HASAN KALYONCU UNIVERSITY
Electrical-Electronics Engineering Department
EEE 499 Project Proposal Form

Part I. Project Proposer

Name Last name		**E-mail**	
		Date	

Part II. Project Information

Title of the Project	Image Denoising using Diffusion Models without Clean Image Dataset				
Maximum Cost of implementation (TL)	**5000 TL**	**Conceptual Design Dead Line**	**in 5 weeks**	**Prototype Production Deadline**	**in 13 weeks**
Standards and licenses to be used in the project. example; IP65, IEEE, APACHE, MIT, etc.	IEEE standards, Apache License (for open-source libraries)				
Project Description					
This project explores the application of diffusion models for image denoising in scenarios where clean image datasets are unavailable. The diffusion model framework will be trained to progressively denoise noisy images using generative techniques, which work by modeling the distribution of the data and reversing the diffusion process to recover clean images from noisy versions.					
Project Justification					
Unlike traditional image denoising techniques that require paired clean/noisy datasets, this project will focus on using diffusion models to handle noise without the need for clean image references. This represents an innovative approach to image restoration, especially in challenging environments where obtaining clean datasets is impractical.					
New aspects	The use of diffusion models for image denoising without a clean image dataset introduces a new technique in image processing and machine learning, leveraging probabilistic generative methods to recover underlying clean images.				
Complexity : Diffusion models are computationally intensive and require careful tuning. The absence of clean datasets adds further complexity, as the model must learn to denoise using noisy data only, making the design and training process more challenging than traditional denoising methods.					
Challenging problem and issues	Lack of clean image data for training, Proper diffusion model design and implementation, Managing high computational costs due to the iterative nature of diffusion models				
Related electrical-electronics science fields and subfields	Machine Learning, Deep Learning, Signal and Image Processing, Probability and Statistics				
Tools	Python programming language, Machine Learning frameworks: PyTorch, TensorFlow. High-performance computing resources (e.g., GPUs for model training). Image datasets with varying noise levels for testing				
Risk involved					
Potential problems and alternative solutions	Model failure: Investigate alternative generative models like GANs or variational autoencoders Data scarcity: Utilize synthetic datasets with simulated noise or explore self-supervised learning techniques				
Minimum work required	20 hours per week for 14 weeks				