

# INTRUDER DETECTING SMART SECURITY AND ALERTING SYSTEM FOR RESTRICTED AREAS

K Nived Maanyu  
Dept. Of ECE  
Sreenidhi Institute Of Science  
And Technology  
Hyderabad,India  
[knivedmaanyu@gmail.com](mailto:knivedmaanyu@gmail.com)

D Goutham Raj  
Dept. Of ECE  
Sreenidhi Institute Of Science  
And Technology  
Hyderabad,India  
[gouthamdasa007@gmail.com](mailto:gouthamdasa007@gmail.com)

R Vamsi Krishna  
Dept. Of ECE  
Sreenidhi Institute Of Science  
And Technology  
Hyderabad,India  
[vamsynani1998@gmail.com](mailto:vamsynani1998@gmail.com)

Md Baba Fareeduddin  
Dept. Of ECE  
Sreenidhi Institute Of Science  
And Technology  
Hyderabad,India

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**Abstract:** Intruder detecting smart security and alerting system is a system designed to detect the intruder (that is any unwanted person expected not to be entering into desired perimeter), followed by warning the intruder and alerting the admin of the surveillance system.

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## [I] Introduction:

This paper is focused towards security in restricted areas. As there are many breakdowns into restricted areas considering past actions which occur frequently. This reason have seeded the idea of a intruder detecting system using image processing and can be extended for triggering defensive systems and alerting systems. Not only in militant areas or any restricted areas this type of intruder detecting system can be used in smart homes, banks, and other places where the client is not interested to allow any unwanted personnel into the perimeter.

Henceforth, we came through the concept of intruder detection at the same time the system can be designed to warn the intruder or take any measures such that it prevents something unusual. The system can even provide live streaming and live capturing the intruder actions and save them in a predefined cloud of the security system. Whenever there is an intruder action the organization/client gets the notification on a device or any other web application with the help of cloud.

We can approach a “hypothetical” defensive system especially for a militant area where it strictly doesn't want any human being other than authorized personnel. The defensive system can be included with auto aiming and triggering system for a particular barreled ranged weapon. This system is

adopted under a detailed research in advanced weaponry using image processing with the help of AI systems. The basic concept of the flow of this defensive system start with warning the intruder when he enters the first allotted range of the system using an output device to freeze and surrender himself or else the system will trigger the weaponry when he gets into next allotted range of the system.

Hence considering such system leads to the reduction of the actions such as breaking into restricted areas or any private areas. Even considering such advanced weaponry systems which are categorized to be hypothetical can be achieved under adopting the techniques of AI systems. Further experimental studies are needed to be carried out for the achievement of the desired system. Therefore the design and development of the system will not be a challenging task for us in this developing age.

## [II] Literature Survey:

An important issue faced while employing Pyroelectric Infra Red (PIR) sensors in an outdoor Wireless Sensor Network (WSN) deployment for intrusion detection, is that the

output of the PIR sensor can, as shown in a recent paper, degenerate into a weak and unpredictable signal when the back ground temperature is close to that of the intruder. The current paper explores the

use of an optical camera as a complementary sensing modality in an outdoor WSN deployment to reliably handle such situations. A combination of background subtraction and the Lucas-Kanade optical-flow algorithms is used to classify between human and animal in an outdoor environment based on video data. The algorithms were developed keeping in mind the need for the camera to act when called upon, as a substitute for the PIR sensor by turning in comparable classification accuracies. All algorithms are implemented on a mote in the case of the PIR sensor array and on an Odroid single-board computer in the case of the optical camera. Three sets of experimental results are presented. The first set shows the optical-camera platform to turn in under supervised learning, high accuracy classification (in excess of 95%) comparable to that of the PIR sensor array. The second set of results correspond to an outdoor WSN deployment over a period of 7 days where similar accuracies are achieved.

The final set also corresponds to a single-day outdoor WSN deployment and shows that the optical camera can act as a stand-in for the PIR sensor array when the ambient temperature conditions cause the PIR sensor to perform poorly.[1]

This paper presents a PIR STP designed to have good spatial-resolution capability by incorporating an array of PIR sensors in conjunction with lenses and multi-lenses. It makes use of animation to generate intrusion signals that aid in algorithm development and in developing intuition. An SVM classifier is presented that utilizes a feature vector that is based on a chirplet-based decomposition of the signal. A second part of the feature vector is a cross-correlation parameter between signals recorded by sensors (L1, L2) and (R1, R2). The algorithm is shown to classify with average accuracy in excess of 94%. Further improvements are clearly possible, for example, by modifying the correlation computation to take into account signal chirp.[2]

Nowadays the need to build an affordable and effective intrusion detection system is a necessity

with the events of intrusion or burglary on the rise and as we are approaching towards making our house a smart house in this digital era. The demand for such system is going to increase rapidly if it comes with a feasible price to every household. In most of the prevailing intrusion detection systems, motion sensors are used to detect the presence of an intruder. In this paper, the passive infrared sensor (PIR) is used to detect motion. This paper discusses the application of PIR sensors in such systems and use of ZigBee to create a wireless sensor network and ESP8266 module to send data to a remote server. PIR sensor, being passive in nature is undetectable and work well in the dark environment also. Global System for Mobile communication (GSM) module is also used to send text alerts to the concerned user when an intrusion is detected. Sensor nodes which are implanted in every room send data to the center node when motion is detected. Different sensor nodes which use ZigBee for wireless transmission are all connected to a center node.[3]

This paper describes a knowledge-based VISI On system for automating the interpretation of alarm events resulting from a perimeter intrusion detection system (PIDS). Moving blobs extracted over a sequence of digitized images are analysed to identify the cause of alarm. Alarm causes are modelled by a network of frames, and models are maintained for the scene. Due to poor spatial resolution, non-visual contextual information is required to supplement the image data. Probabilities are combined and propagated through the network by Subjective Bayesian Updating.[4]

Automatic surveillance is an important research area and has been studied for many years. In this paper, a new method of Cross Border Intrusion detection in hilly region has been discussed. The Kinect cam-era ensures that intruders crossing the border can be detected during daytime as well as in night. We introduce a border surveillance system that is able to recognize intruder actions like standing, walking, crawling, and bending, etc. in illuminated as well as in dark conditions. The system is able to detect whether the moving object is a human being or an animal and activates an alarm

if it detects human movement. Also, the system works well in plain as well as in hilly terrain. Using skeletal tracking application provided by Kinect console, the actions are classified and recognized. The HMM based classification makes the system robust and thus, makes it a versatile component for being a part of other different applications. The proposed system gives result for an overall detection accuracy of 92%. [5]

Recent research in computer vision has increasingly focused on building systems for observing humans and understanding their appearance, movements, and activities, providing advanced interfaces for interacting with humans, and creating realistic models of humans for various purposes. In order for any of these systems to function, they require methods for detecting people from a given input image or a video. In this paper, we discuss a representative sample of techniques for finding people using visual input. These techniques are classified with respect to the need for pre-processing (background subtraction or direct detection), features used to describe human appearance (shape, color, motion), use of explicit body models, learning techniques. [6]

### **[III] Existing Methodology:**

As we look into present situation the PIR sensors are used to detect motion. For example PIR sensors are used for automatic switching home lights. Hence the PIR sensors are most durable for detecting motion in a predefined range.

Whenever the PIR sensor detects the motion the system triggers an alarm or any warning so that the intruder is captured.

At the same time the admin can take action or else prevent burglary. The PIR sensors can be arranged in desired pattern which are weak spots where security is not so effective and easy to break in for any intruder.

Henceforth, whenever the motion is detected in weaker spots of the area the intruder is caught. At the same for any militant purpose like in areas such as border, the PIR sensors are placed on the fencing

post's such that the sensors covers the area in radial axis along posts and creates a continuous range along border fence by placing each sensor on each post so that whenever the intruder approach the fence the PIR senses the motion and sends signal to processor and the processor triggers the alarm.

In this way the present security system are designed using PIR sensors or any other motion sensors.

### **[IV] Proposed Methodology:**

In our project we made some changes to the existing model of security system using PIR sensor so that there is no chance of any intruder could break in the restricted area. Instead of using PIR sensor we wanted to increase the accuracy among detecting the human motion using object detection theory adopting open cv modules in python language.

Whenever the human face appears before camera the camera senses the face and captures the face according to the algorithm.

Henceforth we extended the project by saving the captured face in a cloud storage so that it can be accessed by the admin using a webpage or any application from anywhere anytime. We have also installed an alarm or we can introduce a warning audio file using speaker such that it is triggered whenever a face is found in the frame.

There is even a hypothetical extension for the project as we have discussed in the introduction of this paper that is an auto aiming system can be synced with the motion of the human using camera ("not practiced in the project") such that the system can aim and trigger a stun gun (electroshock weapon) and finally the intruder gets captured.

### **COMPONENTS REQUIRED**

- SD card
- Raspberry pi 3 or above
- Logitech usb webcam
- Monitor / computer / laptop

- Pictures of eyes and face
- Designed program
- Cloud storage (ibm cloud)
- Power supply cables
- Lan cable needed if monitor is not used
- Raspberry pi case if needed

#### [V] Comparison of proposed with existing methodology:

As we know the existing methodology, the existing system cannot differ between the motion of human and animal. As PIR sensor detects the motion by sensing infrared radiation from the object which cause motion.

Therefore, both human and animals are hot bodies which exert temperature sensed by the system and alarm gets triggered even by a cat intrudes. To overcome such error in the system we have adopted camera instead of PIR sensor for sensing intruder. By adopting such changes to existing model the accuracy of sensing intruder is high than before. The main disadvantage is the proposed model is quite expensive than existing model as we discussed in above section of the paper.

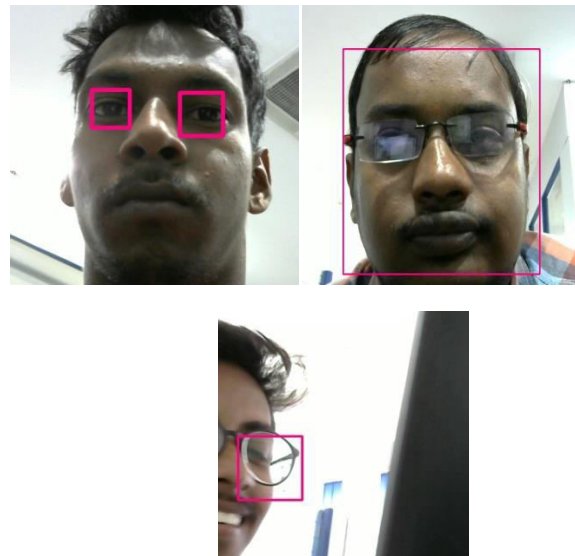
#### [VI] Conclusion:

When a malicious attacker infiltrates your network, it can lead to massive losses to your business, including data breaches, data theft, and even the loss of personal information. Protecting your networks from intrusion is one of the most important components of any security system, but figuring out which to use can be daunting. An Intrusion Detection System (IDS) is abbreviated as a tool or software that works with your network to keep it safe when someone tries to break into your system. There are a number of different types of burglaries - detection systems. Intrusion Detection System (IDS) is designed to monitor both incoming and outgoing network activity and identify suspicious patterns that may indicate that someone is trying to infiltrate or compromise your system.

Detection of intruders, as used in computer security, refers to the process of monitoring computer and network activity and analyzing events to look for signs of intrusion into your systems. Identity cards are considered passive monitoring systems, as the main function of an IDS product is to alert you to suspicious activity, not to prevent it.

Therefore, the system is a bit high accurate than the existing model by adopting camera and some python module in raspberry pi but making it expensive than before.

#### [VII] Results:



These are the photograph taken whenever a human face appear in front of camera.

#### [VIII] References:

- [1] Tarun Choubisa, Sampad B. Mohanty, Mohan Kashyap, Shivangi Gambhir, Kodur Krishna Chaitanya, Sridhar A, P. Vijay Kumar, Fellow, IEEE , An Optical-Camera Complement to a PIR Sensor Array for Intrusion Detection and Classification in an Outdoor Environment, 2017 IEEE 42nd Conference on Local Computer Networks Workshops.
- [2] Raviteja Upadrashta, Tarun Choubisa, V. S. Aswath, A. PraneethAjit Prabhu, Siddhant Raman, Tony Gracious, P. Vijay Kumar Dept. of Electrical Communication Engg., Sripad Kowshik, Madhuri S. Iyer, T. V. Prabhakar , Dept. of Electronic Systems Engg., Indian Institute of Science, Bangalore, 560012, India, An Animation-and-Chirplet Based Approach to Intruder Classification using PIR Sensing, 2015 IEEE Tenth International Conference on

Intelligent Sensors, Sensor Networks and Information Processing (ISSNIP)Singapore, 7-9 April 2015.

- [3] Khirod Chandra Sahoo, Department of Electronics and Communication Engineering, Umesh Chandra Pati, Department of Electronics and Communication Engineering, NIT Rourkela, 978-1-5090-3704-9/17/\$31.00 © 2017 IEEE 164, IoT Based Intrusion Detection System Using PIR Sensor, 2017 2nd IEEE International Conference On Recent Trends in Electronics Information & Communication Technology (RTEICT), May 19-20, 2017, India.
- [4] Paul L. Rosin, Cognitive Systems Group, School of Computing Science, Curtin University of Technology, Perth, 6001, Western Australia, Tim Ellis Machine Vision Group, Centre for Information Engineering, City University, London, EC1V 0RB, UK, Detecting and Classifying Intruders in Image Sequences.
- [5] Neeti A. Ogale, Department of Computer Science, University of Maryland, College Park, MD 20742, A survey of techniques for human detection from video.