SURVEILLANCE SYSTEM USING OBJECT DETECTION IN RASPBERRY PI

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Abstract : CCTV surveillance is a widespread precaution employed to provide mitigation against danger or threats. With rapid advancements in technology, we aim to cascade newer technology to our conventional problem of security. We intent to use the video feed from CCTV in conjunction with an object detection methodology and provide real-time protection. The software receives input from camera, processes and then analyses the data in order to find inconsistencies. The surveillance system thus proposed will be sensitive to not only movement of objects but will also be photosensitive, thus providing greater protection against unforeseen dangers.

Keywords : IoT,Object detection,Raspberry, Security,Surveillance .

I. INTRODUCTION

CCTV monitoring system has become an indispensable and a necessary measure in our lives and are used by clients,amongst most things, to identify trespassers .These systems are used commonly in all domains and industries for deterring crimes and providing security all the way from traffic observation to observation of high-crime areas or neighborhoods for 24/7 hour monitoring . We aim to propose a smart solution to this problem that gives real-time feedback and enforces greater security. For this purpose,we are providing additional capabilities to the camera by connecting it with the Raspberry Pi hardware, which contains embedded python code to make decisions. Conventional security systems simply relay and store the data.They are unable to resolve and understand any abnormalities in the environment. They thus seem to serve as passive security measures as one can gain knowledge either from the data stored or by constantly viewing every frame of video footage.In comparison, our proposed model is more active. It is able to perceive the environment and make the decision of alerting the client or local policing station, without the need of being supervised or overlooked by a human.The use of raspberry pi was decided as it's small size offers us the advantage of attaching a computational device as part of the surveillance system which ensures faster response time.It provides the ability to identify the state of affairs of the scene being monitored and able to provide notifications and alarms as the event takes place. The monitoring systems sends an email to the client along with live feed at that instant. Thus, the client can watch over the security from any part of the world which also removes the location dependency of the conventional surveillance systems. Thus,the Closed-Circuit Television(CCTV) suffers from several drawbacks such as obscure pictures, ability to classify moving objects and lack smartness in general apart from a substantial burden on storage spaces and costlier hardware implementation.

II. EXISTING SYSTEM

As per the statistics, not more than 63% people currently use Surveillance systems. And the systems they use harbour a lot of anomalies. The camera's maximum work output is to cover the wide area of about 180 degrees. Some expensive cameras have the capability to turn 360 degrees and record 1080p High resolution videos, but still they aren't capable of detecting any anomalies in the current set of images being recorded. Apart from that they are inactive and demand the footage to be constantly viewed to provide security [1].

During the last year, several big brands in the surveillance market introduced Internet of Things or IoT to Surveillance system. It was a big stepping stone for the Surveillance industry and components like Raspberry Pi and Arduino to be introduced to the world. Precisely, their cameras recorded 1080p High-Resolution videos

and allow the users to remotely access LIVE footage [2]. Thus giving the users a better outcome for the Aforementioned problem.

The existing system does not provide amenity of making decisions while capturing the current video, thus making it as smart as the person behind the screen footage. This complication steers to multiple downsides including burglary and several other catastrophes.

Our proposed solution elucidates this complication by bridging the ends of Surveillance system.

Figure 1: The picture shown above depicts the hardware connections for the system. It involves a Raspberry pi board connected with a vga camera via the 16-Pin port.

III. PROPOSED SOLUTION

Image recognition using Raspberry Pi eclipses the meagerness of CCTVs. The mere introduction of an Object detection algorithm in the live video tracking will succor the user's abstract needs of streaming the Live video, thereby seen as an analogy of traditional security guards. According to the prerequisite knowledge, raspberry pi is an embedded computer hardware system that fits in your palm. It provides a whole lot of features to supersede traditional recording methodologies . A Pi camera, makes it easier to record streaming all day or remotely access the Live streaming. With object detection, the pi sends a signal, alarming the owner to protect his belongings thus preventing any adversity. The loophole in the traditional CCTV was that only the video was displayed continuously thus lending the responsibility to the security guards reviewing the constant Live feed. Image recognition bridges the owner straightly to the Pi with a User interface, which is easily accessible via Internet. There need not be any physical wires or unnecessary connections and networks for the video to lay over before being displayed. The owner can retrospect the feed to view unadulterated content. To create such a system we make use of changing intensities of light. The camera captures an image of the scene being monitored as a baseline. It then uses the intensity parameters of this baseline to compare with live video frame [3]. Each pixel intensity is checked respectively according to the Frames-per-second. At the back end of the device, a python script runs which executes continuously and processes the input data. Once the deviation in the pixel intensity is captured, the code enters into the trigger loop, thus alarming the owner by means of an E-mail or Alert notifications. This omits the middle layer of co-workers and connects the camera to the respective owner [4]. A drawback of this kind of Object detection is that the pixel intensity is highly sensitive. Thus, making even a minute change in the picture fed, trigger the system. The system stores the current image as benchmark and then, compares the upcoming frames per second with this point of reference. If the pixel intensities remain constant then the loop keeps running. As soon as an anomaly is detected with the pixel intensity, the system is triggered and starts executing a set of code. Under this code, the system sends an Email alert on the respective owner's registered Email id, thus informing about an incongruity that occured remotely, providing a link to view the Live camera feed and record the same for future references and lawsuit proof [5]. This omits the traditional loose surveillance, making the work environment safe and fortified.

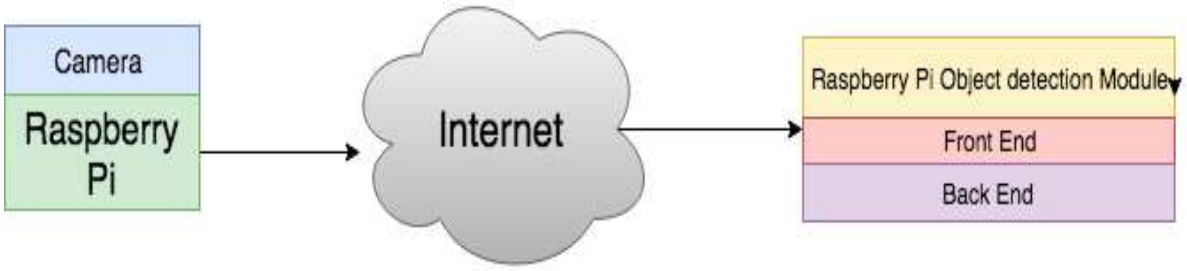

Figure 2: The picture shows a schematic view of the working system connected online. The remote location sends a relay to the front end via the internet connection.

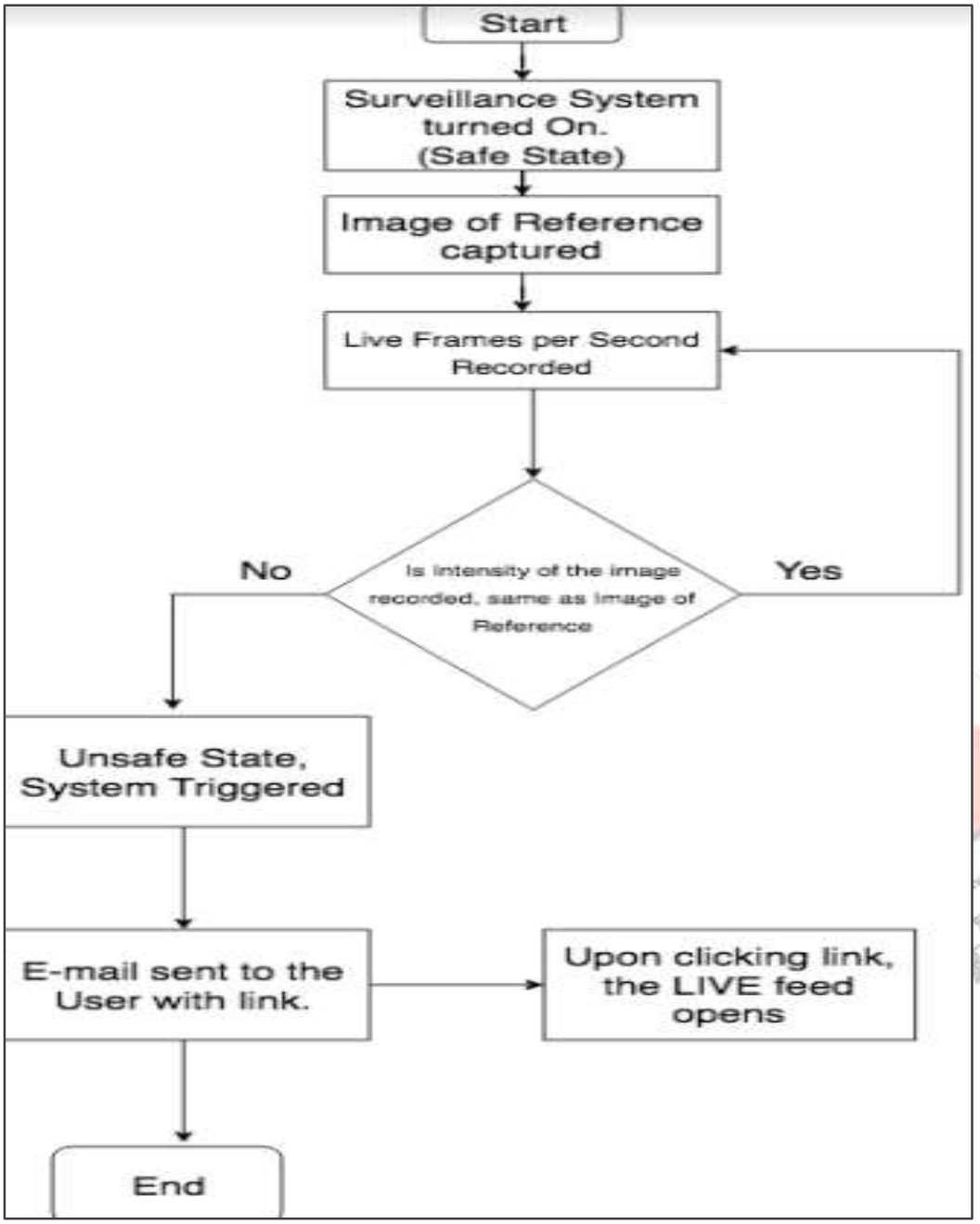

Figure 3:The figure depicts a flow chart from the initial start state and showing all the states that the surveying system follows. It captures live frames, compares them to a baseline and and checks the state(safe, unsafe). If triggered, notified via email and live feed.

CONCLUSION :

The proposed solution fathoms the constraints in the existing solution and provides an elucidation for the aforementioned constraints.
The provision is practically proved to be a superior class of surveillance system, keeping in mind about the expenses one can spend on a surveillance of his/her possessions, thus making it a better

alternative when compared to the existing system. Apart from the good hardware, the shiny aspect of the system is that it works remotely, thus enabling the user to relinquish the dependency on the conventional wire systems. Another welfare point for the user is that, the proposed system is extremely portable making it easily installable at any desired location without any constraints of wire fittings and system compatibility.

In conclusion, the proposed system is the by-product of the comprehended constraints faced by the users, and now they can have what they desired for in the same price and less maintenance, thus ensuring their welfare

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