*A Project Report on*

**Image Fusion by Non-Subsampled Contourlet Transform and Singular Value Decomposition**

*Submitted in partial fulfillment of the requirements for the award of the degree of*

**BACHELOR OF TECHNOLOGY**

**IN**

**ELECTRONICS & COMMUNICATION ENGINEERING**

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**ADITYA ENGINEERING COLLEGE**

**An Autonomous Institution**

**(Approved by AICTE, New Delhi & Affiliated to JNTU, Kakinada)**

**ADITYA NAGAR, ADB ROAD, SURAMPALEM**

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**CERTIFICATE**

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**Komaram Sai Ram Dora 15A91A04E1 ABSTRACT**

In Image processing we require both high spatial and spectral information in a single image. However the instruments are not capable of providing such information either by design or because of observational constraints. One possible solution for this is Image fusion. Image fusion is the process of combining two or more images into a single image. The proposed algorithm uses advantages of NSCT and MSVD and overcome the flaws in existing methods in literature.

The NSCT is fully shift invariant, multi scale and multi direction expansion. To achieve shift-invariance the NSCT is built upon coupling a Non-Sub Sampled Pyramid (NSP) with the Non-Sub Sampled Directional filter bank (NSDFB).

MSVD is an attractive algebraic transform for image processing, because of its endless advantages, such as maximum energy packing which is usually used in compression, ability to manipulate the image in base of two distinctive subspaces data and noise subspaces, which is usually uses in noise filtering and also was utilized in watermarking applications. Finally, the ultimate fused image can be obtained by synthesizing all sub-images with inverse NSCT. The proposed algorithm is tested by using PSNR, SSIM and entropy. The results shows robustness over existing methods.

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**NOMENCLATURE**

CCD Charge coupled devices

LCD Liquid crystal display

TIFF Tagged Image file format

BMP Bitmap

EXIF Exchange Image file

GIF Graphics Interchange format

JPEG Joint photo graphic experts group

NSCT Non sub-sampled contourlet transform

CT Contourlet transform

SVD Singular Value Decomposition

NSP Non-subsampled pyramid

NSDFB Non-subsampled directional filter bank

MS Multispectral

PAN Panchromatic

SWT Stationary wavelet transform

DWT Discrete wavelet transform

ROLP Ratio of low pass pyramid

DCT Discrete cosine transform

PSNR Peak signal to noise ratio

SSIM Structural Similarity Index

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