

# Human-Detection and Tracking

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**Abstract:** *Real-time human detection and tracking is a vast, challenging and important field of research. It has wide range of applications in human recognition, human computer interaction (HCI), video surveillance etc. The research for detection of a person has reached far but the real-time tracking of human beings has not gained much importance. Tracking of human being can be used as a prior step in human recognition. Keeping continuous track of person will allow to identify. of persons at any time. The system consists of two parts first human detection and secondly tracking. Human detection step is split into face and body detection, Face is a vital part of human being represent most important information about the individual. The design consists of a Quad-Copter with an object detection camera and GPS to quickly track humans from distance on areas which are not quickly reachable from land and/or are not safe for a human to reach unknowingly. The key element here is the detection of humans below rubbles in case of disaster and terrorists' attacks. Moving Object Detection is a technique used in Artificial Vision. It consists of processing the video so that any object moving within the field of view can be detected. This technique is used to recognize the movement of an object, vehicle, or person through a camera in an autonomous mode and displaying an alarm to the operator*

**Keywords:** human detection.

## I. INTRODUCTION

To aid the problem of tracking humans quickly without risking more human lives in desperate times like disasters or terrorist attacks. The design consists of a Quad-Copter with an object detection camera and GPS to quickly track humans from distance on areas which are not quickly reachable from land and/or are not safe for a human to reach unknowingly.

### Field of the Invention and use of Invention

This invention relates to saving human life in disaster like earthquake and floods. More people are becoming vulnerable to disasters or are forced to cope with acts of violence, financial crises and growing uncertainty, often without adequate support from their governments.” Disasters can be either natural or human-made events and can include pandemics, technological disasters or environmental cataclysms.

### Prior Art and problem to be solved

To solve the problem of tracking humans quickly without risking more human lives in desperate times like disasters or terrorist attacks and cut down the fuel costs of the vehicles like helicopter used during disasters.

### 1.1 Objects / Objectives of the Invention

To aid the problem of tracking humans easily & quickly without risking more human lives in desperate times like disasters. **“Purpose is to Save Life and Save Humanity”.**

### Summary of the Invention

As helicopter fuel cost are very costly, and Our invention helps in cutting down the fuel cost of the helicopter during the disaster and flood.

Our invention also saves the time in tracking the human easily. So, we can save more and more humans lives in desperate time in disaster and critical situation by detecting and tracking humans via drones.

### Detailed Description of the Invention

A disaster is a serious problem occurring over a short or long period of time that causes widespread human, material, economic or environmental loss which exceeds the ability of the affected community or society to cope using its own resources.

Tracking real-time and the edge is the need of the hour, as most surveillance and analytics cameras need to process the data in the edge rather than streaming it to the cloud for processing. On a top-level, a tracking problem can be classified into two: Single Humans Tracking and Multi-humans Tracking.

Single humans tracking is primarily based on appearance and motion models. It works with object position in 1st frame as input it tracks the humans in subsequent frames. Single humans tracking doesn't need consecutive detections to assist the Tracker. It only uses the first frame detections as its input. In contrast, multi-humans tracking can work either with detection input or without detection input.

It functions as a detection-based tracking system. Depending on the detection, the number of humans to track varies. Tracking performance is often affected by detection accuracy to some degree.

### Reasons for loss of life during DISASTERS

Not quickly recognising the human life in disaster prone areas due to this immediate medical treatment not provided on time.

Also, human involvement requires to search life which requires extra human resources, safety equipment, extra cost & time.

The human tracking module is responsible for estimating and keeping track of the position and velocity of the detected humans. This is done by using yolo algorithm to estimate and detect the position of each human.

This means that the tracking module also has to be able to associate new detections with already existing tracked humans

There are tools you can use to find the shortest route for multiple destinations.

Google Maps is one of the most popular, although it does have some drawbacks. We'll show you how to find the shortest route with Google Maps, and talk about another route planner that will make your life a lot easier.

The concept of surveillance drones arises to aid the problem of tracking humans quickly without risking more human lives in desperate times like disasters or terrorist attacks.

The key element here is the detection of humans below rubbles in case of disaster and terrorist's attacks.

Moving Object Detection is a technique used in Artificial Vision. It consists of processing the video so that any object moving within the field of view can be detected. This technique is used to recognize the movement of an object, vehicle, or person through a camera in an autonomous mode and displaying an alarm to the operator.

Thermal cameras coupled with deep neural networks are a much more robust strategy to actually detect the presence of people. Unlike motion sensors, they will detect the presence of people even when they aren't moving. And, unlike optical cameras, they detect bodies by measuring the heat that they emit in the form of infrared radiation, and are therefore much more robust — their sensitivity doesn't depend on lighting conditions, on the position of the target, or the colour.

We are using mission planner software for ground control station for Plane, Copter and Rover. It is compatible with Windows only. Mission Planner can be used as a configuration utility or as a dynamic control supplement for your autonomous vehicle. Here are just a few things you can do with Mission Planner.

GCS (Ground Control Station) software is typically run on a ground-based computer that is used for planning and flying a mission. It provides a map screen where the user can define waypoints for the flight, and see the progress of the mission.

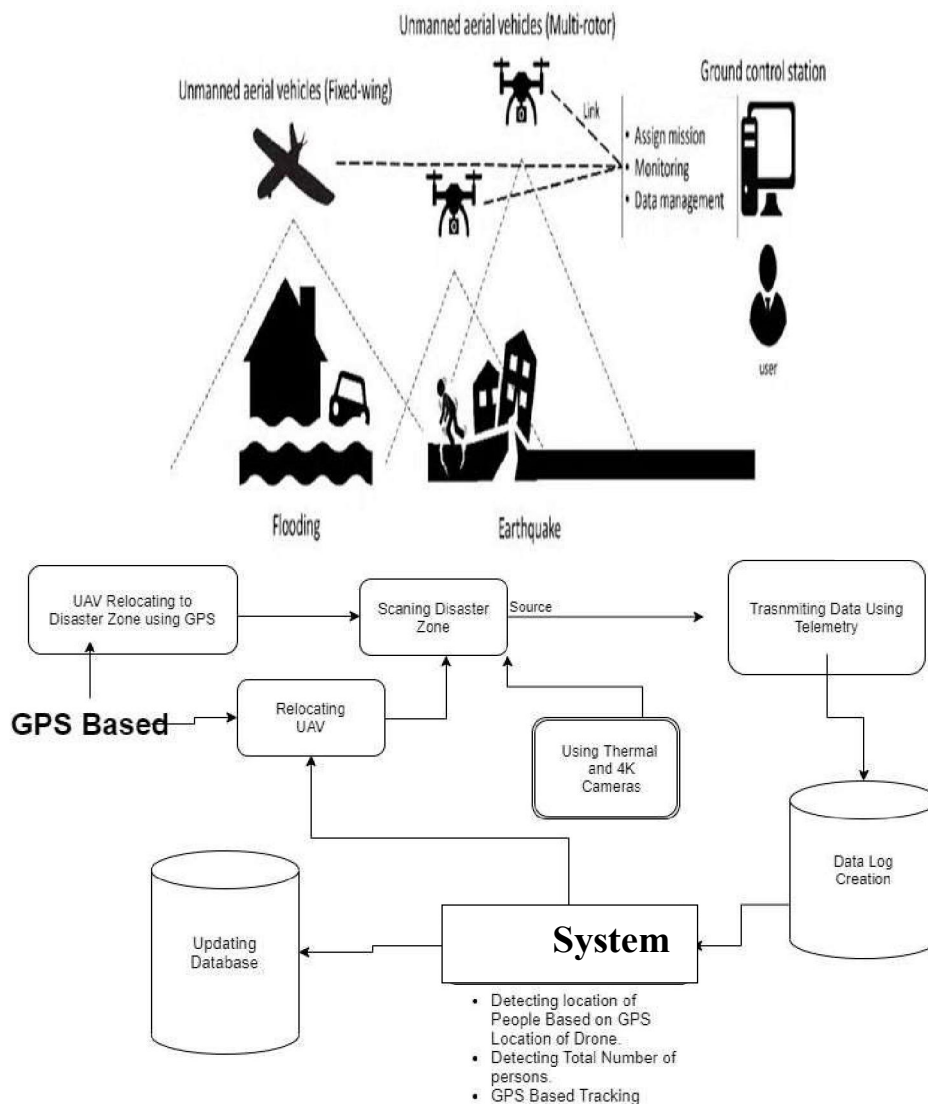
Information is most important for taking decision. In the disaster/unpleasant condition the information is critical for taking decision.

**II. METHODS**

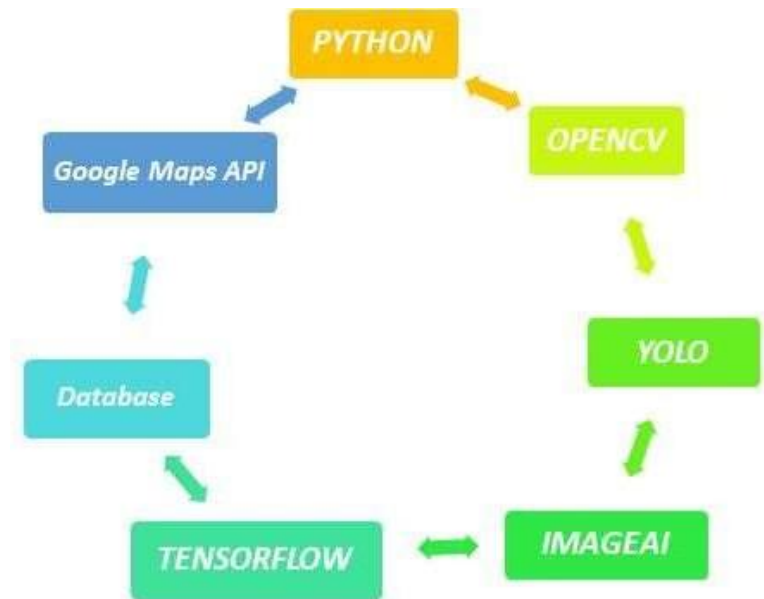
We explore the process of designing a long-term drone surveillance system by fusing object detection, tracking and classification methods.

Given a video stream from an RGB-camera, a detection module based on YOLOV5 is trained for finding drones within its field of view. Although in drone detection, high accuracy and robustness is achieved with the underlying complex architecture, the detection speed is hindered on HD- streams. To solve this problem, we integrate a highly efficient object tracker to update target status while avoiding running the detection at each frame. Benefited from lightweight backbone networks with powerful Transformer design, the object tracker achieves real-time speed on standalone CPU devices. Moreover, a drone classification model is applied on the output of the detection and tracking mechanisms to further distinguish drones from other background distractors (birds, balloons).

**III. FLOWCHART**



Technologies stack: -



**Unit Testing: -**

The goal of unit testing is to isolate each part of the program and show that the individual parts are correct. A unit test provides a strict, written contract that the piece of code must satisfy. As a result, it affords several benefits.

**Find problems early:** Unit testing finds problems early in the development cycle. In test-driven development (TDD), which is frequently used in both extreme programming and scrum, unit tests are created before the code itself is written. When the tests pass, that code is considered complete. The same unit tests are run against that function frequently as the larger code base is developed either as the code is changed or via an automated process with the build. If the unit tests fail, it is considered to be a bug either in the changed code or the tests themselves. The unit tests then allow the location of the fault or failure to be easily traced. Since the unit tests alert the development team of the problem before handing the code off to testers or clients, it is still early in the development process.

2. **Facilitates Change:** Unit testing allows the programmer to refactor code or upgrade system libraries at a later date, and make sure the module still works correctly (e.g., in regression testing). The procedure is to write test cases for all functions and methods so that whenever a change causes a fault, it can be quickly identified. Unit tests detect changes which may break a design contract.

3. **Simplifies Integration:** Unit testing may reduce uncertainty in the units themselves and can be used in a bottom-up testing style approach. By testing the parts of a program first and then testing the sum of its parts, integration testing becomes much easier.

4. **Documentation:** Unit testing provides a sort of living documentation of the system. Developers looking to learn what functionality is provided by a unit, and how to use it, can look at the unit tests to gain a basic understanding of the unit's interface (API). Unit test cases embody characteristics that are critical to the success of the unit. These characteristics can indicate appropriate/inappropriate use of a unit as well as negative behaviors that are to be trapped by the unit. A unit test case, in and of itself, documents these critical characteristics, although many software development environments do not rely solely upon code to document the product in development.

**Integration Testing: -**

The purpose of integration testing is to verify functional, performance, and reliability requirements placed on major design items. These "design items", i.e., assemblages (or groups of units), are exercised through their

interfaces using black-box testing, success and error cases being simulated via appropriate parameter and data inputs. Simulated usage of shared data areas and inter-process communication is tested and individual subsystems are exercised through their input interface. Test cases are constructed to test whether all the components within assemblages interact correctly, for example across procedure calls or process activations, and this is done after testing individual modules, i.e., unit testing. The overall idea is a "building block" approach, in which verified assemblages are added to a verified base which is then used to support the integration testing of further assemblages. Software integration testing is performed according to the software development life cycle (SDLC) after module and functional tests. The cross-dependencies for software integration testing are: schedule for integration testing, strategy and selection of the tools used for integration, define the cyclomatic complexity of the software and software architecture, reusability of modules and life-cycle and versioning management. Some different types of integration testing are big-bang, top-down, and bottom-up, mixed (sandwich) and risky-hardest. Other Integration Patterns are: collaboration integration, backbone integration, layer integration, client-server integration, distributed services integration and high-frequency integration.

**IV. VALIDATION AND VERIFICATION**

**Software Verification:** The process of evaluating software to determine whether the products of a given development phase satisfy the conditions imposed at the start of that phase. Software verification ensures that "you built it right".

**Software Validation:** The process of evaluating software during or at the end of the development process to determine whether it satisfies specified requirements. Software validation ensures that "you built the right thing".

**V. PURPOSE AND FUTURE SCOPE**

We are accepting a set of bounding boxes of a person and compute their respective centroids and then compute the Euclidean distance between any new centroids and existing centroids to track the movement.

When centroids intercept the gate line from the top of the frame the IN counter is incremented and when the centroids intercept from down the frame OUT counter is incremented. And hence we can count the number of people in the defined zone.



**Reasons for loss of life in DISASTERS & TERRORIST ATTACKS.**

- ❖ Not quickly recognising the human life in disaster prone areas due to this immediate medical treatment not provided on time.
- ❖ Also, human involvement require to search life which requires extra human resources, safety equipment, extra cost & time.

To aid the problem of tracking humans & living objects easily & quickly without risking more human lives in desperate times like disasters or terrorist attacks.

**"Purpose is to Save Life and Save Humanity"**

Forest Fire    Flood    Cyclone & Tsunami    Landslides    Terrorist Attack

**VI. CONCLUSION**

Object Detection Projects are no longer a vision but a reality. The future of Object detection Projects and Object Detection Project Ideas is beyond our expectations. The scope of technology is booming with time, and with it is the need for experts. All you need are the right qualifications and skills to make you all acquainted with real-world experience and make you job-ready.