The concern on vehicle security has evolved along with the growth of intelligent transportation systems, as an urgent issue to ameliorate the performance in detecting objects mainly in dark or night conditions [1]. With Increase in popularity of Smart car, it is vital to improve object detection capabilities in low – visibility environment for the safety . The reason behind increased probability of accidents and compromised safety is the result, of the challenges faced by the traditional vision-based systems in low-light conditions [2].

To solve this challenge, we are introducing an AI-based object detection system that benefits and relies on the integration of Artificial Intelligence and Internet-of-Things (AIoT). The AIoT integrates artificial intelligence (AI) technologies with the Internet of Things while combining recent advances in intelligent and connected technologies […] which enables new applications that are beyond what either […] offers alone [3]. This system works with low computational resources; it will operate on day and night object detection modes including traffic modes, with high accuracy, without compromising reliability . The brain of our prototype has the Raspberry Pi 5, a powerful yet affordable quad-core ARM Cortex-A76 CPU based computing platform as its central processing unit.

This system takes advantage of the state-of-the-art computer vision architecture especially You Only Look Once (YOLO) object detection, with versions 5, 6, 7 and 8 that utilize advanced deep learning techniques for real-time object detection [4]. Object detection networks analysis the image at different locations ()and scales, they [5] subclassify candidate regions and generate bounding boxes of specific shapes in multiple stages. By using a single-stage detection frame work, YOLO directly predicts class probabilities and coordinate positions for bounding boxes from full images in one evaluation, which offers advantages on both speed and accuracy over traditional methods. Enabling the performance of the Raspberry Pi 5 (6) by employing transfer learning on these models.

One key part of that imaging system is the IR camera, which takes images in low-light conditions as needed for night vision － and it's hooked up to a computer too. The images are pre-processed and then resized before passing through the YOLO models. Finally, the system is capable of dynamic mode switching to support tracking objects at night [7].

The Xpeng G3 electric SUV is also equipped with some smart ADAS systems, and it serves both traffic and highway modes for an optimized driving experience. In the traffic mode, it automatically turns off alerts in order to prevent excessive false alarms because of the massive number of cars and on the highway mode, it proceeds with alerts as there might be genuine risks at any time [7]. The Raspberry Pi 5 development board is either used in this AIoT project that contains the needed hardware like infrared camera, buzzer, breadboard and anLCD to create a compact and complete module.

The system is able to detect and measure the distance from the vehicle to objects in close proximity around the user's vehicle instantly ( [9], Fig. 2). It also, by nature of its ability to engage at various driving conditions/scenarios improves the safety of transportation as a whole. Combining advanced object detection methods with AIoT technologies has led to significant progress in vehicle safety providing an appropriate environment for night vision [10].