MOTION SECURITY/THEFT PROTECTION USING MATLAB PROGRAMMING

A. Harish Kumar Gupta, GBTU[1]; Second B. Pooja Upadhyay, GBTU [2]; C. Sourabh Dubey, GBTU [3]; F D. Satyendra Pratap Singh, GBTU[4]; KIT Kanpur, A-1, UPSIDC, Industrial Area, Rooma Kanpur Pin- 208001

Abstract

Motion can be detected by measuring change in speed or vector of an object or objects in the field of view. This can be achieved either by mechanical devices that physically interact with the field or by electronic devices that quantify and measure changes in the given environment. Motion sensors are often used in indoor spaces to control electric lighting. If no motion is detected, it is assumed that the space is empty, and thus does not need to be lit. Turning off the lights in such circumstances can save substantial amounts of energy. In lighting practice occupancy sensors are sometime also called "presence sensors" or "vacancy sensors".

Introduction

The Motion in any living object due to its body temperature can be figured out in any direction with or without speed in the field of view. This can be achieved either by mechanical devices that physically interact with the field or by electronic devices that observe and measure changes in the given environment. Motion sensors are often used in indoor spaces to control electric lighting.

A motion detector i.e. Passive Infrared sensor (PIR sensor) is an electronic device that is being used to measure the infrared (IR) light radiating from objects in its field of view. PIR sensors are often used in the construction of PIR-based motion detectors. Apparent motion is detected when an infrared source with one temperature, such as a wall. All objects above absolute zero emit energy in the form of radiation. Usually infrared radiation is invisible to the Human eye but can be detected by electronic gadgets designed for such a purpose. The term passive in this instance means that the PIR device does not emit an infrared beam but merely passively accepts incoming infrared radiation. "Infra" means below our ability to detect it visually and "Red" is because of its Color representation which shows the lowest energy level of the color RED and applies to many sources of invisible energy.

How PIR Motion Sensors Work?

There are many different ways to create a motion sensor. Motion is detected when an infrared emitting source with one temperature, such as a human body, passes in front of a source with another temperature, such as a wall. It is common for stores to have a beam of light crossing the room near the door, and a photo sensor on the other side of the room. When a customer breaks the beam, the photo sensor detects the change in the amount of light and rings a bell. Many grocery stores have automatic door openers that use a very simple form of radar to detect when someone passes near the door. The box above the door sends out a burst of microwave radio energy and waits for the reflected energy to bounce back. When a person moves into the field of microwave energy, it changes the amount of reflected energy or the time it takes for the reflection to arrive and the box opens the door. Since these devices use radar, they often set off radar detectors. The same thing can be done with ultrasonic sound waves, bouncing them off a target and waiting for the echo.

All of these are active sensors. They inject energy (light, microwaves or sound) into the environment in order to detect a change of some sort.

This feature of "sensing the motion" on most lights (and security systems) is a passive system that detects infrared energy. These sensors are therefore known as PIR (passive infrared) detectors or pyro electric sensors.

Software Used

MATLAB-2007 for Image Acquisition using Image Acquisition Toolbox is used for the sensor and camera so that the objective may be done. In this we make a program using MATLAB-2007 which is made in C compiler i.e. any of the compilers as GCC compilers.

A Bit about Image Acquisition in MATLAB

Image Acquisition Toolbox enables you to acquire images and video from cameras and frame grabbers directly into MATLAB. You can detect hardware automatically and configure hardware properties. Advanced workflows let you trigger acquisition while processing in-the-loop, perform background acquisition, and synchronize sampling across several multimodal devices. With support for multiple hardware vendors and industry standards, you can use imaging devices ranging from inexpensive Web cameras to high-end scientific and industrial devices that meet low-light, high-

speed, and other challenging requirements. Image Acquisition Toolbox provides graphical tools and a programmatic interface to help you work with image acquisition hardware in MATLAB. You can automate repetitive tasks, create workflows combined with tasks such as image processing, and create standalone executable that acquire images and video with MATLAB Compiler. The toolbox enables you to customize the acquisition process to include integrating image processing functionality to identify objects, enhance imagery, or construct mosaics and panoramic views as the data is acquired.

Electric Components to be used

- Microcontroller AT89s8253
- Motor Driver L293D
- Voltage Level Converter Max232
- Voltage Regulator 7805
- Capacitors, resistors and diodes as and when required.
- Webcam (Quantum 5MP)
- USB to Serial Converter
- Pir Motion Sensor

Project Methodology

Passive infrared sensor

Whenever any living thing comes in front of the webcam, it will sense its body temperature and then sends the information to the microcontroller which is attached with the computer.

Microcontroller

Microcontroller sends the command to motor which starts rotating and captures the picture of the living things around the coverage area for which it is restricted that it can only capture snaps.

Motor

The motor is attached to the sensor through Microcontroller AT89s8253 by which it rotates the webcam around the coverage area to sense the objects as fixed in the MATLAB program.

MATLAB

A MATLAB-2007 program for Image Processing is used for the sensor and camera so that the objective may be done. In this we make a program using MATLAB-2007 which is made in C compiler i.e. any of the compilers as GCC Compiler etc.

Take Picture and Store

Now the pictures will be taken and send to the computer or laptop for observation and the picture is stored in the system using the flash memory within the microcontroller. It can use for security purpose in our usual life or for any security purposes.

Circuit Diagram

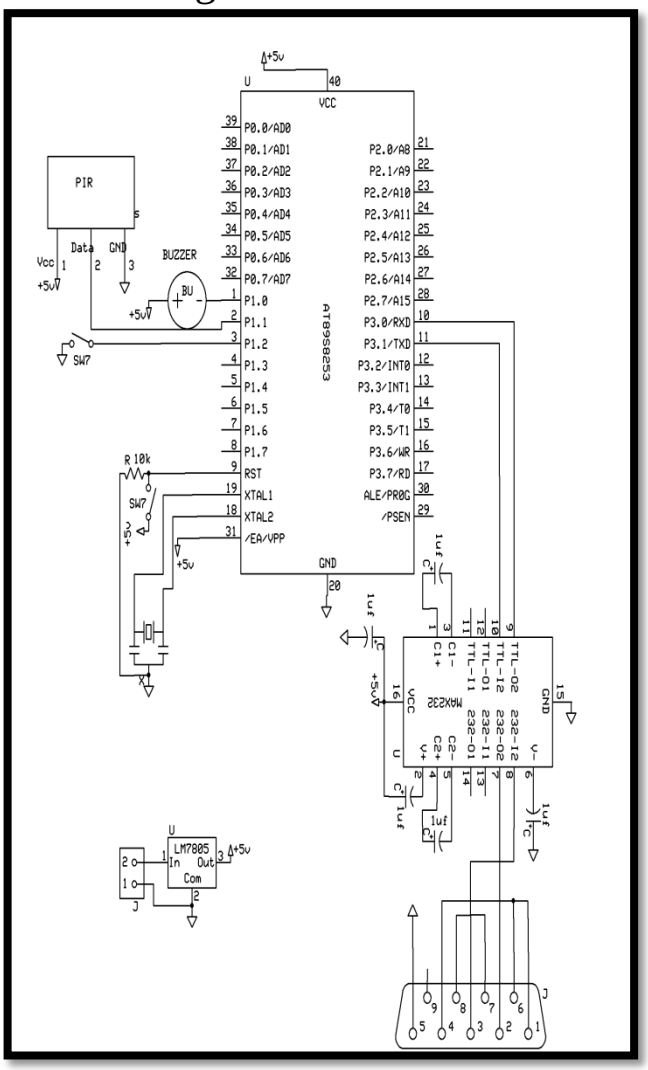

Figure 1: Circuit Diagram for Motion Security / Theft Protection Using MATLAB Programming

Conclusion

The camera takes the picture according to the program as fixed while burning the MATLAB programming for Im-

age Acquisition. When the camera takes the picture it sends to the computer for observation using the PIR sensor & as there is some difference measured an alarm blows for security purposes. Hence this project will help as the security aspect for human being, which will act as important aspect for the day today life, in MILITARY Security purposes, in Engines etc.

Future Scope

- We may implement a buffer in the system to store the captured images using image processing.
- The security system could be controlled from a remote distance from the installed system.
- The information recorded by the security system could be received through internet or wireless systems on our electronic gadgets.
- It could be used in Military for security purposes.
- We can design our system so that it could be automatically locked if required.

Block Diagram

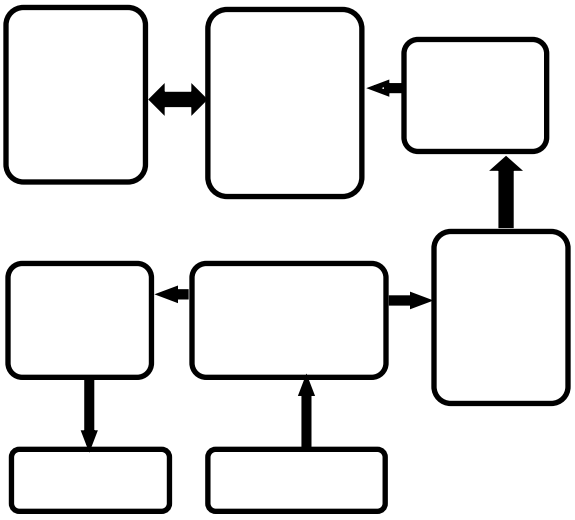

Figure 2. Block Diagram For Motion Security / Theft Protection Using MATLAB Programming

Acknowledgement

It gives us an immense pleasure to present the technical paper on topic Motion Security/Theft Protection Using MATLAB Programming undertaken during Bachelor of Technology final year. We would like to express our deep and sincere gratitude to IJATER Journal for the support to develop this document our project guide for providing us excellent guidance, encouragement and inspiration throughout the project work. We would like to extend our special thanks to Head of Department & Project In charge for their immense support in all kind of work**.**

References

[1]. Cheng-Hung Tsai, Ying-Wen Bai, Chun-An Chu, Chih-Yu Chung and Ming-Bo Lin, “PIR-sensor-based Lighting Device with Ultra-low Standby Power Consumption,” in Proc. IMTC, pp. 1524-1529, May,2011.

[2]. Cheng-Hung Tsai; Ying-Wen Tsai; Ying-Wen Bai; Chun-An Chu; Chih- An Chung. Dept. of Electron. Eng., Nat. Taiwan Univ. of Sci. & Technol,Taipei,Taiwan Instrumentation and Measurement Technology. Confrence (I2MTC), 2011 IEEE.

[3]. P. Zappi, E. Farella, and L. Benini. Enhancing the spatial resolution of presence detection in a pir based wireless surveillance network. In Proc. IEEE Int. Conf. on Advanced Video and Signal based Surveillance, 2007.

[4]. Lin Gu, Dong Jia, Pascal Vicaire, Ting Yan, LiqianLuo, Ajay Tirumala, Qing Cao, Tian He, John A. Stankovic, Tarek Abdelzaher, Bruce H. Krogh, "Lightweight detection and classification for wireless sensor networks in realistic environments", in SenSys, Nov. 2005.

[5]. Zhiqiang Zhang, XuebinGao, Biswas J., Jian Kang Wu, "Moving Targets Detection and Localization in Passive Infrared Sensor Networks", in The 10th International Conference on Information Fusion, July 2007.

[6]. Electronics Industries Association, "EIA Standard RS-232-C Interface Between Data Terminal Equipment and Data Communication Equipment Employing Serial Data Interchange", August 1969, reprinted in Telebyte Technology "Data Communication Library", Greenlawn NY, 1985.

Biography

HARISH KUMAR GUPTA is pursuing the B. TECH degree in Electronics & Communication Engineering from the Gautam Buddha Technical University, Lucknow, Uttar Pradesh & will complete the degree in the year 2012. Currently he is in B.TECH final year at Kanpur Institute of Technology, Kanpur, Uttar Pradesh. HARISH KUMAR GUPTA may be reached at harishgupta_1528@yahoo.co.in ,

POOJA UPADHYAY is pursuing the B. TECH degree in Electronics & Communication Engineering from the Gautam Buddha Technical University, Lucknow, Uttar Pradesh & will complete the degree in the year 2012. Currently she is in B.TECH final year at Kanpur Institute of Technology, Kan-

pur, Uttar Pradesh. POOJA UPADHYAY may be reached at up.pooja76@gmail.com,

SOURABH DUBEY is pursuing the B. TECH degree in Electronics & Communication Engineering from the Gautam Buddha Technical University, Lucknow, Uttar Pradesh & will complete the degree in the year 2012. Currently he is in B.TECH final year at Kanpur Institute of Technology, Kanpur, Uttar Pradesh. SOURABH DUBEY may be reached at sourabhdu@gmail.com,

SATYENDRA PRATAP SINGH is pursuing the B. TECH degree in Electronics & Communication Engineering from the Gautam Buddha Technical University, Lucknow, Uttar Pradesh & will complete the degree in the year 2012. Currently he is in B.TECH final year at Kanpur Institute of Technology, Kanpur, Uttar Pradesh. SATYENDRA PRATAP SINGH may be reached at satyendra95@gmail.com.