determine paddy husking and rice breakage percentages. The machine vision system consists of three main components including an imaging chamber, a digital camera, a computer equipped with image processing software. The singulation device consists of a kernel holding surface, a motor with vacuum fan, and a dimmer. For separation of paddy from rice (in the image), it was necessary to set a threshold. Therefore, some images of paddy and rice were sampled and the RGB values of the images were extracted using MATLAB software. Then mean and standard deviation of the data were determined. An Image processing algorithm was developed using MATLAB to determine paddy/rice separation and rice breakage and paddy husking percentages, using blue to red ratio. Tests showed that, a threshold of 0.75 is suitable for separating paddy from rice kernels. Results from the evaluation of the image processing algorithm showed that the accuracies obtained with the algorithm were 98.36% and 91.81% for paddy husking and rice breakage percentage, respectively. Analysis also showed that a suction of 45 mmHg to 50 mmHg yielding 81.3% separation efficiency is appropriate for operation of the kernel singulation system.

**Keywords :** breakage, computer vision, husking, rice kernel

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