

# MOTION DETECTION CAMERA

A  
Project Exhibition - 1

Submitted in partial fulfillment for the award of the degree of  
**Bachelor of Technology**  
In

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Submitted to

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**October - 2022**



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**CANDIDATE'S DECLARATION**

I hereby declare that the Dissertation entitled "MOTION DETECTION CAMERA" is my own work conducted under the supervision of Dr. ANIRBAN BHOWMICK, Assistant Professor, SEEE - SCHOOL OF ELECTRICAL & ELECTRONICS ENGINEERING at VIT University, Bhopal.

I further declare that to the best of my knowledge this report does not contain any part of work that has been submitted for the award of any degree either in this university or in other university / Deemed University without proper citation.

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## **VIT UNIVERSITY BHOPAL (M.P.) – 466114**

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### **CERTIFICATE**

This is to certify that the work embodied in this Project Exhibition -1 report entitled “MOTION DETECTION CAMERA” has been satisfactorily completed by **Ms. Sukanya(21BAC10022), Ms. Rani Kushwaha(21BAC10035), Mr. Sachin(21BAC10036), and Ms. Kajal Singh(21BAC10039)** in the School of Electrical & Electronics Engineering at VIT University, Bhopal. This work is a bonafide piece of work, carried out under my guidance in the School of Electrical & Electronics Engineering for the partial fulfilment of the degree of Bachelor of Technology.

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## **Executive Summary**

Our home and work place need security all the time but it is not possible for everyone to install a strong and technical security system or a CCTV camera for looking our house as a security purpose. So everyone can secure their house that's why we searched for some basic project ideas and then finally we planned to make a home security system which will secure our home. The project entitled motion detection camera are used to monitor activity in a given area using mobile phone. They can be used in a variety of applications, including security, surveillance, and surveillance recording. These devices are often used in conjunction with other security measures, such as lights. We have developed an anti-theft system which will mainly focus specifically on the room security system. For this security system, we don't have to store any recorded video and it decrease the needed memory capacity to store the video.

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## List of Symbols & Abbreviations

1.	LED	Light emitting diode
2.	LDR	Light dependent resistor



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# **CHAPTER 1**

## **INTRODUCTION**

### **1.1 INTRODUCTION**

This new electronic model is result of thinking about the security system which is very mandatory in this time. Everyone wants to secure their home but really everyone can't install high tech security system in their home for security purpose. But this arduino based MOTION DETECTION CAMERA project is an important part of smart home to secure the home and surrounding area which will be affordable. One more advantage of this electronic model is that no use of storage capacity but insist of this, it will notify the owner about any strange movement.

### **1.2 MOTIVATION OF THE WORK**

"Safety should never be a priority, it should be a precondition". And to secure our home and nearby area we have to keep an eye out but it is not possible for all time and everyone can't afford and install the expensive and high tech security system for their home security. But security is important. So, we gone through internet and searched for some basic project idea regarding home security and finally decided to create an electronic model which will be affordable, easy to handle, and no more use of storage capacity to store previous recorded video but this model will work as the home security system and it will let us know instantly when there will be any movement near the home. With the help of this model people can keep an eye out and can notice any strange movement. We can use this device as an anti-theft device.

### **1.3 PROBLEM STATEMENT**

Security system instalment is the measure problem of this time. Everyone want to secure their home and work place which is very important for safety reason and it is primary part of the smart home which is now dream of many people. But the problem is expensive. Many people

are not capable for high tech system because of finance. But the safety and security is mandatory.

#### **1.4 OBJECTIVE OF WORK**

- The main purpose of motion detection is to sense an object nearby this device.
- To secure the home and office.
- Increasing the security systems efficiency by decreasing the needed memory capacity to store the real-time videos.

# CHAPTER 2

## LITERATURE REVIEW

### 2.1 MOTION ACTIVATED SECURITY CAMERA USING RASPBERRY PI

In order to further maintain peace and provide security to people now a day, Closed-circuit television (CCTV) surveillance system is being utilized. This study focused on the design and implementation of a low cost smart security camera with night vision capability using Raspberry Pi (RPI) and Open CV. The system was designed to be used inside a warehouse facility. It has human detection and smoke detection capability that can provide precaution to potential crimes and potential fire. The credit card size Raspberry Pi (RPI) with Open Source Computer Vision (Open CV) software handles the image processing, control algorithms for the alarms and sends captured pictures to user's email via Wi-Fi. As part of its alarm system, it will play the recorded sounds: “intruder” or “smoke detected” when there is a detection. The system uses ordinary webcam but its IR filter was removed in order to have night vision capability.

**Reference from:** K. N. Karthick Kumar  
School of Computing, Sathyabama University  
H. Natraj  
School of Computing, Sathyabama University  
2017 International Conference on Communication and  
Signal Processing (ICCSP)

#### **Key findings:**

1. Microcontroller - based board, which enables the design and implementation of a low cost monitoring system that is able to sense any motion or movement.
2. Motion detection approaches based on background difference.
3. Algorithm to detect moving objects within an area covered by the sensor.
4. This gadget can see any development and send warnings on the client dashboard which thus advises the checking focus.

## 2.2 OBJECT-LEVEL MOTION DETECTION FROM MOVING CAMERAS

It is important for a moving observer to be able to identify his/her surrounding objects and determine whether these objects are moving or stationary, which is called object-level motion detection. Detecting object-level motion from moving cameras is a difficult problem to solve for collision-free navigation due to the dual motion introduced by the mixture of the camera motion and the object motion. This paper presents a novel technique that detects object-level motion from a freely moving camera using only two consecutive video frames. A context-aware motion descriptor (CMD) is designed based on the object's moving speed and moving direction relative to that of the moving camera. The CMD employs the contextual information, e.g., the optical flow of the image background surrounding the moving object of interest, which describes the object motion behaviour better than other contexts such as the camera's GPS and direction. The inconsistency between the histogram of oriented optical flow of the object and its surrounding background is measured for the object-level motion detection. The proposed technique has been evaluated over two types of widely studied objects, i.e., vehicles and humans that are captured with different sizes, moving speeds, and image backgrounds using a moving camera. Experiments on challenging real-world videos show promising performance in object-level motion detection.

**Reference from:** Tao Chen

Visual Computing Department, Institute for  
Infocomm Research, Agency for Science,  
Technology and Research, Singapore  
IEEE Transactions on Circuits and Systems for Video Technology  
(Volume: 27, Issue: 11, November 2017)

### Key findings:

1. The system can detect any movement and send a signal
2. Sensor that work on movement
3. Execution of an inclusive continuous home security system
4. This system presents a novel technique that detects object-level motion from a freely moving camera using only two consecutive video frames.

## 2.3 INDEPENDENT MOTION DETECTION WITH EVENT-DRIVEN CAMERAS

Unlike standard cameras that send intensity images at a constant frame rate, event-driven cameras asynchronously report pixel-level brightness changes, offering low latency and high temporal resolution (both in the order of micro-seconds). As such, they have great potential for fast and low power vision algorithms for robots. Visual tracking, for example, is easily achieved even for very fast stimuli, as only moving objects cause brightness changes. However, cameras mounted on a moving robot are typically non-stationary and the same tracking problem becomes confounded by background clutter events due to the robot ego-motion. In this paper, we propose a method for segmenting the motion of an independently moving object for event-driven cameras. Our method detects and tracks corners in the event stream and learns the statistics of their motion as a function of the robot's joint velocities when no independently moving objects are present. During robot operation, independently moving objects are identified by discrepancies between the predicted corner velocities from ego-motion and the measured corner velocities. We validate the algorithm on data collected from the neuromorphic iCub robot. We achieve a precision of  $\sim 90\%$  and show that the method is robust to changes in speed of both the head and the target.

**References from:** Vasco, Valentina, Arren Glover, Elias Mueggler,

Davide Scaramuzza, Lorenzo Natale, and Chiara Bartolozzi.

"Independent motion detection with event-driven cameras."

In *2017 18th International Conference on Advanced Robotics (ICAR)*,  
pp. 530-536. IEEE, 2017.

### Key findings:

1. The system will capture images only when the motion exceed a certain threshold.
2. Reduces the volume of data that needs to be reviewed.
3. This system would be efficient enough to differentiate between the false and real theft

# **CHAPTER 3**

## **PROBLEM FORMULATION AND PROPOSED METHODOLOGY**

### **3.1 PROBLEM FORMULATION:**

In the last 10 years, the security industry has seen huge improvement in its ability to amass Surveillance information. Bigger budgets, cheaper cameras, and cheaper storage have resulted in bigger and better surveillance system – 30 million security cameras generate 4 billion hours of video every week in the United States alone. But despite these huge increases in CCTV spending, there has been little to no reduction of fraud, theft, crime, and terror. Conventional surveillance systems haven't made human beings any faster at watching all that video, understanding its content and finding critical information.

Some of there are too expensive or impractical just for home use and not applicable for many situations. This “Security Gap” between what we collect and what we can analyse is at the root the most pressing problems in surveillance system today.

### **3.2 HOW CAN WE IMPROVE HOME SECURITY?**

We need a system that should work whenever there is any object or movement if front of the system and should take picture and send an alert message.

There are so many reasons to develop such a system that can improve our home and industrial as well as workplace security so that we can keep the things in our control.

For all these reasons we have made such a system that can overcome all these problems. We have made a motion detection camera that can capture any image if there any movement or object and can save the image for our convenience.

The Surveillance System with Motion Detector is built to perform adequate surveillance security system in order to prevent any crucial crime with automated capturing scene and provides immediate response to suspicious events.



### 3.3 PROPOSED METHODOLOGY:

#### 3.3.1 Introduction:

The goal of this project is to make a system which can be monitored by user through android application. As it is connected with the system with Arduino. The overall achievement from this system is an Arduino was used as the core of the system it receives inputs whenever the motion is detected through Ultrasonic sensor. The image is captured through camera and stored in the Android Phone, which producing the output to monitor a security system from a location away from the surveillance area through android device. In addition, used Arduino operating system as our operating system with the suitable software C++ programming language.

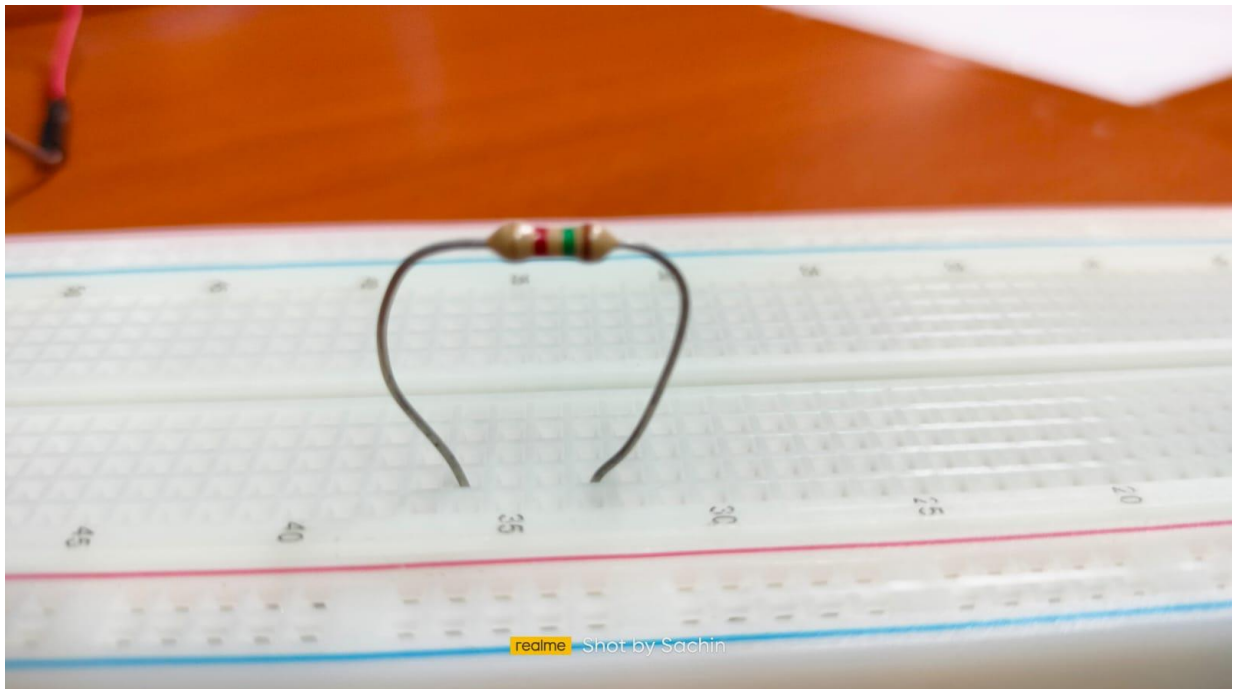


Fig. 3.1 RESISTOR

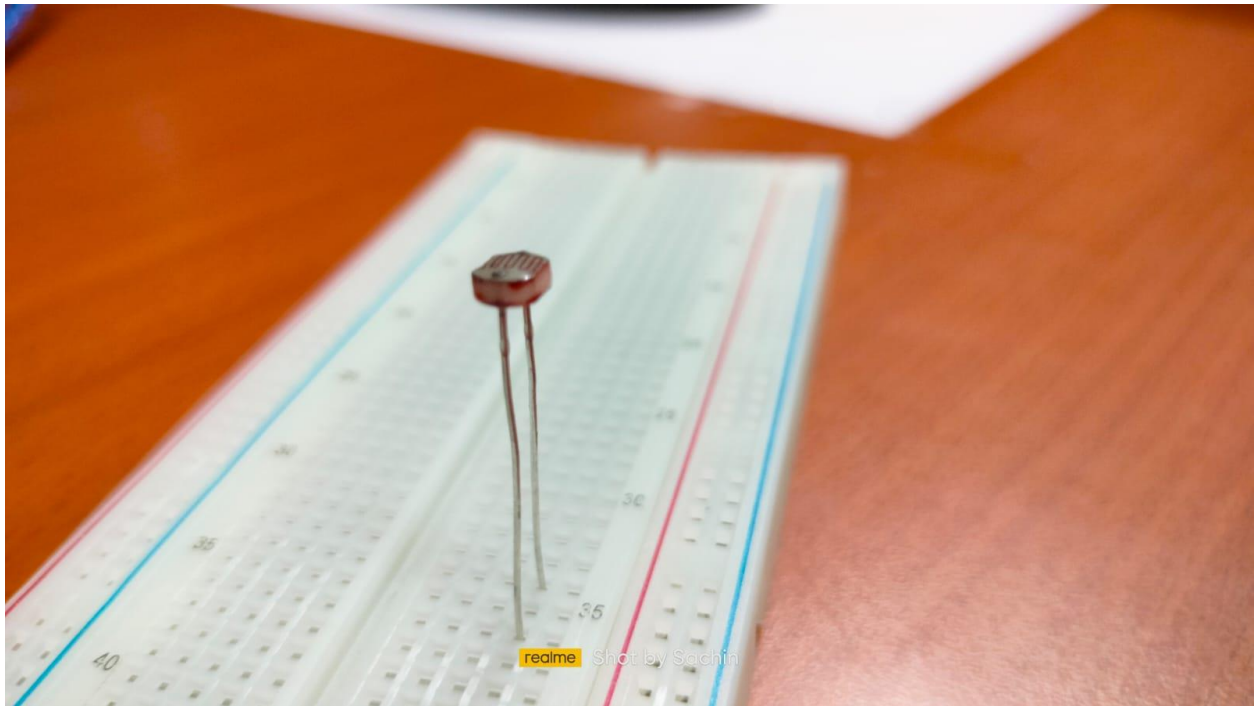


Fig. 3.2 LDR

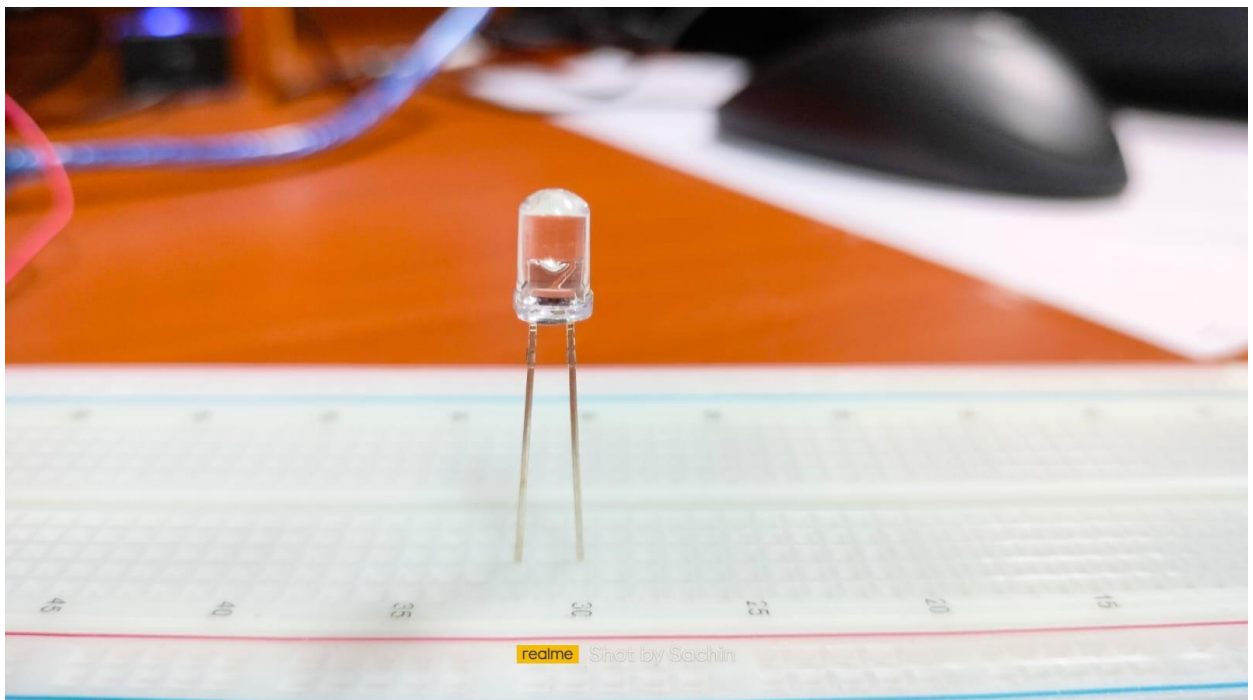


Fig. 3.3 WHITE LED



Fig. 3.4 ULTRASONIC SENSOR - HC -SR04

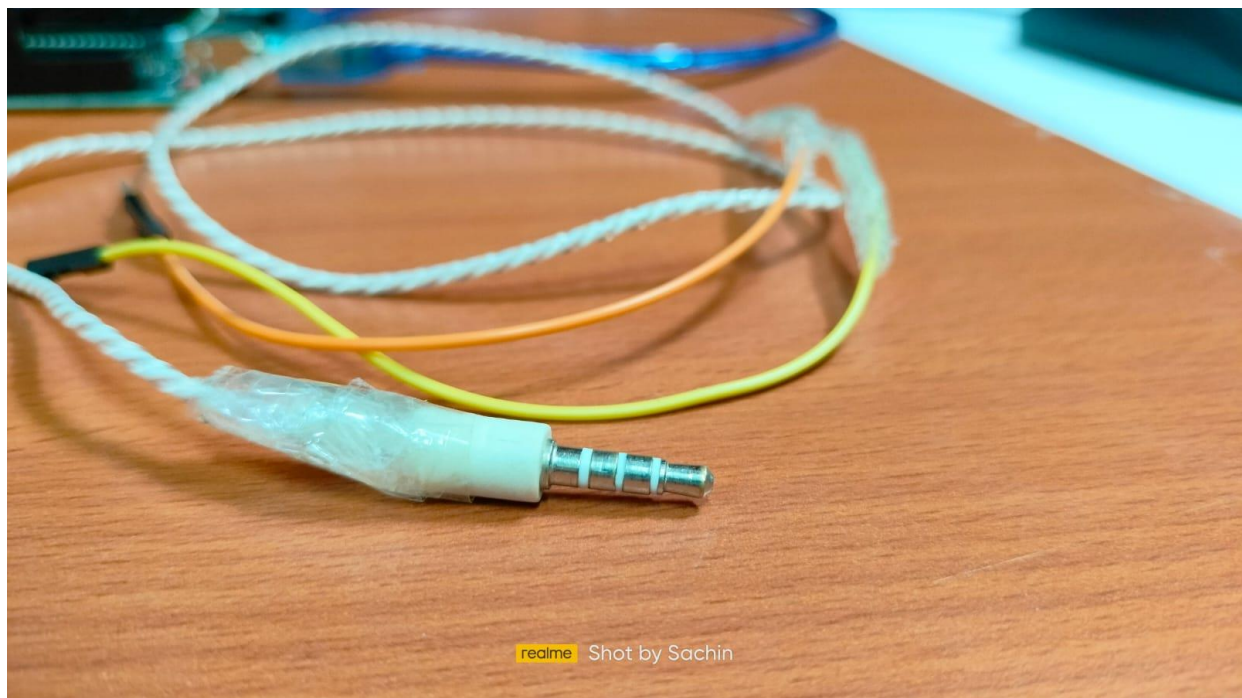


Fig. 3.5 EARPHONE JACK



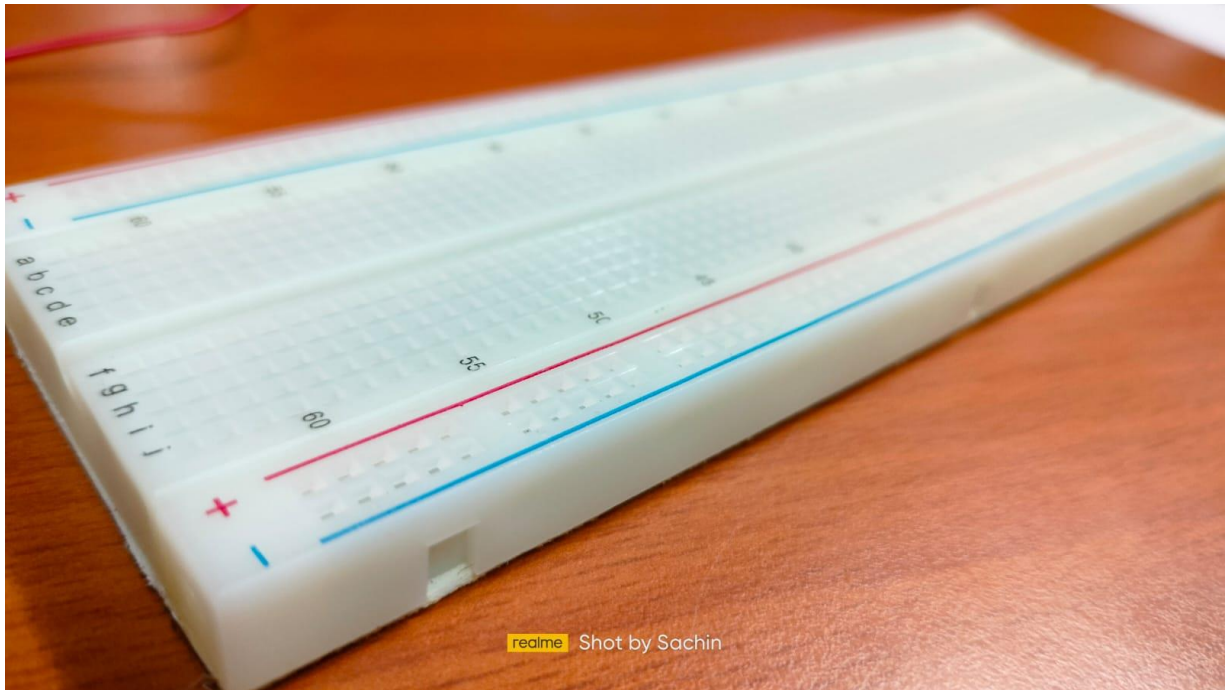


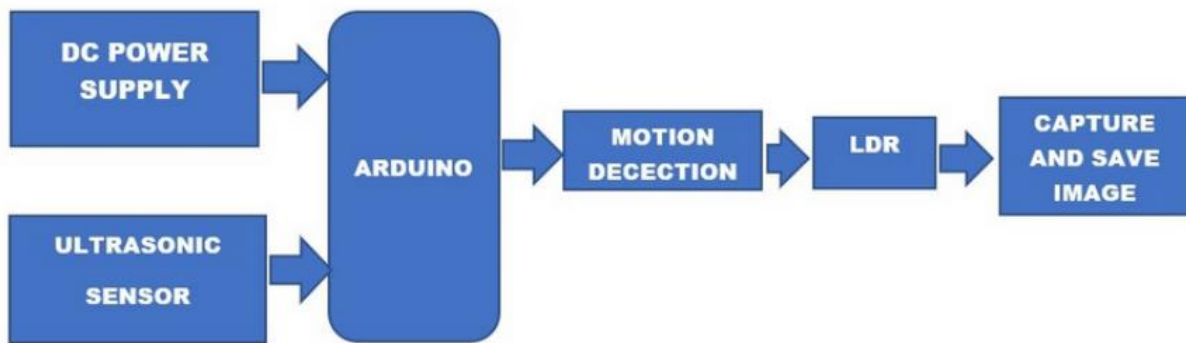
Fig. 3.6 BREADBOARD



Fig. 3.7 ARDUNIO UNO

### 3.3.2 Analyse and design the system:

- The working of the project can be clearly explained by considering the android motion detection camera.



### MOTION DETECTION CAMERA

Fig. 3.8 BLOCK DIAGRAM OF MODEL

- In this project ultrasonic sensor is used for detecting any object.
- An arduino is used as microcontroller to operate the whole system.
- The ultrasonic sensor detects any object then a signal is send to LDR and LDR changes its resistance which depends on the presence of light.
- Every earphone has a volume button which works on a smartphone as a shutter button when the camera app is opened.
- The earphone's volume buttons are connected with the mic and ground within a fixed value of resistor.
- LDR changes its resistance which depends on the presence of light. For this, we have connected a high bright LED in front of the LDR. When Arduino turns on the LED, the resistance of LDR decreases.
- Then LDR works as a volume button, it triggers the shutter button and captures a picture.

# **CHAPTER 4**

## **RESULTS AND DISCUSSION**

### **4.1 RESULTS**

- The main objective of the project, which is the design and implementation of smart motion detection system to be displayed through Android Phone, has been done successfully.
- This electronic model is clicking the pictures of any strange motion instantly and being saved in gallery automatically.
- After implementation of this system in the house, it will work as the security system.

### **4.2 DISCUSSION**

- At last, we discussed about the all work we have done to complete this model and found that it is working perfectly. It is fully prepared to work as a security system.
- During working on this project, we learned many things related to electronic components, its function and working.
- In future, we will try to modify this security system model so that it can secure our home more smartly.

# **CHAPTER 5**

## **CONCLUSION AND FUTURE SCOPE**

### **5.1 LIMITATION/CONSTRAINTS OF PROPOSED SYSTEMS**

- If the range of the sensor is not high then the model is not worth it. We have to select that one sensor which have high range of coverage for sensing any activity.
- To implement this electronic model, we have to arrange one mobile phone for capturing pictures of motion which will be engaged in this model all the time.
- This model is not advance as the high tech security system. If mobile phone is not there, then there will be no screen to capture or record any motion.

### **5.2 FUTURE SCOPE**

- In future, this model can be used for modelling advance security system by modifying the function.
- We can modify this model to use it in the surveillance recording.
- This Project can be integrated with machine learning, IOT and other latest technologies and it can also be used in autonomous vehicle technologies and can be a very effective business model which uses automation to create a theft-free environment.

### **5.3 CONCLUSION**

- The equipment within this system are consisting of basic components.
- Circuit design only involve the sensor system and easy to construct with needless component within.
- The counting system also equipped with warning alert to know the status presence of audience.

- The motion detection camera device is a Home/Office based security system which can be of great where security is a matter of concern.
- The motion detector patches up for the need of a cheap and small security system in day-to-day life.
- The system can be used in different environments and several places like houses, banks, hospitals, labs and other automated systems, which dramatically reduce the hazard of unauthorized entry.



# REFERENCES

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