# ENHANCED CAMSHIFT KALMAN FILTER FOR OBJECT TRACKING

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## Declaration of the Candidate and Supervisor

The work submitted in this dissertation is the result of my own investigation, except where otherwise stated.

It has not already been accepted for any degree, and is also not being concurrently submitted for any other degree.

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# ABSTRACT

In this thesis an enhanced Cam-shift Kalman object tracking algorithm for video surveillance and object tracking was developed. And this new algorithm was based on a modified Cam-shift tracking algorithm and the Kalman filter. This modified Cam-Shift algorithm solves a major drawback in the classical Cam-Shift algorithm such that the search area for the next frame was optimized, so that the time taken to track the object was minimized. The classical Cam-Shift algorithm for tracking performs well under perfectly maintained conditions such as light condition and without partial occlusions that constitute a good tracking method. However, under different environment conditions and with occlusions the algorithm fails. To test the performance of the enhanced Cam-Shift algorithm color of the object was selected as the feature for identifying the object, and was compared with the performance of the classical Cam-Shift algorithm. Also mean-shift algorithm was also incorporated for the comparison. In order to enhance the performance and accuracy under cluttered environment, the presence of noise and occlusions Kalman filter was combined. When the object disappears from the scene partially or fully the algorithm is capable of tracking the object. The experimental results verifies the ability of the enhanced Cam-shift Kalman object tracking algorithm in comparison to the classical Cam-Shift, which can locate the target object more effectively.

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**List of Abbreviations**

| | |
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| CAM-Shift | Continuously Adaptive Meanshift |
| LIDAR | Light Detection and Ranging |
| DoG | Difference of Gaussian |
| AUC | Area Under Curve |
| FPGA | Field Programmable Gate Array |
| GPU | Graphical Processing Unit |

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