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RESEARCH ARTICLE

SURVEILLANCE SYSTEM USING ACTIVE RFID TAG AND MOTION DETECTION CAMERA

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ABSTRACT

From many years we are facing problems of intrusion on our nation's boundary. There is need to improve the security arrangements with help of technology. With our project we will be able to improve the surveillance across the boundary. It will help to detect the intrusion activities and helps the army people to take necessary action. The benefit of this system is to surveillance the people without using close circuit cameras.

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INTRODUCTION

Surveillance is the monitoring of the behavior, activities, or other changing information, usually of people for the purpose of influencing, managing, directing, or protecting them [1]. Video surveillance is a vital tool for protecting people and property around the clock. The increasing availability and, thus, lower cost of higher-quality cameras makes improving the effectiveness of video more affordable. Surveillance systems are becoming need of business, offices, markets, hospitals, residential areas etc. So, designing a surveillance system have many aspects. It need some modifications according to its purpose. Main purpose of surveillance system is security. But there are other some very important uses of surveillance. Surveillance is used by governments for intelligence gathering, the prevention of crime, the protection of a process, person, groups or objects. In police department or in investigation department surveillance systems are very useful in investigation. Now days, videosurveillance (Tian and Hampapur, 2005) systems with some modification is getting utilized for traffic analysis (Bahlmann, 2005). The systems and vision research communities to develop a surveillance system that is low-cost, reliable, easy-to-manage, easy-to-deploy and can process video data for automated realtime alerts and effective retrieval of archived footage (Chingchun Huang, 2009).

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So, the main purpose of this project is designing a surveillance system with RFID tags and motion detection camera. RFID tags will be used due to their cost effectiveness. There are surveillance systems in market with different technologies but they have very high cost. So, using RFID tags we can design a cost-effective surveillance system.

Definitions

- Image Processing: Image Processing is the method to perform some operations on image in order to get enhanced image or to extract some useful information from it.
- RFID: It stands for Radio Frequency Identification. It uses electromagnetic fields to automatically identify and track tags attached to the object. There are generally two types of RFID's RFID tags can be classified into three major categories by their power source (Hai Liu) : active tags, passive tags, and semi passive (semi-active) tags. An active tag contains both a radio transceiver and a battery that is used to power the transceiver. A passive tag operates without any battery. It reflects the RF signal transmitted to it from a reader or a transceiver and adds information by modulating the reflected signal. The passive tag does not use any battery to boost the energy of the reflected signal. Similar to passive tags, semi-passive tags use the radio waves of senders as an energy source for their transmissions. However, a semi-passive tag may be equipped with batteries to maintain memory in the tags or power some additional functions. Active tags are more powerful than passive tags/semi-passive tags, such as larger range and memory, more

functions. Meanwhile, the active tags are more expensive than passive/semi-passive tags. RFID tags operate in three frequency ranges: low frequency (LF, 30~500kHz), high frequency (HF, 10~15MHz), and ultra high frequency (UHF, 850~950MHz, 2.4~2.5GHz, 5.8GHz).

Brief review of Literature

The objective of this project is to integrate an RFID (Radio Frequency Identification) reader into a Wireless Sensor Network (WSN) to authorize or keep track of people carrying RFID tags. The objective will be accomplish by integrating hardware and software. The hardware consist of WSN nodes – the RFID node connected to one of the WSN (Chingchun Huang, 2009), nodes, and a computer connected to the other WSN node (Active RFID tag). For the RFID equipment, we will use the SM130-EK kit, which included the RFID reader and the RFID tags (Bolivar Torres, 2010). The software consisted of a program module developed in Python to control the microprocessors of the nodes; and a database controlled by a simple program to manage the tag IDs of people wearing them. The Active RFID reader and RFID nodes were connected through I2C interfacing. Also, the work of sending commands to the RFID node, to make it read a tag and send it back to the computer, was accomplished by the Python code developed which also controls the data signals . Another part is using Image processing algorithm we will detect motion. At the computer, the received tag ID is evaluated with other existing tag IDs on the database, to check if that tag has authorization or not to be in the covered area and also detects the unknown person using Motion sensors Camera (Hai Liu). The system also alarms the presence of unknown person. Our research has the potential of being adapted for use with secure real-time access control applications involving WSN and RFID technologies (Chiesa, 2002). The designed protocol will be tested on both in real world with designed hardware and in a network environment on a computer. Real world tests were only performed in small scale as the numbers of nodes are limited.

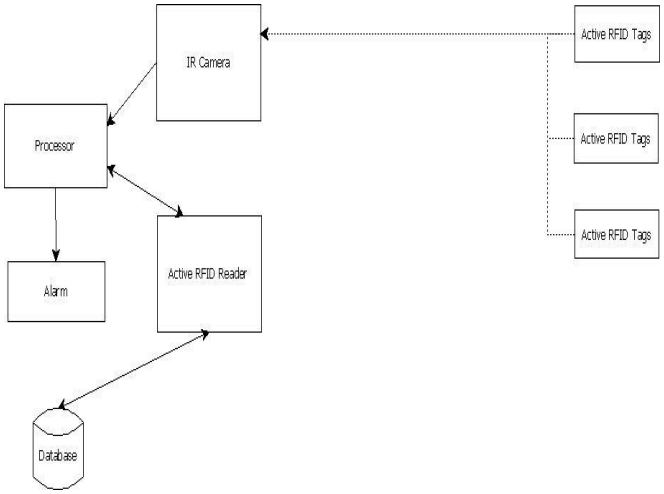

Fig. 1. Architectural Block Diagram

Purposed IDEA'S ARCHETECTURE AND DESIGN

The architectural block diagram of purposed idea is given below in Fig.1. The IR camera is connected to the central processing unit by means of cable or wireless. Then the processor in terms connected with Active RFID reader and Alarm. The Active RFID reader is connected with database server. First we will capture video stream with help of camera and provide this input to Matlab 2015b software where we are going to run image processing algorithm for motion detection (Jechlitschek, 2006). As soon as it receives stream of video, it divides that stream of videos into continuous stream of image frames. Then the subsequent image frames are compared and if any change in the frames is encountered it can be said that the motion is detected. Then with the help of processor we will enable active RFID reader and it will check for active RFID tags in that region. If it finds one, it will check the authenticity of that tag by looking into database if no entry found then the signal to ring the alarm is generated.

Detail Description of Modules and path

After IR Camera

Infrared Camera is used to capture the video stream at current time. This video stream is provided to Matlab software through wire or wireless way and further image processing takes place there.

Image processing

This module performs motion detection algorithm on received video stream from IR camera. If any motion is encountered, then it generate the signal to switch on Active RFID reader.

Active RFID tags and Active RFID Reader

Active RFID tags are used for identifying individual. When processor enables Active RFID reader it checks for possible number of Active RFID tags within its range and if it finds one then it will capture the signal and send it to database for authentication (Bolivar Torres, 2010).

Database

All the readers are connected with the central database server. This check for the authenticity of tag, if it finds some sort of threat then it sends signal to processor to generate alarm. When Active RFID tags come in contact with the reader. Reader sends that information to the database and it checks that ID with the same domain, where it comes from and then make a log for that event and follow the Standard Procedure for that type of case, for example if that tag is not authentic then the alert will be sent to the processor and processor will generated alarm for the same. On the other hand, if that tag is authentic then the log file will be made only and nothing will happen.

Brief review of Literature

Cascade Object Detector

The cascade object detector uses the Viola-Jones algorithm to detect people's faces, noses, eyes, mouth, or upper body. You can also use the Training Image Labeler to train a custom classifier to use with this System object.

Face Detector = vision. Cascade Object Detector();

MultiObjectTrackerKLT- MultiObjectTrackerKLT implements tracking multiple objects using the Kanade-Lucas-Tomasi (KLT) algorithm.

tracker = MultiObjectTrackerKLT() creates the multiple object tracker.

vision.VideoPlayer- The VideoPlayer object can play a video or display image sequences.

```
frame = snapshot(vidObj);
frameSize = size(frame);
videoPlayer =vision.VideoPlayer('Position',[200 100 fliplr(frameSize(1:2)+30)]);
```

rgb2gray(framergb) function- convert color image frame into gray image.

```
framergb = snapshot(vidObj);
  frame = rgb2gray(framergb);
```

Conclusion

Due to implementation of this idea we will able to detect the intrusion activities on nation's boundaryand it helps to improve security arrangements across boundary. This project can be implemented not only on nation's boundary but also in every surveillance system. This system can read tags with the range only up to 10 meter. The performance of this system depends on the quality of RFID system.

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