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LASER BASED SECURITY SYSTEM

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ABSTRACT

Security is most important factor in this digital world. With the advancement of technology, the criminals are trying to find new ways to perform the criminal activities. The technology advancement has led the world to another level, so the crime has also become more tech-oriented. In order to overcome this problem, we are proposing a laserbased security system and the intruder is unaware of the fact that a security system is installed in the entry positions like doors or windows. Laser based security system acts as an additional security layer which includes ESP32 CAM, LDR Module, Laser Module, Blynk Application to view the capture image of the intruder. Since laser light goes through long distance without scattering effects and the ray is almost invisible. When somebody crossover the laser ray the circuit senses the discontinuity and sends the captured image of the intruder along with notification alert to Wi-Fi connected device through Blynk Application.

Keywords:ESP32 CAM, Blynk Application, LDR, Security System, Image capture ,Notification alert.

1.1 OVER VIEW I. INTRODUCTION

Rapid advancement in the field of technology, plays an important role in wide range of criminal activities. It opens more opportunities for crime and draws people into committing crime leading to an unpreceded growth in the crime rate. This system helps us to protect our home, offices, banks, lockers from intrusion and unauthorized access. There are many types of security system that are currently used by most people like CCTV but these security systems are visible to naked eyes that will alert the intruder, to avoid this we are proposing a project on Laser based security system. This security system helps us to prevent incidence like robbery, stealing and this system can be implemented both indoor and outdoor. If the intruder is detected ESP32 CAM starts capturing the image and it gives notification alert with image of the intruder to Wi-Fi connected device.

II. LITERATURE SURVEY

Laser based security system using Arduino UNO by Paramitha Mondal, Madhusree Mondal. The proposed system contains sensor, Arduino UNO, ESP Wi-Fi module, buzzer, LDR module. In this system once security system detects the intruder buzzer starts buzzing very loudly, spy camera takes the photo of the intruder and sends it to the registered email address for valid proof.

Laser based security system for home by Harshal Hemane, Debarati Sen. In this proposed system mirrors are used to reflect the laser rays to cover the region surrounding home in all direction. When laser light is incident on a mirror, it gets reflected from one mirror to another and falls on LDR.

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If any of the laser ray is blocked the buzzer produces beep sound. [3] Laser security alarm system by A.B.N.V. Prasad, K. Ravi Raj, K. Siva Ganesh, M. Lithin Siva swamy Naidu, N. Phaneendra. In this project based on the voltage drop across the LDR is considered to turn On and Off the transistor. If the voltage drop across the LDR is low transistor is turned Off, if the voltage across the LDR is high transistor is said to be turned On. Once the transistor is turned on buzzer produces beep sound.

Laser security system by Debarati Dutta. The proposed system contains LDR, IC555, transistor, buzzer which gives alert that the intruder has entered the monitored entrance through beep sound.

Door lock security using Raspberry Pi and QR Code by Arigela Sai Kalyan, Balibineni Bharat Teja Raju, Mudraboina Venkatesh. In this project the study is aimed to develop a web-based security door using QR code system for the laboratory where at the same time the authorized person can perform access monitoring the student's attendance.

III. METHODOLOGY

Keeping everyone's security in mind. Laser based security system is proposed which consists of sensors, alert system namely Blynk Application, UART TTL Module used to burn the code on the microcontroller (ESP32 CAM), ESP32 CAM is used to take photo of the intruder. If the intruder tries to enter the monitored entrance the system detects the intruder by making use of LDR and Laser Module. When the laser light is incident on LDR is blocked resistance of the LDR increases. Once the resistance of the LDR increases it triggers ESP32 CAM to take photo of the intruder. ESP32

CAM takes photo of the intruder and along with notification alert sends it to Wi-Fi connected device



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through Blynk Application. The security system should be successfully connected to the Blynk server using the authentication token and Blynk libraries. From Wi-Fi connected device one can see the captured image of the intruder and can take more photos from anywhere around the world. The user will get notification alert irrespective of whether the smart phone is locked or unlocked or even if any app is opened at that moment

1.2 SOCIAL RELEVANCE

A laser security system is the one that emits a narrow beam of light and gets to know the intruder presence on getting the beam Reflected from the intrude. .On the basis of the reflected from the beam ,the system is able to know the distance, size and speech of the intruder and differentiate it from other objects. Laser based security system is a type of security and alaram system that uses laser light and a light sensor. A security system protects our homes, offices ,banks , lockers ,etc from intrusion and unauthorized access. Home protection and family safety are the primary purposes of a home security system. While this includes detecting bulgary, a security system also detects a number of other threats, including smoke, fire, carbon, monoxide poisoning, and water damage. There are different types of security systems available and laser based security is an important and efficient type. A laser security system can acts as a standalone system, which makes some sound or noise when it detects any irregular activity, or can be part of a much bigger security and home automation system, which can send messages, call the owner etc. Laser security system can be used in safety lockers in our homes, where even if the locker code is hacked ,it acts as an additional layer of security. Apart from security systems, this laser based setup can also be used to check if pets or babies crossed a certain boundary. The basic sensing component of a modern laser security system is an infrared motion detector . An infrared motion detector works by using beams of infrared light to detect changes in heat. When a person moves into the beam of light, the sensors is alerted by the body heat given off by the individual. Lasers are very secure way to send the information. This is newer technology, but you can send information on a laser beam just like you would fiber-optic, and just like fiberoptic, laser communication is almost impossible to hack.

1.3 APPLICATIONS

1.Laser Security System can be used in safety lockers in our homes, where even if the locker's code is hacked, it acts as an additional layer of security.

2. Apart from security systems, this laser based setup can also be used to check if pets or babies crossed a certain boundary.

3. Laser Security System **can be used in safety lockers in our homes**, where even if the locker's code is hacked, it acts as an additional layer of security. Apart from security systems, this laser based setup can also be used to check if pets or babies crossed a certain boundary.

4. A laser security alarm is a system designed to detect intrusion – unauthorized entry – into a building or area. They are also called security alarms, security

the 5.Laser based Security System is a type of security and alarm system that uses laser light and a light sensor. A security system protects our homes, offices, banks, lockers etc. from intrusion and unauthorised access.29-

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6.Safety; the condition of being protected against harm. Security is defined as being free from danger, or feeling safe. An example of security is when you are at home with the doors locked and you feel safe.

systems, alarm systems, intrusion detection systems,

perimeter detection systems, and similar terms.05-Dec-

 $7 \cdot$ A security alarm is a system designed to detect intrusion, such as unauthorized entry, into a building or other areas such as a home or school.

8. Some alarm systems serve a single purpose of burglary protection; combination systems provide fire an intrusion protection.

9.Modern alarm security systems provide the ability to monitor the activities happening on your property when you are away. There are security systems that have an addon feature of detecting fire or smoke. These systems will instantly notify you during emergencies like a fire

breakout, gas leak, or a flood emergency.

10.Adding a security system to your home gives you an extra layer of defense against any potential intruders. Whether you rent or own, you can enjoy the benefits that come with having a security system. Explore your options by comparing the home automation.

1.4 Proposed System

- Laser security system was invented by Edwin Holmes.
- He was born on April 25,1820 west Boylston,us.
- Died on 1901.
- Nationality American
- He is known for Burglar alaram.
- Laser based security system is a type of security and alaram system that uses laser light and a sensor . A security system protects our homes , offices, banks, lockers, etc. from intrusion and unauthorized access.

2. BLOCK DIAGRAM



Security is main concern for various buildings, houses and offices. There are a variety of security alarms available in market which uses various types of technology for intruder

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detection like infrared sensors, motion sensors, ultrasonic sensors, laser sensors, etc. Previously we have also built some security alarm circuits like this <u>PIR sensor based</u> <u>motion detector</u> and <u>burglar alarm circuit</u>. In this circuit tutorial we are going to build a **laser security alarm system** which uses a laser light and a laser light detector circuit. It gets activated when someone crosses it.

In this **laser security alarm circuit** we have used **LM358 Dual Comparator IC** for comparing voltages coming from <u>LDR</u>. Comparator is configured as Non-inverting mode and one 10K potentiometer is connected at its noninverting terminal. An LDR is used for <u>detecting light</u> or laser light with respect to ground through a 10K resistor. And the midpoint of LDR and resistor is directly connected to inverting terminal of comparator. A red LED is connected at output pin of comparator for indicating intruder detection. A mono-stable multi-vibrator is also used for activating buzzer and LED for a time period. And a 9 volt battery is used for powering the circuit.

3. HARDWARE COMPONENTS

3.1 ESP32 CAM



The ESP32 CAM is a full-featured microcontroller that also has an integrated video camera and microSD card socket.

It's inexpensive and easy to use, and is perfect for IoT devices requiring a camera with advanced functions like image tracking and recognition. The ESP32 CAM s a small size, low power consumption camera module based on ESP32. It comes with an OV2640 camera. ESP integrates Wi-Fi, traditional Bluetooth and BLE Beacon, with 2 high-performance 32-bit LX6 CPUs, 7-stage pipeline architecture. It is suited for home smart devices, industrial wireless control, wireless monitoring, QR wireless identification, wireless positioning system signals and other IoT applications. It is an ideal solution for IoT applications.

3.2 LDR MODULE



The LDR

Sensor Module is used to detect the presence of light/ measuring the intensity of light. The output of the module goes high in the presence of light and it becomes low in the absence of light. The sensitivity of the signal detection can be adjusted using potentiometer. LDR Module works on the principle of "Photo Conductivity". It is associated with both analog output pin and digital output pin labelled as AO and DO respectively on the board Light intensity reach the set threshold, DO port output high, when the external ambient light intensity exceeds a set threshold, the module DO output low.

3.3 LASER MODULE

. Laser module are used in a variety of applications that requires small sizes in addition to low power consumption with long operating lifetimes. Laser Module is a breadboard friendly, low cost having a wavelength of 650nm, operating voltage of 5V. The laser head is composed of a light-emitting tube, condenser lens, and adjustable copper sleeve and it is assembled when delivered, the focal length of the lens is adjusted glued by a strong glue stick, which can work directly connecting to a 5V DC power supply



3.4 UART TTL MODULE



The FTDI USB to TTL serial converter module is a UART board



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used for TTL serial communication. It is a breakout board for the FTDI FT232R chip with USB interface, can use 3.3V or 5 V and has Tx/Rx and other breakout points.FTDI USB to TTL serial converter modules are used for communication to and from microcontroller development boards such as ESP32 CAM, which do not have USB interfaces.

3.5 LASER BUZZER

As the output of the transistor is connected to the Trigger Pin (Pin 2) of the 555 Timer IC, if the transistor is ON, the trigger pin gets a short low pulse and as a result, the output of the 555 becomes HIGH. This will **activate the alarm by turning ON the buzzer**.

3.6 TRANSFORMER



A transformer is a passive electrical device that transfers electrical energy from one electrical circuit to another, or multiple circuits. A varying current in any one coil of the transformer produces a varying magnetic flux in the transformer's core, which induces a varying electromotive force across any other coils wound around the same core. Electrical energy can be transferred between separate coils without a metallic (conductive) connection between the two circuits. Faraday's law of induction, discovered in 1831, describes the induced voltage effect in any coil due to a changing magnetic flux encircled by the coil. Transformers are most commonly used for increasing low AC voltages at high current (a stepup transformer) or decreasing high AC voltages at low current (a step-down transformer) in electric power applications, and for coupling the stages of signal processing circuits. Transformers can also be used for isolation, where the voltage in equals the voltage out, with separate coils not electrically bonded to one another. A wide range of transformer designs is encountered in electronic and electric 20 power applications. Transformers range in size from RF transformers less than a cubic centimetre in volume, to units weighing hundreds of tons used to interconnect the power grid.

4.1 OPTICAL CHARACTER RECOGNITION

OCR (optical character recognition) is the use of technology to distinguish printed or handwritten text characters inside digital images of physical documents, such as a scanned paper document. The basic process of OCR involves examining the text of a document and translating the characters into code that can be used for data processing. OCR is sometimes also referred to as text recognition. OCR systems are made up of a combination of hardware and software that is used to convert physical documents into machine-readable text. Hardware, such as an optical scanner or specialized circuit board is used to copy or read text while software typically handles the advanced processing. Software can also take advantage of artificial intelligence (AI) to implement more advanced methods of intelligent character recognition (ICR), like identifying languages or styles of handwriting. The process of OCR is most commonly used to turn hard copy legal or historic documents into PDFs. Once placed in this soft copy, users can edit, format and search the document as if it was created with a word processor.

4.2 TEXT-TO-SPEECH

Text to Speech abbreviated as TTS, is a form of speech synthesis that converts text into spoken voice output. Text to speech systems were first developed to aid the visually impaired by offerings computer that would read text to the user TTS should not be confused with voice response systems Voice response systems synthesize speech by concatenating sentences from a database of pre-recorded words and are used for different purposes than TTS systems which form sentences and/or phrases based on a languages .The quality of TTS is judged by its similarity to the human voice and by its ability to understand clearly. An intelligible TTS program allows people with visual impairments or reading disabilities to listen to written words on a home computer. Many computers operating systems have included speech synthesizers since the early 1990s.A text-to-speech system is composed of two parts. Front end and a back end. The front end has two major task First it converts raw text containing symbols like numbers and abbreviations into the equivalent of written not words. This process is often called text normalization. The front end then assigns phonetic transcription to eachword and and divides and marks the text into prosodic units, like phrases, clauses and sentences.

5.0PERATION

The transmitted light travels in the air until it is blocked by a fixed object in front of it. The beam of light

4. TECHNOLOGIES USED

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on hitting the fixed object gets reflected back into the device having a detector. The detector continuously keeps on measuring the light falling on it after reflection.

2. When the Laser Security System is idle with no one coming into the path of the light beam, there will always be the same amount of light coming to the detector.

3.When any burglar comes in the path of the light beam, the path of light gets disturbed and the amount of reflected light falling on the detector gets altered. 4.On noticing the change in the falling light, the detector considers it as an intrusion attempt and activates the alarm unit to generate the alarm.

5. The alarm goes off with a loud sound to alert the intruder as well as the security personnel of the premises.

ADVANTAGES

1.Build It Yourself. The first benefit is that you're going to have the freedom to build the system yourself. ...

2.Beam travels a long distance.

DISADVANTAGES

The laser security system works only if the laser is obstructed. If the intruder passes without obstructing the laser, it is considered as a failure. In order to secure a larger area, we need more lasers and corresponding sensors.

6.FUTURE ENHANCEMENT

01 Identification: We can implement a person identification system like face-recognition and fingerprint scanning features in the future.

02 Various Applications: This type of system can be used in antique/expensive items protections or for various other security purposes.

For the future, **the laser will evolve in many directions**. It will become smaller and less powerful, in some cases down to single photon emission, if we think quantum. On the other hand, lasers will get ever more powerful, up to a region where it pulls particles out of the vacuum.

03 Multiple Lasers and LDRs: We can use various Lasers and LDRs to make this system more effective.

04 Renewable Power Supply: We can also provide renewable energy sources like solar power to power this system.

CONCLUSION

The proposed system helps in avoiding robbery, thefts and crime. It also introduces a smart approach to detect the intruder. Avoiding thieves results in the safety of our financial assets and thereby this system provides us protection against all. This system is low cost and robust. This security system can be used in different commercial buildings mainly banks. This highly reactive approach has low computational requirement; therefore, it is well suited to surveillance, industrial application and smart environment. This system hopefully will be the helping hand for society

RESULT

The text document which has to be read out has to be placed at a considerable distance from the webcam so that the image is clear enough with proper illumination. The fig(c) shows a terminal window which is seen at once we switch on to circuit. In the terminal window the command for image to text conversion has to be given. Immediately a form window opens. In the form window, a dialog box is seen named 'image to read'. That option has to be clicked to enable the webcam. The webcam auto focuses the image and it is captured

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