

IMPLEMENTATION OF VISION BASED INTELLIGENT HOME SECURITY SYSTEM USING ARM7

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Abstract – An intelligent home security system with high level of security is explored in this paper. This system uses visual surveillance and much useful in home and company security. The main processing unit here using is ARM7 processor. There are different security systems in earlier days. The very basic of this started with simple alarm system. Now a days it include capturing of images also. Here we are presenting a security system which include capturing of image along with the SMS notification to the particular phone numbers. It also sends an email to the prescribed mail id. This security system gives the total count of persons in the home. The loads can also be controlled automatically. This will help to reduce unnecessary wastage of power.

Keyword : visual surveillance, ARM7, image capturing, counting mechanism.

1.INTRODUCTION

In the present world crime has been increasing rapidly. So our goal is to prevent the crime to some extent. The security system that we are developed is useful for this. It will saves valuable lives, money and time. Generally home and workplace become the victims of crime. Many people are using various types of security systems at present days. It will prevent the unauthorized intruders in the premises of our home and also at other places. Such systems will help the people to feel a bit safe while they are staying outside from their places. Different systems work only within a certain boundary. For example CCTV. It is a closed circuit television camera which gives camera footage that can be seen when any user or the guard is in the control room. All people value

security. The illegal entry by force, such as breaking a window or entering through an unlocked door in homes is taking place at many places. Therefore we have seen an increasing need for home security systems. There are different systems like wireless and wired systems which are used for home security. The security system generally include different sensors, ICs and alarm. Depending on the type of home security system, the price may vary from one another. Technology has been helping to develop the security system for low prices. Some other systems may incorporate home automation, smoke sensors, temperature sensors etc. Now a days there is a lot of burglary happening at many places and it has been increasing because police are not taking immediate action. For example if the burglary happened at some place, police will get information after the incident had happened and they can't take the immediate action and in the meanwhile the thieves will escape. This is the reason for increasing robberies in the cities. Hence many security systems are developing with high tech technologies and these systems are available in the market at present. Still they have some limitations and we must be aware of all the things which are happening around us. In the present security system the main processing unit is ARM7 and it sends and receives the signals from different functions of operations. The entire process is controlled by ARM7 processor.

The human or object movements will be detected by IR sensors and the camera mounted will capture the pictures of the detected persons. Then the security system will sends an SMS if any unauthorized person is detected and also an email notification. The IR sensor will also count the number of persons entering into the home. If the count is zero then the loads will automatically turnoff. This will prevent the wastage of power and money.

2. WORKING PRINCIPLE

The security system uses the motion detection algorithm for detecting the human movements. This process will be done by IR sensor used in the system. If any human is detected then the microcontroller will send the signals to serial port and this will process the camera to capture the image. The captured image is compared with the images already stored. If any unauthorized is detected the GSM module sends an SMS to the phones and also a mail will be sent to the specified mail id with the captured photographs as attachments. The door will be opened automatically after comparing the images to the authorized persons. The system schematic is shown below in fig.1

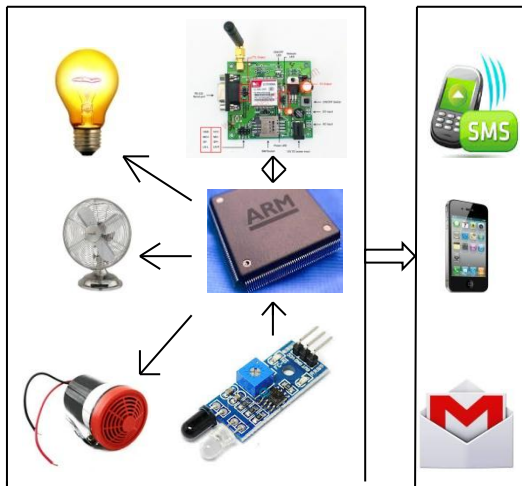


Fig.1 Schematic image of a home security system model

For any unauthorized, the owner has to send command as open for entering into the home. The counting of people is done by using image processing algorithm. When the total number of people in the room is zero then the main processor sends command to the relays to turn off the loads.

3. BLOCK DIAGRAM OF PROPOSED SYSTEM

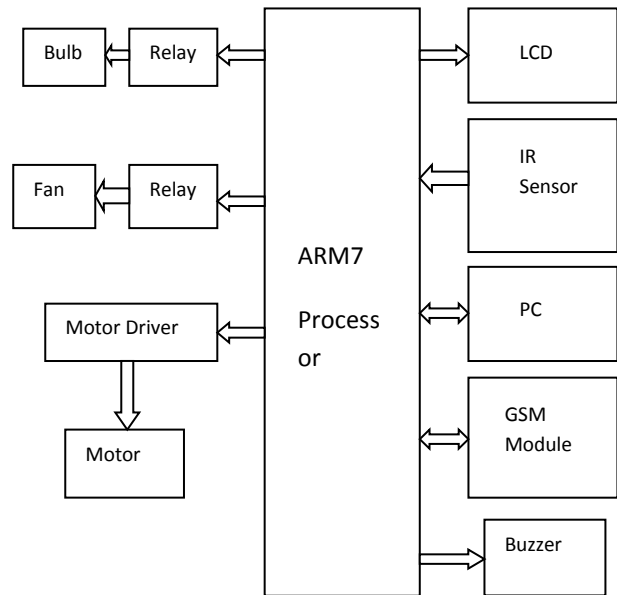


Fig.2 Block Diagram of the home security system

4. ELEMENTS OF THE SYSTEM

4.1 ARM7 Processor

ARM LPC2148 is a 64 pin Micro Controller which comes under ARM 7 version of ARM processors. It comes under the processor core architecture ARM7TDMI-S. It is a 32 bit Micro Controller. This is intended for high end applications involving complex computations. It follows the enhanced RISC architecture. It has high performance and very low power consumption. It has serial communications interfaces ranging from a USB 2.0 Full Speed device, multiple UARTS, SPI, and I2Cs. Various 32-bit timers, dual 10-bit ADC(s), single 10-bit DAC, PWM channels and 45 fast GPIO lines with 9 interrupt pins. The ARM7TDMI-S is a general purpose 32-bit microprocessor, which offers high performance and very low power consumption. The ARM architecture is based on Reduced Instruction Set Computer (RISC) principles, and the instruction set and related decode mechanism are much simpler than those of micro programmed Complex Instruction Set Computers (CISC). This simplicity results in a high instruction throughput and impressive real-time interrupt response from a small and cost-effective processor core. Pipeline techniques are employed so that all parts of the processing and memory systems can operate continuously.

4.2 GSM Module

GSM(Global System for Mobile communications) is a cellular network, which means that mobile phones connect to it by searching for cells in the immediate vicinity. GSM networks operate in four different frequency ranges. Most GSM networks operate in the 900 MHz or 1800 MHz bands. Some countries in the Americas use the 850 MHz and 1900 MHz bands because the 900 and 1800 MHz frequency bands were already allocated. This module is used to send SMS to the owner's mobile number when ever any unauthorized person is detected. This module is connected to the serial port of the computer using Bluetooth. Then we can use AT commands for sending SMS. Various AT commands are present for sending SMS. For example AT+CMGS, AT+CMGF, AT+CNMI.

AT+CMGF: This command is used to send text message from the modem.

AT+CNMI: This command is used to store the SMS-DELIVERS and the SMS-STATUS-REPORTs are displayed.

AT+CMGS: This command sends SMS to the mobile. It is like send button as we use in mobile phones to send SMS.

4.3 Motor Driver

The motor driver which is used in the proposed system is L293D. It is useful for driving the motor which will helps to open the door. The L293 and L293D are quadruple high-current half-H drivers. The L293 is designed to provide bidirectional drive currents of up to 1 A at voltages from 4.5 V to 36 V. The L293D is designed to provide bidirectional drive currents of up to 600-mA at voltages from 4.5 V to 36 V. Both devices are designed to drive inductive loads such as relays, solenoids, dc and bipolar stepping motors, as well as other high-current/high-voltage loads in positive-supply applications. All inputs are TTL compatible. When an enable input is high, the associated drivers are enabled, and their outputs are active and in phase with their inputs. When the enable input is low, those drivers are disabled, and their outputs are off and in the high-impedance state. With the proper data inputs, each pair of drivers forms a full-H (or bridge) reversible drive suitable for solenoid or motor applications.

4.4 IR Sensor

There will be transmitter and receiver in the IR sensor. The object detection will be done by using the this sensor. The infrared rays take part the process and variation in surrounding radiations will helps in detecting the objects in its range. This IR sensor is also used for counting of number of persons in a room.

The other elements used in this system are LCD, Buzzer, Motor, Relays.

5.HARDWARE AND SOFTWARE DESCRIPTION

5.1 Human Motion Detector

The primary module in the proposed system is human motion detector. It is used to sense the human movements through the hardware available in the system. This can be installed at entry and exit points like doors, windows, etc. This work is done by IR sensor. This may contain different components like resistors, capacitors, IC's, etc. This is connected to computer using USB connector.

5.2 Image Capturing Subsystem

The main function of this system is to receive the signal from microcontroller and then the image will be captured by switching on the web camera attached to the computer. The microcontroller senses any human interruption and sends signal to the serial port which is used to read the data and perform the further operation.

The data is processed and image will be captured after receiving the signal. The web camera continuously captures the frame. The continuous frames will then be converted into a still image.

5.3 SMS Sending Subsystem

Whenever any unauthorized person is detected then this module is used to send an SMS to the owner's mobile or any prescribed phone number. This operation will be performed using the GSM modem. It is connected to the serial port of computer using Bluetooth. By using various AT command, we can send SMS to the owner's mobile.

5.4 Emailing Subsystem

Some special servers like SMTP servers which are available to us are used for sending mails. This efficient

and reliable method is provided by Java. From this we are using Gmail's SMTP server. It offers a portable server for sending mail from any network for any email address.

5.5 Loads Controlling Subsystem

The count of the persons in a home or a room can be determined using this system. If the total count is zero then the microcontroller will send signals to the relays to turnoff the loads automatically. So the power wastage can be reduced using this system.

Softwares used for implementation

The softwares used for this system are keil μ vision and proteus softwares. Files used for capturing images are .net files. The program code for the proposed system uses Embedded C language.

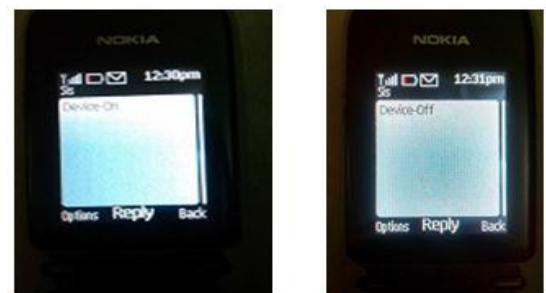
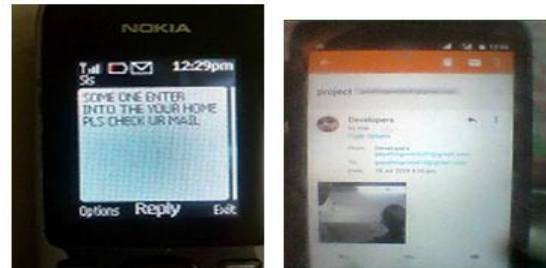
6. IMPLEMENTATION PROCESS

Each module in our system will work with flexibility and accuracy. The programs which were written must be well synchronized so that the hardware part will work properly. The entire implementation of the system start from the detection of object or human movements and the result will be as the image of the intruder in the email and SMS on the user mobile finally. The system has certain steps that the process is executed in a sequence.

1. Initially the hardware part after getting power supply, it will switches the IR sensor to detect any intrusion. After detection it will send signal to the computer to perform further operation.
2. The program run continuously and waits for the signal from the hardware. When the signal is received from the hardware the system captures the image.
3. The captured image or images will be compared with the stored images in the database and the door will be opened automatically if the person is authorized. The number of persons in the room will also be counted.
4. If the person is unauthorized then the code runs and SMS will be send to the user mobile and also a mail will be send to the defined mail id with the captured image.
5. When the user send the command as open then only the door will be opened otherwise it will not open. The

user can also activate alarm in any situation by sending instruction.

7. OBSERVATION



8. CONCLUSION

The real time problem of protecting our valuable things in our absence have a solution by our present work of proposed system. Here the system is designed successfully which will sense the unauthorized human movements. This will notifies the owner through mail and SMS in his absence also. With this security system, we are fulfilling the motto of developing the low cost security system which will be available to people in the market. Energy consumption in an efficient manner is also very important to create a balance in nature. The loads can be controlled automatically so the power wastage is avoided. Mobile based home automation system can also be developed in future which will have more features that are more useful to the people.

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