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# ATM Anomaly Detection

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**Abstract:** ATM anomaly detection is the field of study that aims to provide protection against physical and electronic theft from ATMs and safeguarding their installations. This is achieved by using Machine to Machine (M2M) technology. M2M is a communication technology. It provides real time monitoring and there is no need of human intervention. We can silently indicate theft using anti-skimming defend system. If a person wears helmet or mask it can be identified by recognition technique and the abnormalities are detected by using vibration sensor and flame sensor. This application is used to improve the security in the ATM centers.

**Keywords:** Raspberry pi, M2M, Image processing, Haar cascade algorithm

## I. INTRODUCTION

Face Recognition is an application to naturally distinguish an individual in the wake of contrasting and a database of pictures. A test picture is taken with the assistance of a camera from a still source or video outline, and in the wake of representing different conceivable face appearance varieties, is contrasted and the database pictures for character. Analysis has an extraordinary enthusiasm for this field for its applications in different spaces. One of the business utilizations of the face acknowledgement frameworks could be begin with little essential login applications and prompting the improvement of a high security get to control framework, secure biometric based exchange or exceptionally verified observation framework A information and procedure acclaimed affirm or check the character of an individual or totally security requirements.2 confirmation could be a framework wherever in 2 or a great deal of different elements zone until wont to exhibit the people exploitation higher than issue is ordinarily alluded to as "Solid Confirmation". The technique for numerous responses to challenge inquiries similarly you as recovers 'something you have' or 'something you are' are taken into thought multifaceted. Automated Teller Machine is a programmed telecommunication system which provides access to financial transactions for the financial institution. These days, the number of ATM centers has been risen accordingly. Although it is storing money in the ATM machines, there is a great chance of theft activities. It could bring great losses of human and social wealth. Various types of ATM looting are occurred. The ATM threat may be divided into three types of attack: card and currency fraud, logical attacks and physical attacks. Here mainly focuses on the physical attacks. To prevent from these attacks various video surveillance based systems have been developed. The availability of credit cards in a single board computer such as Raspberry pi has allowed the development of different automated and monitoring system with very low power consumption, faster processing capability at lower cost. The ATM guard system proposed in this paper avoids the need of security officials in ATM centers.

## II. EXISTING SYSTEM

### A. ATM Monitoring System Using MATLAB

This paper detects whether the person is wearing mask and also determine the count of person those who are entering into the ATM. If there is any abnormal situation it produces only alert signal and it does not send any message to the authorized person. Therefore by using the MATLAB the execution of the system will be slow than the compiled language and it is comparatively more costly than the raspberry pi.

### B. ATM Monitoring System Using ARM Processor

This paper is used to detect the abnormalities happening in the ATM using smoke sensor and the camera for monitoring the ATM and it provides user name and password by using ARM processor but the ARM processor have the limited memory bandwidth to serve the embedded page to a web browser and scheduling of instruction make difficulty in debugging process.

### C. Anomaly detection using CCTV

In this paper they proposed an approach that can identify referred to obscure assaults on ATM only by using cctv cameras. In that they have programmed demonstrate era method to distinguish ordinary activities from the abnormal activities which is involved in the ATM but now a days there is a possibilities of breaking and using the chemical sprays to make the camera malfunction and it does not have any security equipments to detect the further abnormal activities in ATM.

### III. PROPOSED SYSTEM

In our proposed system, the person wears mask or helmet will be recognized using haar cascade algorithm and the person wearing mask or helmet does any abnormality it will be detected using vibration sensor or flame sensor then the image will be captured and mailed to the authorized person and sms will be send and the door will be closed once the abnormality is detected.

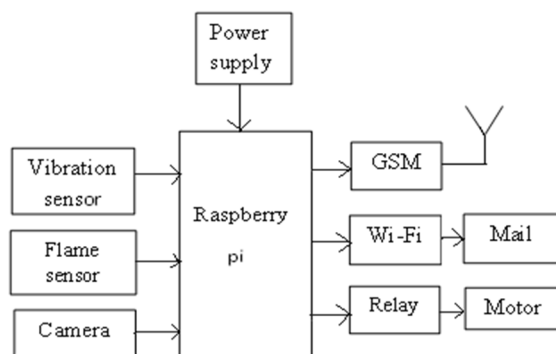


Fig 1 Block diagram

The system is programmed using python language and raspbian os is used to operate the hardware connected to raspberry pi and to upload the programm in the hardware to communicate between them.

### IV. HARDWARE

#### A. Raspberry Pi

The 3rd generation Raspberry Pi 3 Model B is a Raspberry Pi. This powerful single-board credit card machine can be used in many applications, replacing the original Raspberry Pi Model B+ and Raspberry Pi 2 Model B. While retaining the popular board format, the Raspberry Pi 3 Model B provides you with a more powerful processor, 10 times faster than the Raspberry Pi first generation.

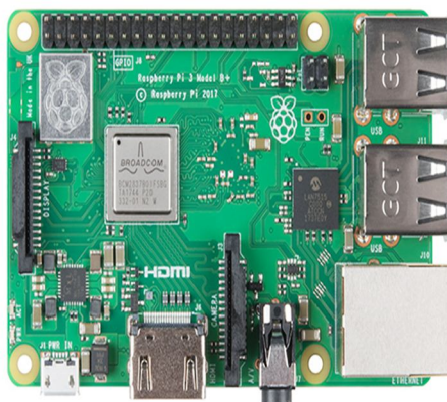


Fig 2 Raspberry pi 3 Model B

#### Specifications

Processor	64 bit quad code processor ARMv8 CPU at 1.4 GHz
Memory	1GB SDRAM
Connectivity	2.4 GHz and 5GHz IEEE802.11.b Wi-fi, Bluetooth 4.2, Throughput 300 Mbps
Access	40 pin GPIO header
SD Card support	Micro SD format
Input Power	5v/2.5A DC
Operating Temperature	0-50 <sup>0</sup> C

Table 1 Raspberry pi specification

### B. Vibration Sensor

When vibration is detected then the switch will be in ON state. The conductive current roller in the switch may create a movement or vibration which causes current to disconnect or the rise of resistance and trigger circuit.

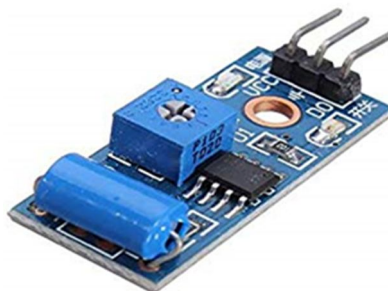


Fig 3 Vibration sensor

#### Features

- 1) Input voltage: 5v
- 2) Output voltage: 3.5-5v
- 3) Output: digital
- 4) Life expectancy: 5, 00,000 times.
- 5) Suitable for triggering small control circuits
- 6) Response time: 2ms

### C. Flame Sensor

A flame sensor is used to detect flame or fire. It has the capability to detect ordinary light source in the range of 750nm – 1100 nm. The output of the flame sensor can be digital or analog. It can detect upto 100cm of distance. It can also be used in fire fighting robot.

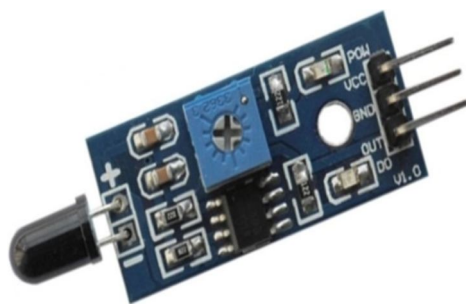


Fig 4 Flame sensor

#### Features

- 1) Operating Voltage is 3.3V to 5V DC
- 2) Operating Current is 15mA
- 3) Digital output is 0V to 5V, Adjustable trigger level from preset
- 4) Analog output is 0V to 5V based on infrared radiation from fire flame falling on the sensor
- 5) The angle detection is upto 60°
- 6) Comparator chip LM393 makes module readings stable.

### D. Relay

Relays can be operated in both electrically and mechanically. It has electromagnet and set of contacts in which the electromagnet is used to carry out the switching mechanism. The operation of relay circuit is used to control the high power circuit using low power signal. For high end applications relay requires high power to drive electrical motors and the relay used for this purpose is called as contactors.



#### Features

- 1) Input voltage is 12VDC
- 2) Driver unit is ULN2003A
- 3) Isolation unit is In4007
- 4) Fast switching
- 5) Motor forward and reverse operation

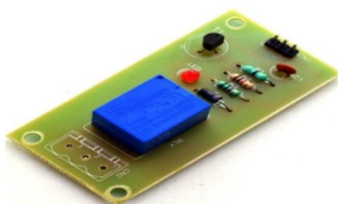


Fig 5 Relay

#### E. Camera

Effective Web Cam captures images from any video unit, including USB cameras, analog cameras attached to a capture card, TV boards, FireWire camcorders (IEEE 1394) interface and network cameras, up to 30 frames per second. When the software detects motion in the area being monitored, it can sound an alarm, email the captured images to you, and start transmitting or recording a video.



Fig 6 camera

#### F. Dc Motor

DC Motor converts Electrical power into Mechanical power. The current carrying conductor is placed in a magnetic field and it experiences a torque and this is called as motoring action. The mechanical force is produced when magnetic field and electric field interacts.

#### Features

- 1) Supply voltage is 5VDC
- 2) Very reliable and low cost
- 3) Speed is 1000rpm

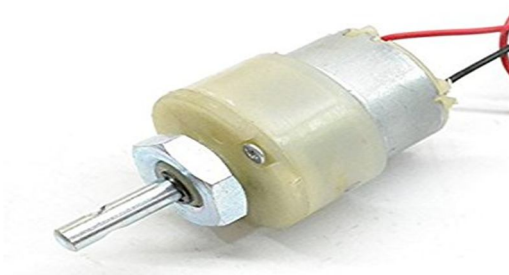


Fig 7 DC Motor

## V. SOFTWARE REQUIREMENTS

### A. Raspbian OS

Raspbian is the operating system for Raspberry Pi. Different versions of Raspbian are available including Raspbian Stretch and Raspbian Jessie. Raspbian is highly optimized for the low-performance ARM CPUs of the Raspberry Pi series. Raspbian uses PIXEL, Pi Enhanced X-Window Environment, as of the latest update, Lightweight as its main desktop setting.

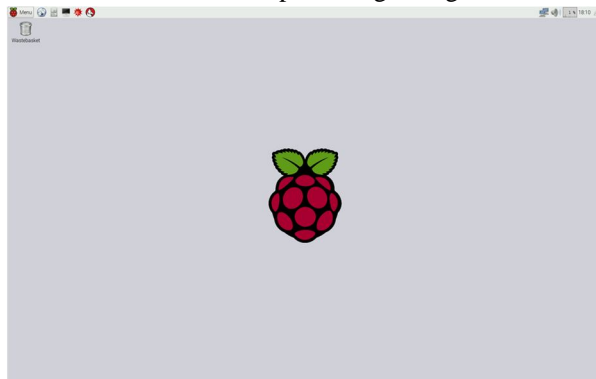


Fig 8 Raspbian os

### B. Python

Python was first developed by Guido Van Rossum and it was first released in 1991. It is an interpreter, high level and general purpose programming language. It has a philosophy of design stressing the readability of code, especially utilizing substantial white space. Python features a program of dynamic style and automated memory management. It supports various programming paradigms, including object-oriented, imperative, functional, and procedural paradigms, and has a broad and extensive standard library.

## VI. FUTURE SCOPE

- A. In future by detecting the features of eye the human face can be recognized .
- B. It can perform the technology of contour based detection in 3D format.
- C. This system can be advanced to detect the abnormality in ATM center by monitoring the movement of the person.

## VII. CONCLUSION

In this paper we have developed an alert based on ATM secure monitoring system using a raspberry pi microcontroller. In our design we have used the vibrational sensor and flame sensor to detect any abnormality is happening in the ATM center and the data is also sent through mail to the authorized person. If any abnormality is occurring in the ATM then the information will be send to the control room. This project is very essential in the future to make the design more advanced.

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