

# IMPLEMENTATION OF REALTIME MULTI OBJECT DETECTION (MOT) BY SIPEED K210 AI PROCESSOR

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**Abstract** - Multiple Object tracking system Enhances of our day-to-day life magnificent. The object detection with the help of Artificial intelligence creates a major role in recent years. Object tracking can be used in many various fields to make detection easier in our lives but it also gives more challenges while handling it. The Existing paper works mainly depends on association of tracking in real time. Mostly they won't concentrate on real time MOT system. Some Reference involves RNN Technique to get better performance but unfortunately it uses large amount of data so storage problem occurs. The low computation power, tracking of the object in real time authenticity in tracking creates a major drawback in MOT. We overcame by using the performance of our system in the MOT with SIPEED k210 AI processor.

**Key Words:** Multi object Detection, Artificial Intelligence, Video Surveillance and Analytics.

## 1. INTRODUCTION

Generally Multiple object detection is all about finding what and where (tracking by detection) the Multiple objects are in an Image and in a Real time Applications. Multi object computation needed lot of compilation. In Multiple Object Detection the basic principle used is Computer (or) Camera vision data and later processing the data with help of AI processor Algorithms in which the results are attained. According to the Algorithms used, it processes the Real time objects and gives back the results either in instructions (or) in Alerts. This Major technology is a great treat for the Surveillance Industries and It is also used in Face Unlocks, Traffic tracking system, Self Driving Cars, Sentiment Analysis etc.

Surveillance technology now-a-days currently changing many applications. Sensor networks from IoT devices have been widely applied in many field recent days. Such as Artificial Intelligence by using surveillance technology is also been developed by involving machine learning which enables the image tagging and identification of the objects.

In facial unlock system application the detector may or may not face the colour, structural problem. It has many more applications but still the application which are used in real time and online requirements such as driverless cars and robot navigation in real time is challenging task.

This is due to driverless cars needs to predict, desired, plan and locate the areas for driving in real time, those cars should face many challenges like sudden movement of another vehicles, because of that sudden analysing is more difficult for the cars to take decisions quickly and wisely to avoid accidents. In MOT based technologies the existing methods are made very much complicated to achieve the result that too untargeted results. This leads time consuming and the performance of the detection and also low accuracy. The traditional surveillance provides only video capture, storage, process and display. while the processed data it should be analysed or judged without any further information about the target. Sometimes the traditional object detector faces the compression noise, filter distortion, imaging noise etc.

## LITERATURE SURVEY

With reference to the literature survey papers this paper is based on a fast multiple object tracking system using an object detector ensemble. In this the time series states containing all the information necessary to track an object, but not limited to its current locations.to improve the performance the one major technique is used to ensemble the modules which optimize Hypothesis space to get exact prediction but this leads to the treatment which makes mathematically in tractable but it approximates in theoretical framework format. the far detection tracking is not so perfect. we assume that the human movement does not rapidly change so the short term can be handled when the motion is low (or) uncertainty. Here the ensemble is made of two object detectors which is mainly based on YOLOV3 and light head R-CNN architectures. this module achieved highest speed in MOT 16 Challenge which leads to accuracy (MOTA). Some tracking system achieves less accuracy

with fast time others achieve with high accuracy in slow time only few achieves high speed and high time. the main merit of this system is speed while maintain an acceptable accuracy for many real time applications it

also reduce the false negatives of each detector. The demerit is reducing the need of perfect object detector involving more objects detectors and incorporating person re-identification in tracking system [1].

In second literature paper, they proposed about the performance evaluations of an AI based W-band suspicious object detection using (75 GHZ- 110GHZ) as W-band. It is done with by using IoT paradigm. This system provides automatic inspections using W-band with large no of people in many large crowded places. The performance evaluation was made which can clearly say that it can increase the probability of identifying the different objects for real time monitoring low conjunction network system. It has been created for better safe data transmission in real time detection but the evaluation results says that the following proposed system its efficiency is very significant. Here CNN is used for deep learning and performing image recognition and classification. If we transfer original 4K video the large amount of traffic is produced. The main merit is it can perform non-stop suspicious object detection automatically. object detection system can archive good performance, low congestion transmission. The demerit is instead of sending the full length of 4K video (3.46 MB), the packet size can be reduced to 0.5 MB [2]

In third literature paper, they proposed the association network for Aerial Multi object tracking and detection in this data sheet methodology comprises the image is varying altitudes leading to change and Occlusions. The two sub-network features are used First stage is used for device detection. Second stage does convolutional bonding box regression they use conventional single hypothesis tracking method using Kalman filtering and frame by frame data association which helps us to track object in long period occlusion. This system strongly couples internal and external memory incorporating the information about the frames and long term dependencies. The merit is increase in maximum no of detection. In this paper they analyzed and proposed DET framework is evaluated on the VisDrone dataset benchmarks. The demerit is this method does not achieve over all best result on the detection. uneven class distribution of data makes it difficult to learn features for all objects. Better augmentation method is needed [3]

### I. EXISTING SYSTEM

In Existing system, the processor has to support the AI libraries every time which affects the motion object detection which is impossible. In some previous technique some tracking system achieves less accuracies with fast time whereas achieve higher accuracy with slow time only few achieves high speed and high time. During multiple tracking many systems faces congestion problem which leads to unwanted data and processing un targeted results. Moreover, many existing systems faces optimization problem on graphs and Novel tracking paradigm incorporating single object trackers into the detector only by predicting the spatial offsets. This method provide only simplicity but tracking level is not satisfied. Some system faces targets specific metric learning method with cost flow network has complex data algorithms which causes slow

processing. In driverless cars the exact information should be given every time about the road and the area environment. Some climatic changes also happen because of that it faces some accidents to the driverless cars. Meanwhile some object detectors often deal many false positive detections and missing detections will occur at the real time which make multiple objects tracking more complicated challenge.

### II. PROPOSED SYSTEM

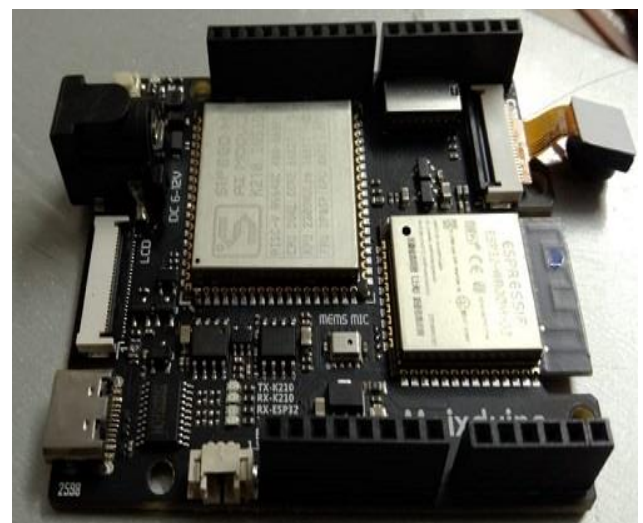
To overcome those drawbacks in the existing system we are using simple components to give better results than existing. In our proposed system automatic moving object detection is made successfully with high level of accuracy. The TFT (Thin Film transistor) Display is used to get specific limited information in each specific frame. Due to this congestion problem can solved effectively. GPIO is used so that the user can handle the runtime unwanted data by eliminating them.

In this system we are using simple hardware components which keeps user under observation at all time. In this paper we did a portable mechanism by using TFT (Thin Film Transistor) display. We get hundred percentage of accuracy in real time application. Compared to traditional methods we can avoid so many unwanted data while processing the targeted one. so that we can save time, storage, efficiency will also be increased in this system because of avoiding unwanted processing of detection by the processor.

This system provides efficient tracking system with simple device and there is no any Optimization problem faced by this system.

### III. HARDWARE DESIGN

The below pictures are multi object detector



**FIG 1:** primary module of MOT SIPEED K210

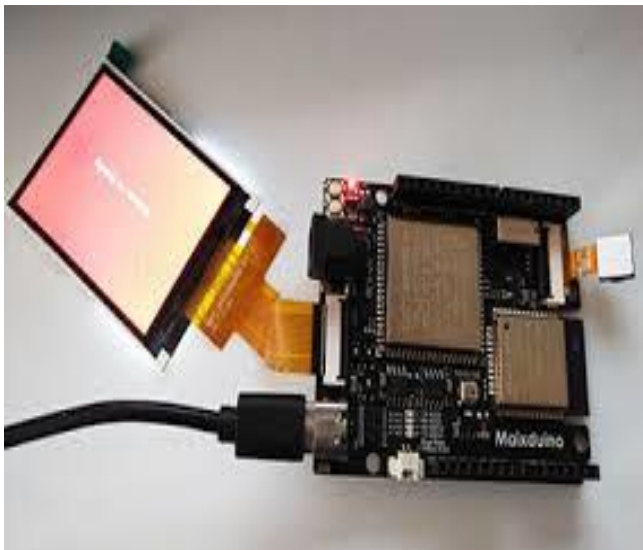


FIG 2: MOT SIPEED K210 AI Processor

**FLOWCHART AND ALGORITHM**

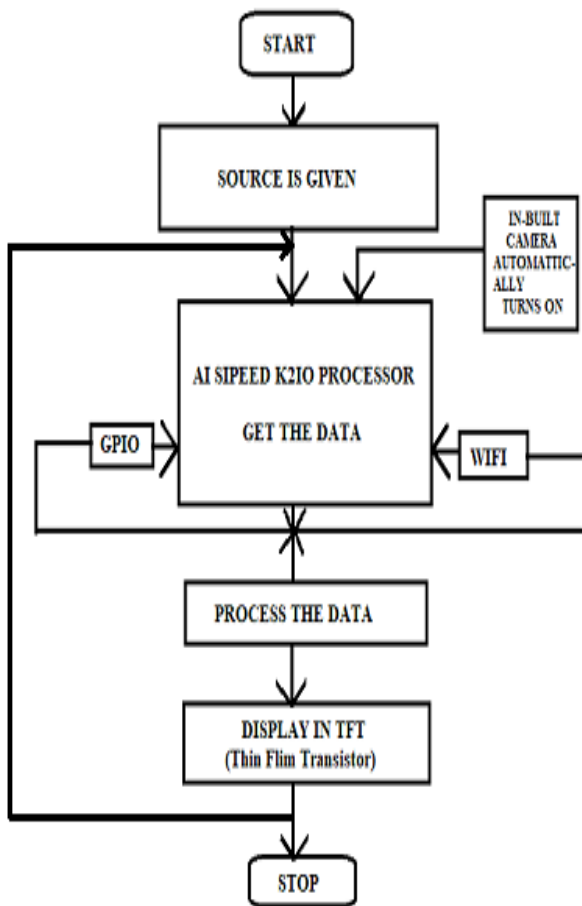


FIG 3 Flow Chart Working of MOT.

In Fig 3, the flowchart initialization part is done by giving the source to the detector. The In-built camera automatically turns on while the detector turns on. The SIPEED K210 processor gets the data from the camera. The SIPEED K210 processor process the available data by using WIFI and GPIO it detects the Image (or) object according to the given algorithm in real time. Then it identifies the processed data and display it on the TFT (Thin Film Transistor) by using the TFT display the Particular object according to the algorithm is displayed and it can be viewed by the Holder. As per Algorithm if it detects again the targeted object in real time the loop again collects all the data and the steps of flowchart is again followed continuously.

**WORKING MECHANISM**

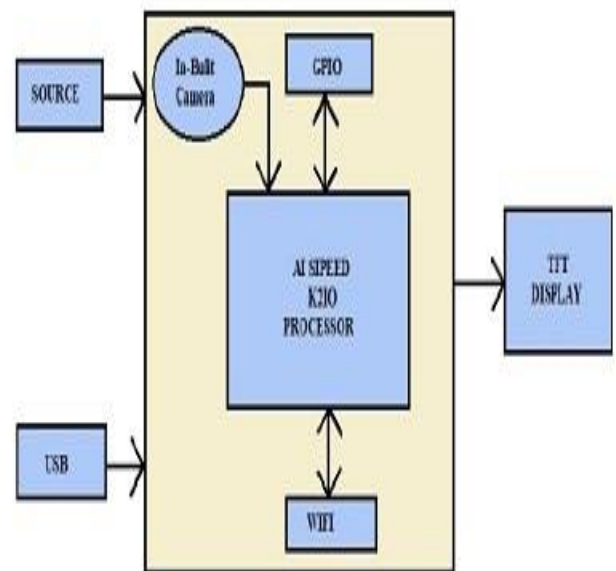


FIG 4. Block Diagram.

Initially the power supply is given to the SIPEED K210 AI processor. The USB cable is connected to the USB Port which helps us to configure the program to the SIPEED K210 processor. The In-Built camera automatically turns on whenever the Detector turns on.

(4.1) SIPEED K210: This AI processor can provide three Channel Buck converters. This means that it can provide three output voltages from the single input power source and also gives you access to some of the GPIO pins. It also has Reset buttons and a Boot button. It receives the data by using Camera and the process is done by using the Algorithms.

(4.2) General purpose Input and output (GPIO): It is a Digital pin which has both Input and Output operations. the main merit it can be controlled by the user in Run time. This GPIO combines with Wi-Fi and AI processor and process the data.

(4.3) Thin Film Transistor (TFT): It is a type of LCD Flat panel Display screen. In this display each pixel is controlled by Transistors for getting accuracy level. It is used to run in a Specific resolution. It gets processed data from the SIPEED K210 processor and displays it.

#### IV. OUTPUT



FIG 5. MOT in Airport Surveillance

The Output is based on Airport Surveillance by using SIPEED k210 processor for Multiple objects tracking in airport. It Detects every movement of each passengers and plots each unique number for the passengers for identification purpose. It continuously detects the every person with same number till the allotted coverage area. According to the algorithm used some places are allotted as restricted place where the passengers should not allow to enter into restricted places. If any of the passengers enter into the restricted places it detects the person following with unique identification number and it displays it in the Thin Film Transistor (TFT) display. Due to this unwanted detection can be avoided during the monitoring at the run time in airport. In software this detection can be viewed it Python IDLE IDE



FIG 6. Output graph of Surveillance.

#### V. CONCLUSION

In this Paper we conclude that the Implementation of Real Time Multi Object Detection (MOT) by using SIPEED K210 AI processor uses only simple components like TFT display, Camera, AI Processor and Controller. Which is cost efficient and moreover it gives 100 percentage accuracy level results. Easy Detections of moving object in both Indoor and Outdoor purpose because of that it is widely used in Agricultural Lands, Surveillance Industries, Face unlocks, Driverless cars, Traffic tracking systems, sentiments Analysis and can be used in many Industrial sectors for multi object detection in run time.

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