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Border Security: Intruder Human Detection using Image Processing

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Abstract:– This project implements a new defense mechanism which has a detecting and an aiming unit. The main objective is to help the armed forces to catch intruders. The targeting unit has a microcontroller along with sensors to detect the presence of humans in thetargeted area and processes various atmospheric parameters electronically.LASER pointer is used to determine if the desired target is hit or missed by tracking the path of the Laser and determining the point of intersection with the LASER. Once the parameters are obtained are obtained the targeting unit automatically positions the gun using its special mechanism.

Keywords:- *Sensors, Wireless sensor Network, Base Station, Target Tracking, Human Model, Monitoring.*

I. INTRODUCTION

Ensuring a nation's border is an imperative undertaking for Homeland security. One of the greatest difficulties of fringe security is to secure sheer extent region of border locales. Nations like India have long land fringes and interruption is a long standing issue. Security personals work in round the check and in various landscapes from snow to thick woodland and from sharp slopesto leave. In the day the visual checking is useful; none the less, it is exceptionally hard to recognize potentialinterlopers or dealers in absolute obscurity or in other low-light conditions. Indeed, even Europe and USA additionally have comparable interruption issues. Security Industry is developing at a fast rate because of expansion in wrongdoing rate in the previous couple of years. Interruption location gadgets have been utilized widely for security purposes as a part of request to distinguish the section of unapproved individual in an ensured zone. Different video reconnaissance frameworks are introduced with the alert framework at open and private spots.

II. LITERATURE SURVEY

A. Title- Automated Intruder Detection System Using Camera/Image Capture :

Autonomous shooting system projects have been previously created andimplemented in the past. The system as a whole is not a new technology.Various aspects of the system have been done previously for a variety ofreasons, such as the motion tracking and a gun based system that executesincoming targets. These were the original and unique technologies that whenintegrated together will help in building our autonomous shooting system.The influence of these existing technologies has widened the range for thegrowth of different prototypes for future solutions. The previous projectsfailures and successes are determined by the researching them for the designof this project which will help to improve our system[1].

B. Title- Intruder tracking using wireless sensor network

In this paper, Target tracking, data processing and analysis play a major role in this type of applications. The proposed system is to develop a centralized computer application that needs to identify moving objects in a specific area using sensors. Human intruders can be detected using this system. The objective is to design and implement an object tracking system to detect and track objects, and report direction and speed of the intruder to a central base station. The human intruder is detected using a passive infrared (PIR) sensor. The sensor is connected to a MICA sensor node. The PIR sensor is able to detect the humans and provide information about the direction of the movement. The gathered information from the sensor network is to be given to the base station for processing. The proposed system provides an environment for easy deployment and which does not require any existing infrastructure or constant monitoring by humans[2].

C. Title- Using seismic footstep signatures for discriminating of bipeds from quadrapeds

Seismic sensors are widely used to detect moving targets in the ground sensor network, and can be easily employed to discriminate human and quadruped based on their footstep signatures. Footstep detection and classification is a very challenging problem as a result of the complex environmental conditions and non stationary nature of the seismic signals.[3].

D. Title- A new approach in border security applications with Camera Detection

In recent years, either in humanitarian aid or border security acts, identifying and tracking asylum seekers or refugees has become a critical problem. In traditional biometric identification solutions used for person recognition in border security or humanitarian aid activities, biometrics like face, fingerprint or iris have usually been preferred [4].

E. Title- Large scale border security systems modeling and simulation with OPNET

Most aliens who manage to get across borders undetected are known to end up in cities, and comprise some of the greatest security challenges a country can face.

Effective border detection systems can help inreal time border security integrity.[5].

F. Title- Field trial of the first photonic-based radar for maritime border security and harbor protection

The field trial results of the first photonics-based radar system in a real maritime environment are presented in this paper. The system allows increased performance and an unprecedented potential flexibility by sending and detecting Radar Signals.[6].

G. Title- A Model-Based Approach to Predicting the Performance of Insider Threat Detection Systems

The confusion matrix is presented to verify whether the intruder is insider or not. To evaluate a predictive model, datasets are used which include injected insiders. [7].

H. Title- Smart Surveillance Security &Monitoring System Using Raspberry PI

This paper helps in the designing and implementation of Smart surveillance monitoring system using Raspberry Pi and PIR sensor for mobile devices. It increases the usage of mobile technology to provide essential security to our homes and for other control applications .It has human detection and smoke detection capability that can provide precaution to potential crimesand potential fire. The credit card size Raspberry Pi (RPI) with Open Source Computer Vision (Open CV) software handles the image processing, control algorithms for thealarms and sends captured pictures to user's email via Wi-Fi. [8].

I. Title-Social Simulations for Border Security

In this paper, the interactions among border security forces, smugglers and population are incorporated in social, cultural and organizational aspects and represent mobile sensor and surveillance network.[9].

J. Title- Border Security: Using sequential pattern minning using Supplementing Human Intelligence in a Sensor Network

Sensors are used for achieving border security. These sensors can also respond to other events triggered due to external factors also called as false alarms. This paper focuses on eliminating false alarms.

III. TECHNIQUES

A. Motion tracking

Motion tracking algorithm can be used for detection, identify and track the object, once the objects within the image have been detected, the next logical step isto track those objects. Our algorithm uses the most popular method of trackingby optical flow. The algorithm is known as the Lucas-Kanade algorithm, whichis a differential method. In this method, we give some points to track and wereceive the optical flow vectors of those points. So applying Lucas-Kanade there, we get optical flow of the detected object.

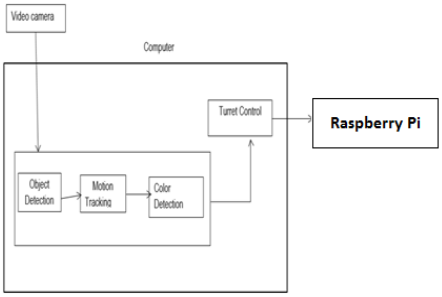
IV. EXISTING SYSTEM

WSN gained popularity in the last decade due to their ability to connect physical and digital world. WSNs have quickly become popular due to their low cost solutions to verify real world challenges. Currently, WSN is applied in numerous applications such as the monitoring of wildlife, border security, industries etc.[1].

A. Following are the requirements of the detection system

- The camera was the firm factor to detect the intruder as enters in the surveillance, functional parts of the camera locating the intruder.
- In current system the need of the human for the particular action to be performed on the Intruder.
- The system should have the prime factor to deal with the environment in the circumference, optional technology will get the use of the surveillance.
- The Intruder detection helps to reduce the Causality on the Border and might get the system optional retrieval.

➢ *Architecture*

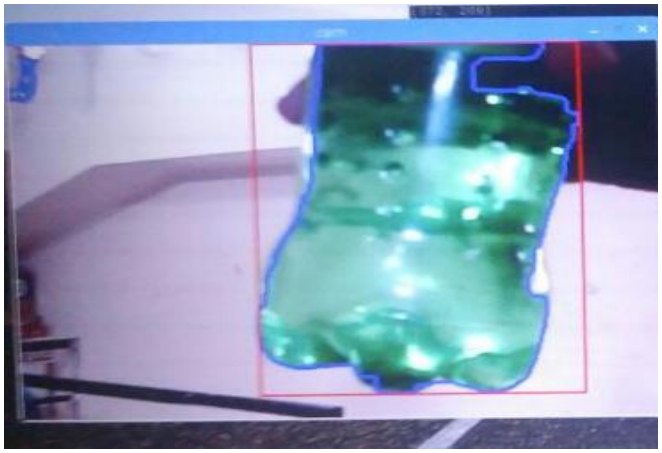


V. PROPOSED SYSTEM

➢ *Proposedsystem consists of following parts*

A. Object detection

For detecting objects we are using the Histogram of Oriented Gradients (HOG) descriptor. This method suggested in Histogram of Oriented Gradients for Human Detection demonstrated that the HOGimage descriptor and a Linear Support Vector Machine (SVM) by Dalal and Triggs in their seminal 2005, we can use this totrain highly accurate object classifiers. Thus we are using this descriptor to detect human objects in the video stream



B. Motion tracking

Once the objects within the image have been detected, the next logical step is totrack those objects. Our algorithm uses the most popular method of tracking by optical flow. The algorithm is known as the Lucas-Kanade algorithm, which isa differential method. In this method, we give some points to track and we receivethe optical flow vectors of those points. We getoptical flow of the detected object using Lucas – Kanade.

C. Color detection

The system will be able to differentiate between allied targets and enemy targets by detecting colours. We use HSV instead of RGB to detect colors.

The primary benefit of a pixel represented by HSV is that it would be relativelyeasy to detect the various shades of a single color. This method gives you a nicebinary image that displays the specified color as white with all other objects andcolors on the screen as black. By specifying a certain range of color to represent anallied target, the system will be able to calculate the average color of the target.

VI. ADVANTAGES

- System will be safe and reliable for military and lawenforcement use.
- Al low-cost robotic device.
- The device can interact without human presence.

VII. CONCLUSION

As we conclude here, implemented the system for reducing the causality for the men on border, efficient security system that automatically detects the intruder and response accordingly. The security is been based on the automation without any human interaction.

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