

Task-1:

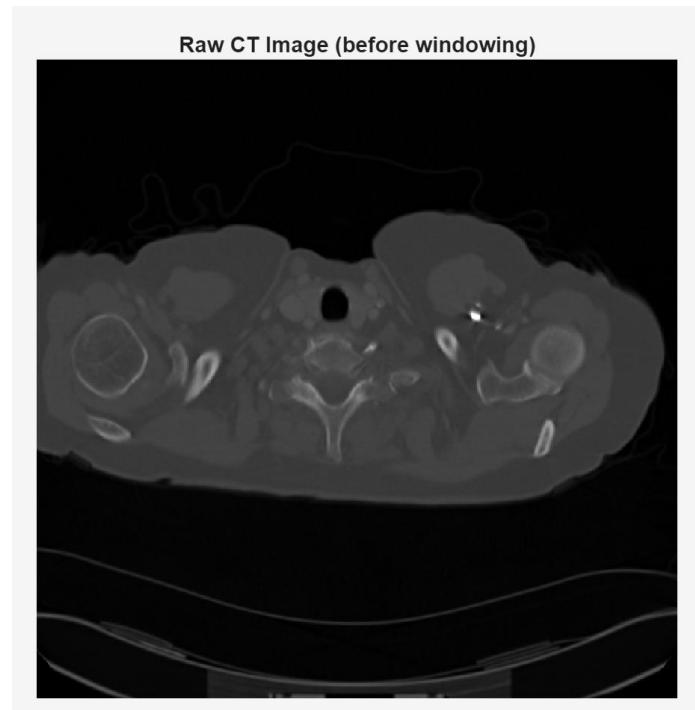


Figure-1: Raw CT Image Before Windowing Operation



Figure -2: CT Image after windowing has been done

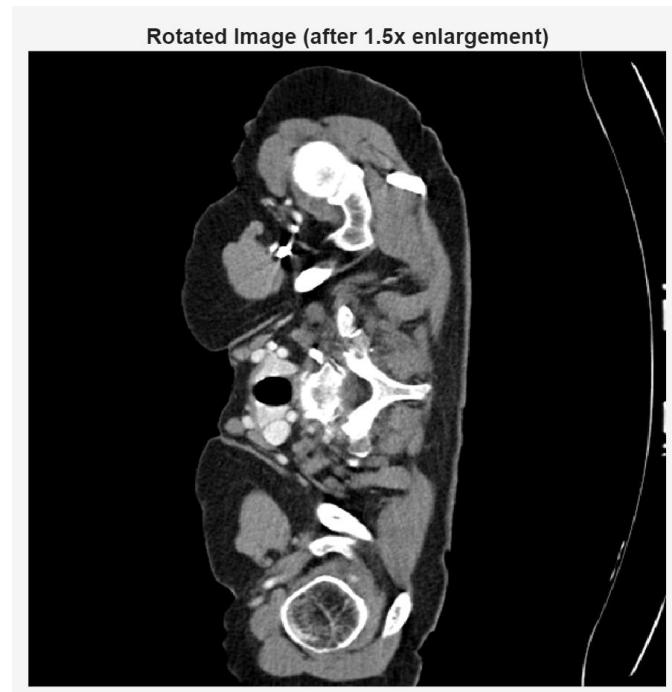


Figure-3: 90 Degree Rotated Image After Interpolation

1.2 Second Task: Histogram Analysis:

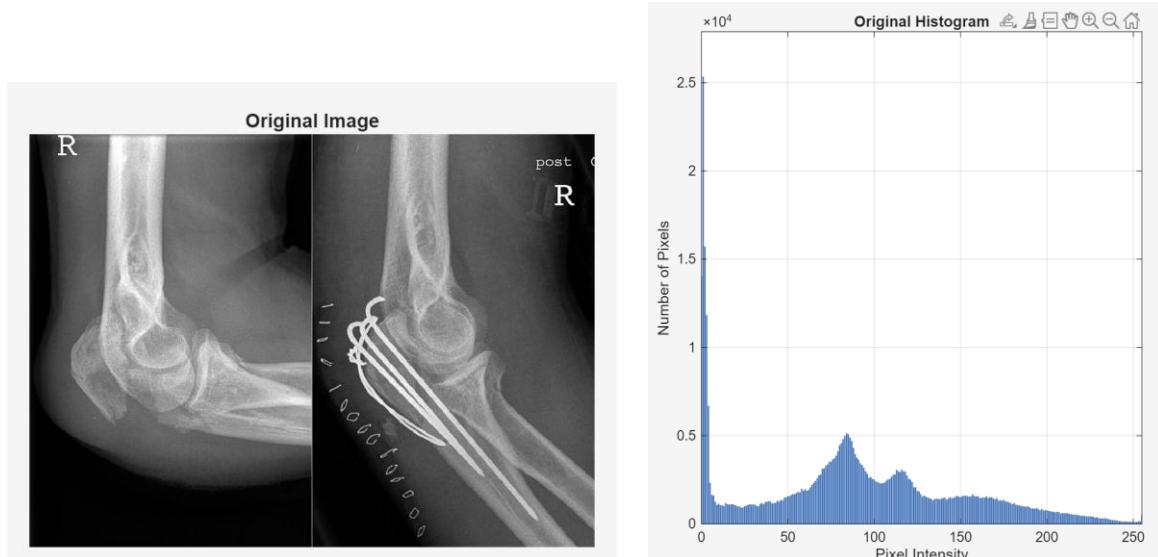


Figure-4: Original X-Ray Image and the Histogram of Original Image

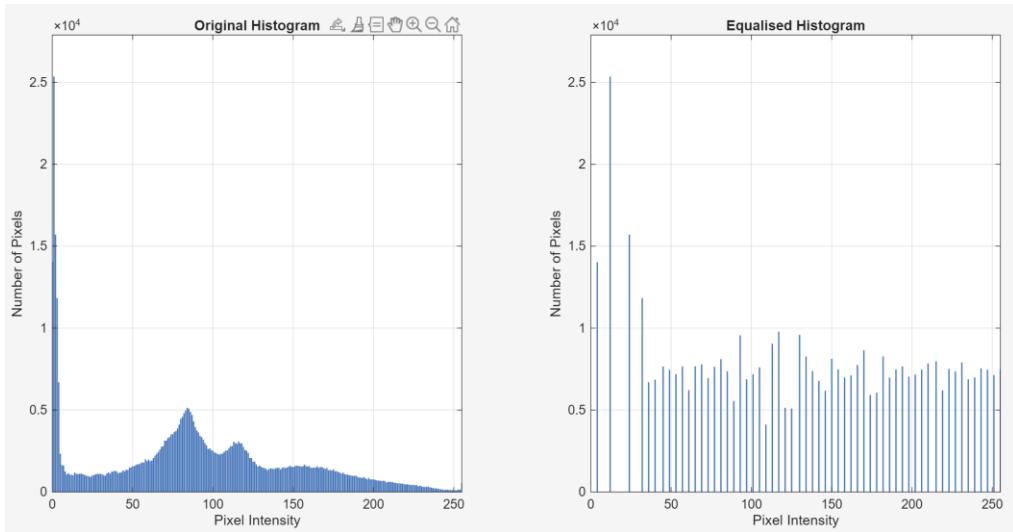


Figure-5: Histogram of the Original X Ray Image and Histogram Equalized Image



Figure-6: Original X-Ray Image and Histogram Equalized Image

1.3 Third Task: High Pass and Low Pass Filtering:

In this task, three low-pass and three high-pass filters were used on an MRI brain image to assess their differing effects on image detail and smoothness.

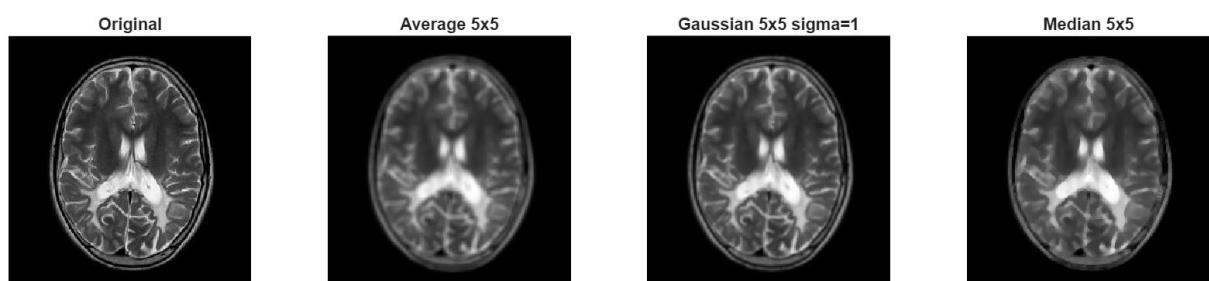


Figure -7: After Applying Low Pass Filters to the Original Image

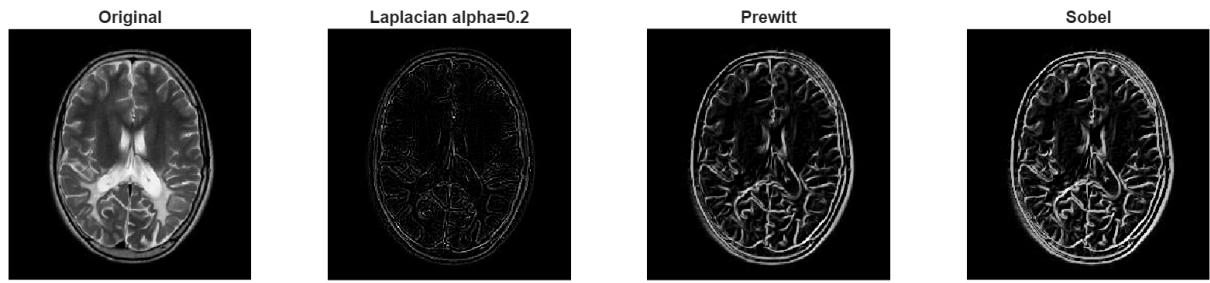


Figure-8: After Applying High Pass Filters to the Original Image.

1.4 Fourth Task: Image Sharpening



Figure – 9: Result of Image Sharpening Using Three different parameter values



Figure-10: Original X Ray image and Sharpened Image using parameter that provide Balanced Sharpening

1.5 Fifth Task: Noise Removal

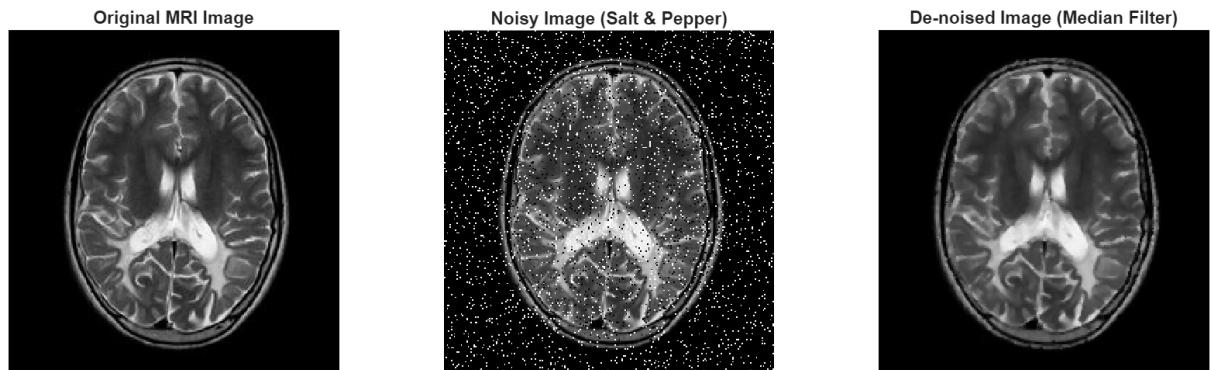


Figure-11: Original Image, Image after adding Salt and Pepper noise and Denoised Image

Task-2:

2.1 CT Reconstruction

In this task, a CT image was reconstructed from its sinogram using the inverse Radon transform (backprojection) method.

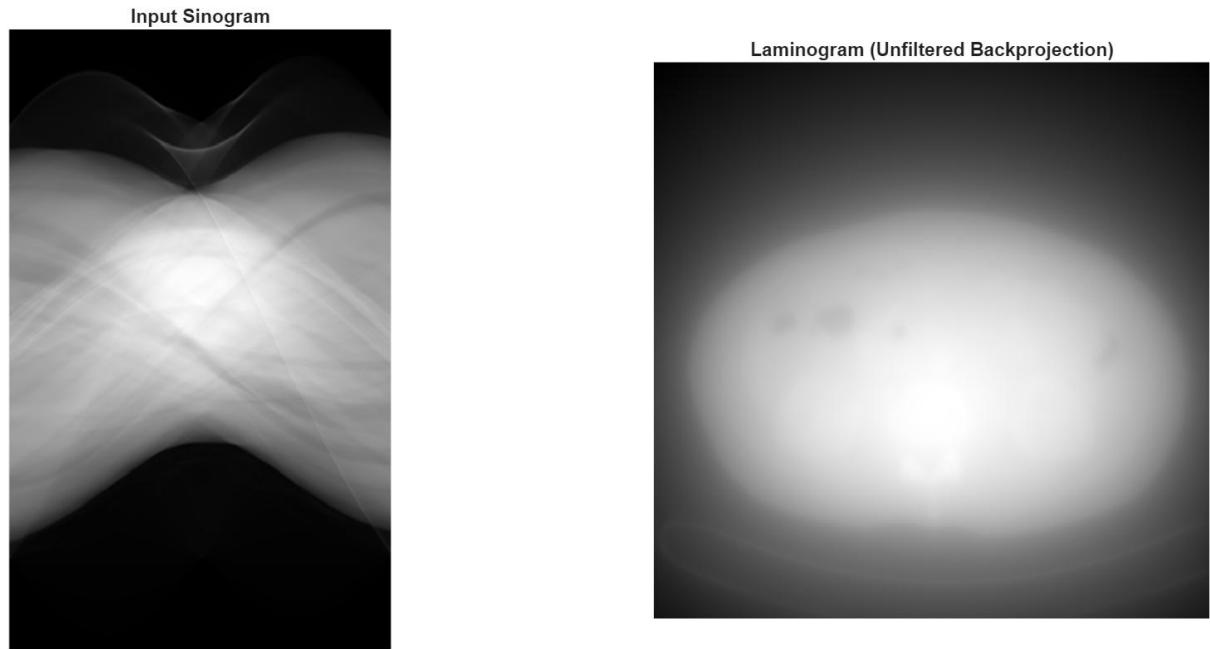


Figure-12: Unfiltered Backprojection from Sinogram

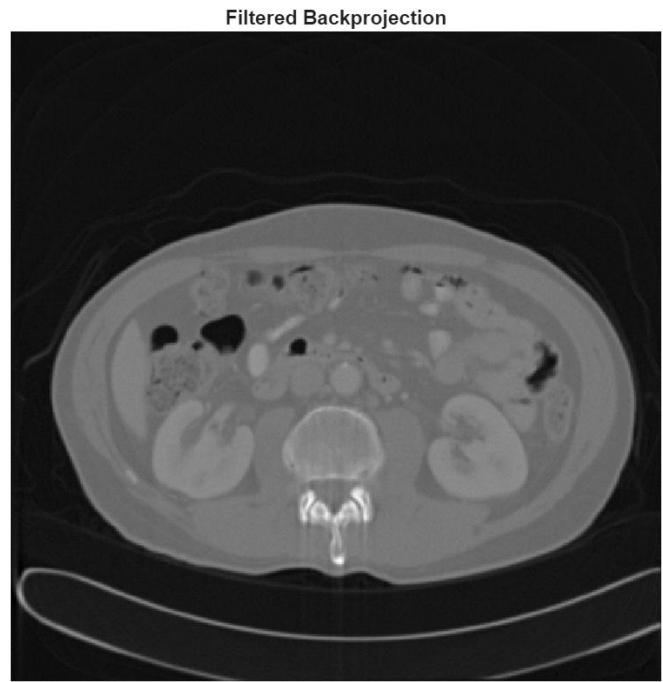


Figure-13: Filtered Backprojection of the Sinogram

Task – 3:

3.1 Fourier Transform Low Pass Filter:

The task involved applying a Gaussian Filter to the provided X Ray image in the frequency domain and then performing inverse fourier transform to show the filtered image in the spatial domain.

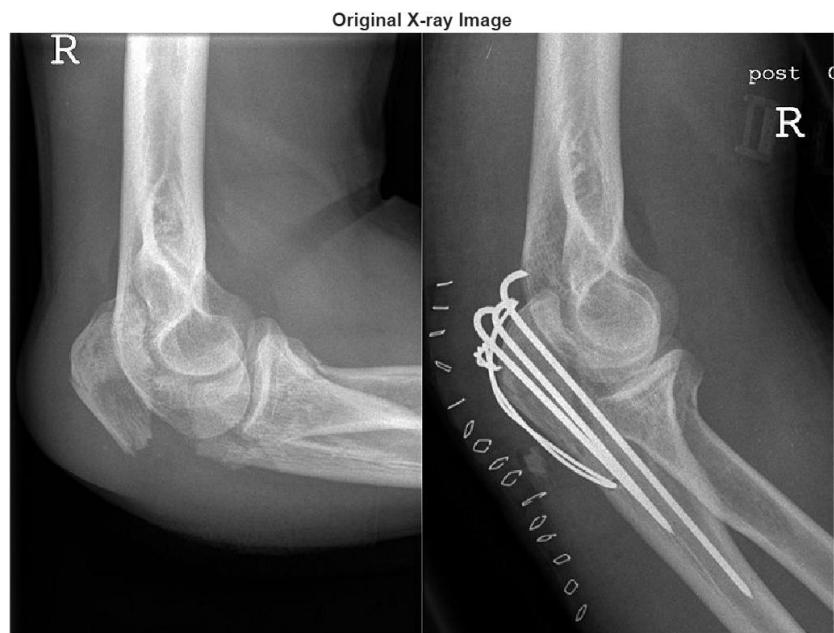


Figure-14: Original X-Ray Image

Fourier Transform of X-ray Image

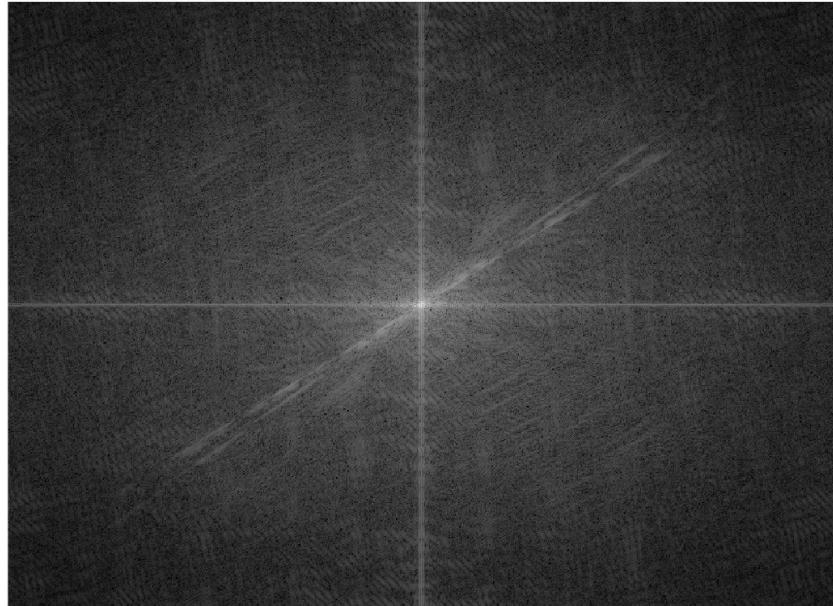


Figure-15: Image in Frequency Domain

Filtered Fourier Transform (Gaussian LPF)

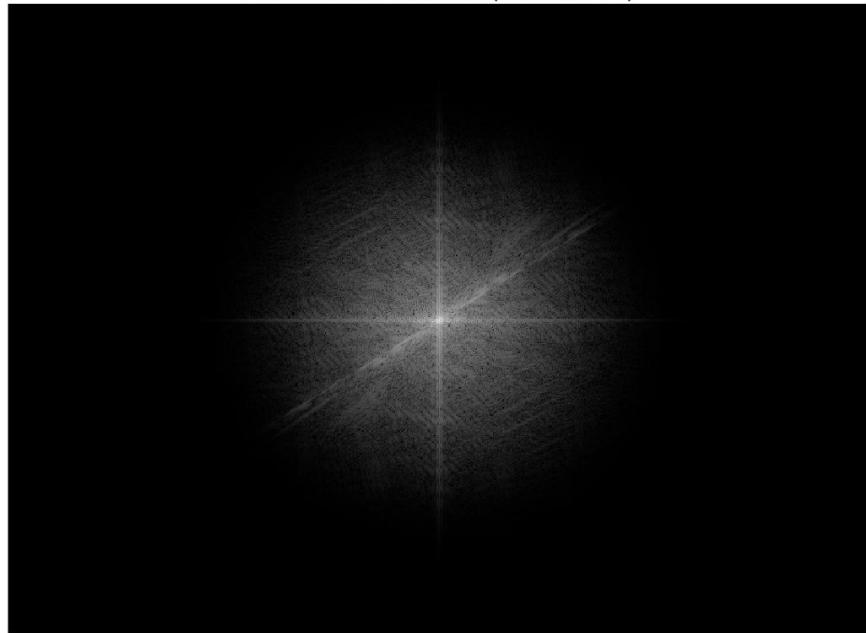


Figure-16: Applying Low Pass Gaussian Filter in the Frequency Domain



Figure-17: Result in Spatial Domain after applying Low Pass Filter in Frequency Domain

1.3 Apply Fourier Transform Noise Filter:

In this task, periodic noise was added to the provided X Ray image then A Gaussian Notch Reject Filter was used to remove the periodic noise from the image.

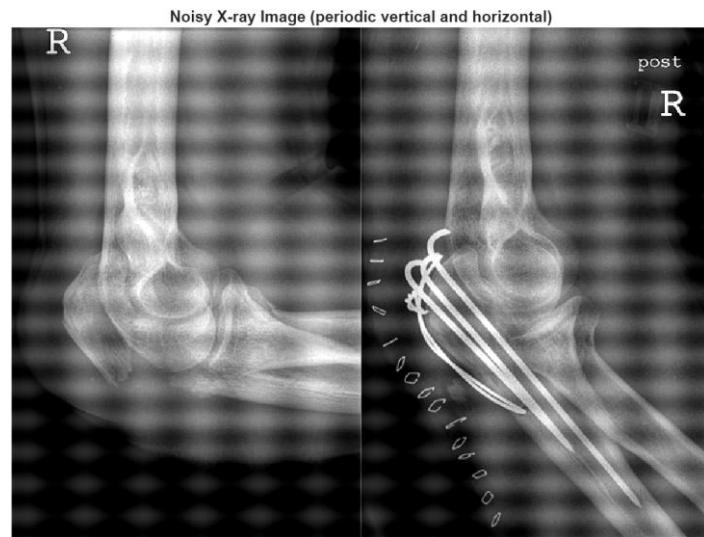


Figure-18: Periodic Noise in Horizontal and Vertical Direction

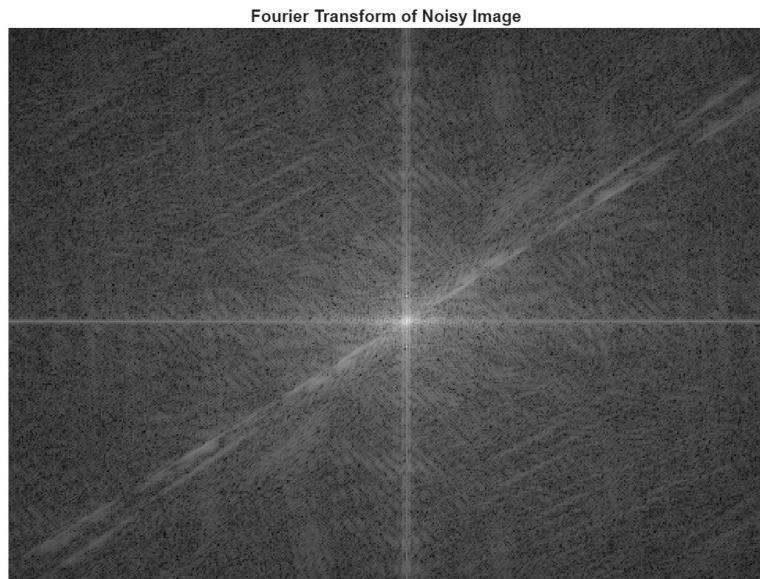


Figure -19: Fourier Transform of the Noisy Image

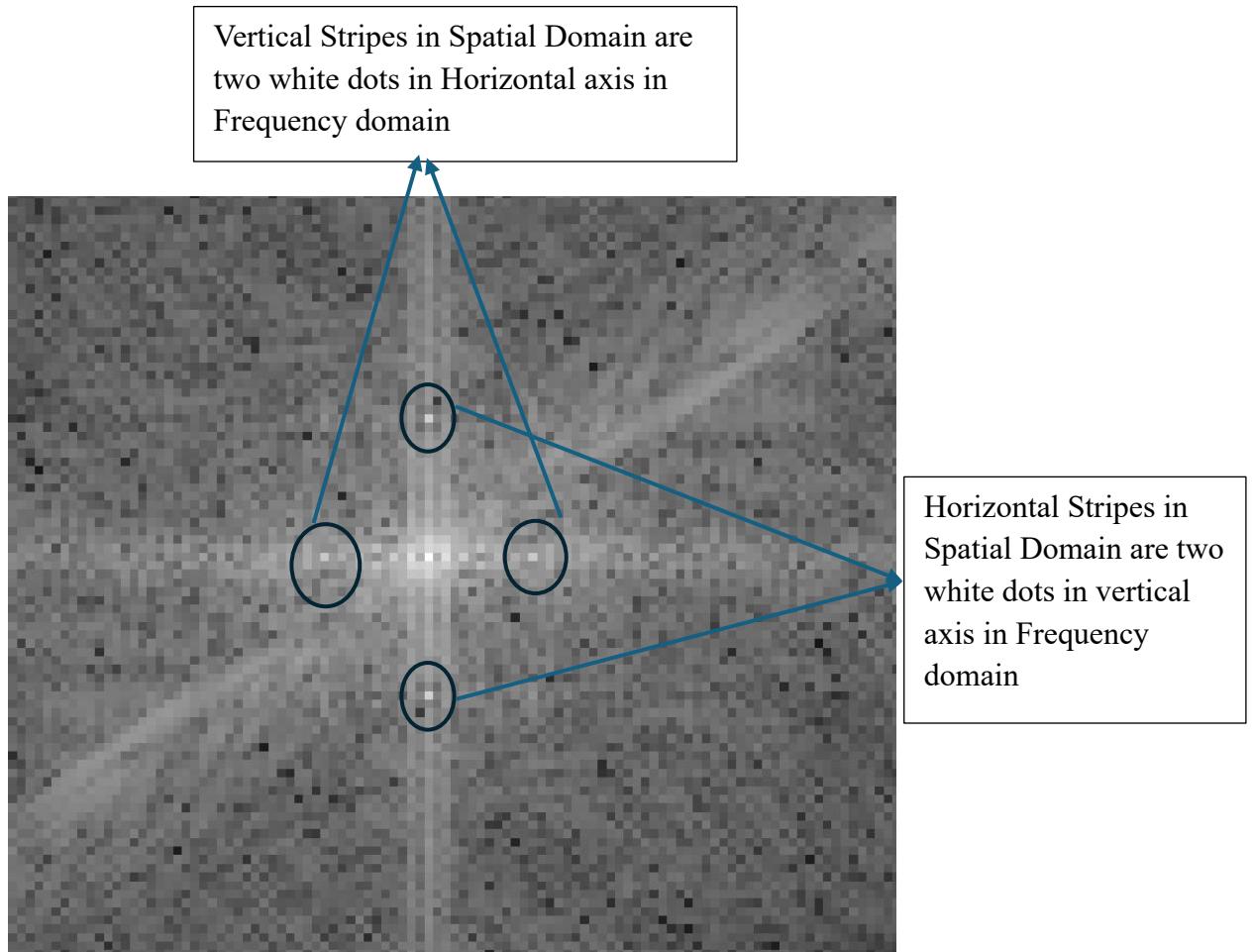


Figure-20: Periodic Noise of Spatial Domain in Frequency Domain

Filtered Fourier Transform (Gaussian notch reject)

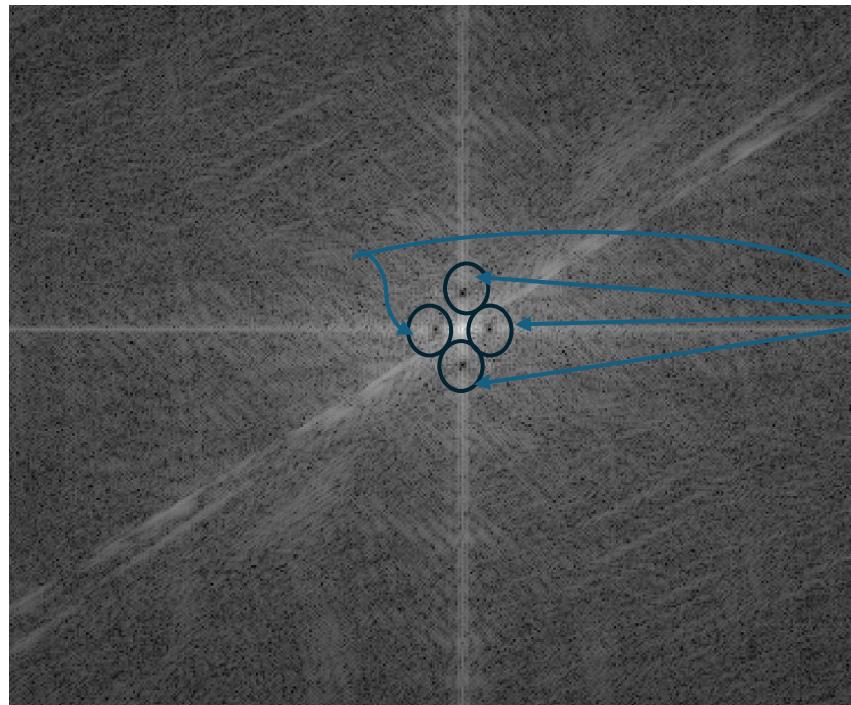
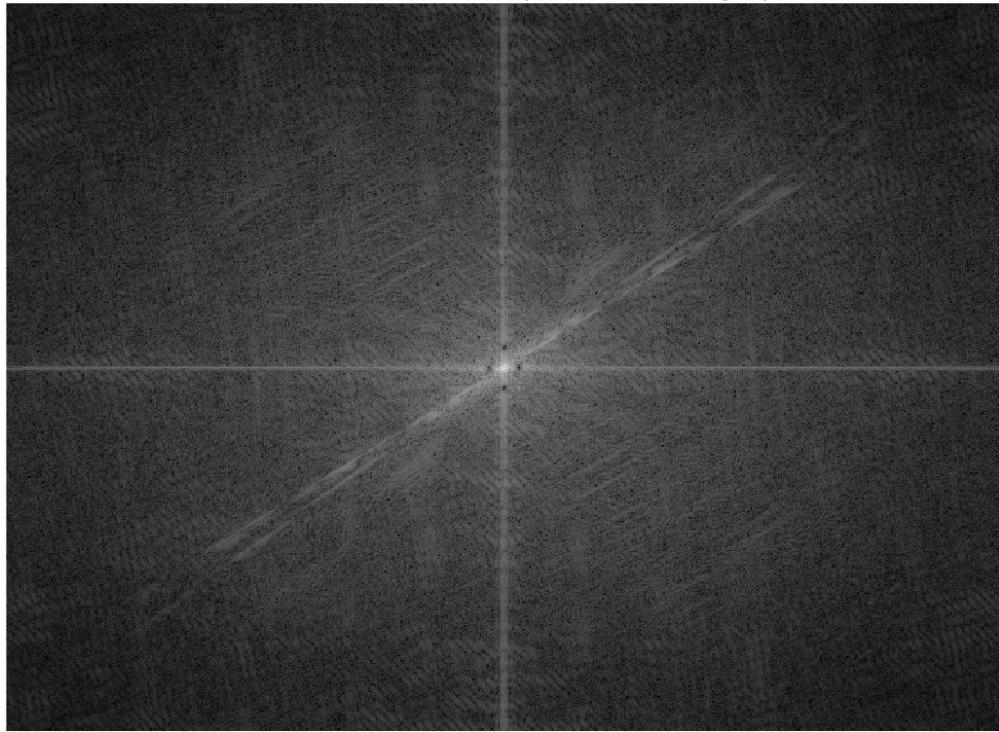


Figure -21: Removal of Periodic Noise – (White Dots) using Gaussian Notch Reject Filter

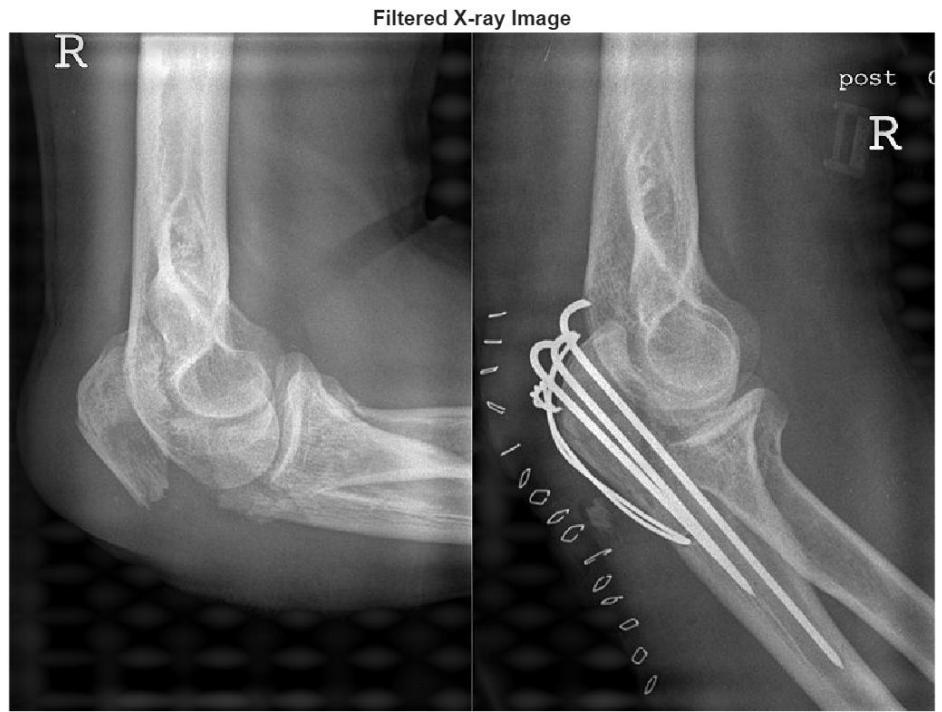


Figure-22: X-Ray Image after removing Periodic Noise