High Security System To Inspect Depredations Using Arduino

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Abstract— **This paper proposed an effective system for monitoring banks and ATM's which is completely autonomous. The security system is designed to detect and catch the robbers when heist occurs in the confidential area. Due to increase in bank and ATM's robberies day by day, security at this place is very important. The major concerns with current manually supervised system are not been able to catch the robbers after the robbery occurs. The proposed security system contains vibration sensor which detects the vibration when thief tries to break the locker. The system also comprised of hidden camera which capture the image and upload it into the server, which helps during investigations. The controller automatically locks the door using the dc motor and sprays the chloroform to make the thief unconscious. It also alerts the branch operator and police controller by sending SMS using GSM technique.**

Keywords- Vibration detection, LABVIEW, Arduino, DC motor and GSM module.

I. INTRODUCTION

Today's technically advanced world, autonomous systems are gaining rapid popularity. As the social computerization and automation has been increased and the ATM and credit card has been installed and spread out to simplify the activity for financial activity, the banking activity has been simplified, however the crime related with financial organization has been increased in proportion to the ratio of spread out of automation and devices. The current manually supervised system is not been able to catch the robbers effectively. But this system focuses on safety by detecting and controlling unauthorized person. The Microcontroller Based Bank Security System fulfils all these requirements. For a common human being the bank means a place which represents a top level of security. On a daily basis we are involved in banking transaction. To secure our expensive jewellery, important documents or cash, we use to use bank locker rooms and to take cash immediately we use ATMs. It has become an important part of our life. To survive in this competitive world and for a continuous growth, the banking industry needs to provide a high degree of security. Because of the public interest every day new branches are Opening. The more
number of branches required more security. Current systems and services are becoming more and more autonomous and the banking sector is not too far from it. Video surveillance in

moving areas has become a current topic of interest in computer vision technology. You can see all the branches are under the surveillance of CCTV cameras, alarm systems, emergency buttons etc. The CCTV cameras are used to monitor the unauthorized activity. It needs to be monitored continuously by a human being which is very difficult work; especially in nights. The alarm emergency button also needs to be pressed manually. This conventional system requires lot of man power.

A system can be developed which will automatically detect the unauthorized motion and inform to the security officials of the banks by different ways without any need of a human being. A prototype of this security system has been designed in the dissertation to increase the level of security in ATM's effectively. The motion detection will be done through camera itself and the hardware associated with it will provide two different ways to inform the security officials a warning message and the image. For messaging a GSM module will be utilized. This paper proposed an effective monitoring and controlling system for ATM's and bank locker rooms which is completely autonomous. The system will focus on the safety of secure places in an effective way by detecting and controlling unauthorized motion. The Ultimate aim of the high security system are tracking the confidential area and detecting illegal entrance and taking necessary control action.

The existing security system consists of Motion detection sensor using MATLAB along with surveillance camera. In this security system, there are more disadvantages such as

- Motion detection is suitable only for bank locker rooms.
- It needs man power to access.
- It is not an immediate action.
- Quite complex.

To overcome the drawbacks of these systems, a new advancement technique is used in our project. The illegal entrance is detected using vibration sensor when thief tries to break the bank locker. If the vibration is detected beyond the threshold level, the sensor automatically sends the electrical signal to the controller. The controller enable the camera and takes the snap[3],[4],[5] and the hardware associated with it will provide three different ways to inform the security officials i.e. using alarm system [6], a warning message and the image which has detected the motion [7],[8] Will be automatically uploaded to the mail server using LABVIEW. For messaging a GSM module [9], [10], [11] will be utilized.

So the important objectives of bank security system are tracking of ATM's and bank locker rooms, detection of vibration and taking the necessary control action. The further sections will describe that how these objectives have been achieved.

II. SYSTEM BLOCK DIAGRAM

The following section will tell us about the approach to the design to achieve the required goals. The design of the security system has been shown in figure[1].

The figure[1] shows that the system design comprises various hardware modules. The primary modules are vibration sensor for motion detection, camera to capture the image and to upload the motion detected image into the mail server. The sensor is also connected to the microcontroller via input port. The system requires microcontroller with one serial port for the GSM modem. To fulfill the requirement, Microcontroller ATMEGA328 is used. The microcontroller also sends the signal to gate drive to enable the dc motor. The gate drive receives the 5v power from controller and produces a 12v power for the DC motor. The microcontroller is connected to the alarming system after some delay and activates the GSM modem to send the warning message. All the hardware's are properly interconnected with each other and well insulated to avoid short circuit issues.
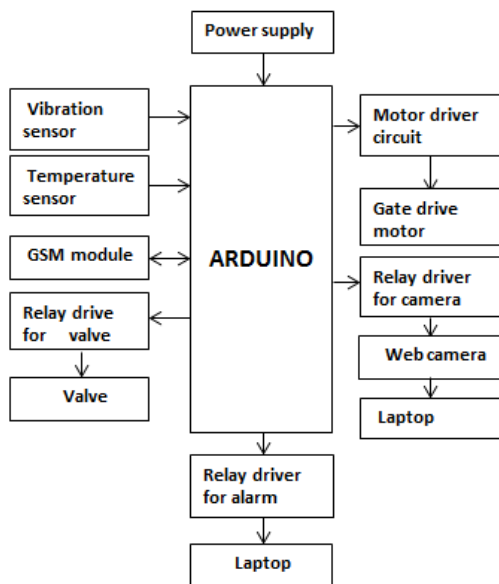

Figure1. Block Diagram of Arduino Based Security System.

III. SYSTEM IMPLEMENTATION

This section will illustrate about the different Methodologies opted to implement the security system and the workflow of the system. The section will also illustrate different program codes used for the implementation of the system.

A.Methodology for capturing image and mail server updation:

The camera which is interfaced with the LABVIEW software shows the captured image by following steps;1ª Create a new VI in *File > New VI*.2ª Go to block diagram window. At *Data Communication > Protocols > Serial* select some VI. 3ª Pick:VISA Configure Serial Port: sets up the serial port, VISA Write (2x): writes the data to the device connected, VISA Read: read data available at serial port from the device connected. VISA Close: closes the connection established, Bytes at Serial Port: checks if there's data available. You'll

learn how to send a string and receive data available at USB port. First of all, C programming skills and LabVIEW diagram block knowledge will help. You will need: Arduino UNO, LM35 (Or other sensor), LabVIEW Software with NI-VISA Driver. The arduino coding is as follows;

1ª Define all variables and pins you'll use. In this case:
- 1 Led (Arduino's LED); - 1 LM35.
Char command;
String string;
#define led 13
#define lm A1

2ª Void Setup.
```
void setup()
 {
Serial.begin (9600);
  pinMode(led, OUTPUT);
 }
```

3ª In the code there are two functions, **TempOn();** and **TempOff();**. They control the sensor.
   3.1: *TempOn();* is a function that starts the measure:
```
void TempOn()
  {
      int x = analogRead(lm);
      float temp = (5.0*x*100.0)/1024.0;
      Serial.println(temp);
      digitalWrite(led, HIGH);
      delay(500);
  }
```
3.2: *TempOff();* is a function that stops the measure:
```
void TempOff()
  {
   digitalWrite(led, LOW);
Delay (500);
  }
```

B. Methodology for gate drive:

The DC motors are controlled using the L298N driver and the Arduino board. We can control the speed of the DC motor by simply controlling the input voltage to the motor and the most common method of doing that is by using PWM signal.The L293D is a 16-pin Motor Driver IC which can control a set of two DC motors simultaneously in any direction. The L293D is designed to provide bidirectional drive currents of up to 600 mA (per channel) at voltages from 4.5 V to 36 V (at pin 8!). These dc motors are connected to gate drive which drives the gate. We can use analogWrite (pin, PWM value) instead digitalWrite (pin, HIGH/LOW) to control the speed of motors.

C. Methodology for Sending Warning Message

The warning message will be send to the security officials using the GSM modem. The GSM modem will be connected to the serial port of microcontroller through MAX 232 IC. Whenever the motion will be detected by the camera the microcontroller will send AT commands to generate a message from the GSM modem. Series of AT commands are required to generate a message. The AT commands to generate a message used in this security system are:

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AT
AT+CMGF=1
AT+CMGS="Destination Phone Number"
Message Body
Ctrl+Z

IV. HARDWARE DESCRIPTION

The hardware requirements for this project are
1. Power Supply
2. Arduino UNO
3. Vibration and Temperature Sensor
4. Alert Buzzer
5. GSM modem

A. Arduino Pin Description

The Arduino has several different kinds of pins, each of which is labelled on the board and used for different functions as shown in figure[2].

Figure 2. Arduino Board

There are several GND pins on the Arduino, any of which can be used to ground your circuit. 5V (4) & 3.3V (5): As you might guess, the 5V pin supplies 5 volts of power, and the 3.3V pin supplies 3.3 volts of power. Most of the simple components used with the Arduino run happily off of 5 or 3.3 volts. ANALOG (6): The area of pins under the 'Analog In' label (A0 through A5 on the UNO) is Analog In pins... DIGITAL (7): Across from the analog pins are the digital pins (0 through 13 on the UNO). These pins can be used for both digital input (like telling if a button is pushed) and digital output (like powering an LED). PWM (8): These pins act as normal digital pins, but can also be used for something called Pulse-Width Modulation.

B. SENSORS

Vibration Sensor

The vibration sensor shown in fig[3] is used to detect the vibrations, it constructed with piezo electric plate, operational amplifier, 555 IC timer. The piezo electric plate is used to measure the pressure, acceleration, and force by converting them to an electric signal.

Figure 3.Vibration sensor

Vibration sensor is connected to arduino (pin A0).Threshold level of vibration is 90 Hz. If the vibration detected above the threshold level, it sends signal to the controller.This switch conduction rate of 98%.

Temperature Sensor

The flame sensor shown in fig[4] is used to detect the flame occurrence. When the sensor detects the fire then it became short-circuit. When there is no fire the sensor become open circuit. For liquids, various units are used depending upon the application and industry, but might include gallons (U.S. liquid or imperial) per minute, litres per second, bushels per minute or, when describing river flows, cumecs (cubic metres per second) or acre-feet per day.

Figure 4.Temperature sensor

In oceanography a common unit to measure volume transport (volume of water transported by a current for example) is a sverdrup (Sv) equivalent to 106 m3 / s. The fire alarm system includes a current modulation section and an address specification section.

C.ALERT BUZZER

Piezo buzzer is an electronic device, Which is used to produce sound. It is made by a material called piezo electric materials. It discovered in 1880s. It is low cost, easy to use, with simple construction. Piezo ceramic is a manmade material, which is effect and widely using one to make piezo disk. It is the heart of piezo buzzer.

Figure 5. Alert Buzzer

D.GSM Modem

GSM stands for Global System for Mobile Communication. GSM allows transmission of Short Message Service (SMS) in TEXT mode. The user receives alert over GSM Modem. The GSM modem is based upon digital mobile communication having data rates from 64 kbps to 120 mbps.

Figure 6: GSM Modem

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V. RESULTS AND DISCUSSION

ALERT NOTIFICATION

Figure 7. Output of LabVIEW and GSM

NOTIFICATION

This is how the phone number and the mail address which is embedded gets intimation while there is theft in the confidential places as shown in fig[7]. Further it takes the action of spraying chloroform in order to fainting the thief.

VI. FUTURE SCOPE

The future statement of the project will be very great, considering the amount of resources, time and money. All these considered amount will be save, which can be used for any other work. There is a lot of future scope for this project because of its security capacity. It can be used in many applications. The product can also be developed or modified according to the rising needs and demand.

VI. CONCLUSION

This paper presents a low cost, intelligent and secured system for the bank locker room areas. The system will focus on the safety of the ATM's in an effective way by detecting and controlling unauthorized motion. The unauthorized detection signal is also online communicated to the microcontroller and that sets the warning alarm nearby, also send the warning text short message service (SMS) to the operator using GSM technique for taking necessary control actions and also image updation into the mail server helps in future investigations. The result in this project is genuine and is a product of sincerity and hard work. The system has been successfully implemented and the aim is achieved without any deviation. There is a lot of future scope for this project because of its security capacity. It can be used in many applications. The product can also be developed or modified according to the rising needs and demand.

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