Movie Piracy Tracking System

[1]Divya Rani, [2]Harish Kumar R, [3]Harsha S N, [4]Manjunath C W, [5]Vanishree M L
[1,2,3,4] UG Student, Department of CSE, Global Academy of Technology, Bengaluru,
[5]Assistant Professor, Department of CSE, Global Academy of Technology, Bengaluru.

Abstract : Cinema is a major entertainment for people in today's life. To entertain people a lot of investment is put on cinemas by the film – makers. Their effort is being ruined by few people by pirating the cinema content. They do it by capturing the video in mobile camera and upload it to websites or sell it to people and this goes on. In this paper, a technical method to prevent video recording in movie theatres is presented. An invisible light is projected from the screen to the whole audience that falls on the cameras which are optically sensitive to infra-red light in turn disturbing the acquisition functions of any camera making an illegal recording in the theatre useless. This paper presents a new method to defeat camcorder piracy and realize content protection in the theatre using a new paradigm of information display technology, called Temporal Psycho visual Modulation (TPVM), which utilizes the differences between the human-eye perception and digital camera image- forming to stack an invisible pattern on digital screen and projector. The images formed in human vision are continuous integration of the light field, while discrete sampling is used in digital video acquisition which has "blackout" period in each sampling cycle.

***IndexTerms* - piracy, image processing, temporal phycho visual modulation, IoT.**

I. INTRODUCTION

In this era, the growth of the Internet has led to many new innovations in the way it is used. Internet can provide fast access to any kind of information and media, and also the copyrighted contents. Piracy[1] refers to the unauthorized duplication of copyrighted content that is then sold at substantially lower prices in the 'grey' market. Final copy of the movie content might get leaked before its release by the multiple teams working on them. The common method is to film the movie inside a theatre and then uploading it on websites or convert them to DVDs and sell them on the streets. The most box office releases are available online within a few days or even hours of the box office release. The Copyright law protects the value of creative work. Making unauthorized copies may subject one to civil and criminal liability.

Night vision goggles are provided to movie hall staffs which would help them to notice any audience trying to record a movie while screening. Instead of treating every movie goes as a potential pirate, an anti-piracy screening system[2] can be implemented in order to make the pirate copy useless as well as having no effect on the audience.

II. RELATED WORK

The audio watermarking algorithms proposed earlier were implemented by image or binary logo or a unique pattern as watermark. This paper presents a new method to defeat camcorder piracy and realize content protection in the theatre using a new paradigm of information display technology, called Temporal Psycho visual Modulation (TPVM), which utilizes the differences between the human-eye perception and digital camera image forming to stack an invisible pattern on digitalscreen and projector. The images formed in human vision are continuous integration of the light field, while discrete sampling is used in digitalvideo acquisition which has "blackout" period in each sampling cycle.
Cinema is a major entertainment for people in today's life.
To entertain people a lot of investment is put on cinemas by the film – makers. Their effort is being ruined by few people by pirating the cinema content. They do it by capturing the video in mobile camera and upload it to websites or sell it to people and this goes on.

Film piracy has been the bane of the film industry for about 5-10 years now, slowly but surely it is starting to slowly deteriorate the way they sale and make their films. This effects is surely bad, it means a rise in prices, a fall in quality and an abundance of crimes committed by thousands of people!.

The goal of this project is to use digital watermarking techniques[6] to detect video piracy. A digital watermark is a distinguishing piece of information that is adhered to the data that it is intended to protect. Avoid Piracy by projecting infrared rays on screen[4]. IR signals are transmitted towards movie audiences in the theatres which will wash out any silicon-CCD (charge coupled devices)-based digital camcorders, which makes the recorded video content unfit for illegal marketing.

III. METHODOLOGY

This system employs two levels of authentication. Firstly, the smart card that is possessed by the respective theatre officer consists of information which is checked with preloaded reference information stored in the comparator. The digital output of the comparator is passed on to the coupler where it provides an electrical isolation between the comparator and driver thereby preventing the flow of back emf into the comparator. The signal is passed to driver consisting of pairs of Darlington transistor where it undergoes amplification and inversion. This driver is used to drive the relay which in turn actuates the micro controller.

The second level authentication is done by the micro controller. On switching on the Micro controller, the keypad gets activated for thepassword to be entered. If the password is verified the controller output is given to the driver through the buffer which provides impedance matching between them. Since the output from the micro controller is low, the driver amplifies the signal and actuates the relays to control the IR LEDs.

The signals that are transmitted by IR LEDs are placed behind and also along the perimeter of the screen are emitted towards the audience. So this invisible light disturbs the acquisition functions of the camera.

On placing IR LEDs behind and around the screen in the cinema theatre, the video playing on the screen becomes blur or scrambled for audience watching the movie because wavelength of IR (700nm-1mm) signal[3] is longer than the visible light wavelength (400nm-700nm). Therefore, the audience will be able to watch the movie without any disturbance but since the camcorders are sensitive to IR light, the recorded content becomes blur or unfit to watch.

The proposed technique tries to minimize the data lost at the receiver side by solving disadvantage of overlapping during extraction problem. Here secret text is embedded as target data within a cover video. The amplitude value of cover video is normalized to 16 bit. During embedding first the data is pre-processed then inserted using modulo operator.

Video file is generally a collection of images and sounds, so most of the presented techniques on images and audio can be applied to video files too. So, video steganography is nothing but a combination of image and audio steganography. So, the combined evaluations i.e., the evaluations for image and audio steganography can be taken together for the evaluation of video steganography. The great advantages of video are the large amount of data that can be hidden inside and the fact that it is a moving stream of images and sounds. A video stream consists of collection of frames and the secret data is embedded in these frames as payload.

1) Pre-processing: The target string length should be multiple of four otherwise some less used special character is concatenated at the end to make string length as multiple of four. For preprocessing, each character of target string is to be converted to their corresponding ASCII as well as 7 bit binary. Then every 4 bits are cut and converted into hexadecimal digits. Let the string is "Secret" whose length is 6. "`" is added to make its length multiple of four. So the string becomes "Secret``". The ASCII of the characters of this target string is 83, 101, 99, 114 and …, respectively and their corresponding 7 bit binary is 1010011 1100101 1100011 1110010…. After concatenating it becomes 10100111100101110001111110010… Then the hexadecimal digits are A 7 9 7 1 F 2 …

2) Embedding using modulo operator: Now these hexadecimal digits are embedded into the cover video by adjusting amplitude values of the target samples. The amplitudes of cover video are divided by 16. Then the remainders are compared with the target hexadecimal digits and the amplitudes of the cover video are adjusted in such a way so that the remainder is equal with the target hexadecimal digits.

The Boundary values for amplitudes i.e. 32760 – 32767 and 0 – 8 are treated differently due to avoid huge change. Suppose the cover amplitude value is 32764 and we want to insert 1 as target octal digit and if the proposed technique is followed then according to forward difference it becomes 32769 which are not within the range 0 to 32767. So in this case the backward differences are considered. That means if the modified amplitude value is less than 0 or greater than 32767 by either considering forward or backward differences, then the cover amplitude value is replaced by the other difference i.e. backward and forward differences.
The 16 bits string length of secret string is stored in first 16 samples by using standard LSB technique for extraction at receiver side.

For extracting the target data from stego video[5] at the receiver side, first the string length is extracted from first 16 amplitudes by standard LSB extraction technique. Then the following steps are to be followed:

1) Extraction using modulo operator: At the receiver side the affected (where the data is hidden) amplitude values are divided by 16 and the remainders of this division are hidden hexadecimal digits. Now this is send to the post-processing technique to get the original target text.

2) Post-processing: Now the resultant hexadecimal digits are converted to their 4 bit binary equivalent. Each of these 4 bits is concatenated to form a binary string. Then every 7 bits are cut and converted to their corresponding decimal equivalent. The characters of these ASCII values are concatenated as per the string length to get the original target string.

The hardware components used are :

a) Arduino interface board
It provide the engineers, artists, designers, hobbyists and anyone who tinker with technology with a low-cost, easy-to-use technology to create their creative, interactive objects, useful projects etc. A whole new breed of projects can now be built that can be controlled from a computer.

In simple words, Arduino as shown in Figure 1, is a small microcontroller board with a USB plug to connect to your computer and a number of connection sockets that can be wired up to external electronics, such as motors, relays, light sensors, laser diodes, loudspeakers, microphones etc., They can either be powered through the USB connection from the computer or from a 9V battery. They can be controlled from the computer or programmed by the computer and then disconnected and allowed to work independently.

b) Arduino Board Layout

The power requirement for ARDUINO is 9 to 12V DC, 250mA or more,2.1mm plug, centre pin positive.
The OFF-the shelf adapter

- must be a DC adapter (i.e. it has to put out DC, not AC)
- should be between 9V and 12V DC
- must be rated for a minimum of 250mA current
- must have a 2.1mm power plug on the Arduino end, and the plug must be "centre positive", that is, the middle pin of the plug has to be the + connection.

c) Liquid crystal display

A liquid crystal display (LCD) as shown in Figure 2, is a thin, flat panel used for electronically displaying information such as text, images, and moving pictures. Its uses include monitors for computers, televisions, instrument panels, and other devices ranging from aircraft cockpit displays, to every-day consumer devices such as video players, gaming devices, clocks, watches, calculators, and telephones. Among its major features are its lightweight construction, its portability, and its ability to be produced in much larger screen sizes than are practical for the construction of cathode ray tube (CRT) display technology. Its low electrical power consumption enables it to be used in battery-powered electronic equipment. It is an electronically-modulated optical device made up of any number of pixels filled with liquid crystals and arrayed in front of a light source (backlight) or reflector to produce images in color or monochrome. The earliest discovery leading to the development of LCD technology, the discovery of liquid crystals, dates from 1888. By 2008, worldwide sales of televisions with LCD screens had surpassed the sale of CRT units. Each pixel of an LCD typically consists of a layer of molecules aligned between two transparent electrodes, and two polarizing filters, the axes of transmission of which are (in most of the cases) perpendicular to each other. With no actual liquid crystal between the polarizing filters, light passing through the first filter would be blocked by the second (crossed) polarizer.

d) IR Transmitter

The purpose of the transmitter is to transform the information we want to send into a signal that can be propagated by the channel. In the case of our wired copper channel, this means we want the information to be transformed into a modulated voltage level, something like the pulse train. For a wireless channel, however, the transmitter needs to encode the information onto an EM wave that can be easily propagated. The circuit diagram is as shown in Figure 1.

The IR transmitter part consists of an Infra red light emitting diode that can capable of sending modulated data within infra red band. To match the receiver frequency the data is modulated at 38.7 KHZ by configuring 555 timer at astable mode of operation, which generates frequency using the components R2 and C2 as shown in above fig. This frequency can be varied over a long range just by varying the preset R1 and C1.

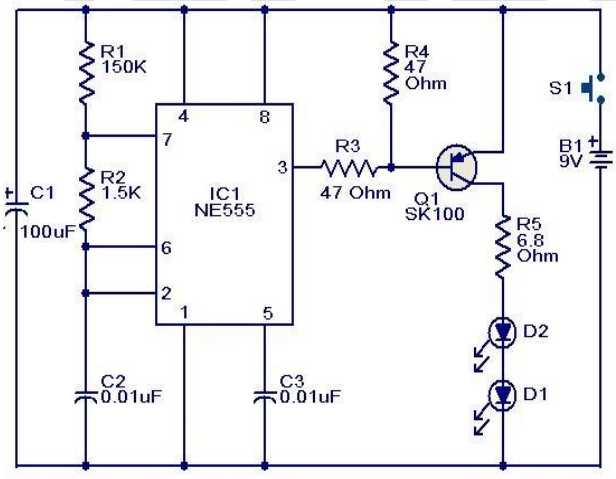

Figure 1. IR Transmitter

IV. RESULTS AND DISCUSSION

This system is designed to increase the security level, will have low cost, low power consumption and high accuracy. It is easy to implement. The copyright information includes data about the vendor, buyer, a serial number and other information. The watermark is spread throughout the image, so its location cannot be traced easily. The spreading of the watermark also prevents data loss from manipulations like compression etc.
Some of the applications are, it can be used for detecting any kind of piracy such as video, audio. It is also used for tracking online videos to avoid illegal leakage. The Government agencies can use this for tracing confidential data.

V. CONCLUSION AND FUTURE SCOPE

The principle goal of this paper is to plan IR based picture preparing procedure for digital camera deactivation in photography precluded region. This system will find the greatest number of cameras by utilizing picture preparing calculations. The unrecognized cameras will be deactivated utilizing IR transmitters. This work will serve useful in the zones, for example, theatres for counteractive action of robbery. It has numerous applications which incorporate keeping up mystery at resistance territories, enterprises, innovative work segments, chronicled landmarks, religious spots, adornments stores, changing rooms at shopping centers.

REFERENCES

[1] Pravin Dhulekar, Swapnali Choudhari, Priyanka Aher, Yogita Khairnar, *Arduino based Anti Photography System for Photography Prohibited Areas* , Journal of Science and Technology (JST) *Volume 2, Issue 5*, May 2017R.

[2] A.K.Veeraraghavan, S.Shreyas, Ramachandran, V.Kaviarasan, *A Survey on Reduction of Movie Piracy using Automated Infrared System*, International Journal of Innovative Research in Computer and Communication Engineering, *Vol. 5, Issue 11*, November 2017.

[3] P.A.Dhulekar,PriyankaAher,YogitaKhairnar,Swapnali Choudhari "Design of IR based Image Processing Technique for Digital Camera Deactivation" presented in IEEE International Conference on Global Trends in Signal Processing, Information Computing and Communication 2016.

[4] Kiran Kale, SushantPawar and PravinDhulekar, "Moving Object Tracking Using Optical Flow and Motion Vector Estimation" Published in IEEE 4th International conference on reliability, Infocom technologies and optimization (ICRITO 2015), 2-4 Sept 2015.

[5] J.Manasa, J.T.Pramod, Dr.S.A.K.Jilani, Mr.S.JaveedHussain, Real Time Object Counting using Raspberry Pi, International Journal of Advanced Research in Computer and Communication Engineering, *Vol. 4, Issue 7*, July 2015.

Virendra Kumar Yadav, Saumya Batham, Anuja Kumar Acharya,"Approach to accurate circle detection: Circular Hough Transform and Local Maxima concept", Published in Electronics and Communication Systems(ICECS), 2014, International Conference on 13-14 Feb. 2014.