*Abstract* — Recent advancements in Computer vision have transformed the concept of self-driving cars from a theoretical possibility into a tangible reality. However, the implementation of these autonomous vehicles demands extensive training, especially given the complexity of navigating in real-time traffic scenarios. Among the various essential tasks for self-driving cars, two primary functions stand out: object detection and object classification. Artificial Intelligence (AI) techniques, such as Deep Learning (DL), excel at executing these tasks with precision through sophisticated State of The Art (SOTA) models. However, these models, while accurate, are resource-intensive both in terms of training and deployment. In scenarios where a vehicle operates within a constrained path, the extensive capabilities of such models may not be necessary for efficient movement. This study aims to assess a real-time, two-stage approach for autonomous vehicles navigating within constrained paths using a monocular camera. The first stage involves object detection utilizing a background subtraction method, while the second stage employs lightweight pre-trained models for object classification.