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Home Security System using Arduino Uno (Implementation)

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Abstract: ***The Project is an implementation of the IOT based home security system, which is able to secure homes and make people feel safe and can be bought by almost everyone. The Major aim of the Project was to be cost efficient and simultaneiusly it should be secure, and this was accomplished with the use of internet of things and other electronics component. With the help of an LDR sensor and a keypad a working automatic door system was achieved.. IoT refers to the infrastructure of connected physical devices which is growing at a fast rate as a massive number of devices and object are getting connected with the internet. Home Security is a very important and useful tool of the IoT and we used it to build a low cost security system for homes which can be used by almost everyone.***
Keywords: Arduino , ESP32 CAM

I. INTRODUCTION

During the previous years, Internet was known as a big form from where we could obtain data. Embedding components into everyday items and gadgets and allowing them into new methods of communication between people, and communication of people with things.. IOT has a very great optimistic impact on our lives. IOT has many meanings from several perspectives, however they all revolve around swapping, gathering and communications between the different things and 'people with things with the assistance of the internet. The idea of the smarter life IOT has the capacity and potential to soon have various applications in making smart home security promising, which starts from fundamentally watching different parts of home, to actually adjusting them. The combination of IOT and home security has made it possible to secure homes from anyplace in the world. The IoT or Internet of Things is devoted to the network in which there are connected and other physical objects that can connect and exchange data among them without the need of any human interfering. It has been well-defined as the "Infrastructure of Information Society", because IoT allows us collect information from practically all kinds of means such as humans, automobiles, kitchen utilities, etc. So anything that is there in the physical domain which can be given an IP address to agree to data transmission on a network can be made a part of the IoT systems, by implanting or using them with different kinds of electronic hardware such as sensors and software and networking equipment. IOT is not alike the internet as it only uses internet to connect to our day-to-day devices which are implanted with circuits to communicate and interrelate with each other using the internet structure. The possibility of IOT applications and project and developed tremendously as it contains more than 200 crores and will grow further with improvement and development in this field.

II. ARDUINO UNO

Arduino Uno, it is a microcontroller which is based on the ATmega328P. it has 14 digital input/output pins after which 6 of those can be used as PWM outputs, then a 16 MHz quartz crystal, it also has 6 analog inputs, it consists of an ICSP header and also a reset button, it has a USB connection and a power jack.

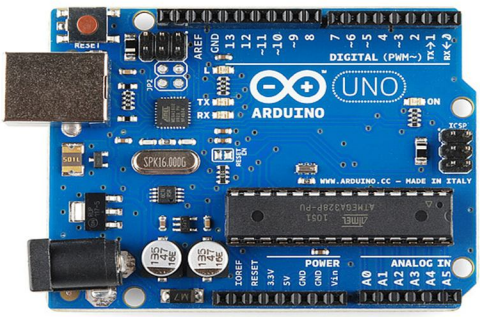


Figure 1: Arduino UNO

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Arduino Uno can sense the things that are going about in the nearby by getting inputs from various types of sensors that can alter its environments by adjusting lights, adjusting actuators, and also the motors. The microcontroller is preset using the Arduino programming language and the Arduino development environment. It is also trained to send data and receive data on the internet with the of Arduino shields, which are also considered in this paper.. The Arduino boards in India were limited to only minor scale projects. The Arduino boards have arrived the Indian market hardly a few years ago. The Arduino IDE offers a very easy combined platform which can work on regular PCs and permit the customers to inscribe the programs in C or C++.

III. LDR

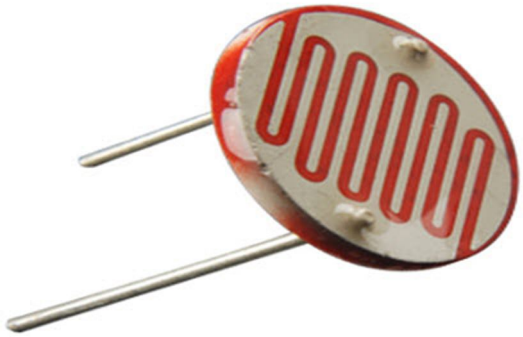


Figure 2: LDR

A LDR is very tiny piece that is used to sense the volume of light that cascades on it and then signals the microcontroller about it. It has a regulating resistance that varies with the light focus on it. The LDRs are prepared of semi-conductor material. LDR is an exceptional kind of resistor that works on the photoconductivity standard means that resistance varies according to the focus of light. The resistance of the LDR reduces when there is an growth in the intensity of light. The belief on which the LDR operates is photoconductivity, which is nothing but a visual occurrence. The light is immersed by the material then conductivity of the material rises. When the light cascades on the LDR, then electrons in the valence band of the material are prepared for the conduction band.

IV. BREADBOARD

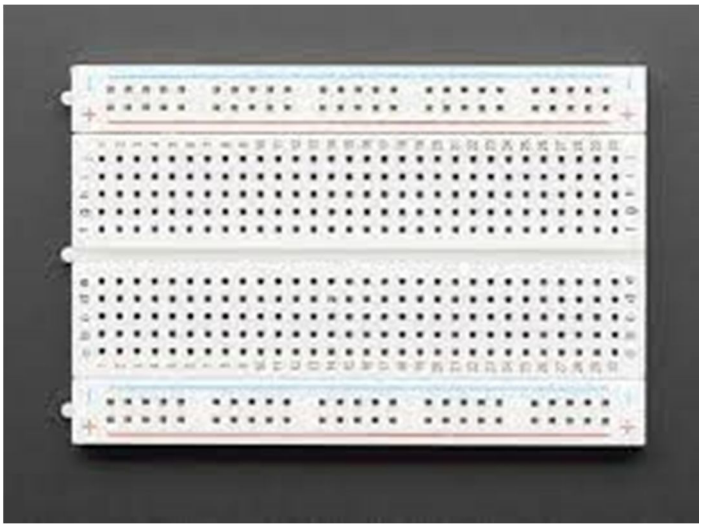


Figure 3: a breadboard

The Breadboard is prepared of strips of metal which are below the board that is used to attach the holes on upper side of the board. This is mostly used for building and trying the circuits before completing any design that is there for specific project that needs to be made.

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V. MQ2 SENSOR MODULE



Figure 4: a MQ-2 sensor module

In the MQ sensor series the most generally used one is the MQ-2 sensor which is prepared up of Metal oxide Semiconductors. It is also known as the chemiresistors because the recognition is centered on the alteration of resistance of the sensing material, when there is existence of gas and it comes in contact with the material.

VI. ESP32 CAM

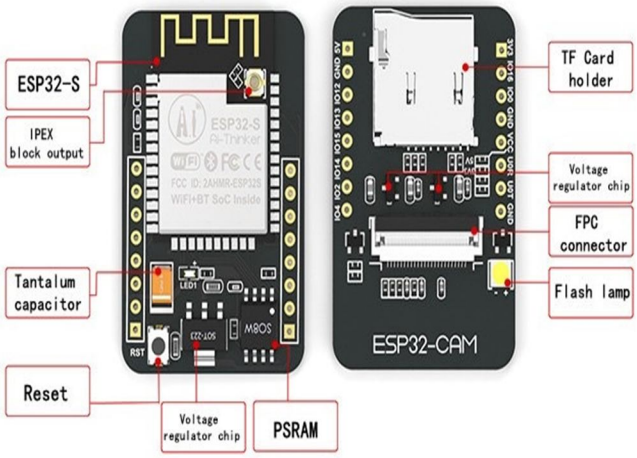


Figure 5: an ESP32 camera module

The ESP32-CAM is a very little camera which also has a ESP32-S chip in it. The ESP32 camera moreover has micro ds card slot in it which can be used to capture and store the images or the videos taken by the camera. This module also provides image Wi-Fi upload and numerous sleep modes, which can be used for several projects and out-of-doors applications.

VII. ARDUINO IDE SOFTWARE

Arduino IDE the software for Arduino projects and applications. It is a text editor with various features like a notepad. It is used for scripting codes, compiling the codes and to check whether there are some faults and uploading it to the Arduino. The file extension ino is specified to the sketches that are transcribed in the Arduino software. This software also offers features such copy, paste, examining the text as well as replacing it, etc. the message part gives feedback and also displays errors whereas saving and exporting the code. It displays the designed board and the serial port on the bottommost right corner of the window.

VIII. IMPLEMENTATION

The MQ-2 sensor will be placed inside the home mostly in the kitchen area so if there is a gas leak or a fire it will sense it send a signal to the arduino and the buzzer will go off alerting people about it.



Figure 6: code for mQ-2 sensor

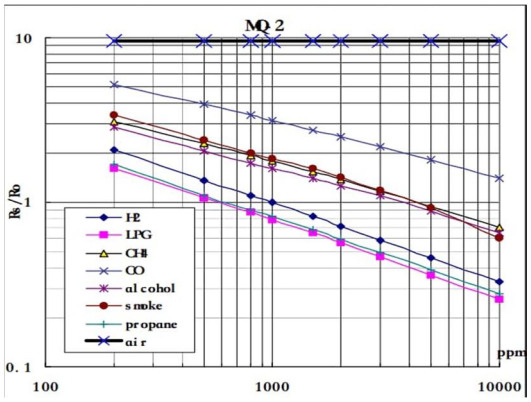


Figure 7: gas concentration graph

The Esp32 cam will be placed in front of the door. And this will work with the help of the LDR. When there is an intrusion detected the LDR will send signal to the buzzer as well as the camera. The camera after the signal is received will turn on and capture a video of 30 seconds of the front door. This will help in capturing the intruder's face, which can be used later on if a case needs to be filed in case of robbery

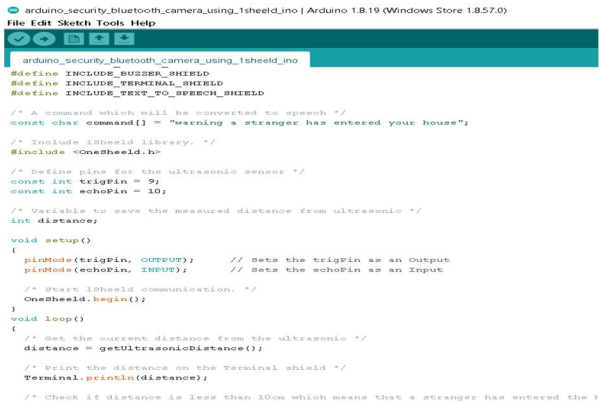


Figure 8: code for ESP32 camera

The LDR will be cleverly placed behind the door. A laser light will be used to put light on the LDR. As long as the light from the laser is focused on the LDR it will be neutral and will make no changes or sound no alarm but, as soon as the light from the laser towards the LDR is cut by a person or blocked even by an object the LDR will send signal to the Arduino and the buzzer will go off. And the people around will be alerted that there is an intrusion or an unauthorized access to the premises.



Figure 9: code for LDR sensor

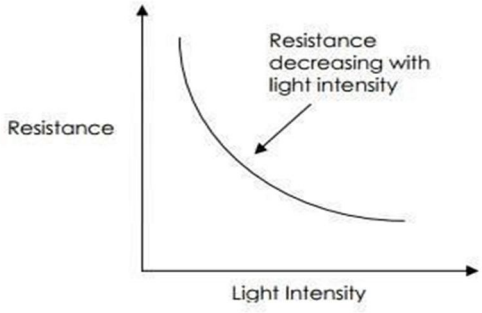


Figure 10: LDR resistance graph

IX. RESULT

The LDR which was used on the door for security purpose is working and as soon as the light was interrupted from the LDR the signal was sent to the alarm and it started ringing. Whenever there was presence of smoke around the MQ-2 sensor, the signal was sent to the buzzer and it started ringing. When the light from the LDR was interrupted the camera was switched on automatically after receiving the signal and started recording a video of 30 seconds.

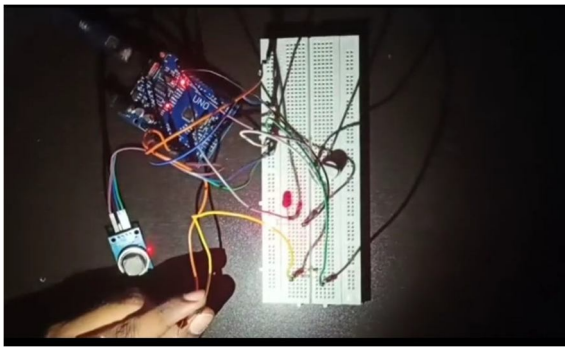


Figure 11: photo of working LDR with buzzer

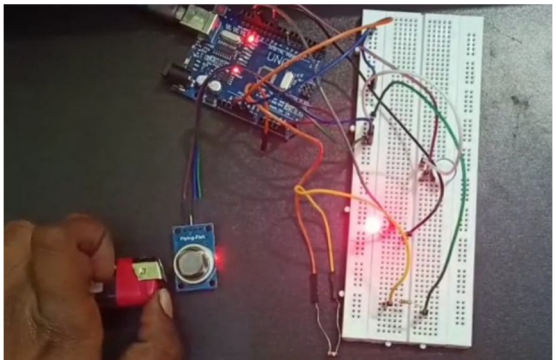


Figure 12: photo of working mQ-2 sensor

X. BENEFITS

The major benefit of this home security system is that it is going to save a lot of electricity as the camera won't be on the whole time. It's going to save the cost for buying heavy storage devices as there isn't going to be a need for it. Because the camera will capture the video only when an intrusion is detected and will not record the whole day's footage.

XI. CONVENIENT

This security system is going to be very easy to use. Once it is installed the user doesn't have to do anything to make it work, it will work on it's on by just being plugged to the power socket. Its maintenance will be very cheap as all the parts are readily available in market for very little price.

XII. PROFITABLE

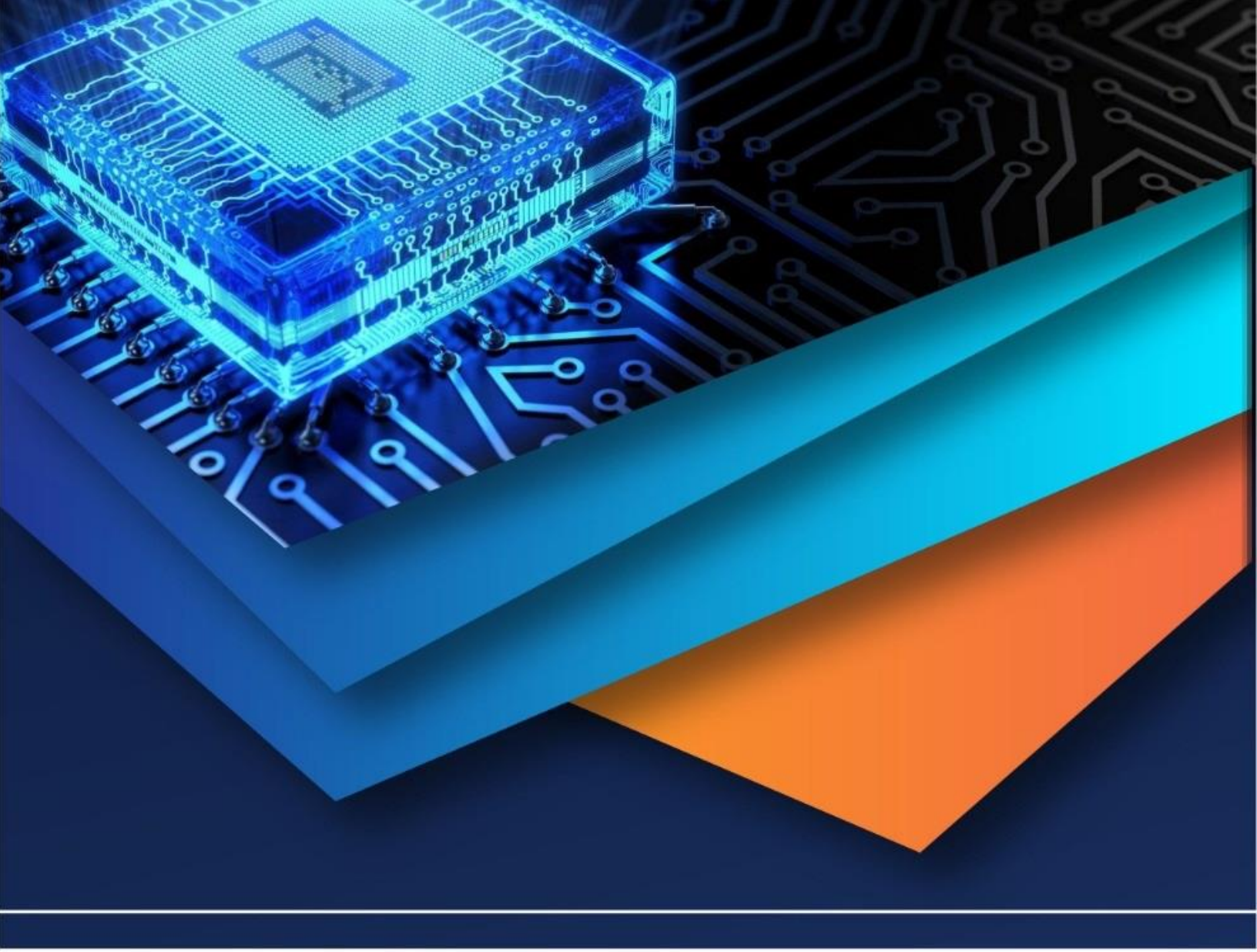
It is profitable to the user as it is very cheap. It requires less voltage to use an Arduino board which uses only 12V DC supply. It can be switched on and off with the help of a mobile. It saves a lot of electricity and storage space.

XIII. CONCLUSION

This paper summarizes and gives brief information about the Home security system using Arduino UNO and how it is different from the existing security systems present out there.

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