

AIR-I (ARM BASED INFRARED RESUSCITATE SYSTEM) [AN INNOVATE APPROACH ON ANTI THEATER PIRATE SYSTEM]

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Abstract: It is always known since the era of adage “*Innovation is the specific instrument of entrepreneurship*”. Such an innovation needs to be protected and patented at any cost. It takes enormous amount of flexibility, effort and passion to have a complete shoot of the movie. But, the illegal theatre pirate business is launching in the market from very long time which is very unlikely to have an impression on the economy of the motion picture industry. The solution seems to be troubling rather mitigating with the synch of the spectators since they are the lime lighters of the movie industry. Every year the occlude towards the spectators increase in the name of constraint in favor of the anti-theatre pirate and in which the notable at the same scenario the economy of the country with pirate faces a steep fall since it loses billions of dollars every year. This definitely mitigates the importance of the pacifying the situation which strives for re-invention and re-engineering in favor and in order eradicating the plausible nature of indulging of the extremists in the specious activities. In the recent years, there implied lot of innovations embracing the idea of detecting the malicious activists in a captivating way. But, nothing stops really from getting the activists insulate from the stealing of the movie in theatres for unofficial business. This depicts the need for the invention to complete embrace the fortification of the modernization and the authors have made a reliable endeavour via AIR-I proto-board model to obviate theatre piracy. In this research work, the authors have used ARM Cortex-M4 that specializes for its very likely speed interfaced with 2x-HC-SR501 PIR Infrared module arrays which are situated over the ambience of the theatre. It has been interfaced via Intersil 82CC5A CMOS Programmable Peripheral Interface which specializes for its lowest ever operating power which makes use of the sub-threshold swing characteristics. In connection with the interfaces, it has been made scrupulous and authorized over other inventions on theatre piracy over several perspectives such as effectiveness, cost, cognitive load and health considerations which will

be discussed elaborately in the paper. Finally, the results has been depicted and compared under the scrutiny of assistant engineer’s team and the spectators via AMIRTHAM Theatre.

Keywords: ARM Processor (ARM-Cortex-M4), Intersil 82C55A CMOS Peripheral Interface, 2x-HC-SR501 PIR Infrared Motion Sensor Module MEGA ARM PI, Minimal Cognitive Load.

Synopsis:

- a. Introduction
- b. Importance of the innovative solutions over pirate
- c. Embedment of Solutions together via Hardware and Software
- d. ARM Cortex-M4
- e. Application of the new tactical system
- f. Quenching the visual pirate by digital camera
- g. Results and Depictions beneath the inquiry of sophisticated investigators

Technologies Realized:

- a. Wireless Sensing
- b. Embedded Technology

I. INTRODUCTION

Piracy continues to be one of the most significant threats to the economic viability of the motion picture industry. It is estimated that global piracy is responsible for billions of dollars in losses every year. Bootlegging, illegal copying and distribution, and Internet piracy are responsible for the majority of losses. It is estimated that over 90% of pirated content is a result of undetected recordings in theatres that are then sold, shared and distributed. Unless new, pioneering, piracy protection solutions are implemented, its impact will continue to dramatically increase as affordable high-definition camcorders and video-capable cell phones proliferate in the global market. So this paper aims at the breakthrough technique to wash out whatever the picture being captured on the theatrical screen [1].

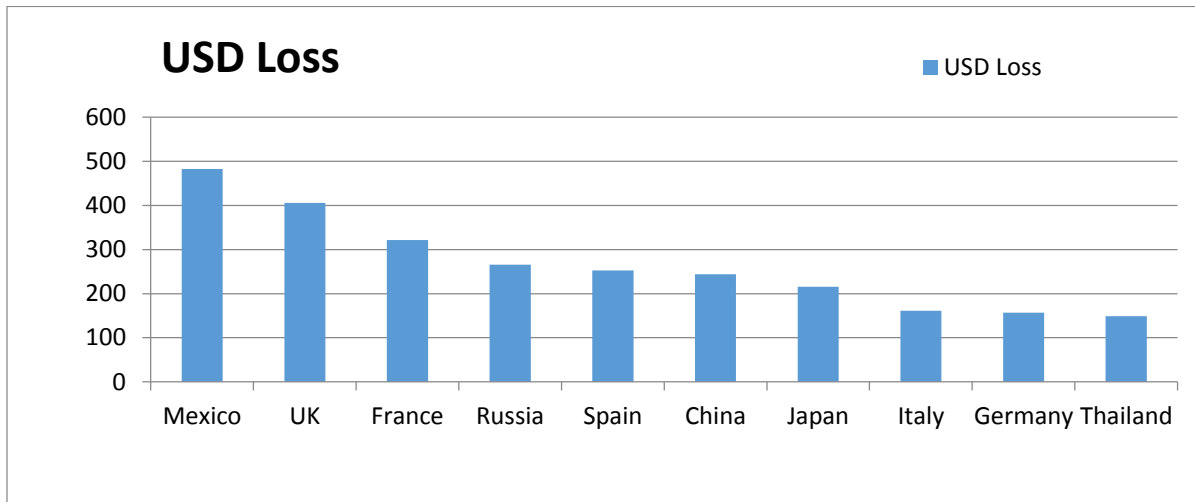


Fig. 1. Potential Loss due to Piracy

This technique eliminates the need for security personnel equipped with night vision goggles, metal detectors, bag inspections or cell phone confiscations. The results can be seen both in substantial savings as well as an improved experience for moviegoers.

II. AN INNOVATE APPROACH TO EXTRICATE THEATER PIRACY



Fig. 2. CRYSTALLINE PLASTER BEEDS
 (Non-Uniform Crystalline Nature)

The core of this innovation is the embedment of ARM Cortex-M4 with Infrared array grids in the ambience of the auditorium simultaneously in conjunction with the fixture of led indicators in the operator room. It's apparently a promising creation to make the show as the so called *Invisible show*. In other words, the show has been cloaked to the digital camera [10] impervious to its sensor arrays.

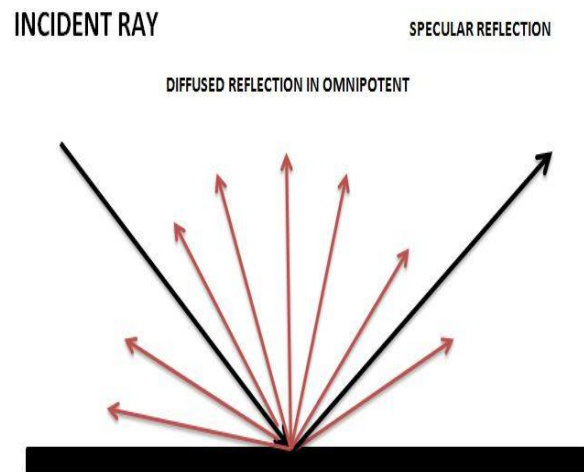


Fig.3 .SCIENCE OF DIFFUSED REFLECTION

Initially, the projector's light is focussed on exactly half the distance at the centre of the screen made of plaster. The incident light is reflected in the form of diffuse reflection [2]. Diffuse reflection is the reflection of light from a surface such that an incident ray is reflected at many angles rather than at just one angle as in the case of specular reflection. This continuously diffused reflection of light forms the motion picture i.e. this diffusely-scattered light that forms the image of the object in the observer's eye. The infrared light of shorter wavelength has the same property of diffused reflection with negligible

penetration through the plaster screen [3, 5]. The construction is as simple as it is, the infrared transmitter embedded with the image projector at the operator room.

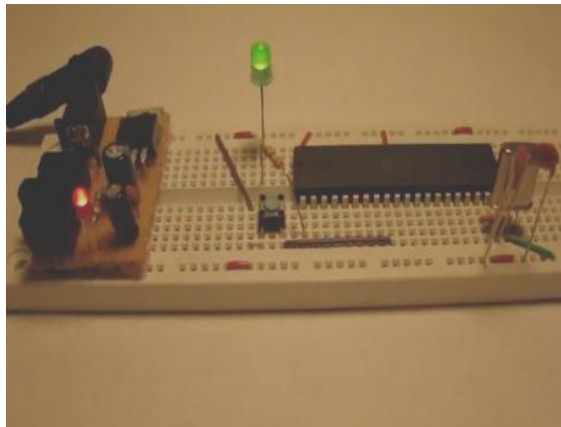


Fig. 4. ANTIPIRACY - AUTHORS PROTOTYPE (BASIC DEMONSTRATIVE PROTOBOARD)

In case of any misery in the working of the sensor then an additional system aims at eradicating the egregiousness using the combination of hardware and software by *ARM Processor programming* [13]. The infrared transceivers are placed right above the screen of the theatre with microcontroller and two LEDs in the operator room. In our research work, these sensors has been dichotomized so that one half focusing at 30° angle and the next half is about 330° angle with the bilateral being synchronized. Now when the infrared light of one side reflected back from the ground to the other side as it has less penetration and high reflection property which is being sensed by the sensor on the other side. This synchronized version of the whole is interfaced with ARM Cortex-M4 processor that controls the entire operation [4]. At the operator room, at the time of the show the microcontroller is given a supply of +5V so that it operates the transceivers and keeps track of it for the proper indication of the modes (i) SAFE mode and (ii) DANGER mode. When all the sensors senses the infrared then the microcontroller triggers the GREEN LED indicating the anti-piracy control is ON i.e. safe mode. If some of the sensors fail to sense or any deviation or damage the lack of sensing of IR triggers the microcontroller to energize RED LED i.e. danger mode to indicate the show is under threat. This succesfully illuminates the vital characteristics of the technique that has been flavorished with a very likely user friendliness and reduced cognitive load to the reader.

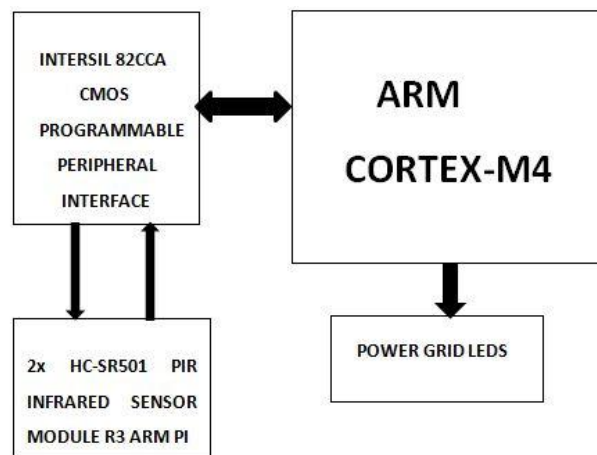


Fig. 5. BLOCK DIAGRAM FOR THE MODEL

III. TECHNICAL BIAS STANDARDISE

The working is that the infrared beam is being focussed on the same point of contact of the incident light that contains actual visible image which is diffusely reflected back on the same way. Since the plaster bed is made of crystalline structure with different orientation for each molecule it reflects the incident wave as diffusing in all direction [2]. By this way of diffusely reflecting the infrared it makes the show invisible as IR ray blocks the image being captured by the professional digital camera or cell phone camera [6]. But infrared is invisible to the human eye as it senses only the visible light. In order to make sure the working of the model, at every seating the embedment of an infrared sensor is dedicated to keep track of the reflected IR light from the screen. Every sensor drivers their appropriate LED matrix at the operating room in order to indicate the protection is under control. The Infrared array grid that has been interfaced with ARM and hardware peripherals is attached to control the LED Grid. [4].

IV. SPECTRAL INVESTIGATION ON DIGITAL CAMERA IN UNIFICATION WITH THE EXPLORATION

Electromagnetic radiations that present everywhere are with different frequencies and different wavelength. Usually human eye can perceive any radiation of wavelength between 380nm and 700nm [7]. But beyond the range is inaccessible to naked eye. On the other, Digital camera captures different intensity ranges of light in the form of pixels for further processing. It cannot block the IR radiations of wavelength 700nm to 900nm except IR Pass Filter

which is exceptionally used only in IR Photography [6]. It has been proved that there is an apparent lagging in the clarity of locking off the lights by the sensor arrays in a range that embraces the infrared spectroscopy. It shows the showy performance of the digital camera over varying input wavelength and frequency to deduce its characteristics.

When the digital camera with IR cut filter is focused on the infrared laser the resultant image appear like a reddish blurry picture to make the background even blurred as it washes out the background image in a complete.

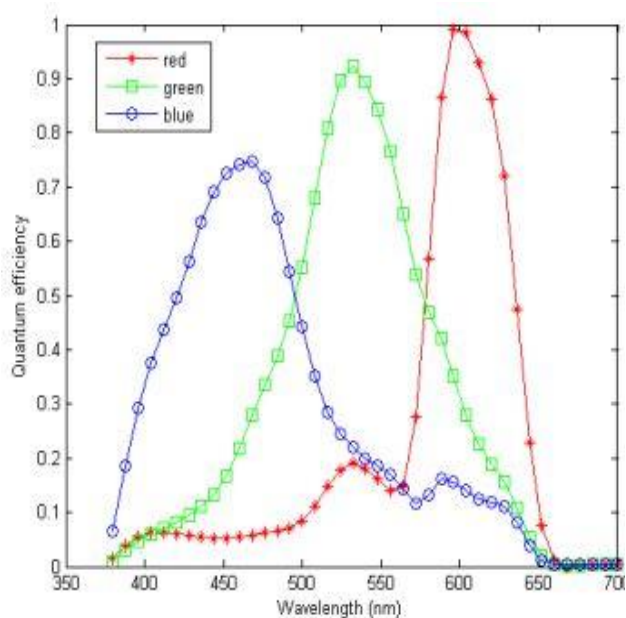


Fig. 6. Quantum Efficacy of CMOS- Image Sensor

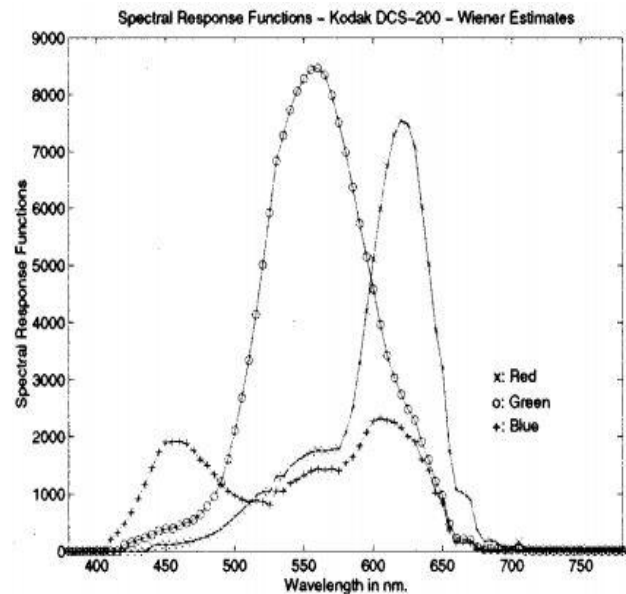


Fig. 7. Spectral Analysis of DSC-400 from Kodak

This again shows an obvious image sensor have the minimal quantum efficiency over 700nm range which will be the engineering of interest [9].

V. RESULTS AND DISCUSSIONS

In many a years, there has been numerous approaches in eradicating the theatre pirate due to which the innovation and motion picture industry faces huge setback and relentlessly dispirited. Hence, in an endeavor to halt this illegal act, the authors have arrived at a proto board model and it has been established in AMIRTHAM Theatre. The Technique has been implemented in the aura of the theatre for 3 consecutive days during which the effectiveness and the perennial nature of the system had been patterned under the scrutiny of well-versed assistant engineers' team. Also the user convenience over the previous technologies for anti-theatre pirate has been shortlisted in order to arrive at the substantiation of the accessible and user-friendly specialty of our system. From the graph depicted via proper patterning with the succor of the spectators, it has been very likely that under the implementation of the technology the clarity has been made in both the comprehensive nature of the system esp., in feasibility as well as the realization of minimal cognitive load.

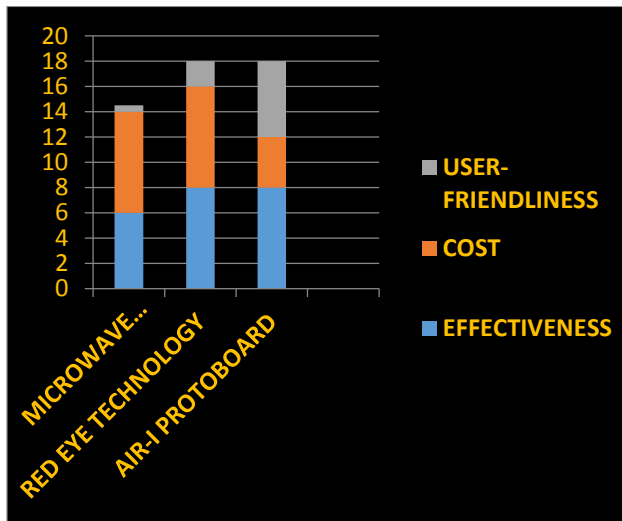


Fig. 7. Comparison of Results Obtained from the AMIRTHAM, Madurai, India addressees

VI. BACKGROUND AND SCOPE OF OUR RESEARCH WORK

The invisible protection for the showcase to revolutionize the anti-piracy has been arrived in a proto board model and the result has been successfully verified. By the way the movie industry could challenge the pirate industry to get rid of the motion picture right now is seemingly impossible. It has been also demonstrated and verified using DSC-400 Professional Digital Camera from Kodak Corporation.

VII. SWOT SCRUTINY

Strength	Weakness	Opportunities	Threatening
Completely Cloaked	Grim Implementation	Country's Economy	No Threats
Spectator-Friendly	-----	Motion Pictures Economy	-----
Minimal Cognitive load	-----	Innovations Protected	-----
No Health conundrum	-----	-----	-----

Table.1. Swot Different inference arrived via different scrutinizers, AMIRTHAM, India]

VIII. INFERENCES

- a. The defect of the current system for theatrical anti-piracy has been rectified with the impression of our thesis into the real world environment.
- b. This model is very likely feasible since it is specially re-invented and re-engineering in order to avoid health problems while cutting off the pirate.
- c. The Authors have discovered a proto board model based on our research work.
- d. The results has been simulated, depicted and compared.

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