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# Missile Burst Prevention and Tracking System Using Image Processing In MATLAB

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**ABSTRACT:** The system is designed to track the missile and avoid the incidents where a single missile attack could cause the loss of thrust for an entire scheme. Here we are trying to develop a system to track the missile which ensuring the seeker and divert maneuver capabilities needed to remove system errors. The system will consist of two subsystems, a detection system and a deflection system. The detection system uses a camera and is connected to MATLAB and sends instruction for tracking in to microcontroller. The MATLAB reads the input image and is programmed to identify the presence of missile by analyzing the images using image processing. Once a missile is detected it activates the deflection system. The deflection system helps to detect the missile from following its current path thereby reducing the risk of missile tracking which has been implemented in MATLAB R2013a simulator.

**KEYWORDS:** PIC Microcontroller, Servo motor ,camcorder, Image processing.

### I.INTRODUCTION

Image processing is a method of extracting some useful information by converting image into digital inform by performing some operations on it. Object detection and tracking are the task that is important and challenging such as video surveillance and vehicle navigation. Object tracking plays a vital role in the field of computer vision. Object tracking algorithms have acquired priority due to the availability of highly sophisticated computers, good quality and inexpensive camera. In the object tracking, the video analysis involves, moving object detection, object classification, frame to frame object tracking. Object detection deals with the identification of objects from video frame and to cluster pixels of these objects. In object classification, the objects are classified as birds, humans, vehicles and other moving objects. While object tracking involves the selection of Region of Interest (ROI) and keep tracking of motion and its positions from the video frames. This project reviews the various challenges and aspects of detection and tracking of missiles.

### II.LITERATURE SURVEY

The purpose of a missile approach warning system (MAWS) is to detect approaching missiles with enough warning time to allow effective deployment of countermeasures. An active MAWS uses a pulsed Doppler radar to detect incoming missiles. For a fighter aircraft, application full spherical coverage must be provided by the MAWS. Due to

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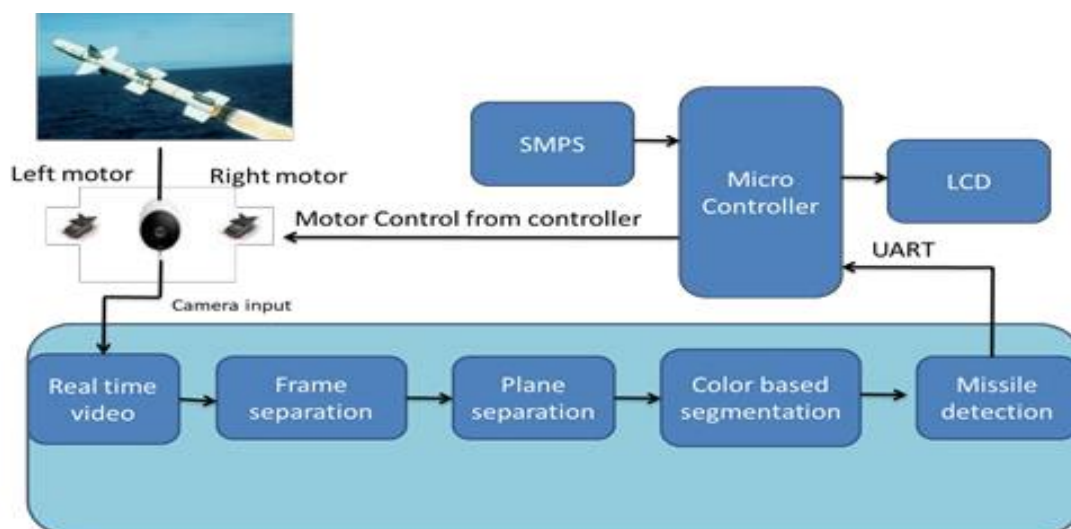
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cost and size considerations, this is achieved with an active MAWS by placing a suitable number of non-scanning, wide-beam antennas around the aircraft.

An important feature for a MAWS on a fighter aircraft is the capability to maintain tracks on detected missile threats. A characteristic feature of the fighter aircraft environment is the occurrence of high-g maneuvers. Without a tracking capability, the rapid changes in aircraft dynamics that occur during the maneuvers could make it difficult for the MAWS to decide if multiple detections in time and space are associated with more than one threat. This is essentially the well-known problem of data association encountered in multiple-target tracking. In the case of MAWS, an incorrect decision with regard to the number of threats can impact on the effectiveness of the deployed countermeasure. Another benefit of tracking is that once a track file has been initiated on a threat, subsequent interruptions that may occur in the detection process will not significantly degrade threat awareness. Finally, tracking can provide a means to reject detections of non-threatening targets on the basis of their dynamics, thereby lowering the false alarm rate of the system.

The missile tracking problem for an active MAWS has similarities with any other target tracking problems involving radar. However, there are two important differences. First, the active MAWS inherently provide a poor measurement of missile angle-of-arrival because of its use of wide-beam antennas. Consequently, it cannot be assumed that target azimuth measurements are available to aid the tracking process. The second difference is that in the general target tracking problem, there is usually no a priori knowledge of the target motion. However, for the MAWS, which is only required to detect and track approaching missiles, the targets of interest are, by definition, those targets homing in on the ownership. This fact provides a priori knowledge of the target dynamics that can be exploited in the tracking scheme. The missile tracking algorithm described in this paper is an optimal one, in the sense that it is based on an extended Kalman filter formulation that incorporates expected missile dynamics in the system dynamics model.

### III.BLOCK DIAGRAM



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## IV. PROPOSED SYSTEM

In proposed system, use camera to detect missile which is fixed in plane.

Once it captures that image through camera and process in MATLAB to distract the missile to avoid tracking.

## V. PLANE SEPARATION

An RGB image, sometimes referred to as a *true color* image, is stored in MATLAB as an m-by-n-by-3 data array that defines red, green, and blue color components for each individual pixel. RGB images do not use a palette. The color of each pixel is determined by the combination of the red, green, and blue intensities stored in each color plane at the pixel's location. Graphics file formats store RGB images as 24-bit images, where the red, green, and blue components are 8 bits each. This yields a potential of 16 million colors. The precision with which a real-life image can be replicated has led to the commonly used term true color image.

An RGB MATLAB array can be of class double, uint8, or uint16. In an RGB array of class double, each color component is a value between 0 and 1. A pixel whose color components are (0, 0, 0) displays as black, and a pixel whose color components are (1, 1, 1) displays as white. The three color components for each pixel are stored along the third dimension of the data array. Plane separation is illustrated below.

## VI. SEGMENTATION

In computer vision, image segmentation is the process of partitioning a digital image into multiple segments (sets of pixels, also known as super-pixels). The goal of segmentation is to simplify and/or change the representation of an image into something that is more meaningful and easier to analyze. Image segmentation is typically used to locate objects and boundaries (lines, curves, etc.) in images. More precisely, image segmentation is the process of assigning a label to every pixel in an image such that pixels with the same label share certain characteristics.

The result of image segmentation is a set of segments that collectively cover the entire image, or a set of contours extracted from the image (see edge detection). Each of the pixels in a region are similar with respect to some characteristic or computed property, such as color, intensity, or texture. Adjacent regions are significantly different with respect to the same characteristics. When applied to a stack of images, typical in medical imaging, the resulting contours after image segmentation can be used to create 3D reconstructions with the help of interpolation algorithms like marching cubes.

## VII. COLOUR BASED SEGMENTATION

Color image segmentation that is based on the color feature of image pixels assumes that homogeneous colors in the image correspond to separate clusters and hence meaningful objects in the image. In other words, each cluster defines a class of pixels that share similar color properties. As the segmentation results depend on the used color space, there is no single color space that can provide acceptable results for all kinds of images. For this reason, many authors tried to determine the color space that will suit their specific color image segmentation problem. In this work, a segmentation of color images is tested with RGB color space.

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## VIII.HARDWARE AND SOFTWARE DESCRIPTION

### 1. HARDWARE

#### a. PIC MICROCONTROLLER

Peripheral Interface Controller (PIC) was originally designed by General Instruments. In the late 1970s, GI introduced PIC 1650 and 1655 – RISC with 30 instructions. PIC was sold to Microchip Features: low-cost, self-contained, 8-bit, Harvard structure, pipelined, RISC, single accumulator, with fixed reset and interrupt vectors.

#### b. LCD

LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs.

#### c. WEBCAM

A simple Webcam setup consists of a digital camera attached to your computer, typically through the USB port. The camera part of the Webcam setup is just a digital camera

-- there's really nothing special going on there. The "Webcam" nature of the camera comes with the software. Webcam software "grabs a frame" from the digital camera at a preset interval (for example, the software might grab a still image from the camera once every 30 seconds) and transfers it to another location for viewing. If you're interested in using your Webcam for streaming video, you'll want a Webcam system with a high frame rate. Frame rate indicates the number of pictures the software can grab and transfer in one second. For streaming video, you need a minimum rate of at least 15 frames per second (fps), and 30 fps is ideal. To achieve high frame rates, you need a high-speed Internet connection.

#### d. SMPS

Switch mode power supplies (SMPS) is used in a range of applications as an efficient and effective source of power. This is in major part to their efficiency. Anybody still works on a desktop, look for the fan output in the central processing units (CPU). That's where the SMPS is. SMPS offers advantages in terms of size, weight, cost, efficiency and overall performance. These have become an accepted part of electronic gadgets. Basically, it is a device in which energy conversion and regulation is provided by power semiconductors that are continuously switching "on" and "off" with high frequency. A switching regulator does the regulation in the SMPS. A series switching element turns the current supply to a smoothing capacitor on and off. The voltage on the capacitor controls the time the series element is turned. The continuous switching of the capacitor maintains the voltage at the required level.

#### e. SERVOMOTOR

A servomotor is a rotary actuator or linear actuator that allows for precise control of angular or linear position, velocity and acceleration. It consists of a suitable motor coupled to a sensor for position feedback. It also requires a relatively sophisticated controller, often a dedicated module designed specifically for use with servomotors. Servomotors are not a specific class of motor although the term servomotor is often used to refer to a motor suitable for use in a closed-loop control system. Servomotors are used in applications such as robotics, CNC machinery or automated manufacturing.

### 2. SOFTWARE a. MATLAB

MATLAB is a high-performance language for technical computing. It integrates computation, visualization, and programming in an easy-to-use environment where problems and solutions are expressed in familiar mathematical notation. Typical uses include:

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- Math and computation
- Algorithm development
- Modeling, simulation, and prototyping
- Data analysis, exploration, and visualization
- Scientific and engineering graphics
- Application development, including Graphical User Interface building

MATLAB is an interactive system whose basic data element is an array that does not require dimensioning. This allows you to solve many technical computing problems, especially those with matrix and vector formulations, in a fraction of the time it would take to write a program in a scalar non-interactive language such as C or Fortran.

## b. EMBEDDED C

An Embedded System can be best described as a system which has both the hardware and software and is designed to do a specific task.

## IX. CONCLUSION

Our proposed system has been successfully tested and implemented. The ability to track targets at manipulation range without resorting can significantly reduce the cost and complexity of manipulator control. In real time, missiles were detected and tracked by using color based segmentation. This data will be sent to microcontroller and it will process the data. Depending upon the data given the servo motors will be rotated. By using this system we can efficiently track the missiles.

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