

IOT Based Border Security with Automatic Gun Actuation Using Motion Tracking System

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ABSTRACT: The aim of this work is to design the automated security system in order to detect, track and destroy the target for surveillance operations. The system can be operated in two modes, in which the target can be tracked automatically by using microcontroller based system. On other hand, the system can also be controlled manually in which the user has right to select the target and performs shooting if necessary. The image processing algorithms are implemented in Matlab. The process starts by processing the video signal on computer by using the video camera, then the target is selected which can be tracked further by using different image processing techniques. After the selection of target, the micro-controller unit takes the decision to shoot any unauthorized person or activity within its range. The gun is mounted on a tripod stand and its movement is controlled by using the stepper motor

KEYWORDS: Microcontroller, Relay, Webcam, actuator.

I. INTRODUCTION

In these days security is the major issue for all over the world. Security is very important in order to protect vulnerable and valuable assets such as a person, dwelling, community and nation from any harm. International security issues are also very important, especially border and coast security to any country. The people of national security agencies, maritime security organization, military forces and other forces sacrifice their lives to protect their country people. The lives of forces are also very precious like other lives. So by using advance technologies, the forces can protect their nation superiorly with minimum life losses. In this modern era, computer base security equipments are very popular among forces because they are more advance and safe for themselves.

For example drone technology the “unmanned aerial vehicle” which is controlled automatically by computer is very popular these days. In this technology, the target is selected and hit by using computer based algorithms including image processing techniques. Real time image and video processing for object detection and tracking has many important applications in the field of computer vision(B. Coifman et al., 1998), such as video surveillance, military purposes etc.

The availability of high quality and inexpensive video cameras and the increasing need for automated video analysis has generated a great deal of interest in the areas of motion detection, object tracking and object targeted(A. Yilmaz et al., 2006) Thus on a very high possible to identify three key steps in video analysis: detection of interesting moving objects, tracking of the detected objects from frame to frame, and analysis of the object tracks to recognize their behaviour and targeted object accordingly.

Another existing example of automatically aimed weapon is the sentry gun which aims and fires the targets which is selected by its sensors Another existing application is “Air Defence Gun” which is mounted on the device at the top of the army tank which automatically tracks and shoots low flying a Object detection with a camera is a revolution in image processing which itself has applications in various civilian and military fields. These applications include air traffic control, navigation system, error tolerant systems, judgment problems, inspection, target I Analyse, command and control, sensor management and weapon assistance.

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II. RELATED WORK

1. This paper has presented an autonomous moving robot has been implemented which is capable to detect a certain object, approaches towards its target and shoot it down. The result shows that the accuracy to find the target is 95 % which demonstrate its accuracy and efficiency. The main constraint of this approach is that it can shoot only static object but no one is always static in nature. So our future work is to make an autonomous system which could predict the direction of moving targets using object tracking.
2. This paper describes a vision-based navigation method in an indoor environment for an autonomous mobile robot which can avoid obstacles. In this method, the self-localization of the robot is done with a model-based vision system, and a non-stop navigation is realized by a retroactive position correction system. Stationary obstacles are avoided with single-camera vision and moving obstacles are detected with ultrasonic sensors. We will report on experiments in a hallway using the YAMABICO robot.

III. WORKING

This system is operated in two ways manually as well as automatically. In which we are going to detect the target with help of microcontroller and camera. And on other hand, we are operating manually. In which the user has right to track the target and perform shooting if necessary.

We have used 24 megapixel camera. The range of the camera is around 50-60 meter. With the help of camera and microcontroller we are detecting the target. We have used pc for to see the detected image.

At the receiver section, we have used 5 volt power supply.

Relay is used as switch. We have used black actuator as gun The main reason behind using black actuator because its mover. For receiving radio singles we have used RF receiver .

Transmitter Section

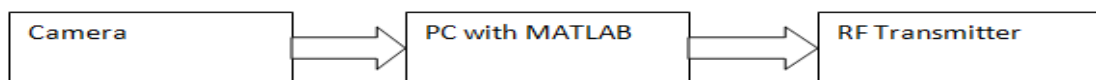


Fig. 1. Transmitter Section

Fig. 1 shows the transmitter Section in which Camera captures the image and it is processed through matlab and send to RF Transmitter.

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Receiver Section

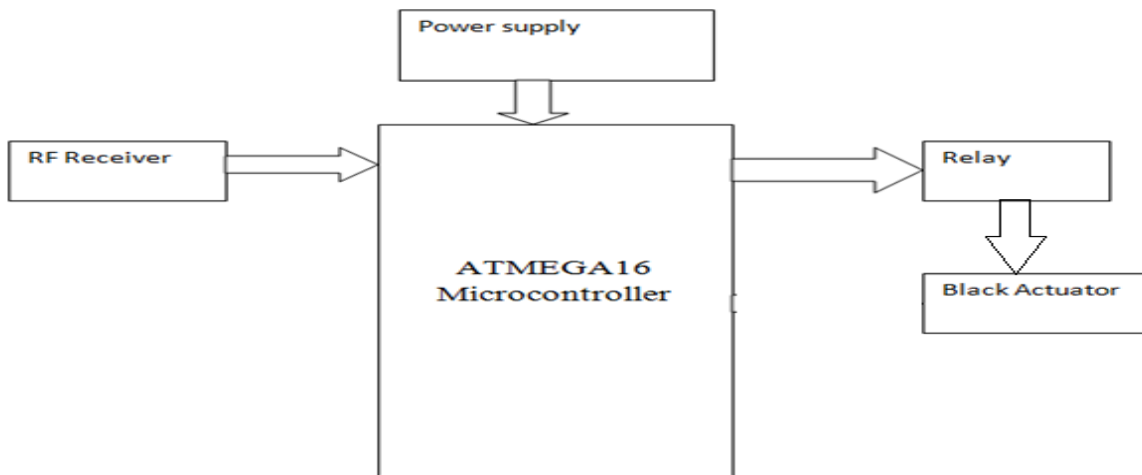


Fig. 2. Receiver Section

Fig. 2 shows the Receiver Section which is synchronized with the Transmitter Section, RF Transmitter sends the data to RF Receiver, RF Receiver send the image signal to Microcontroller which is programmed for the detection of target. Relay acts as a switch and Black Actuator is used for the shooting of unauthorized person or activity within the range.

Black Actuator

An actuator is a component of a machine that is responsible for moving or controlling a mechanism or system, for example by actuating (opening or closing) a valve; in simple terms, it is a "mover". An actuator requires a control signal and a source of energy. The control signal is relatively low energy and may be electric voltage or current, pneumatic or hydraulic pressure, or even human power. The supplied main energy source may be electric current, hydraulic fluid pressure, or pneumatic pressure. When the control signal is received, the actuator responds by converting the energy into mechanical motion.

RF Transreceiver

An RF module (radio frequency module) is a (usually) small electronic device used to transmit and/or receive radio signals between two devices. In an embedded system it is often desirable to communicate with another device wirelessly. This wireless communication may be accomplished through optical communication or through radio frequency (RF) communication. For many applications the medium of choice is RF since it does not require line of sight. RF communications incorporate a transmitter and a receiver. They are of various types and ranges. Some can transmit up to 500 feet. RF modules are widely used in electronic design owing to the difficulty of designing radio circuitry. Good electronic radio design is notoriously complex because of the sensitivity of radio circuits and the accuracy of components and layouts required to achieve operation on a specific frequency. In addition, reliable RF communication circuit requires careful monitoring of the manufacturing process to ensure that the RF performance is not adversely affected. Finally, radio circuits are usually subject to limits on radiated emissions, and require Conformance testing and certification by a standardization organization such as ETSI or the U.S. Federal Communications Commission (FCC). For these reasons, design engineers will often design a circuit for an application which requires radio communication and then "drop in" a pre-made radio module rather than attempt a discrete design, saving time and money on development.

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RF modules are most often used in medium and low volume products for consumer applications such as garage door openers, wireless alarm or monitoring systems, industrial remote controls, smart sensor applications, and wireless home automation systems. They are sometimes used to replace older infra red communication designs as they have the advantage of not requiring line-of-sight operation.

IV. RESULTS AND SIMULATIONS

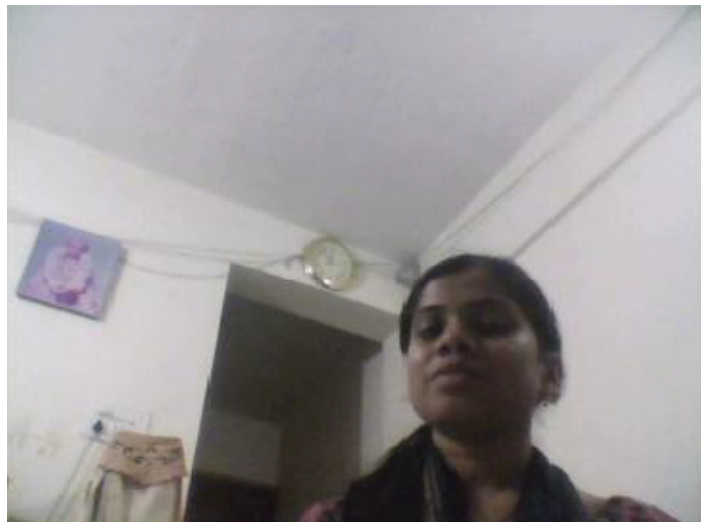


Fig. 3. Current Image

Let us consider example, image Fig. 3. Shows the current image is captured by camera and is processed through matlab algorithm. And Fig.4 shows the motion detected image which is processed and ready for the shooting purpose



Fig. 4 Motion Detected Image

Fig. 4 shows motion detected Image which is ready for the shooting purpose.

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V. CONCLUSION

This project has presented an autonomous moving robot has been implemented which is capable to detect a certain object, approaches towards its target and shoot it down. The result shows that the accuracy to find the target is 95 % which demonstrate its accuracy and efficiency. The main constraint of this approach is that it can shoot static object as well as dynamic object in the nature. The video is captured during the motion of object and it is transferred to the control room through RF transceiver module.

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