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# Multi-camera Model for Object Tracking

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***Abstract*–The multi camera model for object tracking is concept of compound eye, most of the flying insects like butterfly, house fly, and etc, have compound eye. Main feature of the compound eye is angle of vision and sensitive to object movement. Human eye is complex eye which is having lesser angle of vision then compound eye. We use the compound eye concept to implement project. In our multi camera object tracking model, cameras will be acting like eye, and computer system is like brain which will compute the object information. Main thing is communication, for communication using TCP/IP protocol, which is wired point to point communication act like nervous system. Project is about tracking is red, blue, and green, and there direction of movement, and storing the information of object movement with date and time. After storing the object information, stored information will be updated regularly and communicated with other system for future reference. Multi camera object tracking model is having many applications. Applications are security, automation, and entertainment. Implementing project with wireless communication lead to application like unmanned vehicles assistance system, cricket and foot ball live streaming in playing ground, with all object information and computing model will communicate with other connected systems. Multi-camera object tracking model have more angle of vision and using computations can track the object, and make sensitive to primary colors movement in the region of interest. And all primary color objects tracked and followed in direction where they move.**

**Key words- Direction of the object, communication,**

## I. INTRODUCTION

Multi-camera model for object tracking is implemented considering the security, automation, and entertainment. These three are the main Essential in technology. Project explains how multi camera model can be used in the security, automation and entertainment. Project implemented using the processing unit like computer and camera as sensor. Camera help in feeding live information about the video frames from region of interest, computer is used to process the frames from camera using mat lab tool. After processing the object information is stored and it is communicated with other system. For communication using the distributed computing model, model consists of server and client systems, connected with each other. In distributed computing model used the wired communication, TCP/IP protocol is used to communicating the information from client system to server system using local area network (LAN). This can be implemented using wireless communication. While processing the information stored in computer is used in executing process the delay be there is communicating the information.

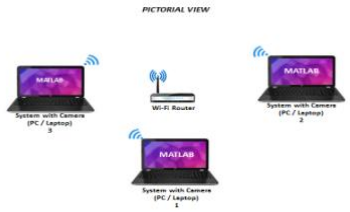


Fig.1 Pictorial view of project design

## II. EXTRACTING THE RGB COLOR MAP OF THE OBJECT

Color based classification. (Color is relatively constant under viewpoint changes and it is easy to be acquired and classified)and they are primary colors. R =(: , : , 1);G = ( : , : ,2); B =( : , : ,3); [1]

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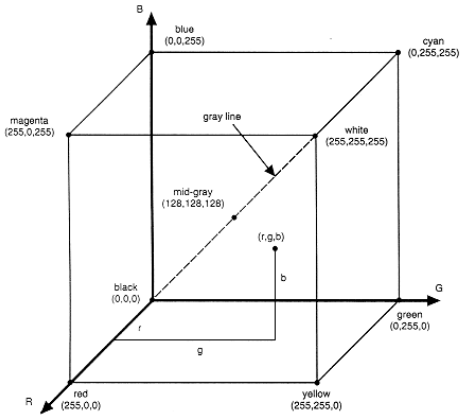


Fig .2 shows the color map values

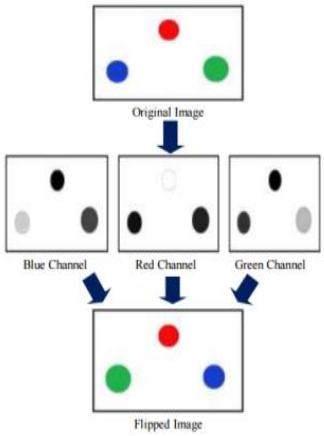


Fig .3 RGB color maps

RGB color map extraction
R = R - (G/2)- (R/2); extracting red color map.
B = B - (G/2)- (R/2); extracting blue color map.
G = G - (R/2)- (B/2);extracting the green color map.

The digital representation of the color maps help to extract the particular color from the map. According to each color index value they divided.

## III. FILTERING THE UNWATED NOISE IN THE OBJECT

Filter the unwanted color maps and noise using the median-filter. Median-filter used in 2D image noise processing. Median filter will give smoothing effect to the image and removes the noise[2]. Figure below will show the smoothening effect the median filter.

Fig.4 RGB image frame

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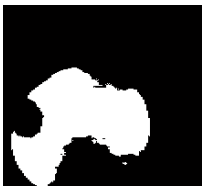

Fig.5 before applying filter

Fig.6 after applying the filter

The figures show that how noise is reduced and image smoothening is done.

## IV. CENTROID CALCULATION OF THE DETCTED OBJECT

Calculating the Centroid will help the tracking of object moving direction. Calculation Centroid is explained below. [6]

$$X_c = \frac{1}{M}\sum_{i=1}^{n} x_i m_i \quad (1)$$

Where M is sum of intense of mi, mi is pixel intense value. Xi and Yi are pixel location on the image, n is total number of pixels.
Using the image pixel location and according to movement of the object, track the direction of object movement

## V. DIRECTION AND DATE OF THE OBJECT

For Calculating the direction of object movement using co-ordinates of the centroid of the moving object. For time we considering the system time and use the system time to find the time of the object

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movement,as figure shown below. System date and time will be shown using syntax

Date=datestr(clock, 0). [7]

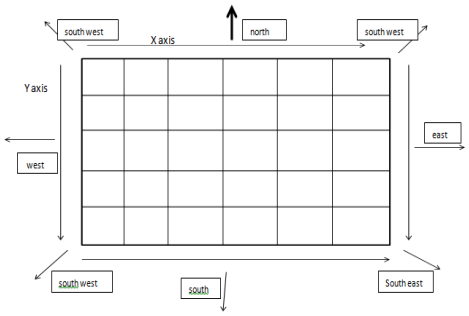


Fig.7 Eight direction calculation

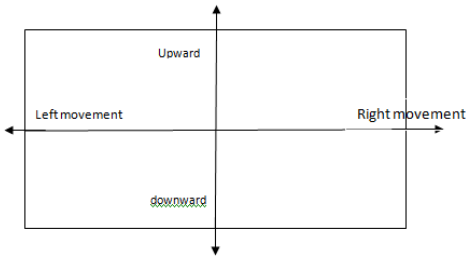


Fig.8 Object movement direction (left/right, upward /downward)

## VI. COMMUNICATION

1. Wired communication

Refers to transmission of data using wire, getting data from point to point, will be seen in telephone networks, internet access, and fiber optics, etc.

Example: Local area network (LAN) using [TCP/IP, UDP]

a. Distributed computing model

i. All local clients (pc1, pc2, pc3) are connected to central server (pc).
ii. Client pc will be connected with USB camera.
iii. All cameras will detect the color based object(mainly RGB) and stores in client pc.
iv. All Client pcwill send the information of the object to the server pc and all will be stored.

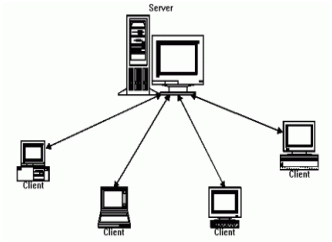


Fig.9 Distributed computing module.

Systems will be using the TCP/IP protocol. Using the IP address server connect with all clients. TCP/IP uses the 32 bit numbers as IP-address, to make it easier to understand like (192.168.11.1).

## VII. OBJECTIVES OF PROJECT

1. Object Detection and Tracking

a. Initialization of the camera.
b. Getting the frames.
c. Extracting the RGB color maps for the image.
d. Filtering the unwanted color map.
e. Threshold the image RGB values.
f. Tracking the detected object with the direction of movement and there date and time.
g. Storing the information of object.

2. Data Communicationin systems

a. All local clients (pc1, pc2, pc3) are connected to central server (pc) using IP-address.
b. Client pc will be connected with USB camera.
c. All cameras will detect the color based object (mainly RGB) and stores in client pc.
d. All Client pcwill send the information of the object to the server pc and all will be stored

## VIII. RESULTS AND DISCUSSIONS

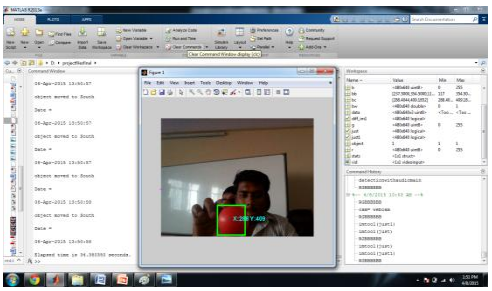

Fig.10 Object moving towards south direction.

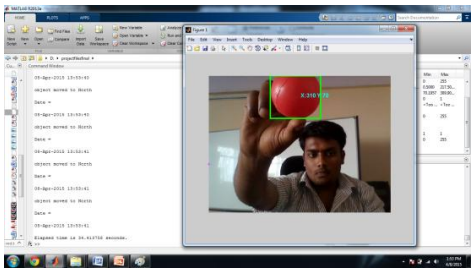

Fig .11 Object Moving towards north direction.

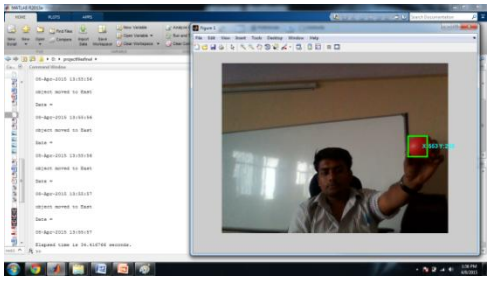

Fig.12 Object Moving towards east direction.

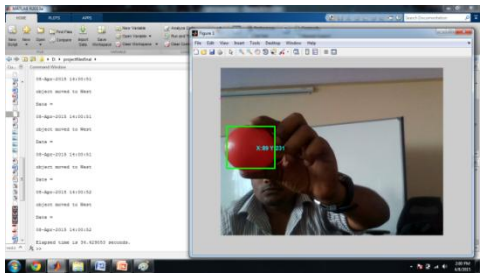

Fig.13 Object Moving towards west directions

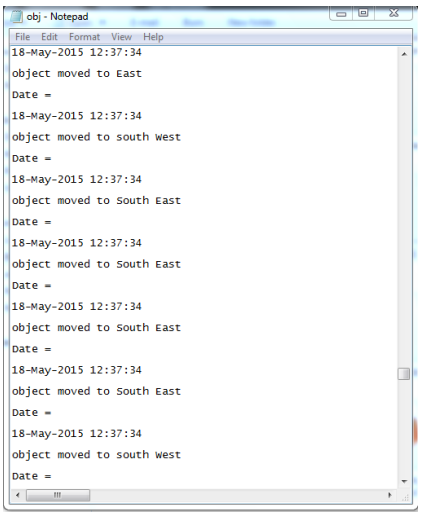


Fig.14 object information text file.

The information text file is communicates from clients to server, that will be storing and updating object information.

## IX. CONCLUSION

For the specified object tracking and communication as model is designed. The designed model is developed using the MATLAB and communication tools is used in the laboratory conditions and normal environment conditions also. Main thing is project is camera, required high resolution camera because that will help to get the each pixel of the frame and help in accurate detection and tracking of the object. In communication we used TCP/IP protocol. While processing the text file with mat-lab unable to send file without delay, getting delay in communicating the object information. Using more advanced techniques can improve this problem.

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