A WELL-DESIGNED SECURE MODEL FOR BANK VAULT SYSTEM

Tanjia Chowdhury[1], Umme Afrah[2], Jannatul Ferdoes[2] Mohammad Jahangir Alam[3]

[1]Lecturer, Department of Computer Science and IT, Southern University Bangladesh, 739/A Mehedibag Road, Chittagong, 4000, Bangladesh,

[2]Department of Computer Science and Information Technology, Southern University Bangladesh, 739/A Mehedibag Road, Chittagong, 4000, Bangladesh,

[3]Assistant Professor, Dept. of Computer Science and IT, Southern University Bangladesh, Chittagong 4000, Bangladesh

[1]tanjiacu@southern.edu.bd, [2] ummeafrahislam04@gmail.com, [2]jannatferdoes5@gmail.com,[3]jahangir@southern.edu.bd

ABSTRACT

We implemented an advanced security system to the bank vault to keep protect from an unauthorized person or theft. The aim of this project is to design an advanced security system for Bank Vault utilizing GSM technology, which provides a secure, genuine, user-friendly mechanism for the safety of the Vaults. The current security systems in the bank use the mechanical key for security purpose. Comparatively, with today's digital world, this system provides slow service. To improve this state, we proposed a GSM-based advanced security system with seven sensors like Gas Sensor, Ultrasonic Sensor, Laser Sensor, Vibrator Sensor, Sound sensor, Motion Sensor, and Light sensor for the bank vaults of Bangladesh. The seven sensors can detect any symptoms of theft. At the same time, the SMS alert will be work to send a message to the authorized number. The GSM security has been proven to be far more superior stronger and safer than the traditional system.

Keywords: *Bank vault, Sensor, Security*

1 INTRODUCTION

A bank vault is a storage space where cash, resources, records, and archives are stored. It protects all of the substance of bank from robbery, unapproved use, fire, cataclysmic events, and different dangers. The surrounding of the bank is under the surveillance of CCTV cameras, alarm systems, emergency buttons, caution systems, crisis catches, and so forth. The caution, crisis catch additionally should be squeezed physically. The monitoring procedure of CCTV cameras is always a troublesome work. They use mechanical keys for safety. Sometimes there may be corruption by the authorized bank official. In this venture, a coordinated Seven-level security arrangement of Bank vault, comprising of GSM module has been proposed which satisfies every one of these prerequisites. In this project, we used seven sensors for handling different corruption. All sensors work independently. All systems work autonomously, yet are consolidated into a single computerized system for viable usage.

The objectives of our paper are

- To develop a Microcontroller based control system.
- Instant protection from unauthorized physical intrusion
- To replace the traditional system.
- To provide a user-friendly system for banks to do their jobs efficiently.
- To make the bank customers feel safe about their possessions.

2 LITERATURE REVIEW

We've looked for many papers on this system and figured out that most of bank vault security systems are structured based on the traditional method. So, most research papers are filled out with developing this manual/traditional method. Ray, Ripan Kumar et.al has proposed an integrated four level security system of bank vault, consisting of IP camera & GSM module. Here all systems work independently but are incorporated into a single automated system for practical implementation [1]. Amit Verma proposes the most proficient layers of a security system for distinguishing any unapproved movement which ought not to happen in the classified regions of Bank [2]. Sudarshan Sharma's aim of the project is to come up with a low cost and efficient module of security locker system which provides more reliability and restrict the access of unauthorized person who is trying to unlock the bank locker system and alerts in the case of theft [3]. N.khera, A.Verma has proposed a viable observing and controlling system for bank storage spaces that are self-sufficient. The security system is designed to detect the illegal entrance in the bank locker room areas that commonly happens in cases of the robberies [4]. Guangyuan Zhao et.al presents the plan and usage of an Embedded Laboratory Security Monitoring System (ELSMS). This framework incorporates a web server which secures video data through the camera and Wireless Sensor Network (WSN) which gets ecological parameters through sensors and sends them to the webserver [5]. Basil Hamed designed a low-cost electronic system which can control distinctive locking systems. The paper presents the technology of Authorized Access Security System which uses ATMEL 89C55 microcontroller and visual basic program to build data logger which provides multiple accesses to a protected area that can be an office, home, bank or whatever needed [6]. In our Bangladesh, the maximum banking security system is not improved still now. They used conventional system. So that an unauthorized person/thief can use this system easily. For the purpose of our project we have talked with some officials from two banks about their bank vault surveillance systems and came to know that one of them still uses manual system and the other bank uses a sensor based security system. The system of the two banks are briefly laid own below:

Mutual Trust Bank: This bank uses the manual security system, which entails a fingerprint-only system. Only authorized officials can access the vault room after they have verified their fingerprints.

Islami Bank Bangladesh Limited: This bank uses a sensor-based system for its security consists of motion and vibrator sensors. Additionally, they use camera footage to send signals. The system runs on watch and sleep modes and works inside the vault room. The watch mode activates after work hours. If intruders break-in, the system will notify the branch manager, zonal head, central monitoring department through SMS. The Central Monitoring alerts through a beep signal. The full system is under control of the remote.

3 METHODOLOGY

Methodology of this prototype Bank security system mainly classified into two categories. At first we observe the simulation output then making decision for hardware implementation. Here, in this proposed system, while making a basic structural design we are going to start our work by first marking our project object. We are going to fix the input and output devices so that it will be easier for us to implement our project functions with less amount of time

1.1 HOW DOES IT WORK

The sound sensor module gives a simple method to recognize the sound and is commonly utilized for identifying sound forces. As we have utilized a GSM module, this module makes an impression on the approved individual when it identifies any sound. The distance of an object can be calculated by measuring the between sending a signal and receiving an echo through Ultrasonic Sensor. Light sensors make a yield signal sign the power of light by estimating the brilliant vitality that exists in a thin scope of frequencies called light. It changes over the light vitality into an

electrical sign yield and sends a signal and alarm rings. PIR/Motion sensor distinguishes changes in the measure of infrared radiation impinging upon it, which fluctuates relying upon the temperature and surface attributes of the articles before the sensor. At the point when an article, for example, a human, goes before the foundation, for example, a divider, the temperature by then in the sensor's field of view will ascend from room temperature to body temperature, and afterward back once more. The sensor changes over the subsequent change in the approaching infrared radiation into an adjustment in the yield voltage, and this event triggers the identification. A vibration sensor commonly contains a piezoelectric precious stone part clung to a mass. When the accelerometer is liable to an accelerative power, the mass packs the precious stone, making it produce an electrical sign that is corresponding up to power connected. The sign is then enhanced and molded utilizing inbuilt hardware that makes a yield signal, which is appropriate for use by higher-level information procurement or control frameworks. At the point when the sensor does not stun, vibration turn OFF express, the yield of high yield, the green light does not sparkle; when the sensor is stun, vibration switch is turned on immediately, yield of low yield, the green marker light; the yield can be legitimately associated with the microcontroller through the microcontroller to distinguish high and low, along these lines recognizing whether the earth there is vibration. A laser sensor transmits obvious laser light through a perspective, towards an objective or item. Propelled laser sensors work dependent on the standard of optical triangulation, which consolidates the direct imager, recognizing where the objective is before the sensor. A gas sensor is a gadget that recognizes the nearness of gases in a region, regularly as a major aspect of a wellbeing framework. A gas sensor can sound an alert to administrators in the territory where the break is happening, allowing them the chance to leave.

The block diagram and circuit of our proposed system are shown below:

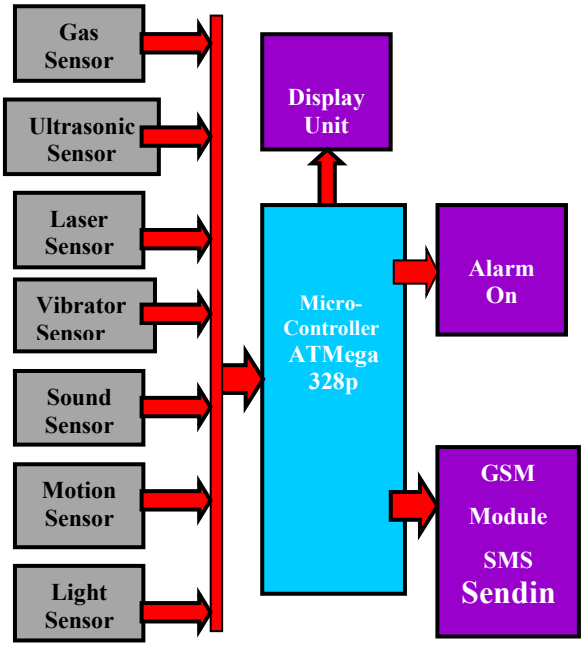

Figure 1: Block Diagram of Proposed system

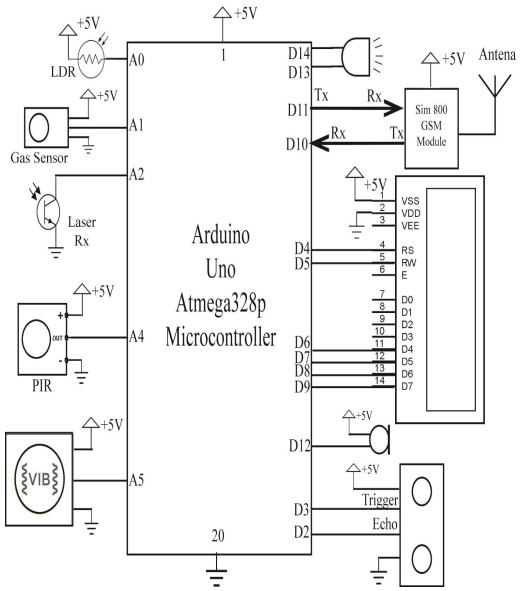

Figure 2: Diagram of system Circuit

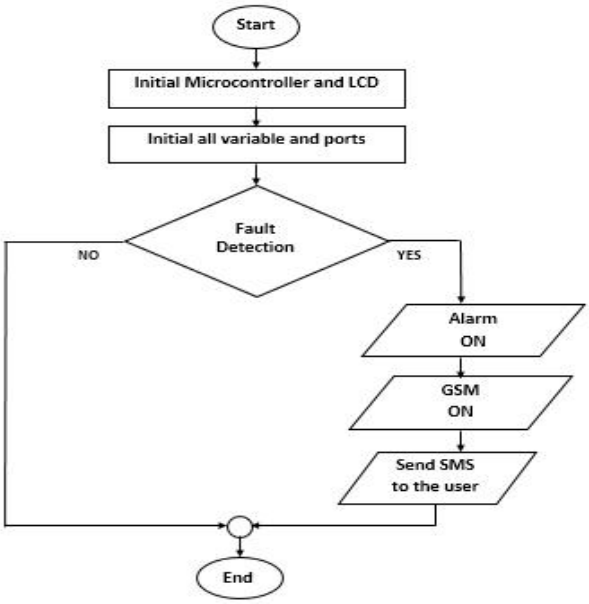

Figure 3: Flow chart of proposed system

1.2 Hardware Implementation and Performance Test

Bank Vault security system is comprised of a sensor, a microcontroller, and GSM Module and power sources. Each unit is based on the microcontroller Arduino Uno that controls the GSM module, send the text and processes information from the Sensor. These components were selected to minimize the power consumption for the proposed application.

Figure 4: Hardware implementation of our system

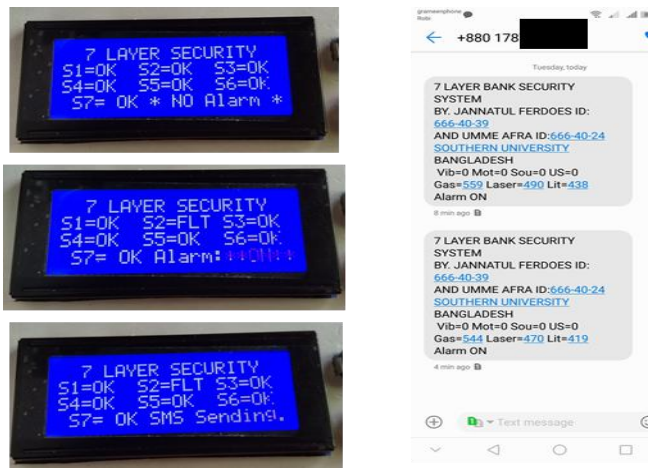

Figure 5: Testing result of proposed system

4 CONCLUSION

The focus of this project is to build up a security framework utilizing the idea of Laser security, CCTV security and SMS security with GSM module. We can redesign our undertaking by utilizing CCTV top notch camera, Metal indicator sensors for safe section and risky passage, unique finger impression sensor for controlling laser security framework on/off to stop framework hacking and a bunches of adjustment we can do to update this. We likewise utilize remote module for checking from long separation for current circumstance. This task has a ton of upgradable degrees.

REFERENCES

[1] Ray, Ripan Kumar, Muhammad Afsar Uddin, and Syed Foysol Islam. "GSM Based Bank Vault Security System." *International Journal of Computer Science and Information Security* 14.2 (2016): 35.
[2] Verma, Amit. "A Multilayer bank security system." *2013 International Conference on Green Computing, Communication and Conservation of Energy (ICGCE)*. IEEE, 2013.
[3] Sivashankar Sutharshan "Bank Locker Security System based on Two-Factor authentication project". Individual Project final report, 2015.
[4] Khera, Neeraj, and Amit Verma. "Development of an intelligent system for bank security." *2014 5th International Conference-Confluence The Next Generation Information Technology Summit (Confluence)*. IEEE, 2014.
[5] Gunagyuan Zhao, Zhiwei Wang, Wei li, Ke Wang, "An Embedded Laboratory Security Monitoring System". Third International Conference on Measuring Technology and Mechatronics Automation, 2011.
[6] Basil Hamed, "Efficient Authorized Access Security System Control Using ATMEL 89C55 & Mobile Bluetooth". International Journal of Computer Theory and Engineering, Vol. 4, No.1, February 2012.
[7] "SIM900 GPRS/GSM Shield", linksprite.com. Retrieved 21 January 2016.
[8] "How Lasers Work", lasertech.com. Retrieved 21 January 2016.
[9] Gas Sensor "MQ-5 datasheet", parallax.com. Retrieved 21 January 2016.
[10] "How infrared motion detector components work", Noncommercial Research page, glolab.com

Article received: 2019-09-23