Real Time Tracking of Down of Abandoned Objects in mass transit areas

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***Abstract*— In general automated offline video processing systems have been used for post-event analysis. However very little has been achieved regarding real-time object recognition. This paper aims at tracking down of abandoned objects in mass transit areas like airports, bus stations etc. in real-time, which enhances the security of the area being monitored compared to automated offline video processing systems.**

***Index Terms*— Abandoned Object, mass transit areas, offline video processing systems**

I. INTRODUCTION

Increasingly, police and security staff rely on video surveillance systems to facilitate their work. This practice is most evident in mass transit areas such as metro stations and airports. However, these systems remain largely labour intensive and the personnel monitoring the video displays find it extremely difficult to be attentive to randomly occurring incidents. Although automated video surveillance do exist, they have been mainly used for offline video analysis after an event has occurred. At present, these surveillance systems are of marginal help for real-time alerts. The function of real-time surveillance system is to draw the attention of monitoring personnel to the occurrence of a user defined suspicious behavior of abandoned objects, when it happens. Two challenges stand in the face of developing, real-time tracking down of abandoned objects in mass transit areas. First, objects of interest, such as luggage in the scene, must be found robustly, classified and tracked through time. Second, a stable means of describing events must be found.

The disadvantages of automated offline video processing systems are they are largely labour intensive i.e more humans are required in monitoring the systems and the personnel monitoring the video displays find it extremely difficult to be attentive to randomly occurring events. In this paper we introduce a framework ,that processes raw video data received from a fixed color camera installed at a particular location, which makes real-time inferences about the observed objects in the scene. Once the objects are tracked and found abandoned for a specific length of time, as defined by the user, a signal is sent from transmitter section to receiver section. The abandoned object can be any luggage, suit case with a bomb, etc. Real time tracking of abandoned objects helps in enhancing the security of the area.

II. TRANSMITTER SECTION

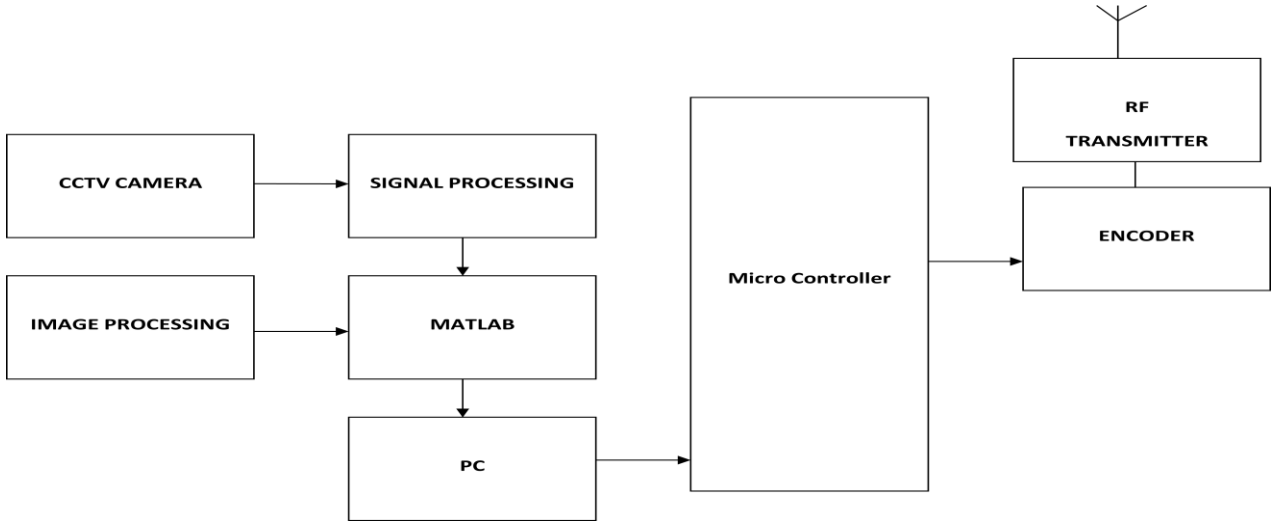

Figure 1 Block Diagram of Transmitter Section

A Camera is used to capture the frames in real time. Now a days, every device comes with an in-built cameras. However we can add IT externally to make it more flexible. MATLAB does image processing on each frame that is captured by camera in real-time, in order to find the objects in the frame. PC is the module where all the processing is done. It is used for storing frames and installing MATLAB. It is used for developing detection and tracking algorithm where, each frame undergoes this algorithm. It has to be with good processing speed in order to support the required development environment. UART means universal asynchronous receiver and transmitter. It provides the physical communication link between the PC and the hardware we are developing. The MCU acts as the processing unit for the hardware. Encoder module improves error less transmission over a noisy channel. We can use N X M class devices based on our requirements. RF transmitter is suitable for short distance communication. The function of RF transmitter is to modulate, up convert and amplify signals for transmission into free space. In Transmitter section camera captures the input frame and the frame is processed using mat lab. If an object in the frame is found to be idle for a particular period of time, then the information is transmitted using micro controller and RF transmitter.

III. RECEIVER SECTION

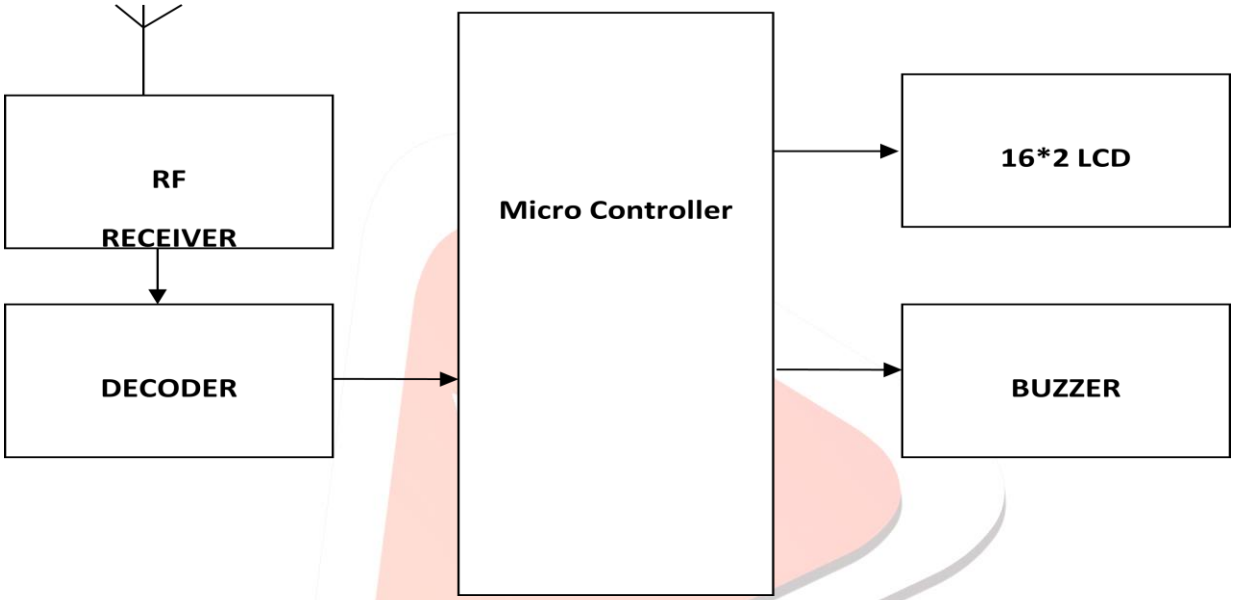

Figure 2 Block Diagram of Receiver Section

RF receiver receives the signal sent by the transmitter section and then, it decodes the received information. Decoder helps in error free reception of signals sent by the transmitter section. LCD means liquid crystal display. It helps in displaying the message "Abandoned Object detected" to the personnel monitoring the video display. The message is displayed only when the object is abandoned for a particular period of time as defined by the user. Buzzer is also used to alert the personnel monitoring the video display, when the abandoned object is detected.

IV. SOFTWARE ENVIRONMENT

MATLAB is the suitable software which provides necessary tools to accomplish the tasks. Image processing tool box is one such tool, which is used to accomplish the tasks. MATLAB is a high level language and interactive environment for numerical computation, visualization and programming. Using mat lab we can analyze data, develop algorithms and create models and applications. Mat lab has wide range of applications including image processing, control system, test and measurement and many more tool sets.

Image processing in mat lab involve addressing of loading an image, using the right format, saving the data as different data types, how to display an image, conversion between different image formats. Image processing tool box software is a collection of functions that extend the capability of the mat lab numeric computing environment. The tool box supports a wide range of image processing operations which include special image transformations, morphological operations, neighborhood and block operations, linear filtering and filter design, transforms, image analysis and enhancement, image registration, deblurring, region of interest operations. The basic data structure in mat lab is the array, an ordered set of real or complex elements. This object is naturally suited to the representation of real images , real valued ordered sets of color or intensity data. Mat lab stores most images as two dimensional arrays(i.e matrices) in which each element of the matrix corresponds to a single pixel in the displayed image.

V. WORKING

Before knowing the working principle of the system, we should know the functions used in mat lab. The three main functions are Find objects(), Object tracker(), Display video with overlay() . Find objects() function is used to identify the objects in current frame by getting the absolute difference between background image and current image frame. The difference is done in the

Ycbcr color space, a typical video signal color space, to ensure that the objects are correctly identified both by lightness (in the gray scale Y channel) and color(in the Cb and Cr channels). From this difference a threshold is used to change the image to black and white. After the image is converted to black and white, noise is removed using morphological operations and then objects are identified using bwlabel" function in mat lab and the properties for the objects are obtained using "regionprops" function in mat lab Object tracker () function is used to track the objects, which are found using Find objects(). It is used to update the information of an already existing object or newly identified object in an frame. Display video with overlay() function is used to overlay the object with red color, when the object is abandoned for specific length of time, as defined by the user

In the Transmitter section camera captures the input frame and the frame is processed using matlab as follows. The input frame is given as an argument to Find objects() function, which in turn identifies the objects in the frame and returns the objects that are identified. These objects are given as an argument to Object tracker function, which in turn tracks the objects and returns an abandoned object, if found. This is given as an argument to Display video with overlay() function, where it overlays the abandoned object with red color and send a signal to RF transmitter. RF transmitter transmits the signal to RF receiver in the receiver section. In the Receiver section, RF receiver receives the signal sent by the transmitter section .Once the information is decoded successfully it makes the LCD, display the message "Abandoned object is detected " and switches on the buzzer, to make it easy for the personnel monitoring the video display.

VI. OBSERVED RESULTS

Figure-III shows the simulated result of RF reception, Figure IV shows the Detection of Abandoned Object

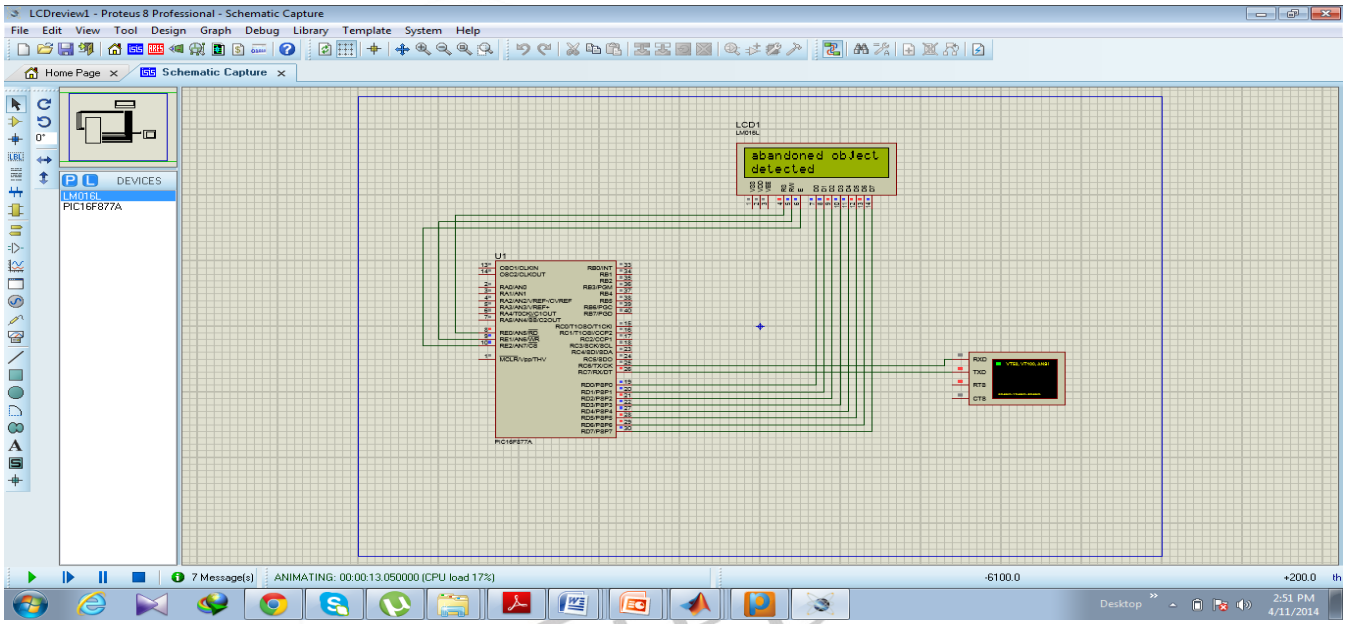

Figure 3 Simulated result of RF Reception

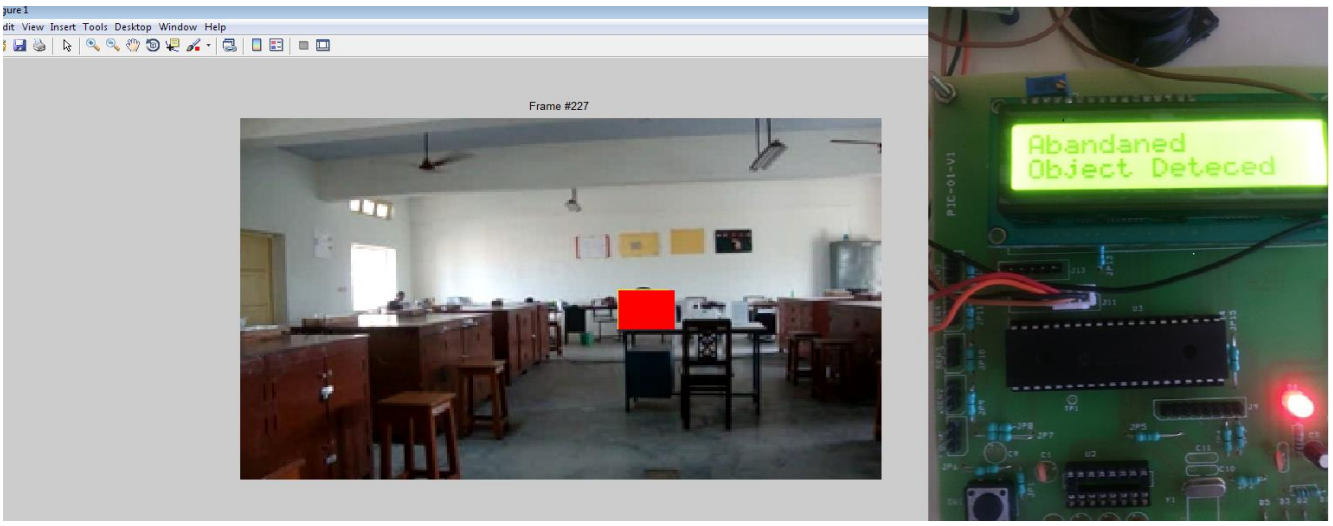

Figure 4 Detection Abandoned Object.

VII. CONCLUSION

In this paper, we have described a real-time system that tracks down the objects that have been abandoned for a specific particular period of time, as described by the user, by taking the absolute difference between background image and current image or frame. The process continues for all frames captured by the camera. Since internal security has been an issue, for all developing countries, development and deployment of these real time systems helps in enhancing the security of mass transit areas.

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