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Title: **SMART UNUSUAL EVENT DETECTION USING LOW RESOLUTION CAMERA FOR ENHANCED ATM SECURITY.**

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SMART UNUSUAL EVENT DETECTION USING LOW RESOLUTION CAMERA FOR ENHANCED ATM SECURITY.

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ABSTRACT

In recent days we come across robbery, theft and attacks on ATM. The cameras that are used in ATM is mainly used for recording and the recorded data will be stored in it. In many cases it become difficult to investigate and track the cases. In our proposed system we are able to detect whether the event happening inside the ATM is usual or unusual event by the use of camera that is fitted inside the ATM. The events are said to be Unusual events if the person's face is covered by helmet or cloth, if person tries to mask the ATM's camera, overcrowd inside the ATM or any fight happening inside ATM, all these unusual events can be detected in the low-resolution video by means of background subtraction method. Whenever an unusual event is detected inside the ATM, the buzzer will be ON and sends the alert message to the authorized person through GSM module. This is sufficient because it uses low resolution frames and sends alert message to the authorities for enhancing ATM security and even the prevention of thefts by using low resolution camera.

KEYWORDS Low resolution camera, Detection of Unusual event, GSM, Alert message.

1. INTRODUCTION

An Automated Teller Machine (ATM) allows customers to perform banking transaction, cash withdraw at any time by using an ATM card. An ATM is almost a direct dispenser permitting client to get money, but there is a lack of security in some or other way, steal money by physical attack, or by software and network hack. Hence in present ATM security there is a need for automatic security alerting system, which enables safety of people entering ATM. Even the government and banking departments has taken various steps for ATM security but additional charges like human guard. The method proposed here is a cost effective, real time based automatic ATM security based on low resolution video surveillance that is detected by system (camera) alone. We are

using ARM 7 LPC2148 microcontroller for implementation of security features.

The main objective of proposed system is designing an enhanced ATM security system with automatic unusual event detection and alerting system to reduce the banking cost. Hence to satisfy the above is done by checking of unusual events occurring inside the ATM, they are

- Person who has entered into the ATM face is covered by helmet or anything while using ATM.
- If more than one face is detected inside the ATM room.
- If the person inside the ATM tries to cover or mask the camera.

Once unusual event is detected inside the ATM, the system is automated in such a way that it automatically locks the door of the particular ATM and sends alerting message to the authorized person so that necessary action could be taken.

2. LITERATURE REVIEW

Sudhir Goswami, Nagresh Kumar, Jyoti Goswami [1] introduced a technique that detects unusual events using conventional low-resolution cameras which is low in price. Sharayu Sadashiv, Sharad D. Sawant [2] designed a system for detecting the abnormal activities. The people should take the precautionary measures for preventing the unusual events. Video is taken as an input and the output from the system would be the classification of abnormal activity or normal activity. The identification of unusual object detection may also be used for several investigation programs. Prajwal B.K, Sreeharsha M.S [3] introduced a technique of detecting the existence of unusual events such as face masking, camera masking, fight or overcrowding in the low-resolution video by using standard deviation. Low resolution frames will be processed, and alert messages are sent to the concerned authorities for further investigation.

3.HARDWARE DESCRIPTION

I. ARM

The (ARM7) LPC2148 is a 32bit RISC microcontroller. It has a unique architecture and it consists of wide memory which is 128 bits that enables the execution of 32bit code. It consists of 32bit timers and watchdog timer. Speed of the ARM is four times greater than the 8051 microcontrollers. It gives good accuracy. ARM consists of 128bit wide interface. It enables high speed operation that

is 60MHz, 8kb to 40kb of on-chip static RAM and 32b to 512kb of on-chip flash.

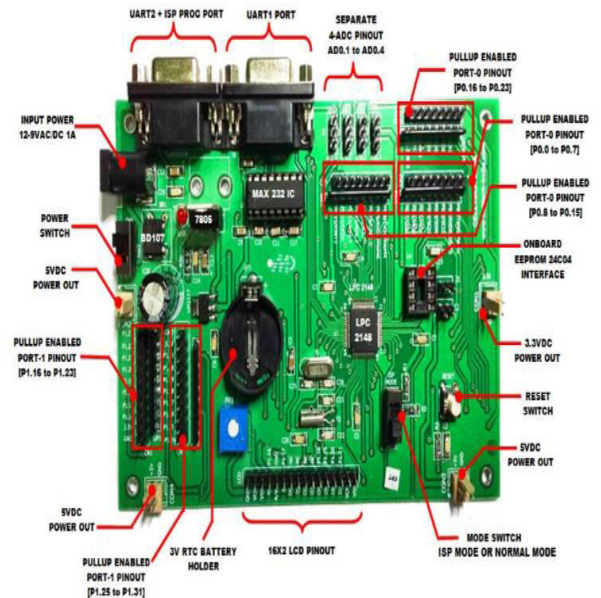


Fig.1: ARM controller board

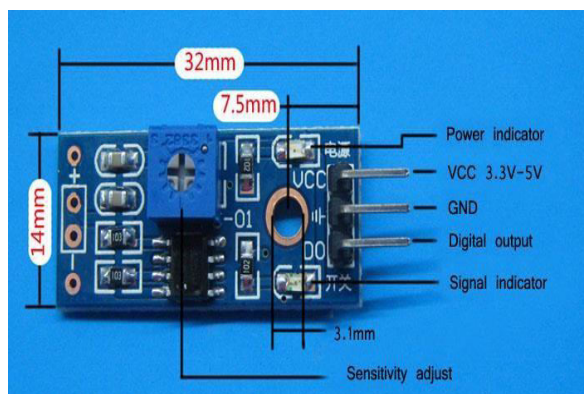
II. PIR SENSOR

PIR sensor senses the movement of a human body. The PIR sensor can detect the motion approximately between 5m to 12m. The average value is taken as 10m..



Fig.2: PIR sensor

PIR sensors consists of 3 pins which are connected at the side and bottom of the sensor. The delay time can be adjusted. It gives standard TTL output.



III. VIBRATION SENSOR

Fig.3: Vibration sensor

The Vibration sensor is based on the SW-420 and comparator LM 393. It detects the vibration which occurs beyond the threshold level which is adjusted. The threshold value is adjusted using the on-board potentiometer. The working voltage of vibration sensor is 3.3V to 5V. The Output is in the form of 0 and 1. It consists of fixed bolt hole with convenient installation. It uses the LM393 wide voltage comparator..

IV. BUZZER



Fig.4: Buzzer

Buzzer is a device which is generally used to produce sound. The operating voltage of is 4-8V DC. The resonant frequency is 2300Hz. The rated current is lesser than 30mA. It is small and neat sealed package. It is based on the inverse principle of piezo

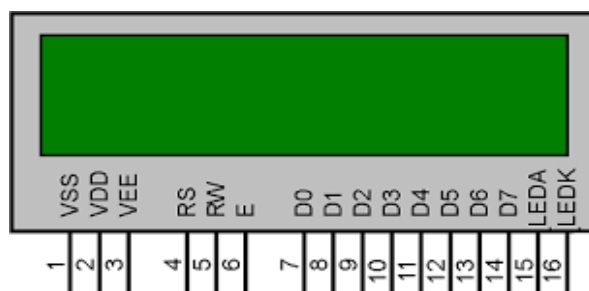
electricity which was found by Jacques and Pierre Curie. It is based on the phenomenon of generating electricity when mechanical pressure is applied to some certain materials. This type of materials is known as piezo electric materials.

V. LIQUID CRYSTAL DISPLAY

Liquid Crystal Display screen is an electronic display module and has a large range of applications. Interfacing LCD with microcontroller is very easy task. LCD module consists of 8bit data interface and control pins.

Fig.5: LCD display

One can send the data as 8 bit or in pair of two 4bit nibbles. 16 characters can be



displayed in two rows in the LCD. It can display numbers, characters and graphics. It consists of an inbuilt refreshing circuit which relieves the CPU from the task of refreshing.

VI. RELAY

A Relay is a kind of sensor which acts like a switch. Relay control high voltage in the circuit by using the voltage signals that are low. Relays operate a switch on the principle of attraction of the electromagnetic.



Fig.6: Relay

VII. SIM 900a GSM

The GSM / GPRS breakout board is based on SIM900a module. The power consumption is as low as 1mA.



Fig.7: GSM 900a module

Low power consumption and size are one of the features of GSM module. It supports SIMCOM enhanced AT commands and it communicates via UART port. It uses encryption to make calls more secure. It has improved spectrum efficiency and Real time clock with alarm management. It gives high quality speech at the receiver.

VIII. POWER SUPPLY UNIT

The power supply is used to deliver the required amount of stabilized and pure power to the circuit. The regulator IC is of two kinds: 78xx and 79xx, one for the positive voltage output and another one for the negative voltage output. This type of circuit needs two different voltages, +5V and +12V. These two voltages are supplied using the power supply unit.



Fig.8: Voltage Regulator

4.SOFTWARE DESCRIPTION

i. MATLAB

It is an technical computing language used in programming and also development of data, algorithm and also numerical computations process. It mainly uses math and computation, algorithm development modeling, simulation. The basic data element used in this an array which is an very active system. it mainly solves technical computing problems especially in matrix and vector formulations in a very short time.

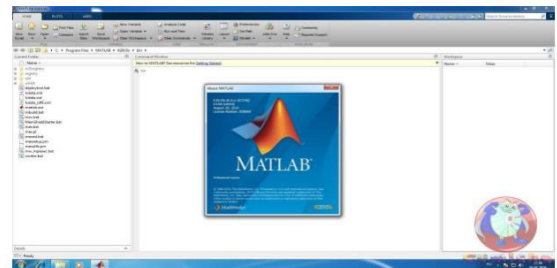


Fig 9: MATLAB Command window

ii. EMBEDDED C PROGRAMMING

This is one of the main processor used in an embedded systems every home needs which we use daily in our life consist of this processor. And each of these processor is associated with an embedded software. The entire system function can be determined by this. Embedded C language is most frequently used to program the microcontroller Earlier, many embedded applications were developed using assembly level programming. However, they did not provide portability.

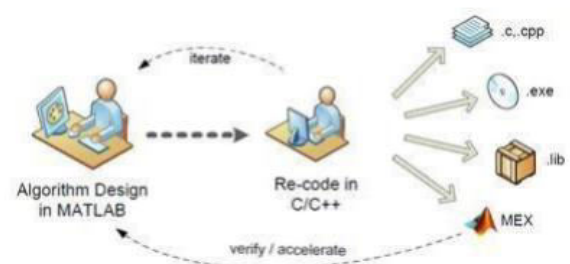


Fig 10: Embedded C Programming

iii. KEIL MVISION

It is a one which combines five important powerful environment in a single system which can be defined as project management, build facilities, run time environment, source code editing, and debugging the programs.. It creates a separate window by the means of allowing multiple screens. It automatically configures the development tools for the target microcontrollers It allows to quickly access all development tools from a single environment. All configuration details are saved in the mvisionIt allows to write and test application code before production hardware is available.

iv. FLASH MAGIC

It is a one line user and intuitive user interface. it programs in hex files. It verifies programs automatically and also programs security bits. it will read any number of data of flash and save as in Intel hex file. It uses high speed serial communication on device that supports it.

5 BLOCK DIAGRAM

The block diagram of proposed system can be shown under the fig.This proposed system uses ARM 7 LPC 2148 microcontroller for the implementation of security features like Automatic door lock, Buzzer and Alarm trigger etc. MAX 232 functions as it mainly covers serial communication between laptop and ARM.

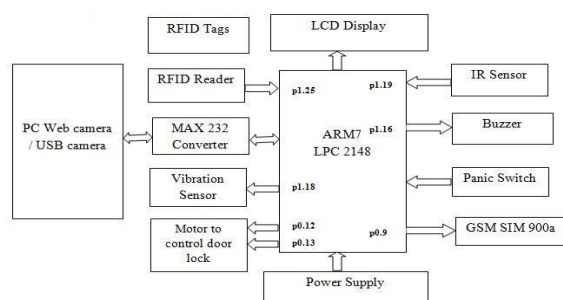


Fig 11: Proposed block diagram

Inbuilt webcam is used which is of low resolution, it captures the live video & image frames are captured from this live video and these are processed for the face detection using developing code any unusual event inside the ATM can be detected. After detecting unusual event the surveillance system will be activated in such a way that it automatically locks the door of that particular ATM and sends the alarming message including mail to security person present in the observation room so that necessary action could be taken.

Sending the message can be done by using GSM module. A panic switch can be used to alert the local people with the help of buzzer.ARM7 microcontroller is heart of our system. If multiple person entered into the ATM or if the person mask the camera present inside the ATM room or if the person wearing helmet system will follow the same procedure as above. If anybody tries to damage the ATM itself, using vibration sensor it send the information to the microcontroller it will process the information and it follow the same as above to alert the system.

6.Flow chart

The flow chart shown in figure below explains the operation of our proposed system. It explains about implementation of our proposed system.

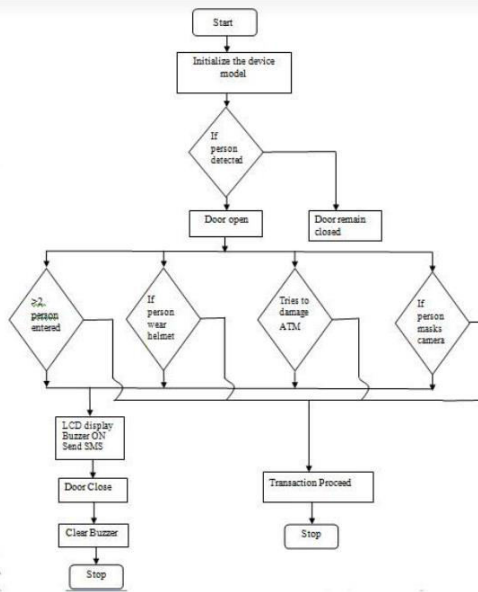


Fig 12: Flow chart for proposed system

7.Result

The implementation of unusual event in low resolution camera using ARM7 microcontroller was successfully done and the communication is done properly. The software like Keil Uvision and flash magic tool to dump the main source code into the hardware ARM7 microcontroller. As our proposed project mainly aim to detect the unusual events/activities that are found inside ATM. Our system detects events like face covering which will be considered as unusual event, not only face covering but also if the face is covered with helmet or even mask then also the event will be considered as unusual event and hence get triggered to give alarm.

8.Application

- Cost effective as it is low power consumption
- Less human power is required
- Economical
- As it gives alert message immediate

action can be taken

- Avoids robbery and acts as safety device

9.Conclusion and Future scope

Our proposed system is designed successfully to detect unusual events that occurs inside the ATM that are already listed above. With our proposed system we have made the security of ATM more powerful so that robbery can be reduced and immediate action can be taken during unusual incident that has occurred inside the ATM. In further enhancement our proposed system can be implemented as real time using advanced processor like Raspberry Pi beagle board etc. and advanced sensors like metal detection that can be placed at the door to sense the metal or iron rod and other related devices.

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