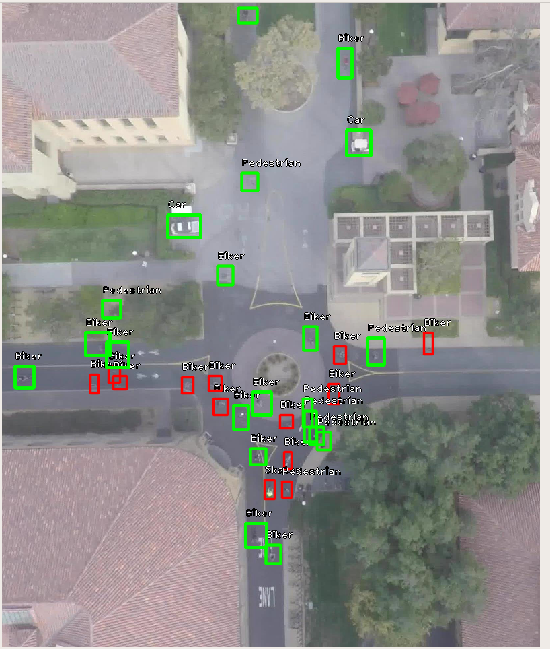
**CHAPTER 01**

* 1. **INTRODUCTION**

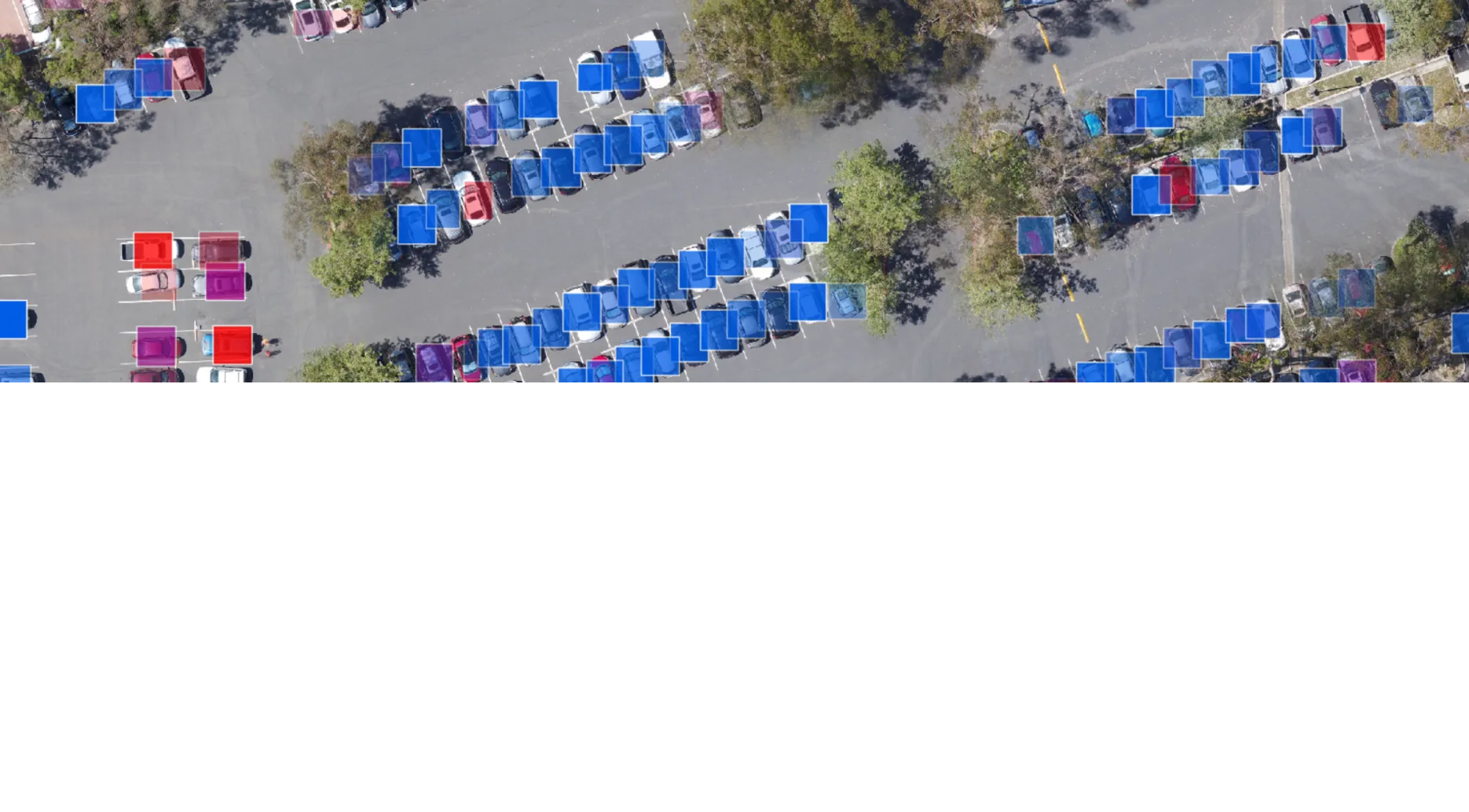
A flying object can have some emergency scenarios in which it is needed to be landed in emergency so that it is basically required to know whether the land area is capable of landing or not and for selecting of particular reason of interest at which the object needed to be identified for safe landing in real time. Image object detection is a process of identifying and locating objects in an image using computer algorithms and machine learning.

This technique is widely used in various applications such as surveillance, autonomous vehicles, medical imaging, and robotics. Object detection algorithms can be classified into different types, including template matching, edge detection, and feature-based methods. The choice of algorithm depends on the specific application and the characteristics of the images being analysed. Object detection is an essential tool in image processing that enables computers to better understand and interpret visual information. With the advancement of technology, we can expect to see even more advanced object detection techniques being developed and applied in various fields.

For example, in surveillance applications, image object detectors can be used to detect and track people or vehicles in real-time, enabling the drone to follow them and gather more information. In mapping applications, object detection can be used to identify and locate landmarks, buildings, and other objects that need to be mapped. In inspection applications, object detection can be used to detect defects or anomalies in structures such as bridges, power lines, and pipelines.



**Figure 1: Image of detection and identification**

****

**Figure 2: Masking on Images**

* 1. **OBJECTIVES**

1.The main object of this project is to determine all the objects present in video which will be taken by ESP32 cam model with help of any flying system.

2. To find the locations safe for landing and identify the regions of interest.

3. By extracting the features of region of interest and mapping it as nearest as possible to the data sets with defined algorithm of linear recursion of machine learning the objects will get label based on that comparative parameter.

4. Even this same system can be used in traffic Analyse and security purpose also. Like find the difference by comparing old images and present images and find the difference with respective time.

* 1. **METHDOLOGY**

A memory card with less memory space capacity and an ESP32 microprocessor, both of which are 32-bit microcontrollers, are connected in order to save costs. When a camera records video, that video data is saved on a memory card and processed using a machine learning algorithm that was trained on mask data from several image datasets that included people, automobiles, mountains, trees, trucks, and plain terrain.

The linear recursion algorithm is being used here. We will now generate a bounding box and its corresponding model name using image processing.

* 1. METHODOLOGY OF THE PROJECT

**Step-1:** Take ESP32 with cam and connected with Arduino

**Step-2:** Using CAM in ESP32 and store in a memory card. And then data of video will be taken from memory card.

**Step-3:** Take entire system to top by using any fly machine like balloons or drone.

**Step-4:** Data collected will be processed by using OpenCV2 module and the features will be redrived and all required features will be extracted.

**Step -5:** Now we will create a machine learning model by a Linear recursion Algorithm

**Step-6:** Machine learning algorithms required data. Data of features of and there classification. We are using persons, mountains, rivers, buildings, cars and motor vehicles, trucks etc.

**Step-7**: Now based on features a bounding box is created and labelled it with the particular object.

**Step-8:** As we will get the video with bounding box and labelled.

* 1. LITERATURE SURVEY

# 1.5.1 An intelligent real-time object detection system on drones et al.

 In this paper, Drones have been widely used in everyday life and they can help deal with various tasks, including photography, searching, and surveillance. it is difficult for drones to perform customized online real-time object detection. In this study, we propose an intelligent real-time object detection system for drones.  It is composed of an FPGA and a drone. A neural-network (NN) engine is designed on the FPGA for NN model acceleration. The FPGA receives activation data from an NN model, which are assembled into the data stream.  By using the Yolov3-tiny model for fast object detection, our system can detect objects at the speed of 8 frames per second and achieves a much lower power consumption compared to state-of-the-art methods. More importantly, the intelligent object detection techniques provide more pixels for the target of interest and they can increase the detection confidence score from 0.74 to 0.90 and from 0.70 to 0.84 for persons and cars, respectively.**[1]**

**Figure 3: The ordinary car-detection result.**

# 1.5.2 Sky Monitoring System for Flying Object Detection Using 4K Resolution Camera et al.

In this paper, The use of drones and other unmanned aerial vehicles has expanded rapidly in recent years. These devices are expected to enter practical use in various fields, such as taking measurements through aerial photography and transporting small and lightweight objects. In particular, with the recent progress of deep neural network technology, the monitoring of systems using image processing has been proposed. This study developed a monitoring system for flying objects using a 4K camera and a state-of-the-art convolutional neural network model to achieve real-time processing. We installed a monitoring system in a high-rise building in an urban area during this study and evaluated the precision with which it could detect flying objects at different distances under different weather conditions. The results obtained provide important information for determining the accuracy of monitoring systems with image processing in practice.**[2]**



**Figure 4: Image captured by the monitoring system and system installation. [2]**

**CHAPTER 02**

**BLOCK DIAGRAM AND ITS DESCRIPTION**

**2.1BLOCK DIAGRAMS:**

CREATING A BORDER BOX AND ITS RESPECTIVE LABEL

LINERA RECUSION MACHINE LEARNING MODEL

MEMORY CARD STORES THAT DATA

CAMARA TAKES REAL TIME VIDEO

**DESCRIPTION**

A memory card with less memory space capacity and an ESP32 microprocessor, both of which are 32-bit microcontrollers, are connected in order to save costs. When a camera records video, that video data is saved on a memory card and processed using a machine learning algorithm that was trained on mask data from several image datasets that included people, automobiles, mountains, trees, trucks, and plain terrain.

The linear recursion algorithm is being used here. We will now generate a bounding box and its corresponding model name using image processing.

The objects will be detected and then some decision can be made by system in order to make safety and secure landing of any flying system.

**CHAPTER 3**

**SOFTWARE AND HARDWARE REQUIREMENTS**

**3.1 SOFTWARE REQUIREMENTS:**

The software components that are used in the preparation of the quadcopter

* Arduino
* ESP-32 board configuration
* Google collab
* Data sets of images and their classification

**3.2 HARDWARE REQUIREMENTS:**

The hardware components that are used in the preparation of the quadcopter

* ESP32-S
* Memory card
* Balloons
* Own drone or Any flying object



**Figure 5: Esp32-S**



** Figure 6: Memory card**

**Figure 7: Drone**



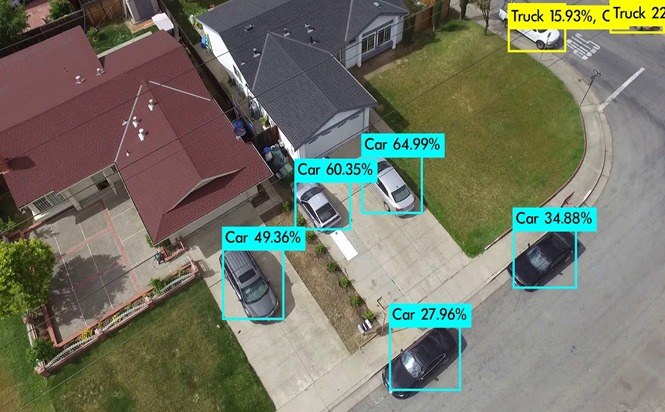
**Figure 8: Balloon**

**CHAPTER 4**

**EXPECTED RESULTS**



**Figure 9 Detection of objects cars**



**Figure 10 Detection and Identification in city**

**CHAPTER 5**

**PLAN OF ACTION&EXCUTION**

|  |  |
| --- | --- |
| **DATE** | **ACTION** |
| 07-10-2023 | Started gathering of information for creating of a flying objects and image processing to identify the objects in video |
|  | Started building of flying system |
|  | Testing the working of system and analysing its parameters |
|  | Creating a full efficient flying system with a retrieving system |
|  | Coding ESP32 cam with help of Arduino ide and external module of ESP loading files |
|  | Taking to take a live video and that data to get store that data in memory card for next processing |
|  | By the data of images processing taken with the help of sets if images of different items like persons image set, cars image set, trees data set and building data set |
|  | Creating or training of with above received data by linear Recursion machine learning model |
|  | Relate the data and its label |
|  | Create boundary box and label for video that is taken form ESP32 cam module |

**CHAPTER 6**

**APPLICATIONS AND ADVANTAGES**

**6.1 APPLICATIONS:**

There are so many applications like in Traffic Management and vehicle detection retail, Inventory management, Urban planning and Infrastructure, Agriculture etc.

1.In Security and surveillance

2.Environmental Monitoring

**6.2 ADVANTAGES:**

1.Can detect a wide range of objects, including animals, vehicles, and other non-human entities.

2. Can detect multiple objects within a single image or video

3. By detecting and avoiding obstacles in the environment, image object detectors can help ensure the safety of both the flying machine and the surrounding area.

4. Image object detectors use advanced algorithms to accurately identify and locate objects in real-time.

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*Mehmetbey University Karaman,Turkey.* https://doi.org/10.1109/ICOT54518.2021.9680627/

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