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# IoT Based Theft Detection Using Raspberry Pi

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***Abstract*— In the present day, Security and Safety are the major concern for the personage. We use C-Mount monitors in order to monitor and identify, but the C-mount has too much ability to record and needs staff to monitor the unlawful movement. Mobile device like Smart phones and I pad are used to perform daily tasks that are handle by commercial computers and laptop. Be overcome, we have found RP-3 model using IOT RP-3 model is much lowered compared to existing system with more appropriate settlement and less power use characteristics an "Internet Of Thing based Theft Detection using Raspberry Pi" Project where we had to use live video photo processing to espy stealer using motion as well as focus the area where motion reoccurred .In this model, we use a RP-camera together RP-3 model together with a route with Virtual show infrared for night and Thumb drive for Data Storage. The model uses imaging to espy and emphasize the exact filed of movement in the camera when camera movement is espying. The model now transmits photo of the event via Internet of Thing, which the End user can view online. It also stores the footage for additional reference in a Thumb drive. The End user can now convert online memory transmitted via Internet of Thing, the Internet of Thing model to view photo of the movements via the internet live. The model thus offers an extra powerful approach to Internet of Thing larceny espy.**

***Keywords*— *Raspberry-Pi, PIR sensor, Wi-Fi adapter, Camera***

## I. INTRODUCTION

Theft prevention in this technology conscious world would become a boom. There are several thefts espy system available to catch the stealer that can be further improved. In some scenarios, the stealer can't be caught using these technologies. the sufferer can't retriever her valuable belongings even when the stealer is captured, better than cure is prevented these is no loss for the personage.

The fresh law for the future will be everything that is linked to the internet. Future is Internet of Thing; India is moving towards the rapid pace.

- Constructing extremely interconnected systems in which appliances are Internet consumers.
- This scheme ought to operate intelligently to improve personage.
- The scheme should enhance the personage-environmental connection in which they reside.

### *A. Motivation*

In contrast to the standard data acquisition system (DAS), the use of M2M Communication gives monitoring and control without human intervention. The complete automation of the system results in a reduction in the amount of errors and drastic increases in efficiency.

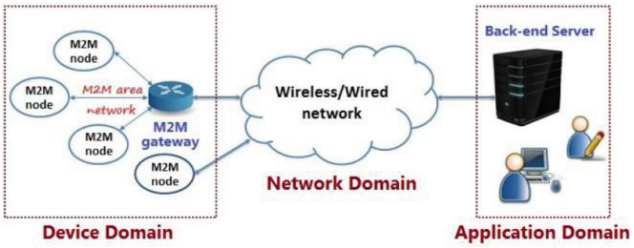


Fig. 1. Working of M2M [10]

### *B. Advantages*

This system secures office/homes from stealer by at once espy thievery and permitting the user to look at the stealer details by lightness stealer and saving the video on the Thumb drive. we have tendency to use a camera with the frame RP-3 model and a Virtual Show Infrared circuit for night read and Thumb Drive disk for storage on the model. A 12V power offer is employed for the model. The model uses picture process to discover associate extract space of motion and therefore overview camera motion within the camera image. The theme currently sends photos of the event via IOT to the client. we tend to use IOT lizard here to make the theme net. It additionally saves the photographs for more reflection in a very thumb drive. The personage is currently ready to remotely show the images of the movements via net via the IOT lizard IOT theme to rewrite the knowledge sent on-line. The theme therefore offers a complicated strategy to felon identification mistreatment IOT.

### *C. Why IOT*

THE FIRST QUESTION that we must always conceive to answer is, of course, what's we tend of Internet of Things? What will the phrase "Internet of Things" mean? we saw used the web to forward, taken, or communicate info. And in every case, the appliance that was connected to the web wasn't a pc, tablet, or portable however Associate in Nursing object, a Thing.

IOT Ecosystem includes web enabled intelligent phones, which capture, transmit and behave on information they obtain from their settings using integrated processors, sensors and communication equipment. IOT devices share the sensors data they collect via the IOT portal or another border device, which sends data to the cloud for local analysis or analysis. These instruments sometimes interact with other associated machines and use the data they receive from each other. The system does most of the job without a personage involvement, but individuals can communicate with the system such as set up, instruction or information access.

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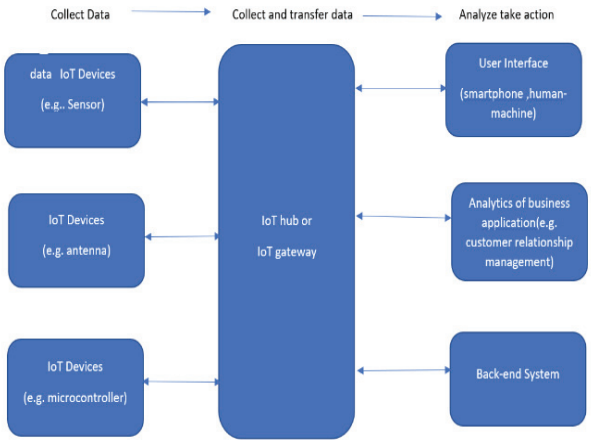


Fig. 2. Working of IOT System

## II. LITERATURE SURVEY

[1]. Surya have applied a model which constantly captures the surroundings and if there is any moment, it activates the mild and captures the screenshot's that effects in sending of those to legal person as an alert. [2]. The Chandana have proposed a model the use of RP-3 version and Gyroscope sensor. When a motion is spotted, the camera takes the photo and then forward a vigilant electron-mail with the spotted photo. The sensor information is imagined in the procedure of charts on Thing Speak. [3]. The Chinmaya have proposed a smart surveillance system using RP-3 model and face recognition. Which gives energy to manage by turning the system ON, primarily created at the incidence of every signal. System will recognized the movement and relying at the detected movement machine will turn on the camera, capture the photo of trespasser and it will send a notification on owner's telephone if the person isn't identified by the system. [4].Umera Anjum have projected a system that is internet of thing issue based mostly detection victimization RP3 that has shown a way to come to be a totally purposeful embedded system established from scrape. This enclosed the cross compiling and ready of vital collections, the formation of embedded kali linux and software as a service. Whenever the motion was detected. [5]. Priya have proposed a smart motion detection model using RP3. In which model, she had expected to modify the model that the model can full-fill the requirement of the person for scrutiny area. It has a application and it will be used in every platform and setups of surveillance. [6]. Sadhana have proposed a review on stolen prevention system using RP-3 model and Passive Infrared sensor. The proposed model is capable of espy presence of person using RP-3 model as server module. This will lead in prevention of stealer. [7]. Adrian McEwen is a creative Technologist and Entrepreneur based in Liverpool. He concentrates on how the IOT intersects with people lives and how heterogeneous networks of devices should work together. [8].Oliver Hersent have proposed the book "The internet of things –key applications and protocols" in which he had describe the M2M area network physical layer and he suggest the working of the IoT . Oliver working on technology which help in IoT sector. [9]. Priya B. Patel have proposed model which aimed to work in such a manner that it can fulfil the needs of the consumer for specific surveillance area. It has limitless application use in filed and it may be used in distinctive situations and set-ups.

[10].Amira Barki has proposed the ETSI M2M architecture over and above most of the commonly blowout M2M application beforehand telling the undefined problem arise in M2M communication. [11]. Michael Miller has set-up a recognition for virtually explain the technology subjects to non-technology readers and for providing the beneficial real-world advice about Internet of things system. He has also explained how IOT changing the world. [12]. Kamal Raj have proposed the inter-network device which can physical provided the service to exchange the data of the IoT service . [13].Nikita Meshram have proposed the low cost home automation system based on MSP430 microcontroller. She provides manual as well as automatic mode control. [14]. TS Vinshnu Priya have proposed the paper in which he tell about the system which he had created to recognition of face and he had applied the system into different analysis field. [15]. Sushma Jaiswal has proposed the system where she was discuss about how hard is to recognition of face in low light and night time so she present the feature which take only the key point in the face image not rather the whole image.

## III. PROPOSED METHODOLOGY

The objective of the theme is to use RP-3 model with the PIR sensors and RP-3 camera for intelligent observance function. Once somebody enters its selection, the PIR detector is employed to spot movement. RP-3 camera activates and displays an image once the PIR detector detects the movement. This image can then be saved within the theme and located on OpenCV and Python for a personality's face. The detected external body part is then compared with the face of native binary pattern algorithms keep within the info. If the image matches those within the info, no warning is created otherwise the recipient receives a text notification via the WI-FI adapter within the robot push-Etta application. This theme permits solely unregistered people to be known. The matter of C-MOUNT and Motion Detection schemes will so solely be overcome, if solely the host monitors or alerts the movements that has determined whether is allowed.

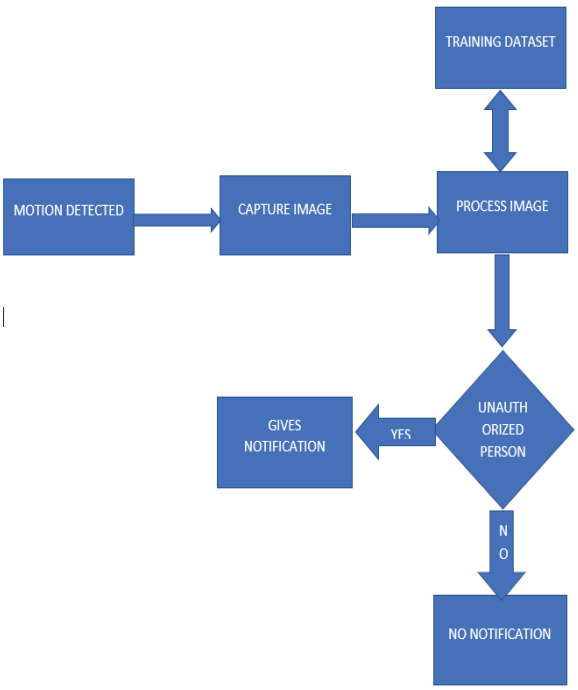


Fig. 3. Flow Diagram of System

## IV. HARDWARE IMPLEMENTATION

The system consists of RP-3 model, PIR Sensor, RP-3 camera, Wi-Fi adapter and Power Supply.

### *A. RP-3 model:*

It was intended to be a tiny, inexpensive device for teaching use of RP-3 model to kids in school. These RP-3model are fitted with a 700 MHz ARM CPU, and design with 256 MB or 512 MB of RAM are available. Up to five THUMB DIRVE 2.0 connections can be supported. RP-3 model can use a non-volatile storage Thumb drive (up to 4gb) and utilizes HDMI to produce digital sound and video. No network interface on-board, but WI-FI and Ethernet networking are supported by Thumb Drive.

Fig. 4. RP-3 model [16]

### *B. PIR Sensor:*

It stands for Passive Infrared Sensor (PIR Sensor). An Electronic sensor, which measures the light radiating from items in its sector of perspective. They are most frequently used in movement sensors based on Passive Infrared Sensor. In safety alarms or automatic lighting apps, PIR detectors are used frequently. Passive Infrared Sensor can detect general movement but don't tell who or what is moving. An effective IR detector is necessary for this intent. The term passive refers to energy for observation purposes. They work entirely by observation infrared radiation (radiant heat) emitted by or divert from personage.

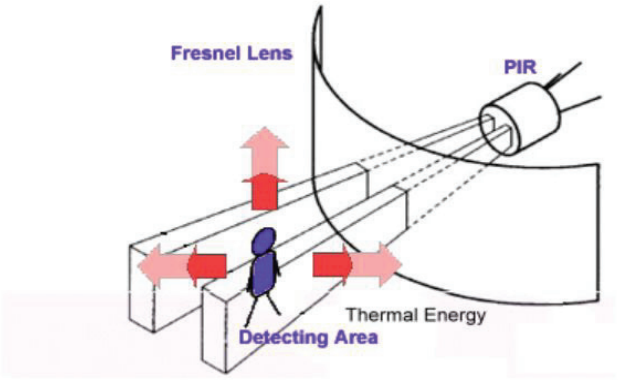


Fig. 5. Working of PIR [17]

### *C. RP-3 camera:*

The RP-3 camera is the new official camera board released by the RP-3 model foundation. The RP-3 camera is a high-quality video recording device with featuring a fixed focus lens. It attaches to RP-3 model by way of one of the little plugs on the board.

*Features:*

- Fixed focus lens on-board
- 8 megapixels
- 3g-5g weight
- Size 25mm *23mm * 9mm
- Connects to the RP-3 model board
- Camera is supported by Raspbian OS.

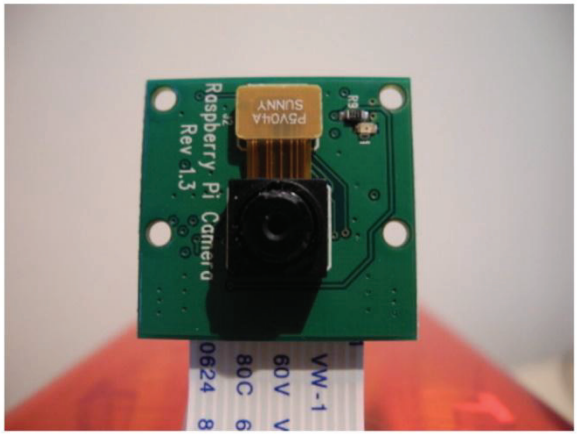


Fig. 6. RP-3 Camera [18]

### *D. Wi-Fi adapter:*

A Wi-Fi adapter device that adds wireless connectivity to a RP-3 model. All the adapters are available as external THUMB DIRVE modules as well as PCI cards that plug into an empty slot on the motherboard.

*Benefits* -

- Frees devices uses from cables
- Eliminates the need to install internal hardware
- Eliminates the need to run cables
- Eliminates the need to upgrade a device
- Can be used on Multiple Devices


Fig. 7. WI-FI ADAPTER [19]

### *E. Power Supply:*

A power supply +5.1V THUMB DIRVE micro Storage is available to the RP-3 model. The exact amount of present (mA) required for the RP-3 model depends on how much you interact with it. We discovered that buying an energy source of 2.5A from a reputable dealer provide you with plenty of energy to operate your RP-3 model.

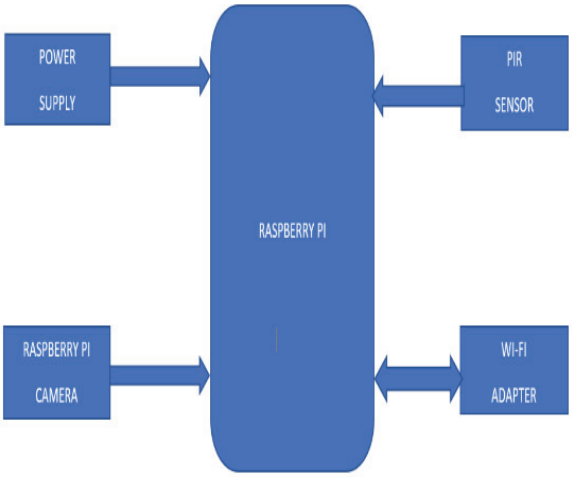


Fig. 8. Block Diagram Hardware Implementation

## V. SOFTWARE IMPLEMENTATION

This Device is basically supported Python programming from sleuthing the detection of motion to engendering associate degree alert. Different Python file or library are used to control Passive Infrared Sensor is used for detection the motion, Python is used in the device which capture the photo through the camera and process that photo. The captured image is then processed using Open CV library that integrates with Python. The Face-recognition system had worked half is meted out by the local Binary Pattern (LBP) formula algorithm.

### *A. OPEN CV:*

It stands for open computer vision (OCV). OCV was founded by Gary in 1999 at Intel and therefore the latest software came in 2000.OCV supports plenty of algorithm with Monitor Vision and ML (Machine learning) and it's increasing day-by-day. Presently OCV supports an outsized style of programming languages and is out there on totally different platforms together with Windows. Also, interfaces supported CUDA and OCL square measure below active development for high-speed GPU operations.

Python might be a general linguistic communication started by Guido van Rossum, that became extremely popular in brief time in the main due to its simplicity and code readability. It permits the engineer to specific his talent in short lines of code whereas not reduce any readability. the guide of NumPy makes the task easy. NumPy might be an increase the use of library for mathematical operations. It offers a MATLAB-style syntax. All the OCV array structures area unit born-again to-and-from NumPy arrays. So, despite operations you may knock off NumPy, you'll mix it with OCV, that will increase variety of weapons in your arsenal. Besides that, many different libraries like SciPy, Matplotlib that supports NumPy will be used with this.

### *B. Local Binary Pattern:*

It is a kind of algorithmic program using for allocation in laptop.it has been initiate to be a controlling feature and taking out the cataloguing functions. the primary step in making the LBP texture descriptor is to convert the photo to grayscale. for every picture or pixel element within the grayscale photo, we tend to choose a neighbourhood of size n close the centre picture element. Associate in Nursing LBP worth is then calculated for this centre picture or pixel element and keep within the output second array with an equivalent breadth and height because the input photo.

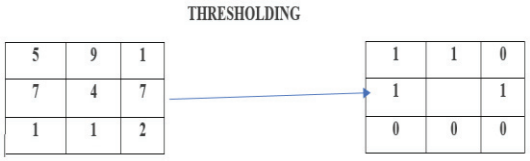


Fig. 9. Constructing LBP is to take the 8-pixel.

The higher than figure we tend to take the centre element and threshold it counters to its neighbourhood of eight pixels. If the intensity of the centre element is bigger-than-or-equal to its neighbour, then we tend to set the worth to one; otherwise, we tend to set it to zero. With eight close pixels, we've got a complete of two ^ eight = two hundred fifty-six potential mixtures of LBP codes.

From there, we want to calculate the LBP price for the centre element. we can begin from any close element and work our method dextrorotatory or counter- clockwise, however our ordering should be unbroken excepted for all pixels in our image and everyone pictures in our dataset. Given a three by three neighbourhood, we tend to therefore have eight neighbours that we tend to should perform a binary check on. The final call of this binary check is kept in associate degree eight-bit array, that we tend to then convert to decimal, like this:

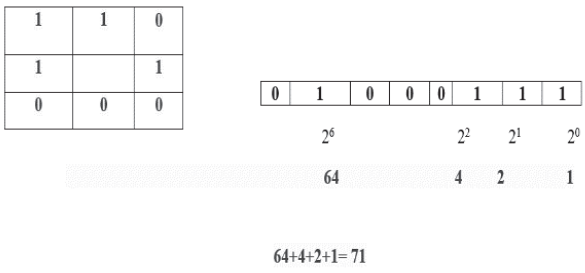


Fig. 10. The 8-bit binary pixel and convert into a decimal.

In this instance begin at the top-right purpose and work our manner clockwise gathering the binary string as we tend to go on. we will then switch this binary string to decimal, yielding a worth of seventy-one. This worth is hold on within the output LBP second array, that we will then visualize below:

### *C. The final algorithm results.*

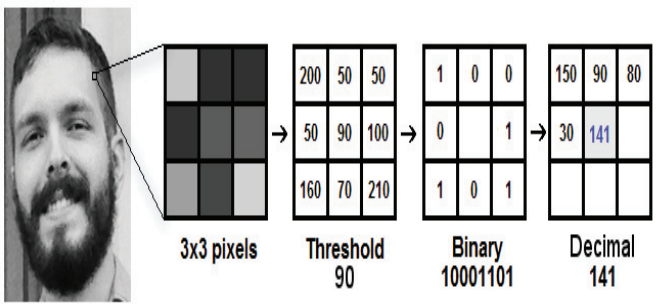


Fig. 11. Working of Local Binary Pattern algorithm

## VI. ARCHITECTURAL FLOW OF SYSTEM

Following Diagram representative, the architectural flow of device installs processing and working of the system which will lead to stoppage of stealer.

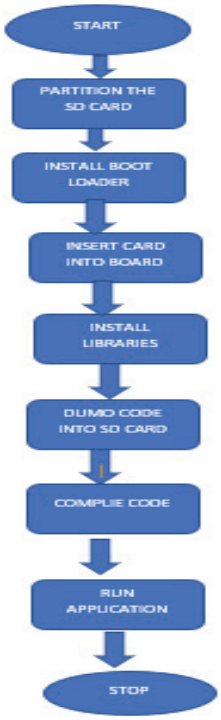


Fig. 12. FLOW DIAGRAM OF SYSTEM INSTALLATION

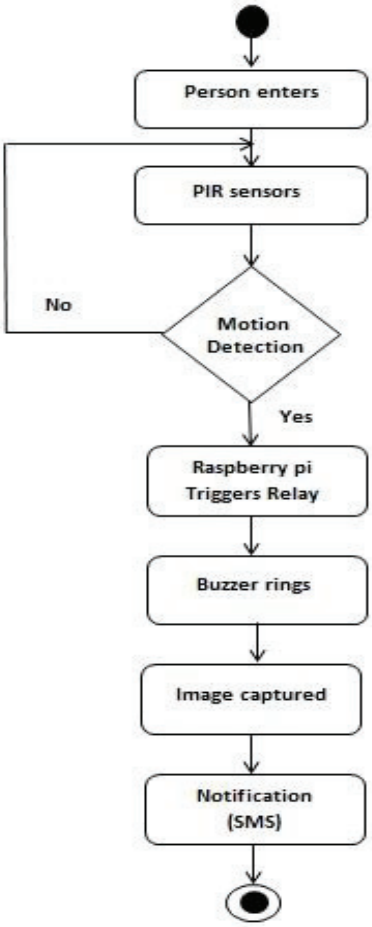


Fig. 13. Flowchart of Proposed System

This model works as follows:

1. Consider a scene where a person come for attempt stealing in a room.
2. If he/she comes in near the sensor; the message is sent to RP-3 model.
3. RP-3 model acts as main hub and operate relay the message to model.
4. After getting message it will relays lead to turn ON and turn OFF the bulb.
5. After these the sound will start ringing.
6. Image is caught and uploaded on electronic mail.
7. system module gives the notification to the person so that he becomes know about the stealer.

## VII. CONCLUSION

The project "IOT Based Theft Detection Using Raspberry PI" has a system which help a personage to protected himself and his family. We have designed and implemented a cost-effective RP-3 model-based security system. This proposed system provides security and surveillance. With the help of RP-3 model, PIR sensor, RP-3 camera, thumb drive and WI-FI adapter. The use of Thumb Drive devices to storage of captured images and recorded videos. The machine gives us the efficient manner data for surveillance the surrounding. System will sense the movement in through the sensor in low light also and forward the signal to Raspberry pi device will turn on the camera, seize the image of person, after that the Raspberry pi device send a notification on owner's smartphone if the person isn't identified by the device.in this device we are mainly focused on captured the image in low light and night time. Its low-cost system and less use of human power.

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