# REAL TIME SECURITY SYSTEM:

## UNDETECTED MOVEMENT TIME LAPSING

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**Abstract:** Time-lapse video is a technique whereby each successive film frame is captured such a slow rate that it can be played back. When it replayed at a normal speed, time appear to be faster and thus lapsing. Times lapse technique is a pretty powerful technique to video document extremely slowly moving object. A differential time-lapse technique will allow us to get rid of the unnecessary data from the regular video, in order to save the time for visualization and storage space capacity. If Time-lapse techniques used for video documentary, not only saves valuable the time to know how things are changed but at the same time reduces the size of documentary. The differential time lapse video is a technique where frames which holds some movement compared to the previously stored frame are only stored. The differential time lapse generated video contains movements only, which is done during the time of recording. If time-stamping is not done, the action time is unfamiliar, hence time stamping is necessary. Time stamping is done using visual watermarking and hidden steganography for different purpose. The log file is also created along with the differential time-lapse video, in order to authenticate the differential time lapse video during the legal issue. This time lapse video is put in to the internet. In this system we also put an another high tech system suppose someone put an standby image program will turn second camera which is hide in another place this information of camera is secret. This system is also uploading in internet and mobile application so whenever the movement occurs the user is inform by message. In this paper, MATLAB based algorithm is used to generate the differential time-lapse video along with time-stamping and steganography and also log file using the image comparison techniques from real time video streaming is captured by image capturing equipment to the system.

**Keywords:** Time-lapse, Differential Time-lapse, Image processing, non-uniform sampling

## (1) INTRODUCTION TO TIME-LAPSE TECHNIQUES:

There are three famous techniques to generate time-lapse video. The time lapse video can be generated in real time or using post presses on the video. Here are the different techniques which are used for generation of time lapse video.

### 1.1 Time-lapse video using noncontiguous acquisition:

In this method, frames are captured from the live video streams. First we set the frame capture interval which specifies how regularly frames are stored from video stream. For instant, if we set frame capture interval to 10, then only 1 in 10 frames are kept, the other 9 frames will be discarded. These selected frames are stored back to back to generate time-lapse video. Disadvantage in order to have 25 frames in time-lapse video, we need to capture 25*n (where n is frame capture per interval) frames. The system will be counting for every frame and wait for the essential number frame.

### 1.2 Time-lapse video using time events:

In this method, we make out timer running back side in the system and when timer runs out of time, we capture a frame and reload the timer to run it, and wait for time till timer runs out of time. Here, we capture frames at uniformly separated time period same as in previous case. With comparison to time-lapse video using noncontiguous acquisition, here time gap is made available between two successive frames to capture while we just need to wait for timer running out. Advantage: Time gap can be utilized for image processing and storing or sending the information through net, allows us to generate real time application.

### 1.3 Time-lapse video using post processed data:

This method is ideal for situation where we are not sure which frames are relevant during capture or where our processing would take too long time to occur during the acquisition. The possible application would be to delete frames which have no motion compare to the previous frames. Here, we may have the different time gaps between successive frames that need to be stored to generate time-lapse video, which makes sure that all important information will be there in video and no redundant information present in video.

## (2) WORKING PRINCIPAL OF TIME-LAPSE TECHNIQUES:

Videos are often projected at 25 FPS, meaning that 25 images appear on the screen every second. Under normal circumstances a video camera will record images at 25 FPS. Now the projection and recording speed are the same, On screen images appear to move normally. Even if the video camera is set to record at a slower speed, it can be projected at 25 FPS.
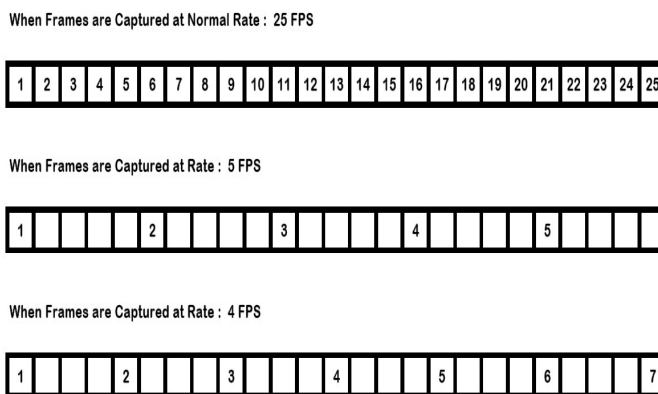
When Frames are Captured at Normal Rate : 25 FPS

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |

When Frames are Captured at Rate : 5 FPS

| 1 | | | | | 2 | | | | | 3 | | | | | 4 | | | | | 5 | | | | |

When Frames are Captured at Rate : 4 FPS

| 1 | | | | 2 | | | | 3 | | | | 4 | | | | 5 | | | | 6 | | | | 7 |

**Figure 1. Time-lapse Technique Interpretation while Capturing Frames**

Hence the image on screen will show to move faster. Figure.1 shows that how time lapse frames are captured. Figure.2 shows how the images are replayed back in 0.28 sec or 0.36 sec in 7 FPS and 9 FPS system respectively. Now, when video of such a different frame are made, within 1 sec we can see 25 frames changing on the screen and hence we can see the moving object as per eye perception rules. These frames are captured at low FPS and hence, when replayed back at normal speed, it seems to be lapse in time and hence time lapse video are generated. Considering the case of 25 FPS, in 1 second we actually see the really what happened in 1 sec, but in the case of 1 FPS, in 1 second we sees what actually happened in last 25 seconds, similarly in the case of 0.2 FPS, we actually realized that what happened in 125 seconds in a second. This can be understood by the same example

which is used earlier to explain working principal. The Figure-2 shows the when time-lapse photographs are replayed back at normal speed movie, within one second which number frame are played back within one second.
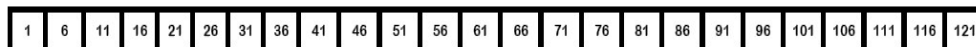
## 2.1 HDTR Images:

An HDTR image is the image in which many frames taken over a random time interval are blend together. The images in the time-lapse set are combined together by progressively sampling time-adjacent images horizontally or vertically.

The difference among the HDTR image and a single-frame long exposure is that the part to any region of an HDTR image is principally from a single image from the time-lapse set, rather than an average of all the images. An HDTR image is generated from a set of time-lapse images.
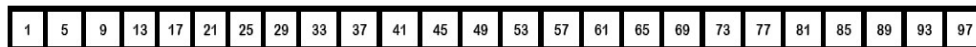
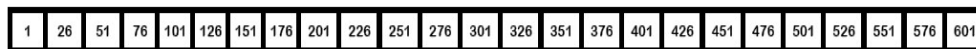When Frames are Captured at Normal Rate : 25 FPS and replayed at normal speed

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |

When Frames are Captured at Rate : 5 FPS and replayed at normal speed

| 1 | 6 | 11 | 16 | 21 | 26 | 31 | 36 | 41 | 46 | 51 | 56 | 61 | 66 | 71 | 76 | 81 | 86 | 91 | 96 | 101 | 106 | 111 | 116 | 121 |

When Frames are Captured at Rate : 4 FPS and replayed at normal speed

| 1 | 5 | 9 | 13 | 17 | 21 | 25 | 29 | 33 | 37 | 41 | 45 | 49 | 53 | 57 | 61 | 65 | 69 | 73 | 77 | 81 | 85 | 89 | 93 | 97 |

When Frames are Captured at Rate : 1 FPS and replayed at normal speed

| 1 | 26 | 51 | 76 | 101 | 126 | 151 | 176 | 201 | 226 | 251 | 276 | 301 | 326 | 351 | 376 | 401 | 426 | 451 | 476 | 501 | 526 | 551 | 576 | 601 |

When Frames are Captured at Rate : 0.2 FPS and replayed at normal speed

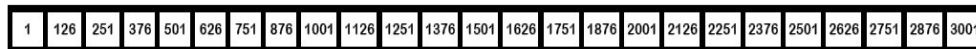| 1 | 126 | 251 | 376 | 501 | 626 | 751 | 876 | 1001 | 1126 | 1251 | 1376 | 1501 | 1626 | 1751 | 1876 | 2001 | 2126 | 2251 | 2376 | 2501 | 2626 | 2751 | 2876 | 3001 |

**Figure 2. Time-lapse Technique Interpretation while Replayed Back**

**Captured Frame**

Here, a simple HDTR is shaped from 5 images taken at different times. From each image, a strip which representing 20% of the image was extracted and the strips are blend to decrease banding artifact. It can be seen from the figure that how HDTR Images are generated from the time-lapse photographs. The first snap is spliced from left side and placed on the left part of the HDTR image. The second photograph's second slice is placed on near to first in HDTR Image and so on, as shown in the above figure. However, it can be easily seen that it is generated by the vertical slicing of the photographs as can be seen in figure below.
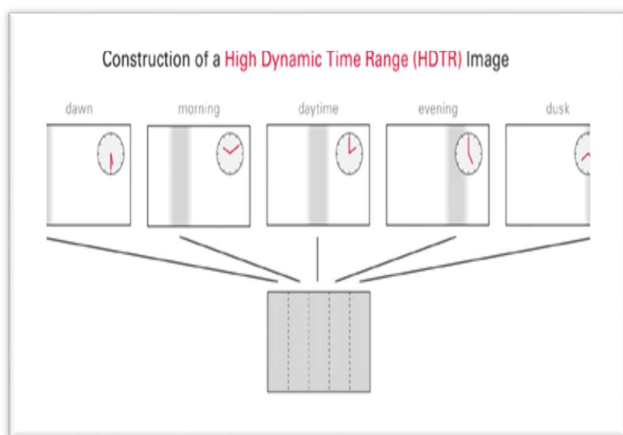
**Figure 3.  HDTR Image generation process**

## (3)  IMPLEMENTATION OF TIME-LAPSE:

Time-lapse performance can be measured from the size and time duration of information available in the time-lapse video to the original video. In order to improve the performance of the time-lapse the traditional periodic time-lapse can't be used. In order to improve, non-periodic time-lapse can be used. To generate a non-periodic time-lapse, a real time image processing application is necessary to perform, which compare the previous image with newly captured image, if  there is some precise difference between this two image, then this image is required to save else need to capture the next image for further process. It may be something like pooling algorithm which requires dedicated processor to keep real time application running.

### 3.1  General Time-lapse Algorithm:

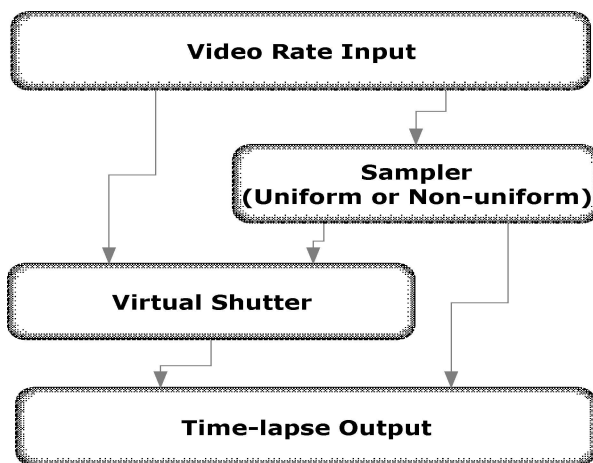General time-lapse creator should have the below components.



**Figure 4. General Time-lapse Creator**

### 3.2    Undetected Time-lapse Techniques:

Undetected time-lapse is shown in Figure 5 Real time video streaming is available from video camera. First one will be saved directly. Next frame will be compared with the previously saved frame by pixel to pixel in 3-dimension array (RGB Image) and 1-dimentsion array (Gray Scale Image). While computing the Image for finding out the Error vector, we take care of minor brightness changes, contrast changing and camera limitation of capturing brightness and contrast. The total average of error vector is computed in 3-dimentaion and 1-dimension array. This value of error are compared, if this are above some minimum change required  then this image is saved at the end of previously stored image, else new captured frame will be taken.  We lost few frames of real streaming data coming from the live capturing camera while doing the calculation, but this will be 2-frames only if frame is not stored and 6-frames if frame is stored for particular case study we used here. This may vary depends on the system's configuration.

## (4) Time Stamping:

In differential time-lapse techniques only movement are stored. The event is recorded, but no one can say that at which time event is recorded. If frame is need to be saved according to differential time-lapse algorithm criteria, the first it is time-stamped and then stored. For time stamping the system clock time is taken as the reference, and water mark techniques is used to show the time and date over the frame.

### 4.1 Over View of the Digital Water Marking System for Video:

 Video watermarking involves embedding cryptographic information derived from frames of digital video into the video itself. Preferably, a user screening the video cannot distinguish between the original, unmarked video and the marked video, but with the way of a watermark extraction application it is possible to find the watermark and obtain the embedded information along with it. As the watermark is part of the video, rather than part of the file format, this equipment works separately of the video file format or codec.
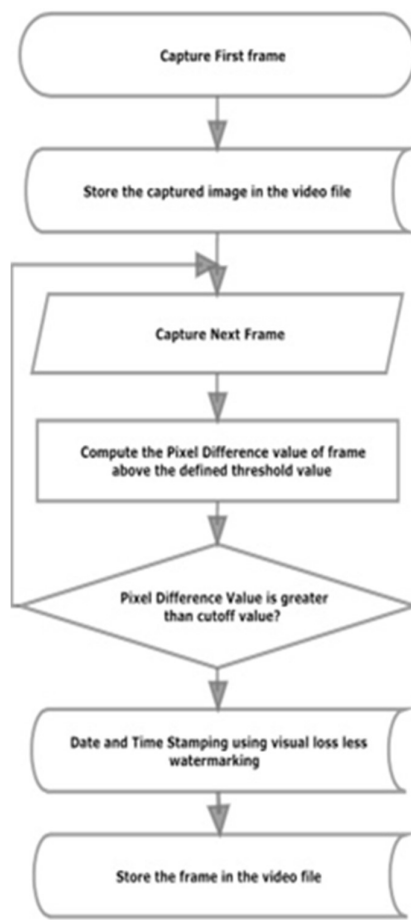
**Figure 5. Differential time-lapse algorithm generator**

This watermarking algorithm should take care of following parameters:

- Robustness: It is the ability of the watermark to oppose attempts by an attacker to demolish it by modifying the rotation, size, quality, or other visual aspects of the video.
- Security: It is the ability of the watermark to oppose attempts by an attacker to remove it or demolish it via cryptanalysis, without modifying the video itself.
- Perceptual fidelity: It is the perceived visual quality of the discernible video compared to the original, unmarked video.

**4.2 Steganography:**

The steganography is also used in order to make sure that even if someone tries to temper the information it can be easily detected. In color image, effectively only two pixel is affected by steganography. The top left and right bottom is used to store the data & time information in first and last pixel read by the MATLAB. For second frame stored information is moved to second pixel and second last pixel and goes on. The advantage is that if someone tries to remove the complete frame from the video, then also it can be detected easily.

**4.3 Log Creation:**

The creation of the log file helps to understand the movement and it can used as the proof that generated differential time-lapse video is not tampered though it can be proofed from the steganography technique also. However, log files also gives idea for the why frame is selected or discarded which is important for the some legal issues.

## (5) RECENT DEVELOPMENT IN TIME-LAPSE:

The most current expansion in time-lapse cinematography is the adding of High Dynamic Range Imaging (photographic technique) to time-lapse video. One of the first experiment was an 11 second series completed in un-automated form by Nicholas Phillips on July 8, 2006. Modern time-lapse enthusiasts have ongoing to follow suit as of May 2007. Jay Burlage and Ollie Larkin have both successfully shot and processed with HDR time-lapse recording in HD with motion control, using DSLR cameras. Time-lapse photography can generate an irresistible amount of data. For example, a single camera which takes 1 image every 5 seconds will create 17,280 images in one day, or closed to 63,07,200 images per one year. Image or video compression allow us to reduces the storage requirements, but the same time resulting data has some compression artifacts and it is not very useful for additional analysis.

In addition, at present it is difficult to edit the images in a time-lapse sequence, and advanced image-based rendering operations such as relighting are not possible. A key challenge with time-lapse data is to provide a representation that capably reduction in storage requirements whiles it allow useful scene analysis and advanced image editing.

## (6) CONCLUSION:

Unknown movement time-lapse method is offered for creating non-periodic time-lapse video which will provide superior compression of time with no lost any of the vital information. We can generate time-lapse videos with periodic or non-periodic lapse in time based on user requirements. Our suggested non-periodic lapse allow to choose the frames of the time-lapse video using an image processing in Matlab application which is user specified and therefore performance of the system is better on some special cases where user can define parameters.

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