# Realization of a Real-Time Image Denoising System for Dashboard Camera Applications

# [3] Yu, Chu, and Li-Zhong Hou. "Realization of a real-time image denoising system for dashboard camera applications." IEEE Transactions on Consumer Electronics 68.2 (2022): 181-190. DOI: [10.1109/TCE.2022.3175796](http://dx.doi.org/10.1109/TCE.2022.3175796)

<https://ieeexplore.ieee.org/document/9776505>

#### Basic Idea

The paper addresses the problem of impulse noise in digital images, particularly those captured in low-light conditions or by dashboard cameras. It proposes a hardware-based solution for real-time image denoising, designed to handle both fixed-value (salt-and-pepper) and random-value impulse noise. The goal is to improve image quality by removing noise while preserving important image details and edge information.

#### Key Contributions

Each section of the paper goes into the analysis and key contribution.

Abstract goes into listing the key contributions as:

* Development of a hardware-based denoising solution that operates in real-time.
* Implementation of an existing algorithm tailored for mixed impulse noise removal.
* Achievement of real-time processing for high-resolution video streams (1920×1080 at 60 fps) using 180 nm CMOS technology.
* Demonstration of the algorithm's efficacy in improving image quality without additional computational or memory overhead.

The introduction has these key contributions:

**Efficient Filtering Scheme:** A filtering scheme for removing fixed-value and random-value impulse noise is introduced.

**Hardware Implementation:** Development of a hardware solution using an application-specific integrated circuit (ASIC) for real-time processing.

**Real-World Application:** The solution is applied to dashboard cameras, demonstrating its practical use in enhancing video quality.

**Benchmarking:** Validation of the proposed method against software simulations and its efficacy in real-world scenarios.

…

#### Technical Approach

#### Data and Model Approach

**Data Approach:** The study utilizes video images from dashboard cameras, which are subjected to impulse noise, as the primary data for evaluating the denoising algorithm.

**Labeling Approach:** The paper does not specify a labeling approach, as the focus is on algorithm performance rather than supervised learning with labeled data.

**Training Approach:** The algorithm was implemented in hardware and not trained; thus, the performance was validated through simulations and practical application.

**Model Architecture:** Details of the model architecture are not provided in the introduction, but it is implied that the architecture is optimized for real-time operation and low power consumption.

#### Key Results

#### Key Limitations

#### Other Notable Aspects

#### Definitions I needed to search up: