WEB-BASED ONLINE EMBEDDED SECURITY SYSTEM AND ALERTNESS VIA SOCIAL MEDIA

MEHARAJ BEGUM.R [1], PRIYADHARSHINI.K [2], SWATHI.K [3], ANUSHA.P.M [4], SOFIYA JENIFER.J [5]

Students [1, 2, 3], Assistant Professor [4, 5], Dept. of Electronics and Communication Engineering, Parisutham Institute of Technology & Science, Tamil Nadu, India.

---***---

Abstract - *This paper presents about providing more security to BANK from intruder. Now a day protecting the BANK from the intruder became very difficult. So far providing the security, plenty of technology has been developed. These existing technologies cannot give the security properly. So we have introduced new technology to provide a more security by using rotatable camera.*

Key Words: **HMM algorithm, Raspberry pi, Optical flow, Median filter, Kalman filter, Cmeans, Canny edge detection, Whatsapp**

1. INTRODUCTION

Security is most important in every place; without security it leads to greater loss; especially providing security to the bank is must to save all of our money; the motivation of this paper is to provide the better security to the bank by using new technology with latest equipment called Raspberrypi and it follows Hidden Markov model algorithm.

1.1 Background

The features and colors of computer visual detection and vision always been an area of interest for popular companies can invest in costly high-level technology and machinery, but with the advent of cheap and small sized(debit-card computers such as the Raspberry Pi has a greater role in society. The RaspberryPi microcomputer was developed for the sole purpose of commercial and academicals use. The applications of any sort of computer vision or feature detection software in general are numerous. Examples: people tracking at shopping mall, surveillance systems with face recognition, helping robots to pick up objects and to navigate, are monitoring the equipment. The idea behind this is to form a foundation of knowledge regarding embedded systems, visual detection of objects and the basics of real-time image processing (or other features), upon which it is possible to add some layers of complexity and have to undergo further research with which to modulate projects ranging from less cost and face recognition or small real-time systems for simple object detection to high complex systems such as intelligent machines with self-learning robots with the capability of visual feedback.

1.2 Aim of thesis

The main goal is to write a python application, with the help of Open CV libraries, which can be used on an embedded system, specifically a Raspberry Pi to:

- Capture the coloured blobs from web camera feed
- considering these blobs are objects, and save them in memory to keep track of their coordinates and other properties
- Attempt to confirm the linear and realistic movement of these objects
- Send helpful message about these objects and its movement continuously as datagram's (using UDP protocol of network sockets) to any software which makes information requests.

1.2.1 Existing system

In current state CCTV camera is used in all places especially in Bank for security purpose and CCTV camera has been checked to find the movement or fault in the bank. Consider the situation like the intruder is coming to bank by today night to steal the money and this can be detected by tomorrow morning only and then we will be checking the CCTV camera to find the intruder.

1.2.1.1 Disadvantage

- It fails to provide the high security
- It requires large memory space to store the images
- It fails to protect the money from the intruder.

1.2.2 Proposed system

This proposed system is to provide the proper security to the bank by using raspberry pi kit and it follows the HMM algorithm .web camera captures the movement of object and send those images to the bank manager and to the police station via whatsapp for security alertness .and it helps to catch the intruder before he departure from the bank with money.
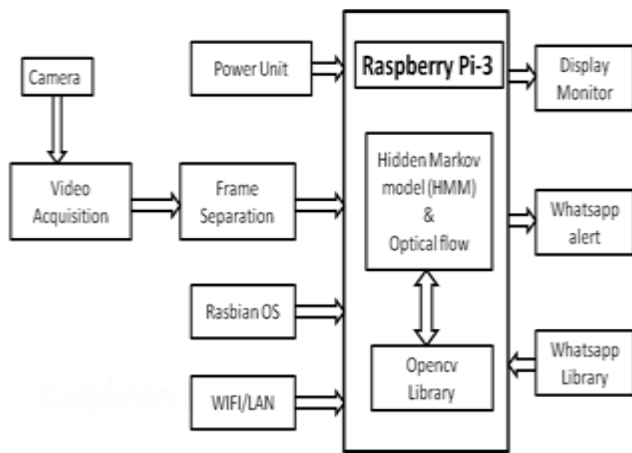
2. BLOCK DIAGRAM

Fig.1 Description of block diagram:

The block diagram consist of various components such as web camera ,raspberry pi kit and display monitor and power unit and the process is shown in the figure 1. The camera is to monitors the bank and captures the images of it and these images are given as input to the video acquisition block, this will convert the images into video format. And this video is given as input to the frame separation part; this will convert the video into number of frames and the output of the frame separation block is given as input to the raspberry pi kit. Here it follows one algorithm called hidden Markov model (HMM) all the image processing process is done by this algorithm. it gets the frames and it takes the two frames at first, in that the first frame is considered as reference image and the second frame is called as processing image, here the changes can be detected by cmeans, that is it compares the two frames(reference and processing images) and finds the changes in it ,this process is done by cmeans.

And the output of the cmeans is given as input to the various filters .at first the noise in this image can be reduced by median filter and output of this filter is given to the kalman filter. This filter used to find the pixel variation by comparing the two frames. Then this output is given to the canny edge detection; this detects the edges of the image. And the back ground subtraction (bgs) is used to fix the threshold value which can be used to detect the movement changes when it exceeds the threshold value. And the optical flow is used to track the movement of the object flow (direction of movement). The final detected image can send via whatsapp for alertness. This can be done by whatsapp library which will make communication between python language and the high level language used in the whatsapp. And the display monitor is connected to the raspberrypi to view the detected image. The raspberry pi requires power unit of five volt and 2amps.and it requires LAN/WIFI connection to send the image via whatsapp and open CV contains all the functions related to the raspberry pi and pi kit works by rasban OS.

2.1 Hardware used:

Raspberrypi kit, web camera, power unit
2.2 Software used:

Geany, python (language), HMM (algorithm), open CV, whatsapp library.

3. COMPONENTS DESCRIPTION:
3.1 Raspberry Pi

Raspberry Pi is a better choice when taking into account of relatively high performance requirements of image processing and the equipment currently available for image processing, are the relatively inexpensive and powerful embedded platform. Raspberrypi has the availability of the Pi camera module, which can capture high-clarity video as well as snaps which are another factor for chosen RaspberryPi and this requires a continues updating of Raspberrypi firmware to the latest version. It works better with OpenCV based applications. Even though using the officially supported camera module, It can be accessed through the V4L APIs and MMAL and it is accepted by the numerous third-party libraries, It can use any USB web-camera.

- It works by rasban OS
- It act as micro controller as well as micro processor
- It is inbuilt with blue tooth, WIFI/LAN
- It has ARM11 processor
- It has 1gb RAM
- It can accept 32 GB memory card

3.2 Web camera

Continuous monitoring and pixel support of 16 mega pixels

3.3 video acquisition

The video capture process is to convert the analog image into the digital image by the analog to digital converter. Next, the chrominance is been demodulated to produce color difference video data. It converts the images into video format.

3.4 Background subtraction

It is used for detecting the moving objects from the difference between the current frame and a reference frame by fixing the threshold. It helps to fix the threshold to track the movement.

3.5 Hidden Markov model (HMM)

In a *hidden* Markov model, the state is not been directly visible, but the output which dependent on the state, is visible. Hidden Markov models are especially used for the application such as speech, gesture recognition, part-of-speech tagging, musical score following, partial discharges and bioinformatics. A hidden Markov model can be considered as generalization of a mixture model where the hidden variables are considered for observation.

3.6 Median filter

Median filte**ring** technique often used to remove noise from the images such noise reduction is a typical pre-processing step to develop the results for further processing.

3.7 Fuzzy c-means

(FCM) is a data clustering technique in which a dataset is grouped into n clusters with every data point. This is used to compare the two images to find the changes.

3.8 Kalman filtering

It is also known as **linear quadratic estimation** (**LQE**) filter .which is used to find the pixel variation by comparing the reference and processing image. The Kalman filter has variety of applications in technology. A common application is for guidance, navigation, and control of vehicles, particularly aircraft and spacecraft. Furthermore, the Kalman filter is a widely applied concept in time series.

3.9 Canny edge detector

It was developed by Jhon F.Canny in 1986 it is an edge detection operator that uses a multi-stage algorithm to detect a wide range of edges in images.

3.10 Optical flow

It detects the motion of objects, surfaces, and edges in a visual scene caused by the relative motion between an observer and a scene. It is also called as scene flow. Which detects the flow of movement.The idea of optical flow was created by the American psychologist James J. Gibson in the 1940.

3.11 OpenCV (Open Source Computer Vision Library)

It is an open source computer vision and machine learning software library. OpenCV was developed to provide a common infrastructure for computer vision applications and to accelerate the use of machine perception in the commercial products. It has C++, C, Python, Java and MATLAB interfaces and supports Windows, Linux, Android and Mac OS. It has all the functions related to raspberrypi kit.

Advantages
- It provides high security
- It requires very less memory space to store the images
- Less cost
- Small in size

Applications
- Bank
- Jewellery shop
- Expensive exhibition

4. CONCLUSION

In this paper a web camera is used to detect the movement of object by using raspberrypi kit and sending alertness messages via whatsapp and thus provides the perfect security.

REFERENCES

[1] 'Motion video sensor in the compressed domain'. SCS Euro media Conf., Valencia, Spain, 2001.

[2] GieseandT.Poggio (2003) Neural mechanisms for the Recognition of Biological movement sand action. Nature Reviews Neuro science 4:179–192.

[3] "Neural Networks for 3D Motion Detection From a Sequence of Image Frames," Chan Lai Wan and Yip Pak Ching, IEEE, computer Science Dept., The Chinese University of Hong Kong, 1991.

[4] Ferster and K.D. Miller. (2000). Neural mechanisms of orientation Selectivity in the visual cortex. Annual Review of Neuroscience, 23:441–471.

BIOGRAPHIES

Meharaj Begum.R pursuing her B.E degree in Electronics and Communication Engineering in Parisutham Institute of Technology and Science.

Priyadharshini.K pursuing her B.E degree in Electronics and Communication Engineering in Parisutham Institute of Technology and Science.

Swathi.K pursuing her B.E degree in Electronics and Communication Engineering in Parisutham Institute of Technology and Science.

Anusha.P.M completed her ME in VLSI Design in Kings College of Engineering and completed her BE in Electronics and Communication Engineering in Periyar Maniyammai University. She is working as Assistant Professor in Parisutham Institute of Technology and Science.

Sofiya Jenifer.J completed her ME in VLSI Design in Kings College of Engineering and completed her BE in Electronics and Communication Engineering in Anjalai Ammal Mahalingam Engineering College. She is working as Assistant Professor in Parisutham Institute of Technology and Science.