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CHOCK-A-BLOCK SURVEILLANCE

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ABSTRACT: Crowd management is an important research due to its significant number of people in society.The overcrowding takes place in some common places like temples ,stadiums, movie theaters,etc.Being in a highly crowded region like a queue in a closed venue not only affects the human level of comfort but it also affects the human level of safety. The CHOCK-A-BLOCK SURVEILLANCE system provides crowd management with the help of two image processing process.The initial process is known as the ingression process that deals with the detection of Crowd intensity in a particular region. It is detected by a blob algorithm. After the detection it enables automatic diversion of crowd based on the crowd intensity in that particular locality. Finally the rushing of the crowd through the exit of the closed venue causes a collision. So it is avoided by the outdoor evacuation process using a haar cascade algorithm to ensure safe exiting of people from the closed venue.

KEYWORDS: Crowd Management ,Crowd Intensity,Haar Cascade Algorithm, Blob Algorithm, Ingression Process,Outdoor Evacuation Process.

I.INTRODUCTION

A group of crammed people is generally represented as chock-a-block ,where the people are at the state of overflowing. Surveillance is nothing but close observation of a certain process. So our system focuses on proper observation of crammed people to avoid further issues that are caused due to overcrowding. The main objective of our system is to provide an efficient density based crowd control system that provides seamless crowd management with the help of image processing techniques. Generally the collision or cluster formation in the crowd is the major issue that affects the human level of safety.A collision is the event in which two or more bodies exert forces on each other in about a relatively short time.This affects the safety level of people.

Fig 1) Image of Crowd

We are in an era where crowding frequently occurs. In some large and crowded places, people are prone to chaos and congestion when an emergency occurs, resulting in huge economic losses, and even casualties.so these situations can be handled only with some managing techniques. Those techniques are known as crowd managing technique.The choke a

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block surveillance system is used for crowd management in a highly crowded region like a queue in a closed venue (eg:temple). It ensures human level of safety as well as human level of comfort too. This system performs crowd management with the help of image processing techniques.

Image processing is an umbrella term for many functions that analyze images or convert one representation of an image into another, in order to get an enhanced image or to extract some useful information from it. Surveillance stands For monitoring the behavior, activities and other changing information usually of people for influencing, directing and protecting them. The purpose of image processing in surveillance applications is to geometrically align the image and to get depth-data analysis such as feature detection or motion sensing.

II. LITERATURE SURVEY

Jie Yin, Yahua Bi, Xiang-Min Zheng,Ruye-Chyn Tsaur, "Safety Forecasting And Early Warning Of Highly Aggregated Tourist Crowd In China"[2019 IEEE ACCESS VOLUME 7]

In this system they deal with the highly aggregated crowd in china,where it affect the human safety and they tested this model under different crowding conditions and assessing the safety level of tourist.Different warning plans were proposed based on the simulated security level.

Yan Mao,Xinmiao Fan,Zixuan Fan,Wu He, "Modelling Group Structure With Emotion In Crowd Evacuation"[2019 IEEE ACCESS VOLUME 7]

In this system they proposed the system based on state of emotion.The state of emotion is nothing but during any emergency it causes over rushing towards the exit door so this situation is even tough to handle.

III.PROPOSED SYSTEM

The proposed system mainly focuses on the human level of safety. Generally in the crowded region the human comfort is affected during two situations,that is during the entry and exit of people. Therefore in our system we are undergoing two process they are given as follow:

- Ingression Process
- Outdoor Evacuation Process

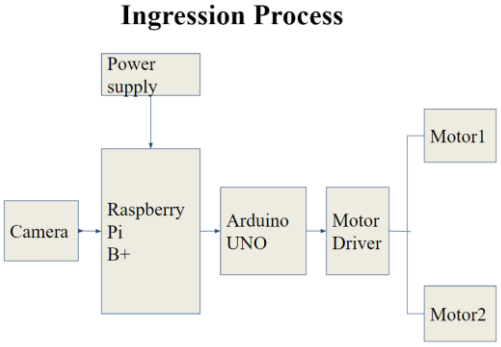

Fig 2) Block diagram of Ingression Process

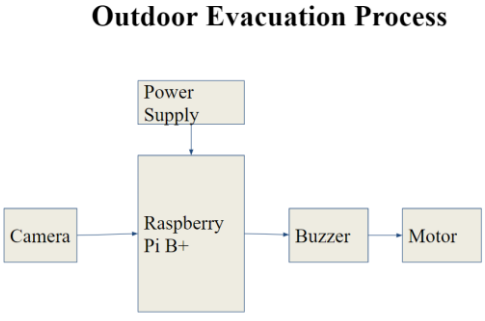

Fig3)Block diagram of Evacuation Process

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Ingression Process

This is the initial process where the overcrowding generally occurs due to collisions among the crowd in closed venues. The intensity of crowded regions is analyzed by a clustering and intersection process where the crowd intensity is related to pixel intensity using BLOB algorithm.

The BLOB is defined as a Binary Large Object. It refers to a group of connected pixels in an image based on their features such as shape or colour. In our system we focus mainly on the colour intensity where the colour intensity is related to pixel intensity. In computer vision, blob detection methods are aimed at detecting regions in a digital image that differ in properties, such as brightness or color, compared to surrounding regions. Informally, a blob is a region of an image in which some properties are constant or approximately constant. The most common method for blob detection is convolution.

In this process the image is captured using the camera and the raspberry pi module is used for processing the image and to identify the clustered region.The respective region is identified with the help of pixel intensity related to the pixel values and the nearby door open in order to split the cluster formed.

Outdoor Evacuation Process

This is the final process in our system where this process is nothing but a way of prevention process.There is a chance of congestion that takes place generally during the exit of people. So it is avoided by allowing a fixed range of people to pass through the exit door. In this process we use the HAAR CASCADE algorithm which is used for taking the exact count of people in a particular region. A Haar Cascade is basically a classifier which is used to identify the object with which it has been trained from the source. The Haar Cascade is trained by superimposing the positive image over a set of negative images. In our system it is used for detecting the count of people in a particular locality. Thus after taking count in a continuous manner it generates a warning signal when the count reaches the maximum. In this process the image captured using a camera is processed using a raspberry pi module where it keeps on counting the number of people and generates a warning signal if it reaches the emergency state.

IV. SIMULATION RESULT

Ingression Process:

In this process we are going to consider people in three different queues where there are two gates in between them.Gate 1 is between queue 1 and queue 2 whereas the gate 2 is between queue 2 and queue 3 . Generally in places like temples people as well as the management are not able to judge the crowd in each and every queue ,so this leads to overcrowding in one queue and leaves the other queues empty.

Fig 4) Queue 1(Full crowd)

Fig 5) Queue 2(Partial crowd)

Fig 6) Queue 3(Empty)

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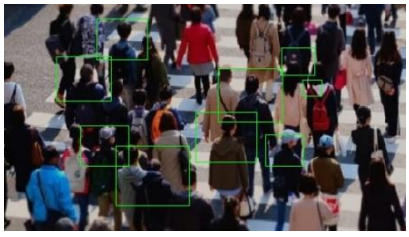

Fig 7) Blobs in Queue 1

Fig 8) Blobs in Queue 2

Fig 9) Blobs in Queue 3

Based on this output the graphical representation is also given where generally the black colour is identified more in each and every crowded image so the graph also represents the same where the intensity of pixel is denoted.

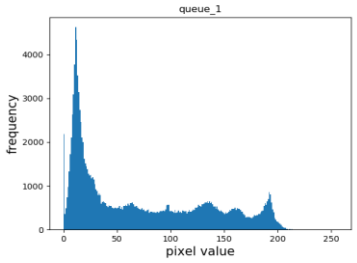

Fig 10) Graph of Queue1

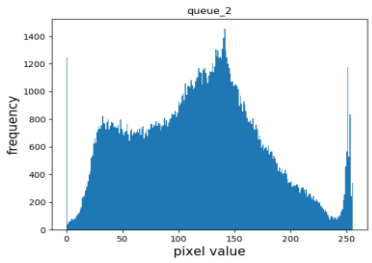

Fig 11) Graph of Queue2

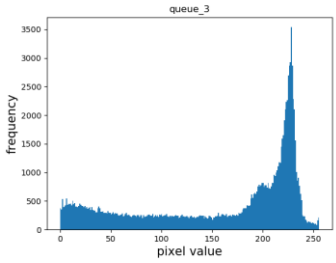

Fig 12) Graph of Queue3

Here we came to a conclusion that the queue 1 is crowded whereas the queue three is empty by the blob that is created. So in order to clear this cluster we open the gate 2 first to move the people from queue 2 to queue 3 and then we open the gate 1 to move the people from queue 1 to queue 2.

```
= RESTART: C:\Users\ELCOT\AppData\Local\Programs\Python\Python38-32\ingression.p
y
blobs_in_queue_1 = 9
blobs_in_queue_2 = 4
blobs_in_queue_3 = 0
open gate 2
open gate 1
>>>
```

Fig 13) Output of Ingression Process

Evacuation Process:

This is the next process used to prevent collision during the exit of people.Generally in places like temples there may be multiple entrances but the exit door always remains one,so this leads to collisions during the exit of people.Let us take two images and compare them.

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Fig 14) Image 1

Fig 15) Image 2

```
File  Edit  Shell  Debug  Options  Window  Help
Python 3.8.2 (tags/v3.8.2:7b3ab59, Feb 25 2020, 22:45:29) [MSC v.1916 32 bit (I
tel)] on win32
Type "help", "copyright", "credits" or "license()" for more information.
>>>
= RESTART: C:\Users\ELCOT\AppData\Local\Programs\Python\Python38-32\evacuation.
y
number of face(s)= 4
buzzer off
number of face(s)= 22
buzzer on
>>>
```

Fig 16) Output of Evacuation Process

So the image 1 has limited number of people where as the image 2 has cluster of people so if we allow the cluster of people to pass through the same door at same time it usually causes collision so the exact count of people is taken to prevent the collision.Here we identify the overcrowding the help of buzzer sound.with

V. CONCLUSION

Thus the system provides the crowd management in a seamless manner and supports the human level of safety and comfort to the best. This process goes hand in hand and makes the system more efficient and useful to the people .It also reduces the pressure on people who are involved in the process of controlling and managing the crowd in most popular places.This automation avoids the manual errors that are created.

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