DESIGN AND IMPLEMENTATION OF AN AUTOMATED ANTI-PIRACY SYSTEM

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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 project, 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. Nowadays, camcorder piracy has great impact on the motion picture industry. Although some watermarking technologies can track the movie pirate, the video content viewed in the theater may be affected and they cannot obstruct the need of pirated movie because the watermarks in pirated moves are invisible. This paper presents a new method to defeat camcorder piracy and realize content protection in the theater using a new paradigm of information display technology, called Temporal Psychovisual 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. Based on this difference, we can decompose a movie into a set of display frames with specific patterns and broadcast them out at high speed so that the audience cannot notice any disturbance, while the video frames captured by camcorder will contain highly objectionable artifacts (i.e., the patterns). The pattern embedded in the movies can also serves   as tracking information to reveal the one responsibility for the camcorder piracy.

Keyword: - *Anti-piracy screen recording system, IR based system,*

1. INTRODUCTION

In today's age 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 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. Piracy is an important issue as far as the manufacturers are concerned as it can result in a huge revenue loss. The goal of this project is to use digital watermarking techniques to detect video piracy digital watermark is a distinguishing piece of information that is adhered to the data that it is intended to protect. The information watermarked includes owner, recipient and/or distributor details, transaction dates, serial numbers, etc., which play an important role in determining the source of piracy.

1.1 Comparatives study of Various Techniques against Camcorder Piracy in Theater

For the long decay the cinema industries are suffering from camcorder piracy due to that every year cinema industries are losing billions of dollars. Most important cause of piracy is camcorder piracy, in which pirates record the movie during playback in theater. DCI (Digital cinema Initiative) given many rules and regulation to protect from piracy but still it is increasing, reason is there is no concrete technical solution exist. In this paper various

techniques that can be opted in future for fighting against the piracy is taken. There are two types of solution exist for the overcoming the piracy problem one is through deterring the pirate and other is not to let it be captured through camera. Watermarking is one way to deter pirates and watermark can be embedded in frames or audio of videos. Modulation's techniques can be used to generate flicker that cannot be detected by HVS but create noise in camcorder recorded videos.

1.2 Advanced Video Watermarking Approach based on Convolutional Encoding: Search for new solution against cinematography piracy traffic

The massive expansion of internet network beside the permanent accessibility of online data storage resource has tremendously facilitated fraudsters task in terms of using illegally cinematic productions (Films, documentaries, animation and cartoons). In the objective to fight against movies copyright infringement and cinema piracy, we proposed in this paper, a video frame analysis based treatable system, able to keep track of unpermitted shared multimedia files. The main idea of our contribution is represented firstly by watermarking technique; each authentic multimedia file is identified by a given ID (which represent information's about the movie, for instance, time and date of projection), This ID is hidden (so as to protect purchaser privacy) using RSA encryption method, secondly, an automatic copyright checker is designated to extract the embedded ID and deduce the authenticity of the queried copy. Since multimedia files undergo video, image and audio compressions, the evoked ID is exposed to a substantial deterioration. In order to overcome this shortcoming, frame watermarking phase is reinforced by a convolutional encoding procedure. On the other hand, ID extraction is conducted via Viterbi decoding, characterized by its high efficiency in retrieving the original data in case of binary errors.

2. PROPOSED METHODOLOGY

In our project, we use the property of light which is not visible to naked eyes, but the one's cameras can pick up, only visible light can be detected by human eyes. But light rays like IR and UV cannot be seen by our eyes, but cameras easily pick images of them. So, while projecting the picture shows in theatres, we send original visible rays that help us see in theatres as movies along with a mix of other invisible light beams. The innovation in our project lies in the design, where we use IR burst a transmitter which is inbuilt within the screen which sends high intensity of infrared rays along with the movie projection. This whole infrared blaster and projector acts as one whole system in sync. As we focus on prevention of piracy in cine field, it is highly necessary that the system operates along with the movie played.

Fig 1: Working model of the proposed approach

2.1 Security System

The security locking system uses an input device to which a predefined code is designed and a lock is set as an interface between the user and the operating device. This switching system has an ability to detect the unauthorized

users unless the passcode is maintained secretly. Access to these unauthorized users is denied unless the system is unlocked in accessing the master print.

2.2 Microcontroller

If the passcode entered is right, then power is supplied for both the IR transmission unit and the projector. This helps in denying the access of unauthorized persons. If any fault is detected in between the IR transmission, the whole power supply turns off.

2.4 Arduino UNO

Arduino UNO is an open-source microcontroller board of ATmega328p microcontroller developed by Arduino, it consists of analog and digital input and output pins that may be further connected to shields and other circuits depending on the application. It has a reduced instruction set which can be used to generate signals that drive the transmitters.

2.5 IR Transmitter & Receiver

IR transmitter is used to make dark regions on the image, it works between 1.6V-3.3V and its wavelength ranges between 750nm-2500nm. This helps in the activation of the device based on the control given to the receiver for further operation of the system.

2.6 Relay

It is an electrically operated switch that gets activated when a signal is given to it from a microcontroller and operates accordingly to the instructions given to it.

2.7 RFID reader

A radio frequency identification reader (RFID reader) is a device used to gather information from an RFID tag, which is used to track individual objects. Radio waves are used to transfer data from the tag to a reader. RFID is a technology similar in theory to bar codes.

2.8 NodeMCU

NodeMCU is a low-cost open source IoT platform. It initially included firmware which runs on the ESP8266 Wi-Fi Soc from Espressif Systems, and hardware which was based on the ESP-12 module. Later, support for the ESP32 32-bit MCU was added.

3. IMPLEMENTATION

In this paper, we use the property of light which is not visible to naked eyes, but the one's cameras can pick up, only visible light can be detected by human eyes. But light rays like IR and UV cannot be seen by our eyes, but cameras easily pick images of them. The innovation in our project lies in the design, where we use IR burst a transmitter which is inbuilt within the screen which sends high intensity of infrared rays along with the movie projection. By using embedded system and MATLAB (steganography) we are going to show the implementation of hardware and transferring of data between embedded device and MATLAB using serial communication. We are implementing password entry using RFID card to read the data from the RFID reader which is interfaced with an Arduino Uno microcontroller using serial communication to display the process carried using lcd display. And to control the turning on/off of IR LEDs we are using relay which is interfaced with the Arduino Uno and NodeMCU is used to send messages through Telegram app. USB TTL is used to transfer data in between MATLAB and embedded device where the data read from RFID reader is sent to pc and given to the MATLAB code and that code will check whether the password extracted from video file and the entered password through RFID reader is matching. If the password matches then the authentication will be sent to the hardware part and movie will be played and on hardware side IR LEDs will be turned on through relay. If password mismatches then movie will not be played and

the alert message will be sent to the user through Telegram app. The coding for embedded system is done on Arduino ide using MATLAB software and Embedded C language.

4. EXPERIMENTAL RESULTS

On switching on the microcontroller, the system waits for the respective person's input to handle the system. If the password is verified controller output is given to the driver through the buffer which provides impedance matching between them. If the password entered by the user matches with the data hidden in the video file, data is retrieved successfully as shown. After authentication of the password, the LCD display displays that the authorized person played the movie. Since the authentication process becomes successful, movie gets displayed on the screen, relay gets activated which in turn turns on the IR LEDs placed behind the screen. If a wrong entry of password is done password authentication fails as there is a mismatch of the password entered by the user as shown. The failure of password authentication does not allow the movie to be played and also an alert message is delivered to the concerned person with the information regarding the location where the movie is being played in an unauthorized way. A dialog box appears to indicate the same as shown and the message being sent to the concerned person as shown in the table.

Serial No.	Description	Image
1	Authorised Entry	
2	IR LEDs turned on	
3	Unauthorised Entry	
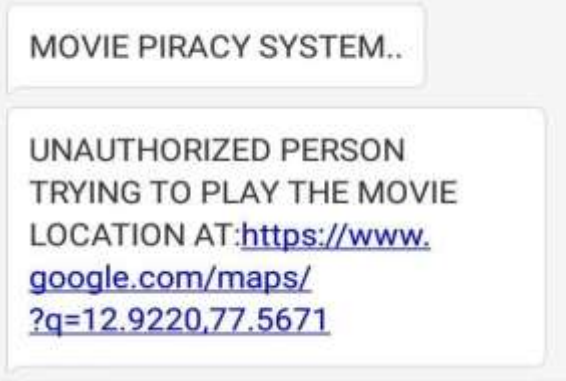
4	Alert message with location	MOVIE PIRACY SYSTEM.. UNAUTHORIZED PERSON TRYING TO PLAY THE MOVIE LOCATION AT:https://www.google.com/maps/?q=12.9220,77.5671

Table 4: Table showing the experimental results

5. CONCLUSIONS

The proposed system is implemented to provide a method to prevent illegal recording of movies in theatres using IR LEDs and concept of video steganography, thus targeting the grey market of piracy. The IR transmitters make the captured videos useless. The concept of video steganography hides the data inside number of frames of image so it is more secured. IR transmitters used in the system are placed in and around the perimeter of the movie screen. The wavelengths of infrared are longer wavelengths than those visible to humans. This range of light is invisible to human eyes. It is very visible to many types of cameras. Hence these lights would not disturb people watching the movie. It will however distort the recordings made by many types of cameras. Hence the captured content gets blurred or disturbance is introduced in it. Video steganography performs data hiding. The process of encryption and decryption is performed using this concept. Video steganography hides the secret key that is used for password authentication. All the secret data is hidden inside the frames of the video using MATLAB software.

6. FUTURE SCOPE

The system increases the security level using these two methods at the theatre. The theatre owner is allowed to make the password entry. Once the password gets verified, the system considers the owner to be an authorized person and allows the movie to be played in the theatre. Consequently, the IR LEDs placed along the screen gets turned on which do not cause any disturbance to the audience watching the movie. However, they cause disturbance to the movie that is being captured by the cameras. This makes the captured content unfit to be uploaded to the websites.

7. ACKNOWLEDGEMENT

6. REFERENCES

[1]. B V V Rajesh Kumar, B Akhil Vardhan, C H Rahul Gupta, P Surekha; Reduction of Movie-Piracy using an Automated Anti-Piracy Screen Recording System; 4th International Conference on Information Systems and Computer Networks (ISCON) 2019.

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

[3]. Abhishek. K. A, Chetan. G, Deepak. M. S, Akash. M, & Rohith. M (2018); Camcorder piracy-RFID based anti-piracy screen. International Journal of Scientific Research & Development.

[4]. Bourdon. P, Thiebaud. S, & Doyen. D (2008); A theoretical analysis of spatial/temporal modulation-based systems for prevention of illegal recordings in movie theatres. In International Society for Optics and Photonics, in Security, Forensics, Steganography, and Watermarking of Multimedia Contents.