SECURITY AND FIRE ALARM ARDUINO-BASED SYSTEM WITH TEXT MESSAGE NOTIFICATION OF TECHBAGZ CCTV BOHOL IN UBUJAN, TAGBILARAN CITY, BOHOL

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APPROVAL SHEET

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The Researchers

ABSTRACT

TechBagz CCTV Bohol is a business establishment located at Ubujan, Tagbilaran City, Bohol, which encountered a thief incident. Currently, the existing security is a Close Circuit Television (CCTV) this may lead to problems such as delay or not capturing the intruder and the lacks of notification to notify the owner on-time of crime. Due to the incident in the store, the researchers aimed to develop a Security and Fire Alarm Arduino-based System with Text message Notification. Specifically, the researchers tried to seek the existing security system that have been installed in the store and identifying the problems of the existing system served as the basis for the proposed system. The development of the system implored the Waterfall Model. The researcher asked for approval of the respondents and conducted an interview using guide questionnaire with the clients. In testing and implementing, researchers used the device usability questionnaire in rating the developed system. Based on the result, the average weighted mean is, '"6.6" interpreted as "Strongly Agree" and 4.73 in web usability interpreted as "Excellent". This means that the respondents believed and confident that the developed system would be beneficial and usable that fits the requirements and expectation of the clients. For a more efficient and accurate security, the researchers highly recommend the design security systems must be implemented in Techbagz CCTV Bohol, Ubujan, Tagbilaran City, Bohol.

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THE PROBLEM AND ITS SCOPE

Rationale

Today, we live in the twenty-first century, when crime and incidents are on the rise, and everyone wants to protect their properties at home and at work, particularly in cities where incursions and fire are prevalent. Being safe and secure from threats like as break-ins and fire is a constant cause of worry. Installing a security and fire alarm system in vulnerable areas is one of the preventive measures to avoid danger.

Security systems consist of alarms and sensors which are being installed in the houses for effective and efficient way of protecting home properties. It is designed to detect burglar incidents. Security and protection system are any of various means or devices designed to guard persons and property against a broad range of hazards, including crime, fire, accidents, espionage, sabotage, subversion, and attack (Encyclopaedia Britannica, 2012).

Based on the data released by the Bohol Provincial Police Office (BPPO), a total of 6,199 crime incidents were recorded from January to November this year. Most crimes were committed on Sundays with 1,071 cases while the least number of crimes were recorded on Thursdays at 795. The BPPO said that most crimes were committed between 4 p.m. and 6 p.m. (The Bohol Chronicle, 2018). Even before the start of Fire Prevention Month this March, a total of 26 fire incidents

were recorded in Bohol province, with December having the most incidents (Bohol Island News, 2020).

Techbagz CCTV Bohol, which is located on the second floor of the Princess Mae building in front of JH Motors in Tagbilaran City's Ubujan District, C.P.G. North Avenue, caught a thief on camera. Despite the presence of CCTV footage, the owners were unable to identify themselves because their faces were obscured. The number of cases of theft and store breaking is on the rise in this situation, particularly when people are not at home or at work. The store owner was also concerned about the possibility of a fire breaking out.

To prevent these, they need to add a security system that will alert them if someone tries to break into the store or if there is a fire breakout in the store so the proponents intend to develop a Security and Fire Alarm Arduino-Based System with Text Message Notification that will monitor the store with the help of a mobile device and getting notified or alarmed via a text message when an intruder is detected and an alarm sound when there is a fire detected especially at night and when no one is at home or someone is present in the area.

According to the store owner, the problems currently encountered in the store in terms of security of Techbagz CCTV Bohol include: (1) no security system that will notify them in case of break-ins, (2) no fire alarm system that will alert them for fire accidents through text message and alarm, (3) database for all the detections, (4) difficulty in retrieving data and manual reporting.

Literature Background

The development of the proposed system was supported by Republic Act no. 10844 also known as the *"Department of Information and Communications Technology Act of 2015."* The law states that:

"Ensure and protect the rights and welfare of consumers and business users to privacy, security and confidentiality in matters relating to ICT, in coordination with agencies concerned, the private sector and relevant international bodies."

This law supports automation as a technique of ensuring security in any type of business through invention and creativity. Software development promotes the idea of growth, progress, and completion of research requirements, as well as technological innovation in the field of computer science application. Because it is legal, part of the creation of the system application requires a theoretical basis to support it.

The study is anchored on the Principle of Understanding Automation of Peter J. Denning and Craig Martell. There have been computational ways of performing human tasks. Tasks can be physical like controlling airplane surfaces, running an assembly line, or mental such as doing arithmetic. They emphasize that there are efficient computational ways to perform a human task.

The study is anchored on the Principle of Understanding Securitization of Balzacq, Thierry, Ed (2010). It organizes securitization around three core assumptions which make the theory applicable to empirical studies: the centrality

of audience, the co-dependency of agency and context and the structuring force of the deposits. Security has develop and provide a new framework for the analysis of securitization processes, increasing our understanding of how security issues emerge, evolve and dissolve. There are various studies that are similar to the planned Security and Fire Alarm Arduino-based System with Text Message Notification in order to gain a better idea of how the project will be constructed. Among the important studies are the following:

1. Arduino-based Intruder Security System with Text Message Notification. An intruder's security system of Butron's Pharmacy and General Merchandise in Sierra Bullones, Bohol. The developers focused in securing the store by developing a warning device to alert the owner when there is an intruder detected especially at night. The device will able to monitor intruders through the PIR Sensor and sends the store owner a text message by the means of the SIM900-GPRS Module and the Arduino UNO microcontroller. (Buslon et al., 2021).
2. The development of the study about a Fire Alarm System using Arduino by means of GSM Module (Makandar et al., 2021).The work purposely for house safety where the main point is to avoid the fire accidents occurred to the residents and the properties inside the house. The device will be able to monitor the temperature of the environment, the smoke level, send SMS alert to an inbuilt GSM number. When the system detects the temperature of 100C or more, it will immediately display an alert notification on LCD display and simultaneously sending an SMS alert to the users upon the high

raise temperature in the house. This fire detection system consists of a smoke sensor, buzzer, LCD display and GSM module is interfaced with Arduino board.

3. The development of the study about home security and energy efficient home automation using Arduino (Nayyar et al., 2017). This project intends to develop an automated energy management system for homes that is both efficient and low-cost. It also has a feature that allows the house to be monitored. The system was created following a thorough examination of the utility aspects of current surveillance and energy management systems, with the goal of improving them. It has features to adapt to natural disasters such as fire, in addition to providing a cost-effective solution for energy management in the home. It's a low-cost and efficient automated Arduino, just like the Security and Fire Alarm Arduino-based System with Text Message Notification.

These existing projects were used as a starting point by the developers to meet the requirements and features of the current procedure for monitoring any intrusions or incidents into the restricted area. This will help and guide developers as they work to improve the current method.

THE PROBLEM

Statement of the Problem

The main objective of this study was to develop a Security and Fire Alarm Arduino-based System with Text Message Notification to secure the area of Techbagz CCTV Bohol.

Specifically, the study sought to answer the following questions:

1. What is the existing security system that have been installed in the store?
2. What are the problems encountered in terms of security in Techbagz CCTV Bohol?
3. What is the possible solution of the problems encountered in the store?
4. What is the user's level of usability of the developed system?

The proposed system is to be called Security and Fire Alarm Arduino-based System with Text Message Notification developed with the following features:

1. Design and implement the following modules:
   a) Detecting
   b) Notification
2. Implement business intelligence techniques for decision support to the store.

Scope and Delimitation

The scope of the study is to produce a Security and Fire Alarm Arduino-based System with Text Message Notification of Techbagz CCTV Bohol that focuses on detecting and sending signals to the owner.

Here are the following processes:

1. **Detecting:** This functions the passive infrared (PIR) sensor, the temperature sensor and the Global System for Mobile (GSM) module. Every intruder and temperature change in the area will be detected by these sensors.
2. **Notification**: The system will notify the owner through text message when an intruder and fire is detected with an alarm through the Global System for Mobile (GSM) module.
3. **Database and Reports:** This contains the daily transaction of all the detected intrusions and temperature changes. The system involves data visualization like a statistical or graphical reporting technique. It will offer reports ready for printing; generates statistical or graphical reports of how many intruders and temperature changes are being detected.

The study is limited on detecting intruders moving around an area within approximately 3 meters to 7 meters as its angle sensor is <100 cone angle which only works in covered area and the temperature sensor with its temperature range of -50~+125℃. The owner can only access the system.

Significance of the Study

The study and development of a Security and Fire Alarm Arduino-based System with Text Message Notification, Tagbilaran City would benefit the following:

The owner and employee. This study would help the owner and employees of Techbagz CCTV Bohol under investigation, whose primary interest is the establishment's security. Knowing that security measures have been added to the developed system would give the owner more confidence. This would help them monitor the store easily that would lessen their work and save time. The sense of security and comfort the owner gains with this system is perhaps the greatest benefit of all. Next to being safe, the confidence of feeling safe would help the owner be a more productive, healthy, and focused person. Through the text alert would give people enough time to seek help from the proper authorities.

Researchers. The researchers designed, tested, and implemented the Security and Fire Alarm Arduino-based System with Text Message Notification, as well as conducting an interview with the owner of Techbagz CCTV Bohol, to gather information for designing and developing the system.

Researchers of the Future. This study could serve as a good example for students to think about new and innovative monitoring and detection system. This project will serve as a reference material to other researchers who wish to have similar studies as they can get background information from the result of this study which will serve as their template to modify their research.

RESEARCH METHODOLOGY

Development Framework

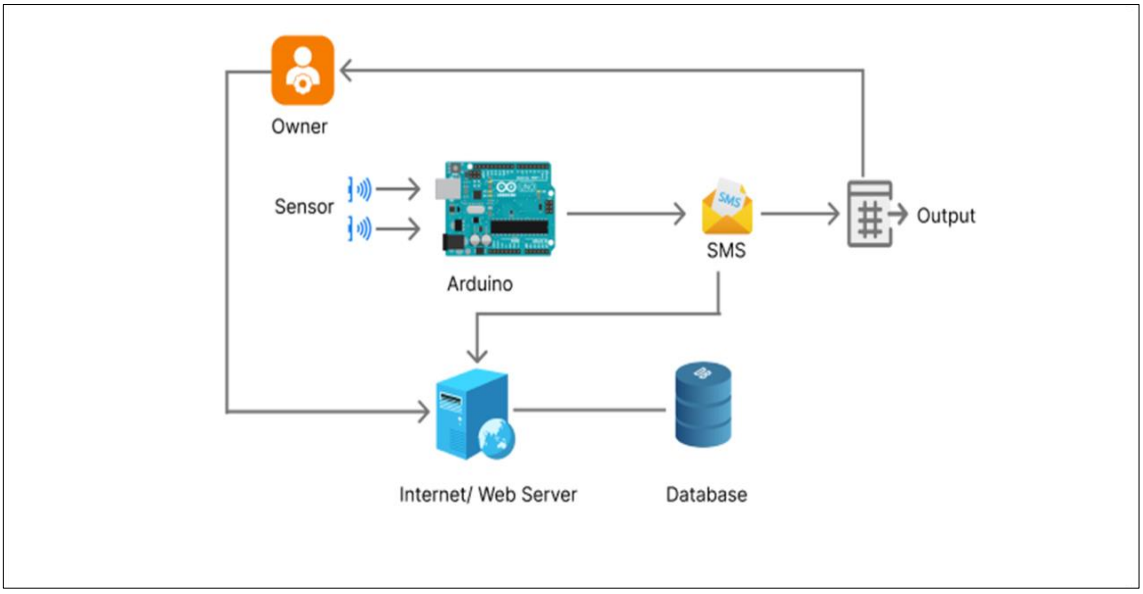


Figure 1. Conceptual Diagram

Figure 1 shows the study's conceptual diagram, which follows the input-process-output principle. It would signify the owner being vigilant, giving time to seek help, and securing the area. Inputs are coming from the intruder and fire. The procedure includes monitoring, detecting, sending text message notifications, and data saving of daily detections of intruder and fire to the database. The output provides decision support to the administration.

Block Diagram

The device's operation begins with the owner of Techbagz CCTV Bohol connecting the power supply and turning on the device (see Figure 2 on next page). The PIR sensor and the temperature sensor will monitor and detect motions

and temperature changes, after which the Arduino will process the data and transmit a signal to the GSM module , which will send a text message notice if an intruder or a fire is detected producing an alarm sound and data is saved to the database. The GSM800L module is in charge of transferring data to the microcontroller, which is then passed on to the mobile phones and to the database. It will send a text message to the assigned phone number. The system is compatible with any mobile phone that has a text message application. It included the specification of the system's core functionalities, which included the entities, functionalities, inputs, and expected outputs.

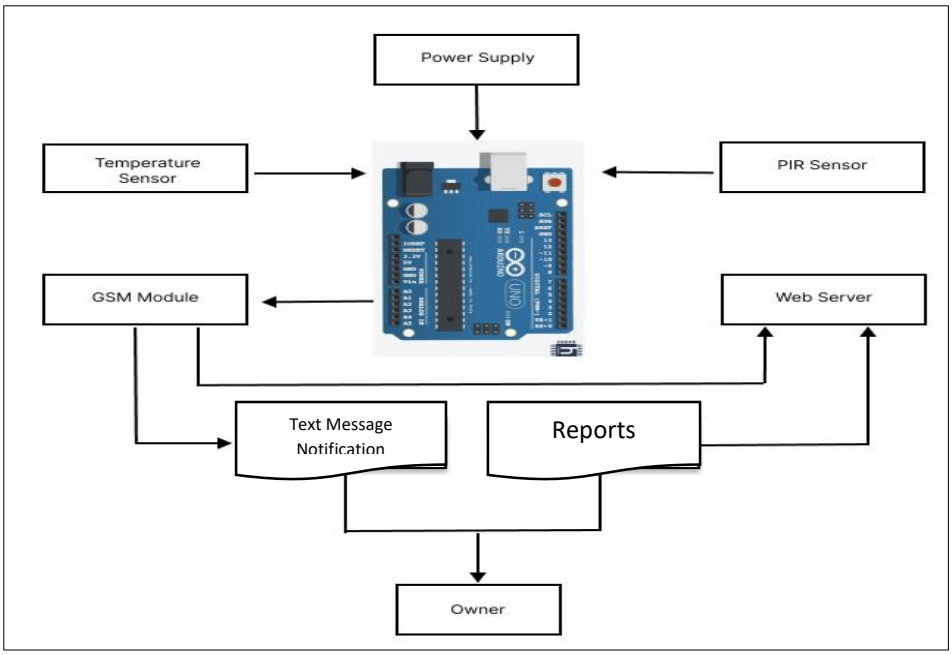


Figure 2. Block Diagram

Figure 3 on the next page displays the hardware architecture of the system. The hardware design entails of two main components which are the connections between Arduino UNO and the GSM SIM800L and Arduino UNO with the motion and temperature sensor. The motion and temperature sensors will be triggered if

there is an intruder and an extreme change in temperature inside the store. When it reaches the temperature set by the store owner, it will send a signal to the Arduino informing it of the motion and high temperature. Value of temperature limit that can be triggered by the temperature sensor can be changed in the code upon the request of the owner. The motion sensed by the motion sensor and the increased temperature detected by the temperature sensor will make the Arduino to alert the owner about the situation through the GSM module. An SMS will be sent immediately to the store owner informing him of the situation inside the store for both intruders and temperature changes, as well as an alarm to notify them. The GSM module will also send data to an online database with the date, time, and temperature in degrees Celsius.

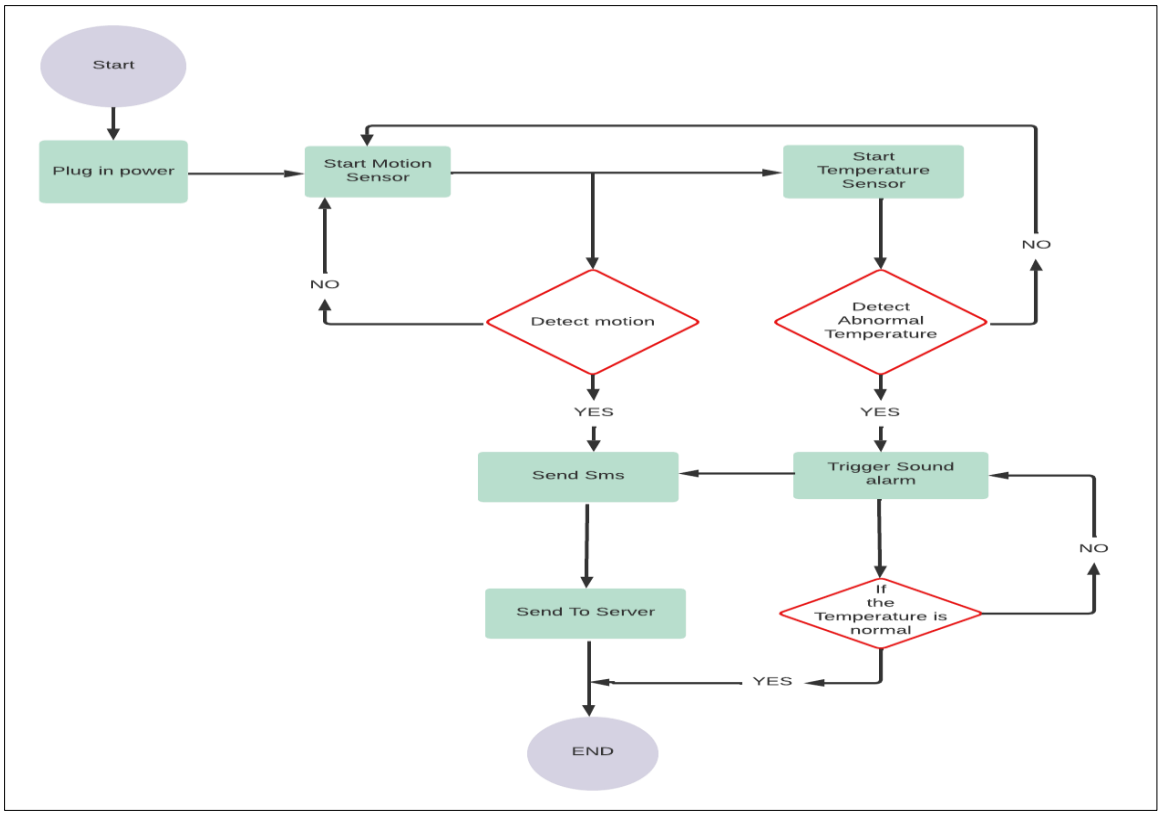


Figure 3. Hardware Flowchart

The software of the system is based on the flowchart in figure 4. After sending an alert message via the GSM module, it will also send data to an online database with the date, time, and temperature in degrees Celsius. To access the database, the admin-user must first register his device. After registering, admin-users can access the online database. The admin-user can change his password and email address on the home form. Admin can view all detected intruders and fires and remove them if he so desires. In the reports, the administrator can view and print reports of intruder and fire detection from a specific date to a specific date and the about form, where admin can view the developers' information.

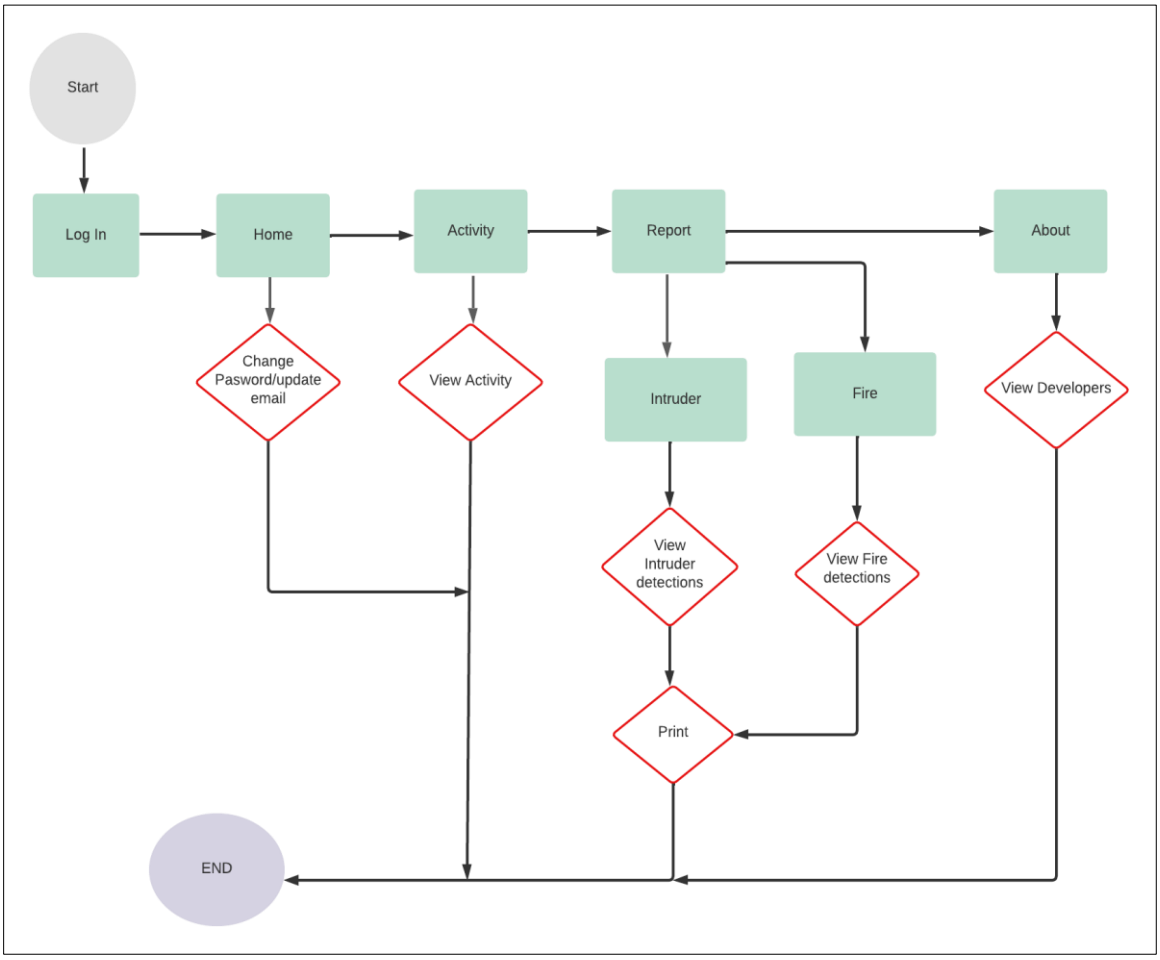


Figure 4. System Flowchart

Development Model and Approach

The Waterfall Model was used by the researcher in Security and Fire Alarm Arduino-based System with Text Message Notification. It is also referred to as a linear-sequential life cycle model. It is very simple to understand and use. It was a step-by-step procedure in which researchers could not move on to the next phase until the first was completed. It entails requirements gathering and analysis, system design, implementation, integration and testing, and maintenance.

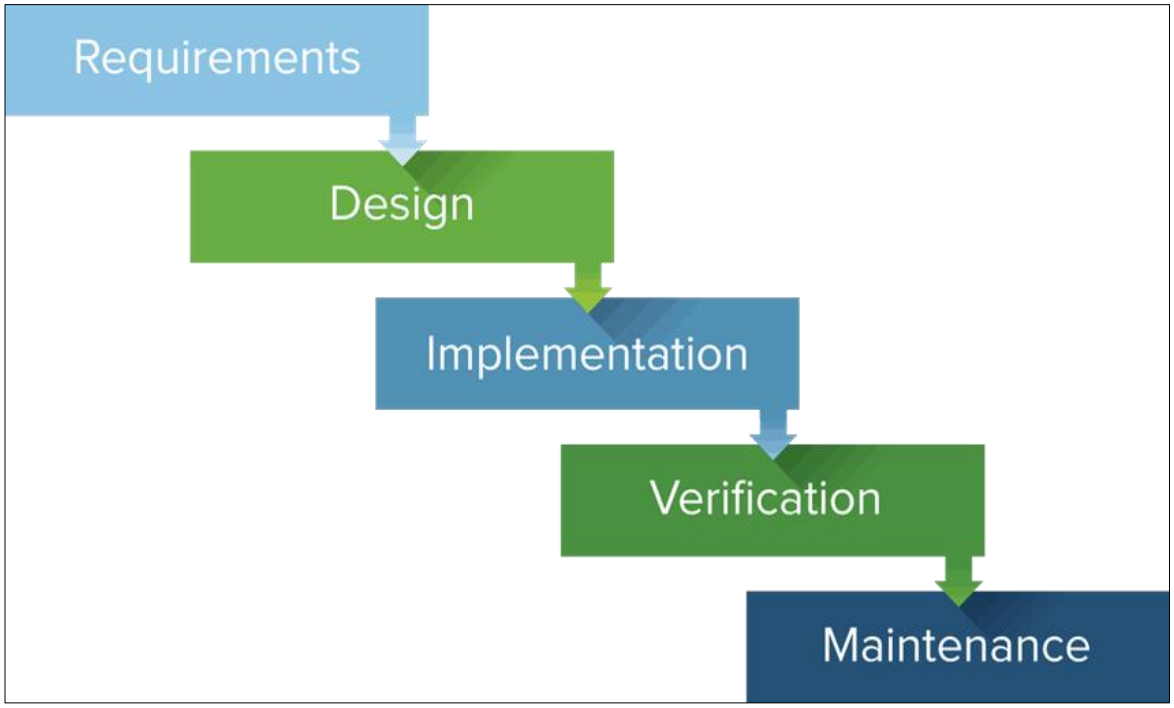


Figure 5. The Phase of Waterfall Model

1. Requirement Gathering and Analysis

The analysis was carried out at this time by testing the system's functionality. To avoid complications when transmitting messages, the location where the device is located must have a network signal. When the PIR and the

temperature sensor detects suspicious activity in the vicinity, it sends a text message notification to the owner via the GSM module and notifies the owner when a fire is detected through a text message and an alarm.

2. System Design

During the Design Process, the system was configured to satisfy the standards established in the preceding phases. During the Requirements Analysis Phase, the requirements discovered were translated into a Device Design Document that accurately explains and is based on the scope created by the researchers.

3. Implementation

During the implementation, device functions were established. The required syntaxes and other components were developed and built with the help of various software and components listed in the Development Tools in order to make the system runnable.

4. Integration and Testing

Following the implementation method, researchers were able to recognize the device's result in an automated Arduino. This was done in order to take into account both the initial result and the expected outcome.

5. Maintenance

The maintenance is the last phase. This phase can be worked on the after the project was done. The researchers decided to monitor the project.

Development Approach

To acquire insights into compositional sub-systems, the researchers decided to use a top-down strategy, which was critical in breaking the modules of the Security and Fire Alarm Arduino-based System with Text Message Notification of Techbagz CCTV Bohol. Top-down approach is a method used to analyze and choose securities. Top-down analysis generally refers to using comprehensive factors as a basis for decision making. The top-down approach seeks to identify the big picture and all of its components.

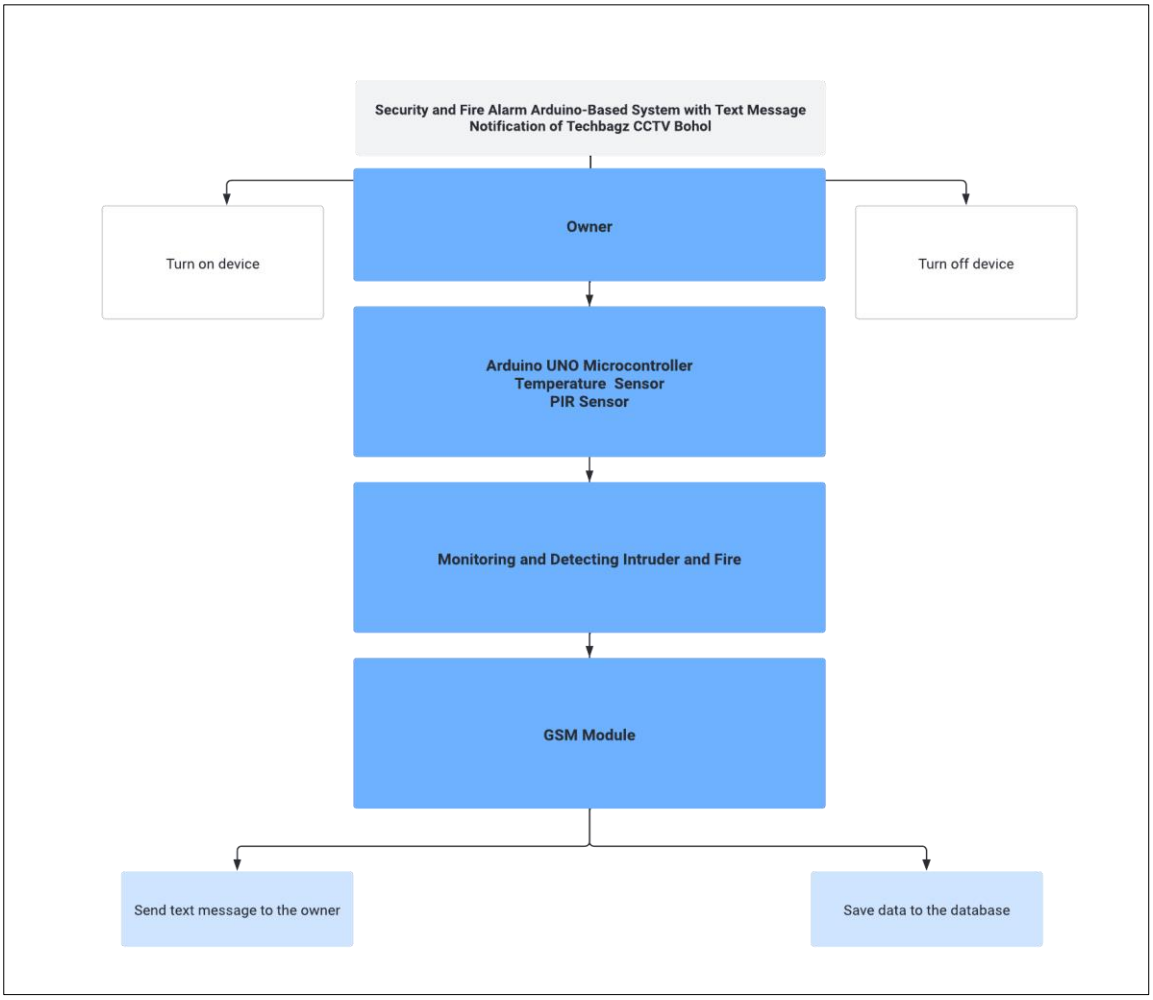


Figure 6. Top-down Approach

Development Tools

These are the tools used in the development of the Security and Fire Alarm Arduino-based System with Text Message Notification:

1. **Arduino Board** – This is the main board and contains everything else you need to program. It is use to read inputs like the sensors and other components that are needed. This will accept all the programs you input to the microcontroller from the Arduino IDE Software.
2. **Arduino Software** – It is use to write and upload programs to Arduino compatible boards. The system controls the board and sends instructions to the microcontroller.
3. **Figma** - a powerful design tool that helps you to create anything: websites, applications, logos, engineering diagrams, process diagrams, network diagrams, software and database diagrams and much more. It was used to represent the process in the system.
4. **Hardware Components** – The Passive Infrared (PIR) sensor, Temperature sensor, the Global System for Mobile (GSM) module, and other electronic components utilized in the project and used are all connected to the Arduino microcontroller.
5. **Lucidchart** – is a web-based diagramming application that allows users to visually collaborate on drawing, revising and sharing charts and diagrams, and improve processes, systems, and organizational structures.
6. **MySQL** – offers standard database driver connectivity for using MySQL with applications and tools that are compatible with industry standards ODBC

and JDBC. It was used in the connectivity of databases in the programming application of the proposed system.

7. **PHP –** a widely-used general-purpose scripting language that is especially suited for Web development and can be embedded into HTML.
8. **Sublime Text** - Sublime Text editor is a sophisticated text editor which is widely used among developers. It includes wide features such as Syntax Highlight, Auto Indentation, File Type Recognition, Sidebar, Macros, Plug-in and Packages that make it easy for working with code base. Used to edit PHP scripting language.
9. **WAMP –** a free open source cross-platform web server solution stack package, consisting mainly of the Apache HTTP Server, MySQL database, and interpreters for scripts written in the PHP and Perl programming languages.
10. **Windows 10 Operating System** – is the latest release of Microsoft's Windows operating system; initially, code-named Windows Threshold, and debuted on July 29, 2015, followed by the windows version 8.0.

Environment and Participants

The goal of the research was to design and develop a Security and Fire Alarm Arduino-based System with Text Message Notification in Techbagz CCTV Bohol at Ubujan, Tagbilaran City. The store, its owner, and its employees were the study's subjects. The major subject of the investigation was the Techbagz CCTV

Bohol, the name of the retail establishment, whose main goal is securing the area. The proprietor and the staff assigned to manage the developed security system.

Data Collection

To create a Security and Fire Alarm Arduino-based System with Text Message Notification, the developers and the researchers do a research group to get more information about the proposed system and also asked permission to the adviser then to owner of Techbagz CCTV Bohol at Ubujan, Tagbilaran City, Bohol to conduct the study. The developer and researchers will conduct an actual interview to the owner by giving a questionnaire in order to gather the needed data in assessing the features, performance and acceptability of the Security and Fire Alarm Arduino-based System with Text Message Notification. From these data, conclusions and recommendations will be provided. There were 6 respondents for the Device and Web Usability. These are the owner, personnel and electronics personnel of Techbagz CCTV Bohol. Below is the table for the distribution of the respondents.

Table 1

Summary of Respondents

RESPONDENTS	NO. OF RESPONDENTS
Owner	1
Electrical Personnel	2
Other Employee	3
TOTAL	**6**

The guide for the interpretation of the results of the Device Usability is presented in table 2 below.

Table 2

Interpretation Guide of the Device Usability

Weight	Range	Description	Interpretation
7	6.4 - 7.0	Strongly Agree	The respondents strongly believe and are confident that the system is very usable.
6	5.5 – 6.3	Agree	The respondents believe and are confident that the system is usable.
5	4.6 – 5.4	Tend to Agree	The respondents tend to agree that the system is usable.
4	3.7 – 4.5	Neither Agree or Disagree	The respondents are neutral in trusting that the system is usable.
3	2.8 – 3.6	Tend to Disagree	The respondents tend not to trust that the system is usable.
2	1.9 – 2.7	Disagree	The respondents believe that the system is not usable.
1	1.0 – 1.8	Strongly Disagree	The respondents are strongly confident that the system is not usable.

Table 3 on the next page presents the interpretation of the results used for web usability. In the web usability, the rating was done based on the Web Usability Guidelines developed by the MIT Information Services Technology. The questionnaire was given to the 6 respondents to identify whether the system follows web standards.

Table 3

Interpretation Guide of the Web Usability

Weight	Range	Description	Interpretation
5	4.2 – 5.0	Excellent	The respondents find the application excellent with regards to the web usability standard
4	3.4 – 4.1	Very Good	The respondents find the application very good with minor inconsistencies and aesthetics.
3	2.6 – 3.3	Good	The respondents find the system very good with noncritical errors causing confusion.
2	1.8 – 2.5	Fair	The respondents find the system fair having serious problems that need high priority to fix.
1	1.0 – 1.7	Poor	The respondents find the system poor with severe problems

To determine the general acceptability of the system, the average weighted mean or weighted mean score computed to evaluate or assess the system and web acceptability level using the following formula:

$$\boldsymbol{WMS = \frac{1f1 + 2f2 + 3f3 + 4f4 + 5f5}{n}}$$

Where:

WMS = Weighted Mean Score

f_1= Frequency of respondents given a rate of 1

f_2= Frequency of respondents given a rate of 2

f_3= Frequency of respondents given a rate of 3

f_4= Frequency of respondents given a rate of 4

f_5= Frequency of respondents given a rate of 5

n = Total number of respondents

1,2…5= constant (rating to the service provided)

OPERATIONAL DEFINITION OF TERMS

The following terms are used conceptually and operationally for better understanding of the study.

Arduino. Refers to an open- source electronics platform or board and the software used to program it. Arduino is design to make electronics more accessible to artists, designers, hobbyist and anyone interested in creating interactive object or environment.

Closed-Circuit Television (CCTV). Known as video surveillance, is the use of video cameras to transmit a signal to specific place, on a limited set of monitors.

Espionage. The practice of spying or of using spies, typically by governments to obtain political and military information.

Global System for Mobile (GSM). A digital cellular phone technology. This was used in research to be the signal converter of sensor data SMS signal.

Hardware. The entire set of programs, procedures, and routines associated with the operation of a computer system.

Intruder. A person who enters a place or building without permission in order to commit a crime.

Incursion. A hostile entrance into or invasion of a place or territory, especially a sudden one; raid.

Passive Infrared Sensor (PIR). A device used to detect motion by receiving infrared radiation. When a person walks pass the sensor, it detect a rapid change of infrared energy and send signal. PIR sensors is commonly used in security alarms and automatic lighting applications.

Security System. A system designed to detect intrusion, such as unauthorized entry, into a building or other areas such as a home or school. A system of interconnected devices working together. They are not limited to the physical safekeeping of objects. They can also be used to protect intellectual properties, such as highly classified data in computers.

Short Message Service (SMS). Is to send and received text to mobile phones using Global System for Mobile (GSM). In the study it is the connection technology between the sensory device and mobile device used in the system development.

Software. Is a set of instructions, data or programs used to operate computers and execute specific task.

Techbagz CCTV Bohol. Is the name of the management being proposed with the Security and Fire Alarm Arduino-based System with Text Message Notification.

Web Hosting. Is a type of internet hosting service that allows individuals and organizations to make their website accessible via the World Wide Web. It is the business of supplying server space for storage of Web sites on the internet, and sometimes the provision of ancillary services such as Website creation.

Chapter II

PRESENTATION OF FINDINGS, ANALYSIS AND INTERPRETATION OF DATA

Existing Operation and Processes

The study focused on the processes of Security and Fire Alarm Arduino-based System of Techbagz CCTV Bohol. Techbagz CCTV Bohol is a business establishment in Ubujan, Tagbilaran City. The only protection provided by establishment is CCTV. These were the following processes that took place in the establishment of Techbagz CCTV Bohol.

A. User Input

The owner would turn on and off the CCTV. The owner's input is received by CCTV. CCTV provides video footages and gives the owner access to all of the CCTV records.

Data Flow Diagram

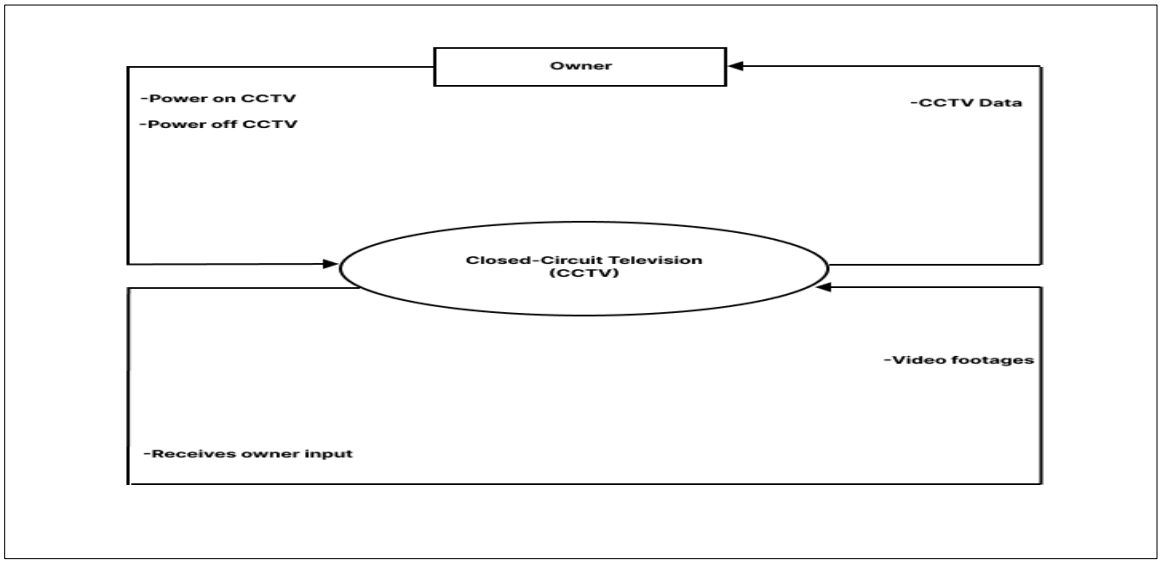


Figure 7. Contextual Diagram of the Existing Security

Event Specifications:

Event List:

1. User Input (CCTV)

Event List Diagram

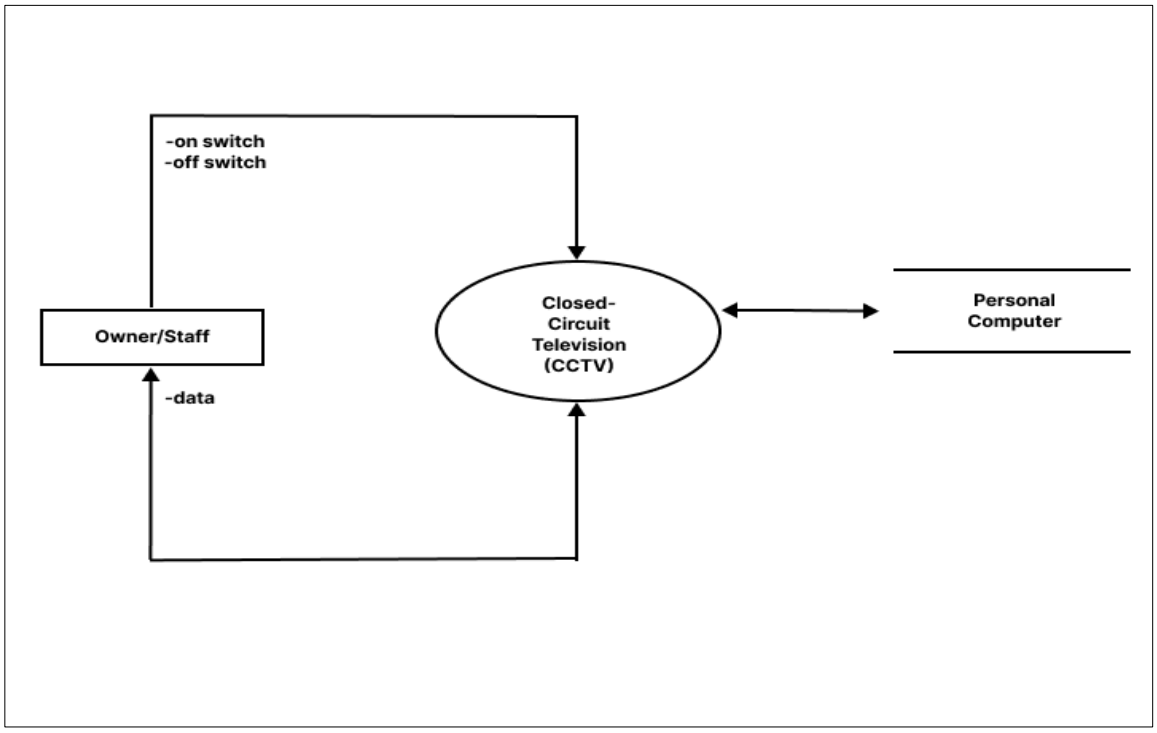


Figure 8. User Input (CCTV)

Needs of the Existing Operation

According to the observations of the researchers, the existing system used by Techbagz CCTV Bohol needs to be improved in order to better secure the region in the event of intruders and fire accidents. They discovered the following requirements:

1. To install a security system that will send a text message to the owner alerting them to secure the area.
2. To install a fire alarm system that will make a beeping sound anytime there is an extreme temperature rise in the store.
3. To create a database that will provide all the daily detections of the device with date and time.
4. To have a database that can generate reports to all of the detections and intrusions be used for the purpose it intends.

Security and Fire Alarm Arduino-based System with Text Message Notification

The needs of the present system serve as the basis for the development of the features of the Security and Fire Alarm Arduino-based System with Text Message Notification of Techbagz CCTV Bohol at Ubujan, Tagbilaran City. This study is expected to address the problems encountered in the present system.

A. Higher-Level Security

In this feature, the security of the establishment is heightened with the use of a motion sensor and temperature sensor integrated into a single device. In order for the device to work, the owner, as the primary actor, he has the option to either plug in the device or use it on battery to turn it on. This activates the entire mechanism of the device, sending an SMS to the owner immediately as soon as an intruder breaks in and going off once a fire breaks out.

B. Data Storage

This feature enables the owner to retrieve the device's data, namely the: motion and heat detection data with their corresponding date and time, device activities, and user log information, using a database.

C. Reports

In this feature, the owner will generate statistical or graphical reports from the database allowing the owner to keep a physical record of the device's activities that has been saved in the database by printing it.

Use Case Diagram

A use case diagram presenting the interaction on the device and hardware components that the sensors and device can detect fire and movement through temperature sensor and PIR sensor and notify the owner.

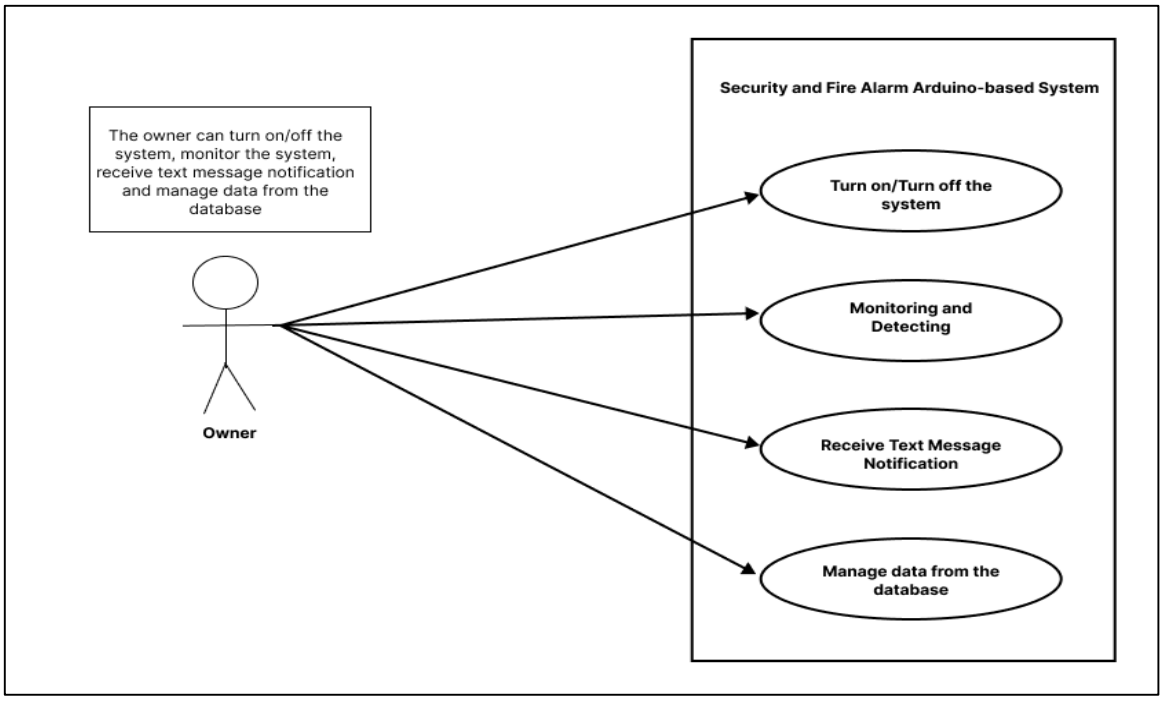


Figure 9. Use Case Diagram

Table 4

Use case 1 Narrative – Higher-Level Security

Scope	**Security and Fire Alarm Arduino-based System with Text Message Notification**
Level	User Goal
Goal	Notify the owner in case of fire and detect intruders and send text message to the owner
Primary Actor	Intruder and Fire
Stakeholder	Owner and employees of Techbagz CCTV Bohol monitoring and detecting intruders and fire in the store.
Preconditions	Temperature change and movement trigger the sensors and alarm.
Success Guarantee	Security and Fire Alarm Arduino-based System with Text Message Notification

Main Success Scenario:

1. The owner of Techbagz CCTV Bohol, will operate the device by turning on, which is plug in the power source.
2. The device monitors and detects unwanted intrusions and fire that occur accidentally and notify the owner by sending text message and an alarm.

Table 5

Use case 2 Narrative – Data Storage

Scope	**Security and Fire Alarm Arduino-based System with Text Message Notification**
Level	User Goal
Goal	Send and retrieve data to database
Primary Actor	GSM
Stakeholders	Owner and employees of Techbagz CCTV Bohol monitors and detects intruders and fire in the store and notify the owner
Preconditions	Admin Logged-in
Success Guaranties	The device can have a storage for all the detections for backup

Main Success Scenario:

1. The owner of Techbagz CCTV Bohol will turn on the device.

2. The device monitors and detects unwanted visitors and fire that occur accidentally and notify the owner by sending text message and an alarm and sends data to the database.

Table 6

Use Case 3 Narrative – Reports

Scope	**Security and Fire Alarm Arduino-based System with Text Message Notification**
Level	User Goal
Goal	Receive data of daily detections and provide reports to the owner
Primary Actors	Owner of Techbagz CCTV Bohol
Stakeholder	Owner and employees of Techbagz CCTV Bohol monitors and detects intruders and fire in the store and notify the owner
Preconditions	GSM Module must have a good signal for sending data to the database
Success Guarantee	The device can generate reports of daily intrusions and fire detected with date and time

Main Success Scenario:

1. The owner or employees of Techbagz CCTV Bohol will operate the device by turning on, which is plug in the power source.
2. The device monitors and detects unwanted visitors and fire that occur accidentally and notify the owner by sending text message and an alarm and sending data to the database.

Database Design

Database design is an essential activity in the system development cycle. It is a process of defining the architecture components, modules, interfaces, and data for the system to satisfy requirements. Systems design could be seen as the application of systems theory to product development. In order to enhance the present information system, the researchers designed a new system that would be used by the client in each operation.

This would show the design of the developed system, and forms involve in recording and retrieval, inquiry as well as other operation involved. The purpose of

the design is to illustrate the framework of the forms, database and procedure involved in the database management.

The design would be typically shown by screen appearance, and program hierarchy presented. The design would also serve as the specification for the working relations between all the parts of a system in terms of their actions, functions and capabilities.

Class Diagram

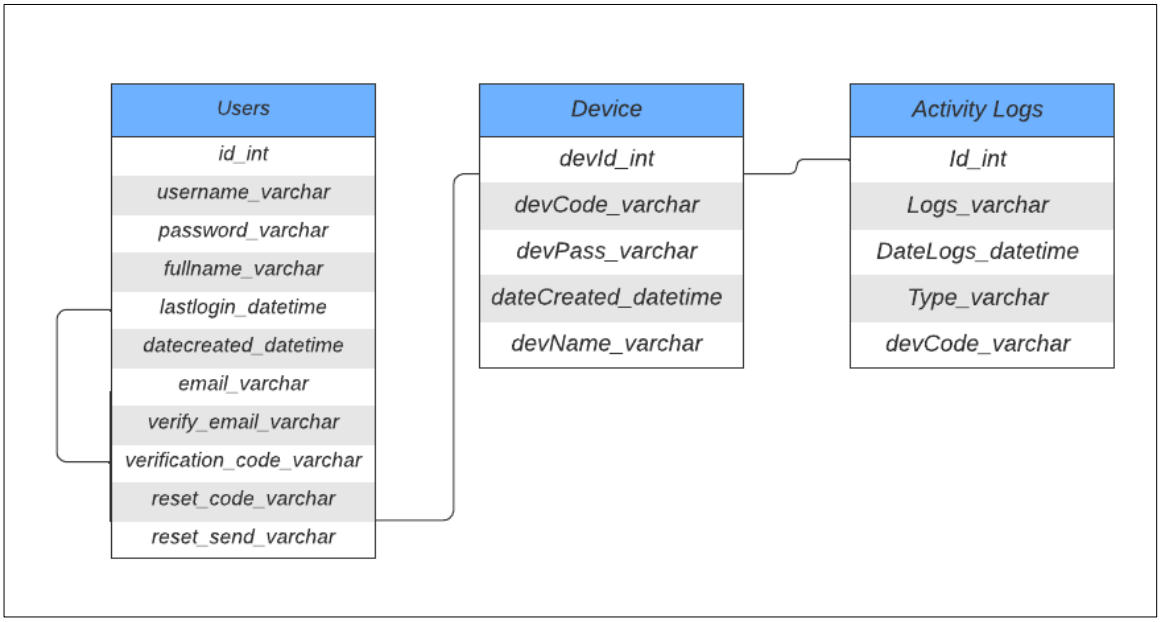


Figure 10. Class Diagram

In software engineering, a class diagram in the Unified Modern Language (UML) is a type of static structure diagram that describes the structure of a system by showing the system classes, their attributes, operational methods, and the relationships among objects. In this study, the class diagram is the main building

block of object-oriented modeling. It is used for general conceptual modeling of the systematic of the application, and for detailed modeling translating the models into programming code to make the study more understandable in terms of processes. Class diagrams can also be used for data modeling. The classes in a diagram represent both the main elements, interactions in the application, and the classes to be programmed.

Data Structure

The following database tables were used in storing the information inputted in the system together with the collection of operations. Table 7 presents the user table used by the administrator for system security.

Table 7

Users

Field	Field Name	Type	Width	Description
1	id	int	11	User id
2	username	varchar	10	Username
3	password	varchar	8	Password
4	fullname	varchar	30	Full name
5	last_login	datetime		Date inputted
6	datecreated	datetime		Date inputted
7	email	varchar	30	Admin email
8	verify_email	varchar	20	Verified or not
9	verification_code	varchar	20	verificationcode
10	reset_code	varchar	20	Reset code
11	reset_send	varchar	10	Reset send

Table 8 presents the activity logs table. It represents the detections of fire and intruder.

Table 8

Activity Logs

Field	Field Name	Type	Width	Description
1	Id	int	20	Id of logs
2	Logs	varchar	25	Logs of fire and intruder detected
3	DateLogs	datetime		Date of fire or intruder detected
4	Type	varchar	10	Fire or an intruder
6	devCode	varchar	6	Registered arduino device

Table 9 presents the device table on the next page. This table is used for the administrator's data.

Table 9

Device

Field	Field Name	Type	Width	Description
1	devId	int	11	Table id
2	devCode	varchar	6	Code of arduino register
3	devPass	varchar	20	Password of the device
4	dateCreated	datetime		Date of users
5	devName	varchar	30	Name of device

Program Hierarchy

Program Hierarchy also known as a structure chart shows the relationship between various modules. Its name comes from its general use in showing the organization (or structure) of a business. They convey the big picture of the modules (or functions) used in a program. Figure 11 shows the program hierarchy for the designing and development of the automated Arduino.

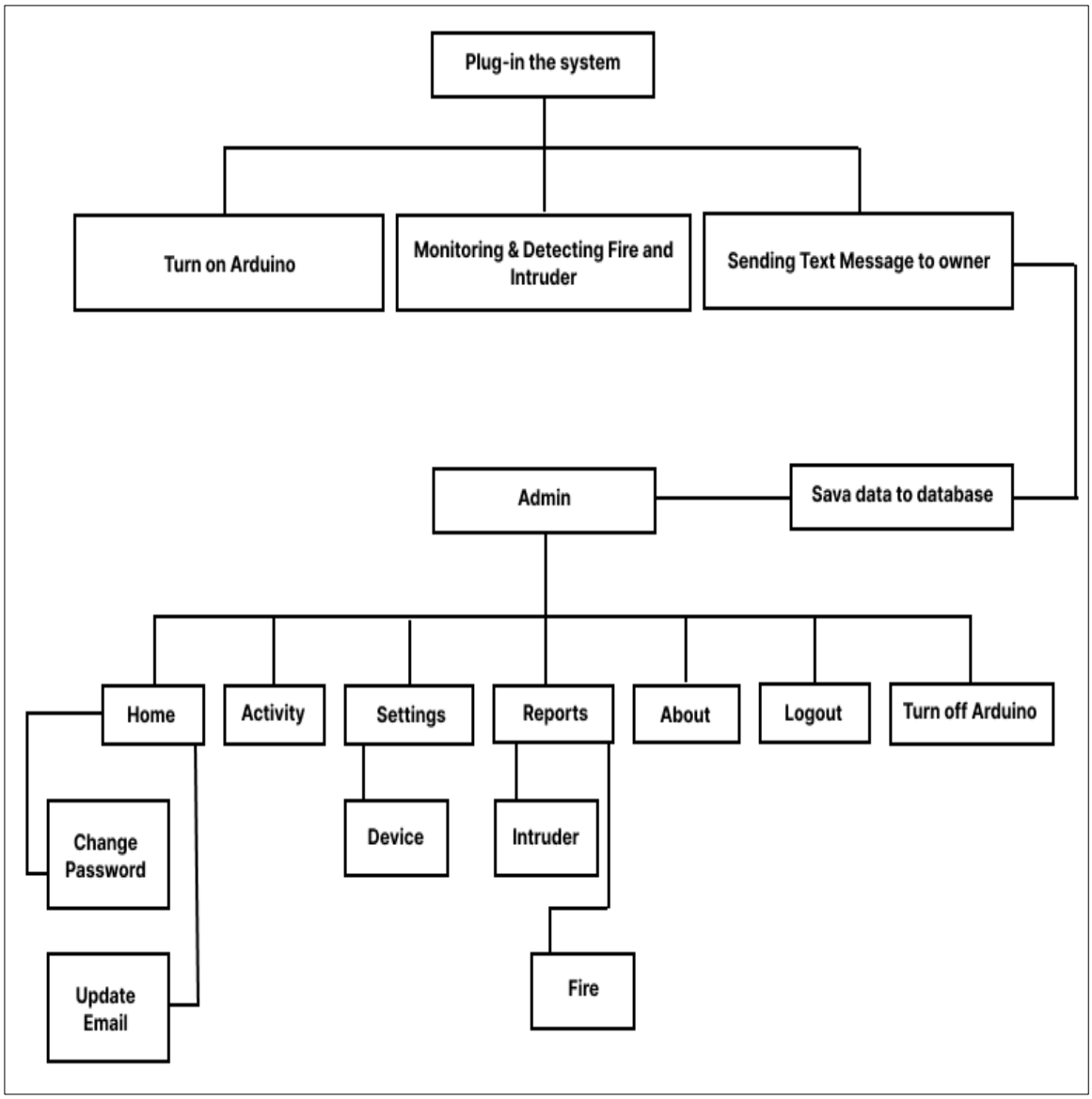


Figure 11. Program Hierarchy

Functional Requirements

A functional requirements defines a function of a software system or its components. A function is described as a set of inputs, behavior, and outputs. The functional requirement may calculations, technical details, data manipulation and processing and other specific functionality that define what a system is supposed to accomplish.

The functionality of the systems are as follows:

1. Hardware Interface and Design Schematic Diagram

Table 10

Hardware Interface

Hardware Interface	Functions
Arduino UNO Microcontroller	Use for the development of Security and Fire Alarm Arduino-based System with text message notification
PIR Sensor HC-SR501	Use for detecting and sensing human body and other large warm objects
Temperature Sensor Ds 18b20	Use for sensing temperature from normal to high
GSM 800L v2	Use to send text messages
Jumper Wires	Use to able to connect to other devices that were embedded in the device
Power Supply	The mainline socket
Serial USB Cable	Use to connect Arduino to the Arduino app from the computer
Mini speaker	Use for the alarm sound for fire detection

The Arduino Uno Microcontroller Board was used as the main hardware component while the Arduino IDE was used in writing the instruction codes (known as firmware) which was uploaded into the microcontroller. Figure 12 shows the design schematic diagram used to design the Security and Fire Alarm Arduino-based System. Figure 13 highlights the implementation of the circuit diagram using the selected components. The connections between components are also shown.

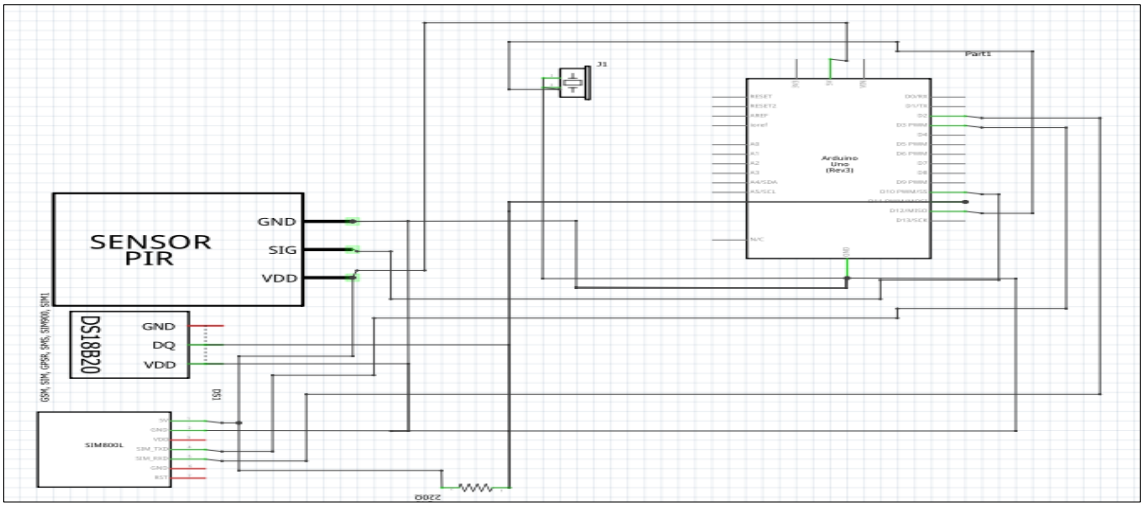


Figure 12. Design Schematic Diagram

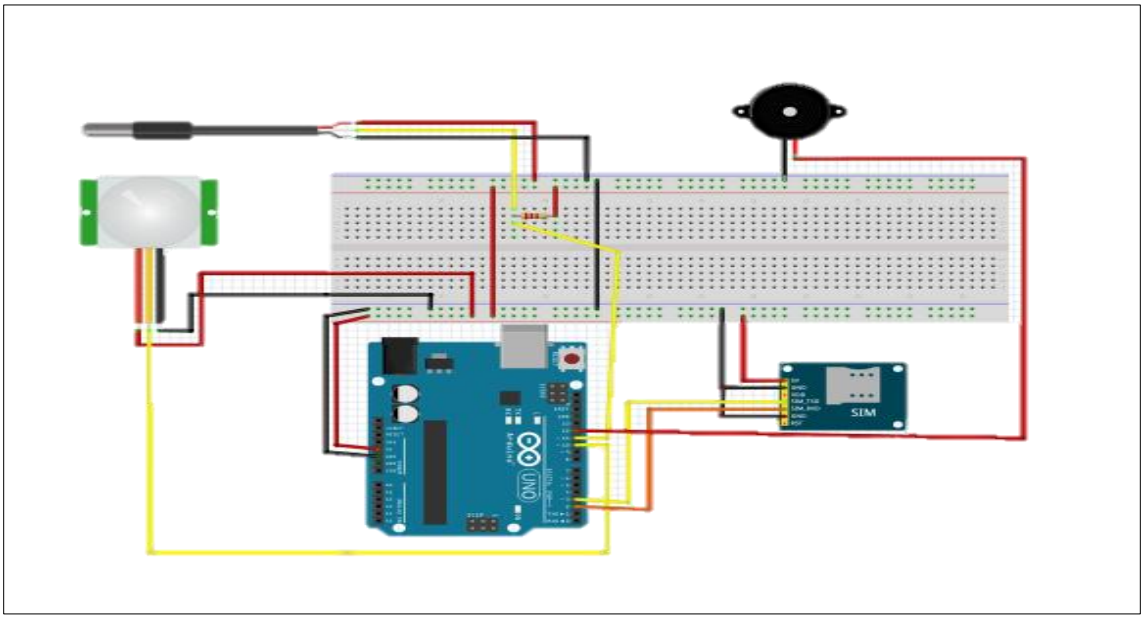


Figure 13. Connections for the Security and Fire Alarm Arduino-based System

Non-Functional Requirements

A non-functional requirement is a requirement that specifies criteria that can be used to judge the operation of a system, rather than specific behavior. This should be contrasted with functional requirements that define specific behavior of functions.

1. Reliability
    - Security and Fire Alarm Arduino-based System with Text Message Notification was able to give to the store owner of Techbagz CCTV Bohol a better and secured area to be alert through text message notifications and alarm by the time if there is a fire or an intruder.
    - The text message notification would be based on the motion and fire detected by the sensor.
    - The Security and Fire Alarm Arduino-based System with Text Message Notification relies on the intruders and fire that are detected by the sensors to send an alert in the store.
2. Operability
    - The store owner/personnel of Techbagz CCTV Bohol would operate the Security and Fire Alarm Arduino-based System with Text Message Notification.
3. Maintainability
    - Researchers planned to use sim card. This is the part of the components that allows Arduino to automatically send text message notification.

4. Availability
    - The Security and Fire Alarm Arduino-based System with Text Message Notification is always available as long as it is connected to the mainline.
5. Delivery
    - The Security and Fire Alarm Arduino-based System with Text Message Notification would be delivered to the store owner of Techbagz CCTV Bohol at Ubujan, Tagbilaran City.
    - Researchers are the ones responsible for installing the Security and Fire Alarm Arduino-based System with Text Message Notification at Ubujan, Tagbilaran City.

Test Cases

Test cases are a series of simple steps that have to be done to check the particular functionality or feature of an application. It is a set of conditions of a variable under which a tester will determine whether a software system or one of its features is working correctly or not. It may test cases to determine that a requirement is fully satisfied. These are the test case scenarios conducted during the acceptance testing.

The plan is to let the user system and follow the instructions in each test case to test the proposed system. The system should perform the expected result in each test case in order to be considered successful.

Module: Security and Fire Alarm Arduino-based System with Text Message Notification

Instructions:

1. First, the user must plug-in the power supply to the mainline, then turn on the Arduino which is the main to start the corresponding intrusions for monitoring and it starts detecting.

Expected Results:

1. When an intruder or fire is detected, it would send automatically a text message notification to the store owner and send data to the database.

Clean-up:

1. Turn off the Arduino.
2. Then plug out from the power supply.

Technical Requirements

The completion of Security and Fire Alarm Arduino-based System has three essential requirements namely: Hardware, Software and Peopleware. The Arduino-based Security and Fire Alarm System requirements must be presented and work together in the newly assembled device.

The hardware is best described as any physical component of a computer system that contains Arduino UNO, PIR sensor, temperature sensor, GSM module

and other electronics which are used for processing data. Such components are classified according to their functional use within a computer system.

The software or a program can be defined as a complete set of written instructions written by the programmer, which enables the computer to obtain the solution of the problem.

The peopleware are the user who would operate the system and those who are involved in the Arduino-based Security and Fire Alarm System. Peopleware refers to the role people play in technology and the development of hardware or software.

Minimum Hardware Specification

This covers the least hardware specification needed by the Security and Fire Alarm Arduino-based System with Text Message Notification to function as intended and expected.

Component	Specification
Controller board	Arduino UNO
Sensors	PIR Sensor
	Temperature Sensor
GSM Module	GSM 800L
Power Supply	9v

Minimum Software Specification

The Security and Fire Alarm Arduino-based System with Text Message Notification requires various software to function properly. This software is enumerated below with its corresponding specification.

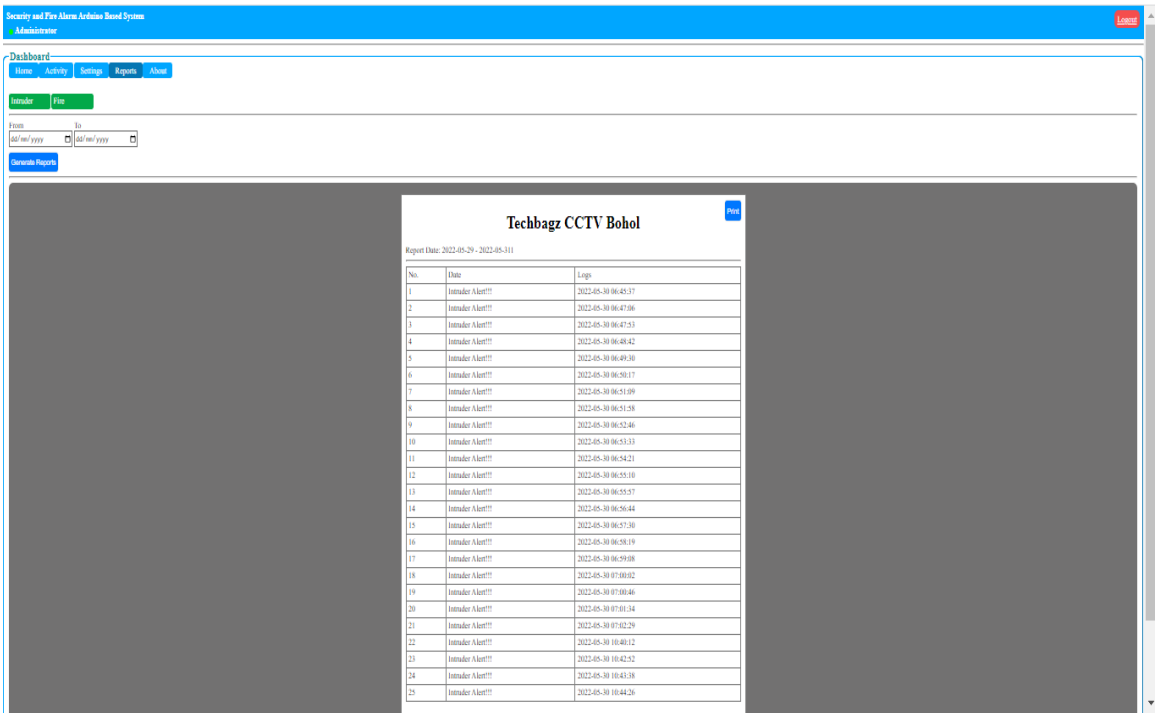
Item	Specification
Arduino IDE Software	Version 1.8.10 It runs on Mac, Windows and Linux Operating System
PHP 7.4	It runs on Mac, Linux and for Windows, the minimum version is Windows 7
MySQL	It runs on all platforms

Business Intelligence Integration

Business intelligence (BI) refers to the procedural and technical infrastructure that collects, stores, and analyzes the data produced by a company's activities. It combines business analytics, data mining, data visualization, data tools and infrastructure, and best practices to help organizations to make more data-driven decisions. The developed system is capable of detecting and generating a text message notification. The device used Arduino code in order to detect and send text message notification when needed. The hardware integrated business intelligence specifically in detecting intruder of the Techbagz CCTV Bohol and generate automatically text message notification to store owner. Database is an additional feature of the system that organized collection of time and date of the intrusions and fires detected through the GSM module.

These are reports showed below that is showing how business intelligence applied in the proposed system. These include the following:

Preview 1 Graphical form of Intruder and Fire Detected Daily

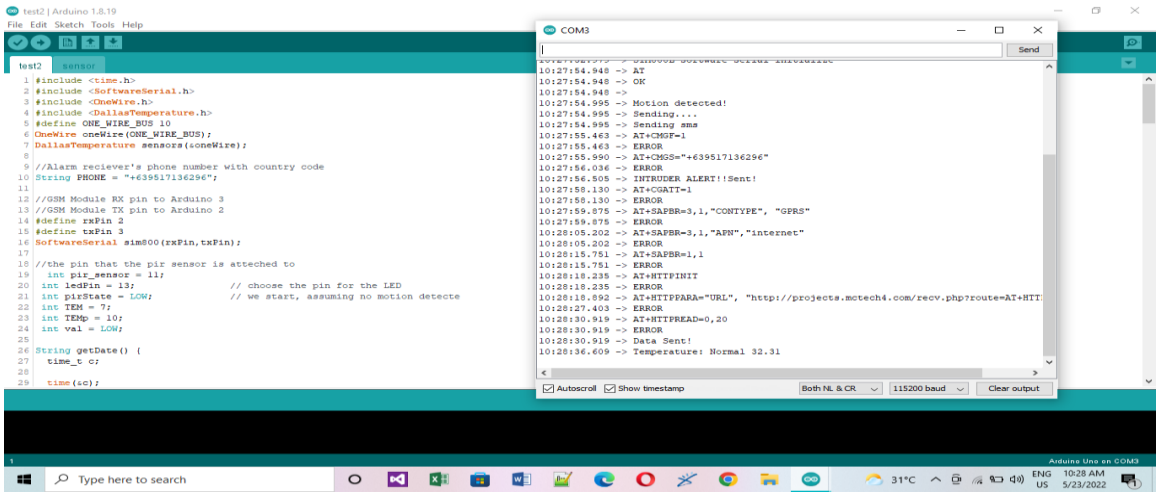


Preview 2 Graphical form of Intruder Detected

Preview 3 Graphical form of Fire Detected by year

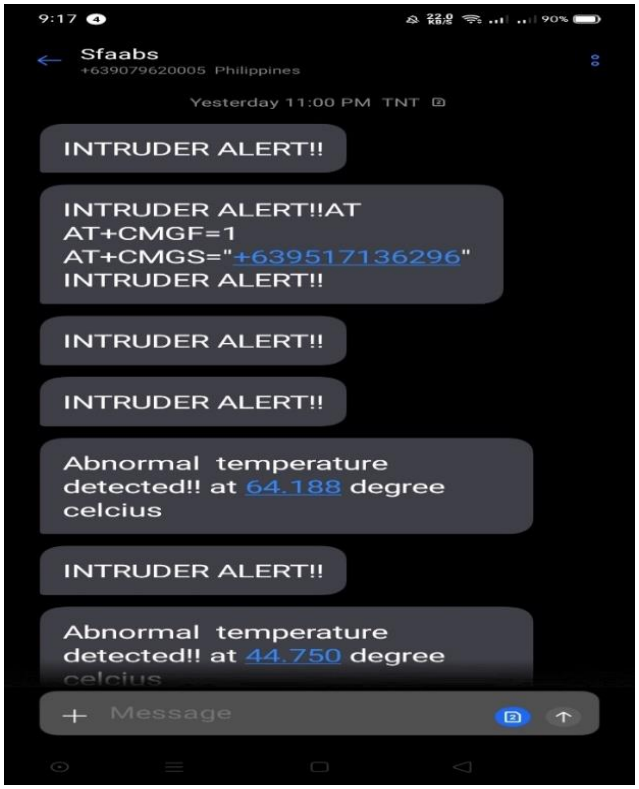
Physical and Screen Layout

Physical and screen layout is one of many attributes to provide user friendliness to the system. It should be designed in a way of the physical layout can navigate the device quickly, easily to recognized of the task the users need to performed and screen layout should be designed in such a way the browsers can navigate the system quickly and easily. Shown below is the output display in Arduino IDE Software.



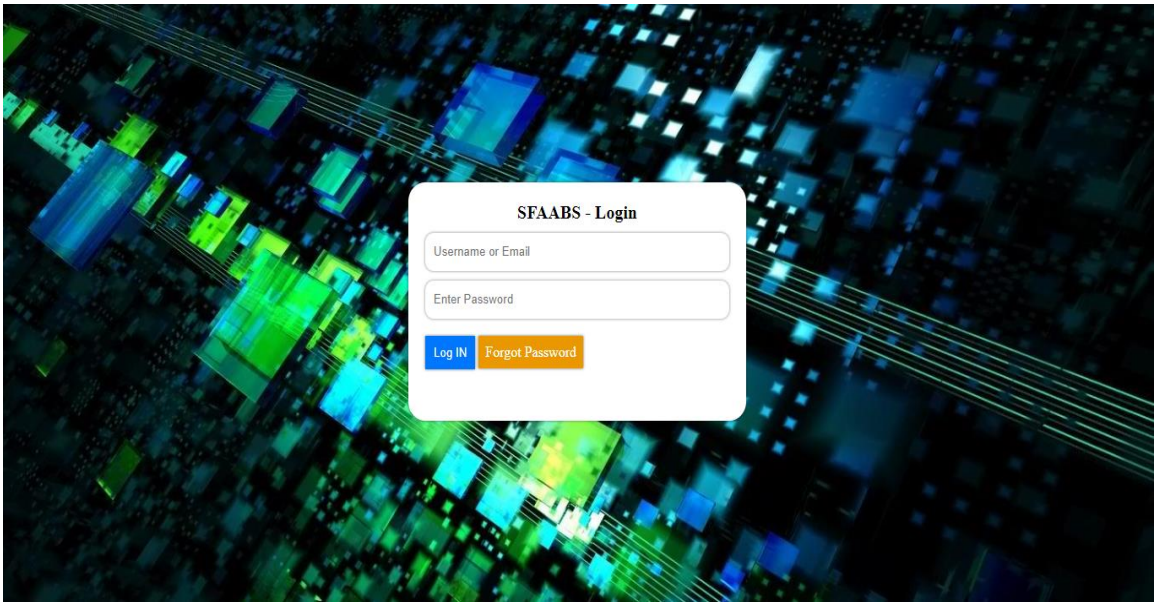
Preview 4 Arduino IDE Software Output Display

Preview 5 shown on the next page is the output display to the Mobile phone.

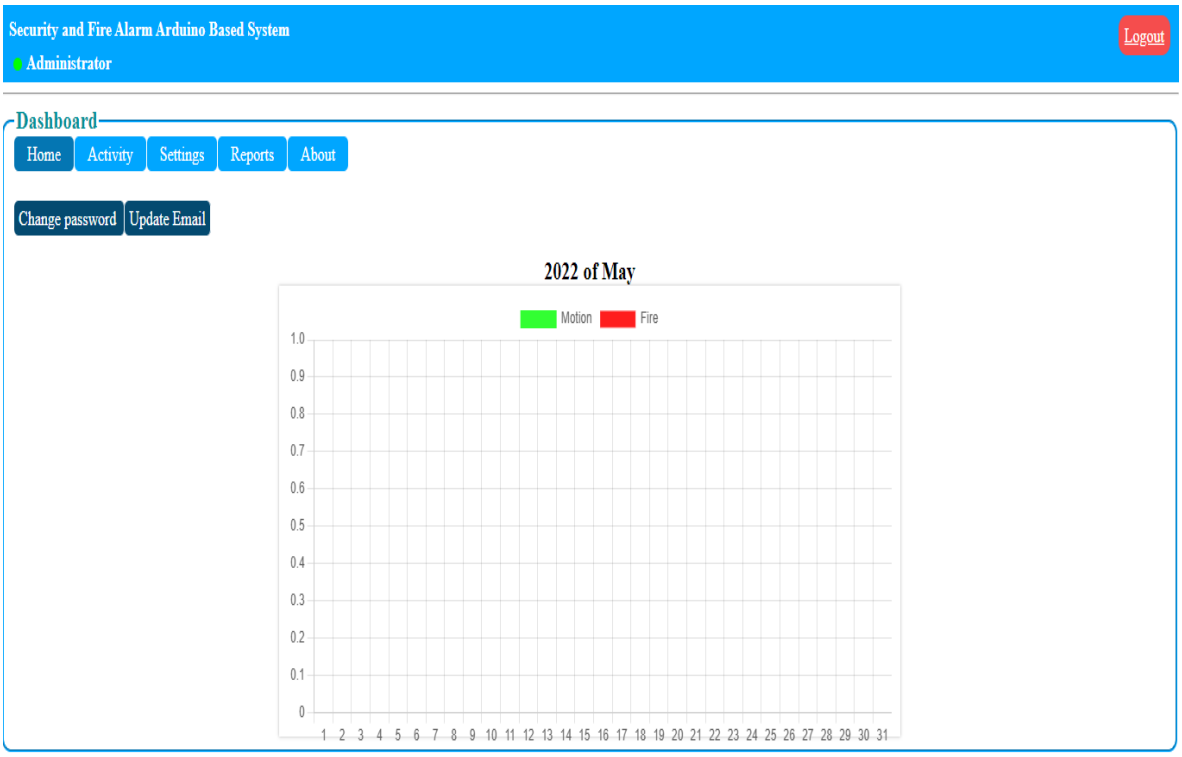


Preview 5 Mobile Phone Output Display

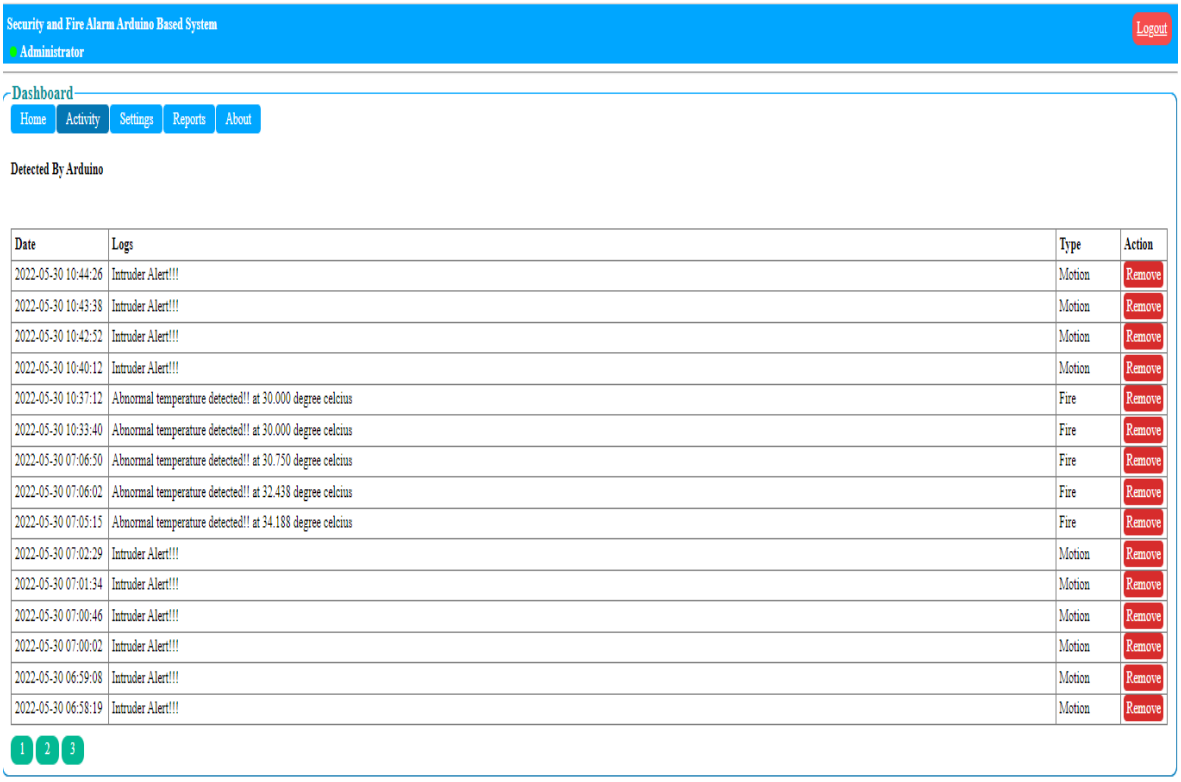
Preview 6 shown below is the output display of the database.



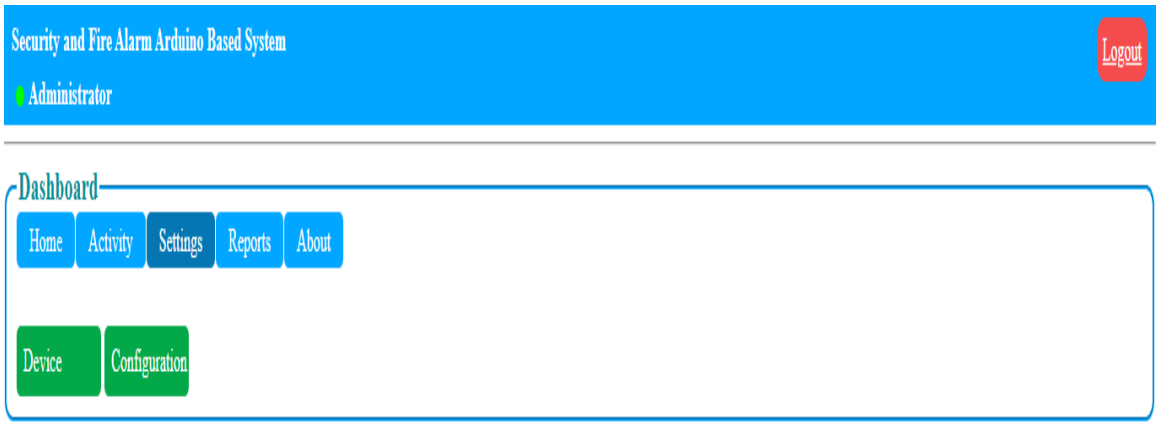
Preview 6 Admin Login Display



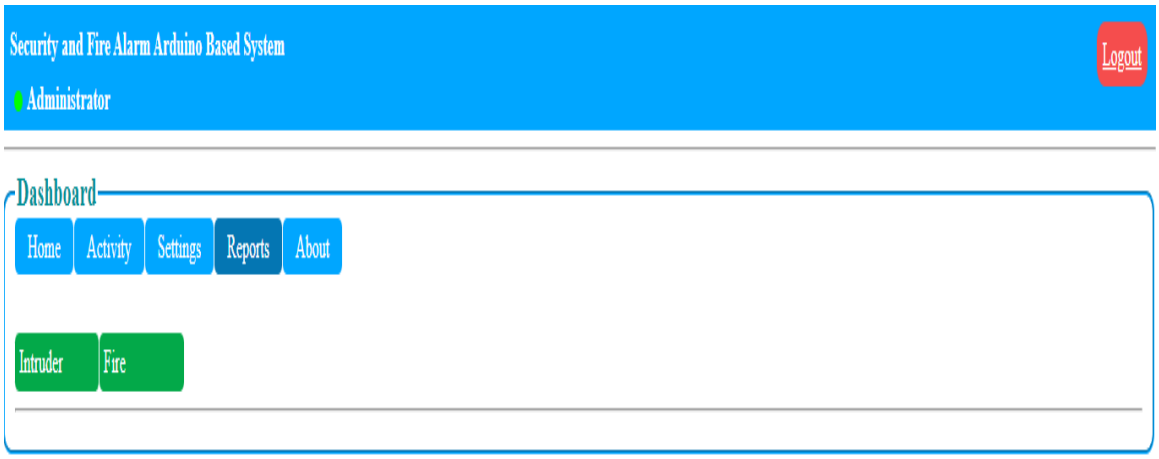
Preview 6.1 Change Password/Update Email Display



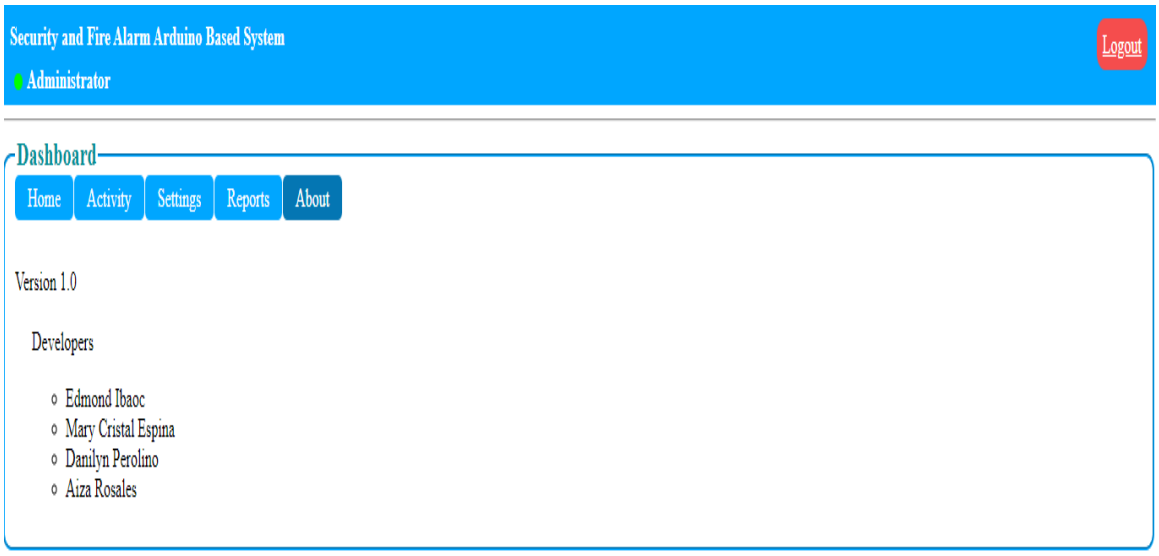
Preview 6.2 Activities Display



Preview 6.3 Device Display

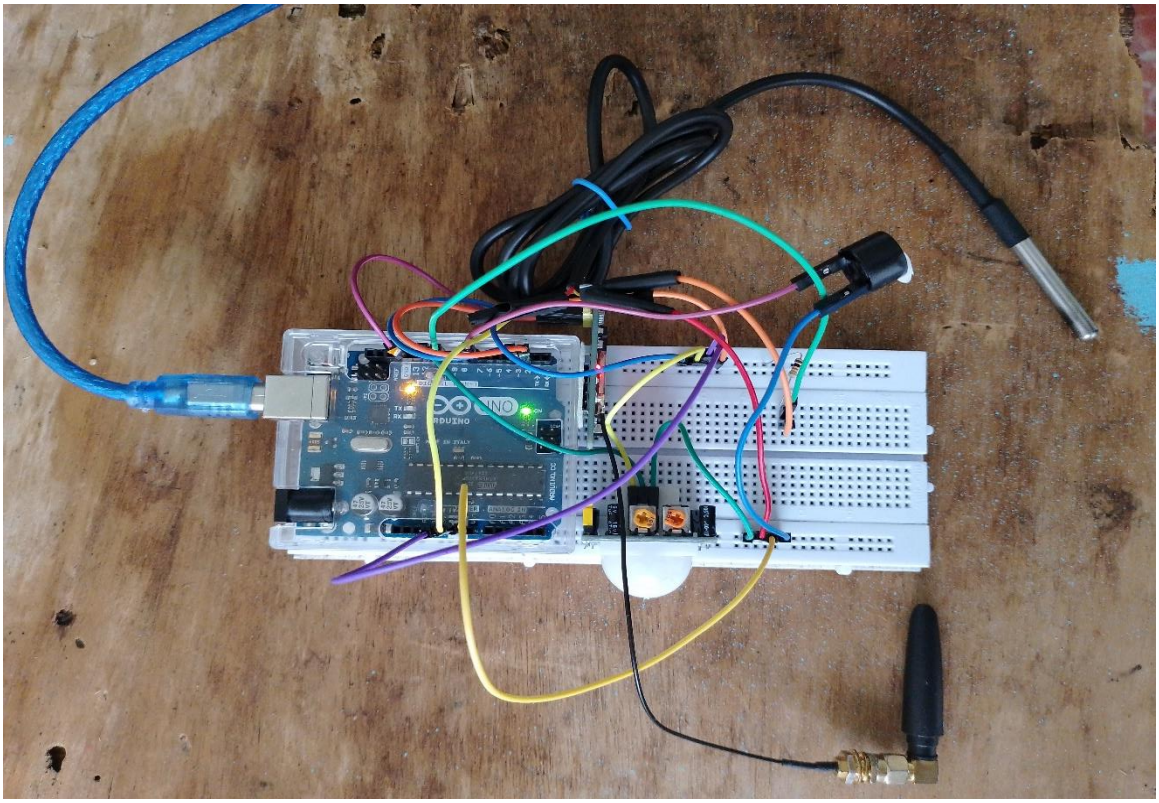


Preview 6.4 Intruder/Fire Reports Display

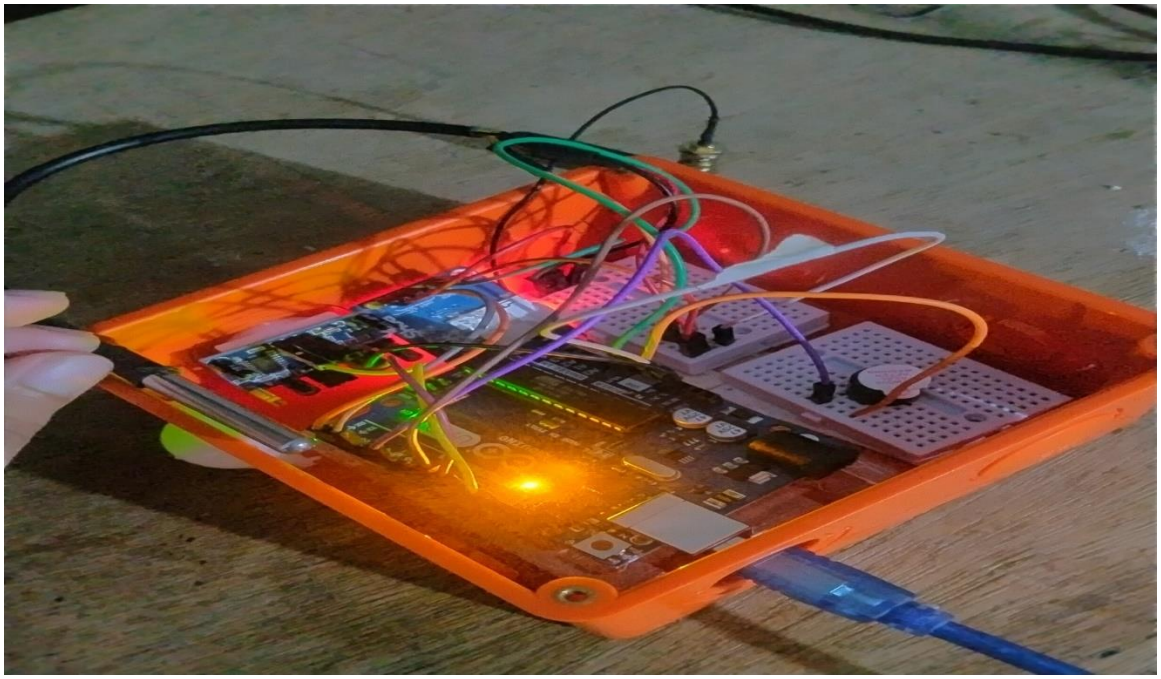


Preview 6.5 About Display

Preview 7 below is shown the Arduino-based Layout.



Preview 7 Physical Layout (without box)



Preview 7.1 Physical Layout (inside a box)

Economic Performance Evaluation

In any project analysis, economic performance evaluation is one of the most important parts of any system and design project. This includes the calculation of the expected cost that the developed system will need as well as the benefits that it gives. This section determines the proposed budget of resources that will be used.

Table 11

Initial Investment and Annual Operating Cost

Items	Quantity	Unit	Unit price	Total
Software				
Software Domain and Hosting	2	Yearly	1500.00	3000.00
Hardware				
Arduino UNO	1	Set	1000.00	1000.00
Electronic Components	1	Set	500.00	500.00
Sensor	2	Unit	100.00	200.00
Electrical Components	1	Set	200.00	200.00
GSM module	1	Unit	500.00	500.00
Electricity				
System Maintenance	1	Lot	500.00	500.00
TOTAL COST				**5,900.00**

Technical and Hardware Performance Evaluation

Table 12 shows the corresponding result of the testing on the first record detected. Based on the testing, the device serve its purpose in performing as a

Security and Fire Alarm Arduino-based System with Text Message Notification at Ubujan, Tagbilaran City. It records the time, temperature and date the motion and fire is detected.

Table 12

First record detected using Arduino

Motion and Fire Detected	Date and Time
Intruder Alert!	11:40 PM (Sun, May 22, 2022)
Abnormal Temperature detected! At 64.188 degree Celsius!	11:09 PM (Mon, May 22, 2022)

With the implementation of the proposed system, the target clients of Techbagz CCTV Bohol can continuously detect and sends a text message notification if there's an intrusion or fire. Moreover, the study would improve the present situation and secure the area of the store.

Testing and Evaluation

Testing and evaluation was performed through implementing and giving a device usability questionnaire to determine the functionality of the device, particularly on the expected output, time/period of information processing, the volume of information handle, and the proper response of the store owner of Techbagz CCTV Bohol. This is also the process of judging the performance of the Security and Fire Alarm Arduino-based System with text message notification in

general. In this study, the Device Usability was evaluated to determine its technical performance as perceived by the target users.

Device Usability

The device usability test reflects on how well it complied with or conformed to given design, based on functional requirements or specifications. The attribute can also be described as fitness for purpose of a piece of device.

Researchers adapted the Device Usability questionnaire by Alapide (2020). This was done to determine the level of acceptability as perceived by the target users. Based on the survey as represented in table 13 on the next page, the respondents gave a general rating 6.6 with an interpretative of “Strongly Agree”. The result generally indicates that the system is usable.

Web Usability

The web usability test was conducted by the developers at Techbagz CCTV Bohol located at Ubujan, Tagbilaran City on May 22, 2022 at 11:00 am. It took 1-2 hours to demonstrate and do the hands-on activity on the Security and Fire Alarm Arduino-based System with Text Message Notification. The system’s operations and features was presented to the owner at Ubujan, Tagbilaran City. After the system was presented, the owner, staffs and the electrical personnel answered the web usability questionnaire. Shown in the table 14 on the next page is the web usability survey result. The tabulated results were computed through the weighted mean from the answers of the respondents. The table shows the weighted mean

and the interpretation of each statement. The average weighted mean is 4.73 of the web usability questionnaire.

Table 13

Device Usability Result

I. Functionality	**Weighted Mean**	**Rating**
The owner can easily turn on and off the device	**6.3**	Agree
The device delivered the expected outcomes	**7**	Strongly Agree
The device performed the assigned task	**7**	Strongly Agree
II. Reliability		
The device complied the user-reliability requirements	**6.6**	Strongly Agree
The device helped the owner secure the store	**6.5**	Strongly Agree
III. Usability		
The device was very easy to understand	**6.3**	Agree
The device was easy to learn	**6.3**	Agree
The device was very efficient	**6.3**	Agree
The device was not that very complicated to use	**6.2**	Agree
IV. Efficiency		
The device detected the intruders and fire continually	**7**	Strongly Agree
The device was behaving timely manner	**6.2**	
The device automatically sends text message notification if there's an intruder or fire in the area and sends data to the database	**7**	Strongly Agree
The database was of great use as a storage of all the detections detected and retrieve data in case of emergency	**7**	Strongly Agree
V. Maintainability		
The device would be using hands-on to enhance its functionality	**6.7**	Strongly Agree
The device implementation would be improved to enhance its functionality	**7**	Strongly Agree
AVERAGE WEIGTHTED MEAN	**6.6**	**Strongly Agree**

Table 14

Web Usability Result

1.Navigation	Weighted Mean	Interpretation
1. Link to site's main page is clearly identified	4.66	Excellent
2. Major/important parts of the site are directly accessible from the main page.	4.69	Excellent
3. Site accommodates novice to expert users.	4.84	Excellent
2. Functionality		
1. Functions are clearly labelled.	4.69	Excellent
2. Essential functions are available without leaving the site.	4.66	Excellent
3. Plug-ins are used only if they add value.	4.67	Excellent
3.User Control		
1. Site reflects the user's workflow	4.93	Excellent
2. User can cancel any operation	4.56	Excellent
3. Per page loads moderately to accommodate slow connection	4.79	Excellent
4. Currently used browser is supported.	4.90	Excellent
4.Language and Content		
1. Important information and task are given prominence	4.76	Excellent
2. Related information or tasks are grouped on the same page or menu within the same page.	4.72	Excellent
3. Language is simple	4.76	Excellent
4. Links are concise, and visible not buried in the text.	4.62	Excellent
5.Online help and User Guides		
1. It is always clear what is happening in the site.	4.72	Excellent
2. Confirmation message is provided for form submittal	4.67	Excellent
6.Consistency		
1. The same word or phrase is used consistently.	4.81	Excellent
2. Link reflects the title of the page to which it refers	4.37	Excellent
3. Browser page title is meaningful and reflects the main page heading	4.88	Excellent
7. Error Prevention and Correction		
1. Sites provides concise instructions for user.	4.79	Excellent
2. Error message are visible not hidden.	4.74	Excellent
3. Error message are in plain language.	4.76	Excellent
4. Error message describe an action to remedy a problem.	4.74	Excellent
5. Error message provide a clear exit point.	4.79	Excellent
8. Architectural and Visual Clarity		
1. Colors used for the site are easily seen and not painful in the eyes.	4.74	Excellent
2. Unnecessary animation is avoided.	4.64	Excellent
AVERAGE WEIGHTED MEAN	**4.73**	**Excellent**

Chapter III

SUMMARY OF FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

Summary of Findings

Based on the study of the present system, the developers found out that the existing system of Techbagz CCTV Bohol, the Closed-Circuit Television (CCTV) can only monitor a small area and cannot warn or tell the owner when there are break-ins or fire accidents. Criminals can vandalize the cameras in various ways such as sticking gum or spraying something on the lens and they may even be able to change the angle of the camera.

The developed Security and Fire Alarm Arduino-based System with Text Message Notification fits the needs of the institution. Based on the needs identified, the Security and Fire Alarm Arduino-based System with Text Message Notification of Techbagz CCTV Bohol at Ubujan, Tagbilaran City was developed with the following components: to detect a motion (intruder), detect an extreme high temperature (fire), automatically sends a text message notification to the owner with its date, time and its temperature in degrees Celsius and sends all the detections to the database.

Based on the evaluation, using the existing security system, the Closed-Circuit Television (CCTV) and the Security and Fire Alarm Arduino-based System with Text Message Notification could provide a higher level of security to the store. A Closed-Circuit Television (CCTV) can monitor and record the daily transaction. Moreover, with its help of the Security and Fire Alarm Arduino-based System with

Text Message Notification, it will give the store a higher-level of security that would notify the store owner whenever there is an intruder and fire through an SMS and an alarm wherein the store owner can have a physical and softcopy of all the fire and intruders detected everyday detailed with time, date and its temperature through the online database. Store owner can retrieve the data anytime. The developed system was pilot tested and survey conducted to the target user to rate the developed system according to the device quality factor. The average weighted mean of the device usability is 6.6 which is interpreted as “Strongly Agree“ and web usability questionnaire is 4.73 which is interpreted as “Excellent”. The interpretation means that the respondents believe and confident that the developed system would be very beneficial and usable to the store.

Conclusion

The researchers discovered that the existing security system of Techbagz CCTV Bohol at Ubujan, Tagbilaran City is ineffective in securing the store's area based on the study's findings. As a result, adding a security system, such as the Security and Fire Alarm Arduino-based System with Text Message Notification, is simple, cost-effective, and feasible.

Using functional testing, researcher developed the Security and Fire Alarm Arduino-based System with Text Message Notification, which detects intrusions and fires and automatically sends a text message to the owner. This provides a higher level of security to the establishment while also meeting the client's needs

and expectations. The Security and Fire Alarm Arduino-based System with Text Message Notification was extremely useful for people who wanted to protect their properties or restrict access.

Recommendations

Based on the conclusions, it is highly recommended that the developed system should be implemented. For a successful implementation of the proposed system, the following recommendations should be taken:

1. Future Researchers have to consider waterproofing capabilities in the housing & enclosure of the device.
2. Administration should identify high frequency signal area where the GSM module be situated.
3. Administration should be trained and oriented to be able to use the device well.
4. Administration should consider yearly maintenance of system to ensure its effectiveness.

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APPENDICES

APPENDIX A

Interview Guide Questionnaire

Authorized Personnel/Owner

1. What is your existing security system?

   ☐ CCTV

   ☐ Extra Locks

   ☐ Smoke Alarm

   ☐ Security Guard

   Other, please specify: _____

2. Are you satisfied with your security system?

   ☐ Yes, because: _____

   ☐ No, because: _____

3. Do you want to upgrade your level of security in your area?

   ☐ Yes, because: _____

   ☐ No, because: _____

4. How many employees do you have in the store?

Device Usability Questionnaire

Instructions:

- Please rate the usability of the system
- Try to respond to all of the items
- For items that are not applicable, use N/ A
- Make sure these fields are filled in

Rating:

Scale	Description
7	Strongly Agree
6	Agree
5	Tend to Agree
4	Neither Agree or Disagree
3	Tend to Disagree
2	Disagree
1	Strongly Disagree

I. Functionality	Rating
The owner can easily turn on and off the device	
The device delivered the expected outcomes	
The device performed the assigned task	
II. Reliability	
The device complied the user-reliability requirements	
The device helped the owner secure the store	
III. Usability	
The device was very easy to understand	
The device was easy to learn	
The device was very efficient	
The device was not that very complicated to use	
IV. Efficiency	
The device detected the intruders and fire continually	
The device was behaving timely manner	
The device automatically sends text message notification if there's an intruder or fire in the area and sends data to the database	
The database was of great use as a storage of all the detections detected and retrieve data in case of emergency	
V. Maintainability	
The device would be using hands-on to enhance its functionality	
The device implementation would be improved to enhance its functionality	

Web Usability Questionnaire

Rating Scale:

5 – Excellent (no problem)

4 – Very good (minor inconsistencies, aesthetic issues)

3 – Good (non-critical, cause moderate confusion or irritation)

2 – Fair (serious problem that needs high priority fix, the user can make a significant error)

1– Poor (with the severe problem)

1.Navigation	5	4	3	2	1	N/A
1. Link to site's main page is clearly identified						
2. Major/important parts of the site are directly accessible from the main page.						
3. Site accommodates novice to expert users.						
2. Functionality						
1. Functions are clearly labelled.						
2. Essential functions are available without leaving the site.						
3. Plug-ins are used only if they add value.						
3.User Control						
1. Site reflects the user's workflow						
2. User can cancel any operation						
3. Per page loads moderately to accommodate slow connection						
4. Currently used browser is supported.						
4.Language and Content						
1. Important information and task are given prominence						
2. Related information or tasks are grouped on the same page or menu within the same page.						
3. Language is simple						
4. Links are concise, and visible not buried in the text.						
5.Online help and User Guides						
1. It is always clear what is happening in the site.						
2. Confirmation message is provided for form submittal						
6.Consistency						
1. The same word or phrase is used consistently.						
2. Link reflects the title of the page to which it refers						
3. Browser page title is meaningful and reflects the main page heading						

7. Error Prevention and Correction						
1. Sites provides concise instructions for user.						
2. Error message are visible not hidden.						
3. Error message are in plain language.						
4. Error message describe an action to remedy a problem.						
5. Error message provide a clear exit point.						
8. Architectural and Visual Clarity						
1. Colors used for the site are easily seen and not painful in the eyes.						
2. Unnecessary animation is avoided.						

APPENDIX B

Letter of Appointment

April 07, 2022

MR. JEFFREY I. BAGA
The Owner
Techbagz CCTV Bohol
Ubujan, Tagbilaran City, Bohol
6300

Sir:
Good day!

In partial fulfilment of our requirement for our requirements for our thesis, we the fourth year student taking up Bachelor of Science in Computer Science under the College of Technology and Allied Sciences (CTAS) of Bohol Island State University-Bilar Campus, Zamora, Bilar, Bohol would like to ask for your permission to conduct a research study.

In connection with this, we would like to ask you to allow us to conduct an interview and observation as our references. Rest assured that the data we will gather will be used for purely academic purposes. Your approval would be greatly appreciated.

We are looking forward to work with your organization about Security and Fire Alarm Arduino-Based System with Text Message Notification. Thank you and more power!

Very truly yours,
SGD. MARY CRISTAL ESPINA
SGD. EDMOND B. IBAOC
SGD. DANILYN E. PEROLINO
SGD. AIZA B. ROSALES
BS in Computer Science-Researchers

Noted:
SGD. DARREL A. CARDAÑA
Subject Instructor

Endorsed:
SGD. DENNIS DOMINIC A. CUADRA
Thesis Adviser

Recommending Approval:
SGD. RENANTE S. DIGAMON, Ph.D.
Chairperson, DCOS

SGD. ARLEN B. GUDMALIN Ph.D
Dean, CTAS

Approved:
SGD. MR. JEFFREY I. BAGA
The Owner

Letter of Approval of the Proposed System

April 07, 2022

MR. JEFFREY I. BAGA
The Owner
Techbagz CCTV Bohol
Ubujan, Tagbilaran City, Bohol
6300

Sir:
Greetings!

We, the Senior Students of Bachelor of Science in Computer Science of Bohol Island State University, are to conduct a system development project (thesis) as a requirement for graduation.

In connection with this, we would like to ask you to allow us to conduct an interview and observation as our references. Rest assured that the data we will gather will be used for purely academic purposes. Your approval would be greatly appreciated.

We are looking forward to work with your organization about Security and Fire Alarm Arduino-Based System with Text Message Notification. Thank you and more power!

Very truly yours,

SGD. MARY CRISTAL ESPINA
SGD. EDMOND B. IBAOC
SGD. DANILYN E. PEROLINO
SGD. AIZA B. ROSALES
BS in Computer Science-Researchers

Noted:
SGD. DARREL A. CARDAÑA
Subject Instructor

Endorsed:
SGD. DENNIS DOMINIC A. CUADRA
Thesis Adviser

Recommending Approval:
SGD. RENANTE S. DIGAMON, Ph.D.
Chairperson, DCOS

SGD. ARLEN B. GUDMALIN Ph.D
Dean, CTAS

Approved:
SGD. MR. JEFFREY I. BAGA
The Owner

Letter of the Questionnaire Distribution

May 21, 2022

MR. JEFFREY I. BAGA
The Owner
Techbagz CCTV Bohol
Ubujan, Tagbilaran City, Bohol
6300

Dear Sir;

Greetings!

It is our pleasure to inform you that the system "**Security and Fire Alarm Arduino-based System with Text Message Notification in Ubujan, Tagbilaran City, Bohol"** is now in its final phase. With this we would like to conduct benchmarking activities as part of the implementation.

This will be conducted in your office at any of your convenience. This activity will allow you to assess our developed Arduino and give feedback, as well.

By this time, we would like to express our gratitude for allowing us to conduct our thesis study. We are hoping for future collaboration with you, our dear client.

May the good Lord continually bless you and your good office.
Thank you and more power!

Very truly yours,

SGD. MARY CRISTAL ESPINA
SGD. EDMOND B. IBAOC
SGD. DANILYN E. PEROLINO
SGD. AIZA B. ROSALES
BS in Computer Science-Researchers

Noted:
SGD. DARREL A. CARDAÑA
Subject Instructor

Endorsed:
SGD. DENNIS DOMINIC A. CUADRA
Thesis Adviser

Recommending Approval:
SGD. RENANTE S. DIGAMON, Ph.D.
Chairperson, DCOS

SGD. ARLEN B. GUDMALIN Ph.D
Dean, CTAS

Approved:
SGD. MR. JEFFREY I. BAGA
The Owner

APPENDIX C

User's Manual and Codes

SECURITY AND FIRE ALARM ARDUINO-BASED SYSTEM WITH TEXT MESSAGE NOTIFICATION

Steps:

1. Plug in the power supply to the mainline.

ARDUINO CODE

```
#include <time.h>
#include <SoftwareSerial.h>
#include <OneWire.h>
#include <DallasTemperature.h>
#define ONE_WIRE_BUS 10
OneWire oneWire(ONE_WIRE_BUS);
DallasTemperature sensors(&oneWire);

//Alarm reciever's phone number with country
code
String PHONE = "+639517136296";

//GSM Module RX pin to Arduino 3
//GSM Module TX pin to Arduino 2
#define rxPin 2
#define txPin 3
SoftwareSerial sim800(rxPin,txPin);

//the pin that the pir sensor is atteched to
  int pir_sensor = 11;
 int ledPin = 13;                // choose the pin for the
LED
 int pirState = LOW;             // we start, assuming
no motion detecte
 int TEM = 7;
 int TEMp = 10;
 int val = LOW;

String getDate() {
  time_t c;

  time(&c);
  return ctime(&c);
}

// Sending to sms
void smsSerial() {
  delay(500);
  while (Serial.available()) {
    sim800.write(Serial.read());
   // Serial.println(Serial.read());
  }
  while (sim800.available()){
    Serial.write(sim800.read());
    //Serial.println(sim800.read());
  }

}

// uset this function for sending the sms
// in every events you want,, like detected motion
level, detected temperature leveel
void sendSMS(String phone, String msg) {
  Serial.println("Sending sms");
  sim800.println("AT+CMGF=1");
  smsSerial();
  //delay(100);
  sim800.println("AT+CMGS=\"" + phone + "\"");
  smsSerial();
  //delay(500);
  sim800.print(msg);
  smsSerial();
  //delay(500);
  sim800.write(26);
  Serial.println("Sent!");
  delay(100);
}

// input the data i web function

/*
**
** fire
** intruder
**
*/

// this is for the GSM

int setup_flag = 0;
void web(String type, String data) {
  if (setup_flag == 0) {
    //setup_flag=1;
    //sendSMS(PHONE, "Webserver testing");

// Serial.println(getDate());
// ht
tps://fsaabs.000webhostapp.com/recv.php?route
```

```
=Send&type=Motion&code=F01&pass=admin123
4&logs=testlogs
    sim800.println("AT+CGATT=1");
    smsSerial();
    sim800.println("AT+SAPBR=3,1,\"CONTYPE\",
\"GPRS\"");
    delay(1000);
    smsSerial();

sim800.println("AT+SAPBR=3,1,\"APN\",\"internet
\"");
    delay(5000);
    smsSerial();
    sim800.println("AT+SAPBR=1,1");
    delay(10000);
    smsSerial();
    sim800.println("AT+HTTPINIT");
    delay(2000);
    smsSerial();
  }
  //sim800.println("AT+HTTPPARA=\"CID\",1");
  //smsSerial();

  sim800.println("AT+HTTPPARA=\"URL\",
\"http://projects.mctech4.com/recv.php?route=Se
nd&type=" + type +
"&code=F01&pass=admin1234&logs=" + data +
"\"");
  //sim800.println("AT+HTTPPARA=\"URL\",
\"http://fsaabs.000webhostapp.com/recv.php?rout
e=Send&type=" + type +
"&code=F01&pass=admin1234&logs=testlogs\"");
  //sim800.println("AT+HTTPPARA=\"URL\",
\"http://google.com\"");
  smsSerial();
  sim800.println("AT+HTTPACTION=0");
  delay(8000);
  smsSerial();
  sim800.println("AT+HTTPREAD=0,20");
  delay(3000);
  smsSerial();
  //sim800.println("WAIT=6");
  //smsSerial();
//  sim800.println("AT+HTTPTERM");
//  smsSerial();
  //sim800.write(26);
  Serial.println("Data Sent!");

}

void setup() {
   pinMode(pir_sensor, INPUT);


 // pinMode(ledPin, OUTPUT);      // declare LED
as output
  pinMode(TEM, OUTPUT);
  pinMode(TEMp, INPUT);

  //pinMode(11,INPUT);
  Serial.begin(115200);          // initialize serial
  //sim800.begin(9600);
  //Serial.println("SIM800L software serial
initialize");

  sim800.begin(9600);
  Serial.println("SIM800L software serial
initialize");

  sim800.println("AT");
  delay(1000);
}


void loop(){


//////////////////////////////////////////////
while(sim800.available()){
  Serial.println(sim800.readString());
}
//////////////////////////////////////////////
while(Serial.available())  {
  sim800.println(Serial.readString());
}
//////////////////////////////////////////////
  val = digitalRead(pir_sensor);
  if (val == HIGH) {                // check if the
sensor is HIGH
   // state = HIGH;
    Serial.println("Motion detected!");
    Serial.println("Sending....");
    sendSMS(PHONE, "INTRUDER ALERT!!");
  //  delay(1000);
   //sim800.println("ATD"+PHONE+";");
    delay(1000);
    web("Motion", "Intruder Alert!!!");
     delay(5000);
    }



  sensors.requestTemperatures();

  Serial.print("Temperature: ");


  float temperatureC =
sensors.getTempCByIndex(0);
  float maxTemp = 35.0;
  float lowTemp = 20.0;
  // test
  //web("fire", "test");

  //condition to set max temp
  if (temperatureC >= maxTemp) {
    // fire is detected
    digitalWrite(TEM, HIGH);
    Serial.println(sensors.getTempCByIndex(0));
    Serial.print("ABNORMAL TEMPERATURE :");
    //Serial.print("Calling");
    delay(10000);
     //sim800.println("ATD"+PHONE+";");
```

```
    //sim800.println("ATD+639517136296;");
  //  converting the float to string

    sendSMS(PHONE, "Abnormal  temperature
detected!! at " + String(temperatureC, 3) + "
degree celcius");
    web("Fire", "Abnormal  temperature detected!!
at " + String(temperatureC, 3) + " degree
celcius");
    //web("fire", "test");
    delay(5000);
  }
  else if (temperatureC  < maxTemp &&
!(temperatureC < lowTemp)) {
    digitalWrite(TEM, LOW);
    Serial.print("Normal ");
    Serial.println(sensors.getTempCByIndex(0));
    delay(5000);
  } else if (temperatureC <= lowTemp) {
    digitalWrite(TEM, LOW);
    Serial.print("Low ");
    Serial.println(sensors.getTempCByIndex(0));
    delay(5000);
  }
```

Main Page

Accessing Web Server

Steps:

1. Type URL “projects.mctech4.com”

Admin Login

Steps:

1. Enter username or email
2. Enter password
3. Click “Log In”
4. Confirmation: “Log in Success. Please Wait”

Home

Change Password

Steps:

1. Click “Change Password”
2. Enter Password
3. Confirm Password
4. Click “Update”
5. Confirmation: “Account Updated”

Update Email

1. Click “Update email”
2. Click “Update”

Activity

Steps:

1. Click “Activity”
2. Click “Remove” for removing of data

Settings

Device

Steps:

1. Click “Device” for adding new device
2. Input the Device Code
3. Input the Device Name
4. Input the Device Password
5. Confirm Device Password
6. Click “Submit”
7. Confirmation: “New Device Registered
8. Click “Remove” for removing of device registered

About

Steps:

1. Click “About” to view the developers’ information.

Logout

Steps:

1. Click “Logout”

Web Server's Code
SECURITY AND FIRE ALARM ARDUINO-BASED SYSTEM WITH TEXT MESSAGE NOTIFICATION

LOG IN

```
<?php
  session_start();
  if (isset($_SESSION['id']) &&
isset($_SESSION['role'])) {
    header('location:index.php');
    exit;
  }
  require_once 'sql.php';
  $sql = new sql();
  // Code for Submitted Login
  // log msg
  $msg = '';
  if (isset($_POST['login'])) {
    $code = isset($_POST['code']) ? $_POST['code'] : '';
    $pass = isset($_POST['pass']) ? $_POST['pass'] : '';

    $log = $sql->exec('select * from Device where
devCode = :code and devPass = :pass', [$code,
md5($pass)]);

    if (count($log) > 0) {
      $_SESSION['id'] = $log[0]['devCode'];
      $_SESSION['role'] = $log[0]['role'];
      $_SESSION['name'] = $log[0]['devName'];
      $msg = '<div class="success">Login Success!
Please
Wait...</div><script>setTimeout(function(){window.locat
ion.href="index.php";}, 1000)</script>';
    } else {
      $msg = '<div class="error">Login Failed! Try
Again!</div>';
    }
  }
?>
<!DOCTYPE html>
<html>
<head>
  <title>Security and Fire Alarm Arduino Based
System</title>
</head>
<style>
  .error{color:red;padding:10px;margin-
top:5px;border:1px solid red;}
  .success{color:green;padding:10px;margin-
top:5px;border:1px solid green;}
  *{outline:none;}
  #frm{width:400px;min-
height:100px;margin:auto;padding:20px;border:3px
solid #0e8bc5;border-radius:5px;margin-top:100px;}
  input {width:100%;height:30px;border:1px solid
grey;margin-top:10px;}
</style>
<body>
  <fieldset id="frm">
    <legend>Login!</legend>
    <form method="post">
      <div style="font-weight:bolder;font-size:15pt;text-
align:center;">
        SFAABS
      </div>
      <div>
        <label>Device Code</label>
        <input type="text" name="code"
autocomplete="off" />
      </div>
      <div>
        <label>Device Pass</label>
        <input type="password" name="pass"
autocomplete="off" />
      </div>
      <br />
      <button name="login" type="submit">Log
IN</button>
      <div><?php print $msg; ?></div>
    </form>
  </fieldset>
</body>
</html>
```

HOME

```
<?php
  require 'sql.php';
  $con = new sql();
  $data = $con->exec('select * from Device where
devCode = :id', [$_SESSION['id']]);

  $err = '';
  if (isset($_POST['upAct'])) {
    $opass = isset($_POST['opass']) ? $_POST['opass'] :
'';
    $pass = isset($_POST['pass']) ? $_POST['pass'] : '';
    $cpass = isset($_POST['cpass']) ? $_POST['cpass'] :
'';
    $pass = trim($pass);

    $old = $con->exec('select * from Device where
devCode = :id and devPass = :pass',[$_SESSION['id'],
md5($opass)]);
    if (count($old) > 0) {
      if ($cpass == $pass) {
        if (strlen($pass) >= 6) {
          $con->exec('update Device set devPass = :pass
where devCode =:code',[md5($pass),
$_SESSION['id']]);
          $err = '<span style="color:green;">Updated
Account !!</span>';
        } else {
          // len password don't match the requirements
          $err = '<span style="color:red;">Password length
must atleast 6 digit !!</span>';
        }
      } else {
        // confirm password
        $err = '<span style="color:red;">New pass and
Confirm pass don\'t match !!</span>';
      }
    } else {
      // wrong old password
      $err = '<span style="color:red;">Wrong old
password!</span>';
    }
  }
  ?>
<div style="width:200px;height:250px;background-
color:white;border:1px solid grey;border-
radius:5px;padding:10px;">
```

```
  <h5>Update Account</h5>
  <form method="POST">
    <input type="text" disabled="" value="<?php print
$data[0]['devCode']; ?>" />
    <br />
    <input type="password" name="opass"
placeholder="Enter Old Password" />
    <br />
    <input type="password" name="pass"
placeholder="Enter Password" />
    <br />
    <input type="password" name="cpass"
placeholder="Confirm Password" />
    <br />
    <button type="submit"
name="upAct">Update</button>
    <br></br>
    <div><?php print $err; ?></div>
  </form>
</div>
```

ACTIVITY

```
<?php
  require 'sql.php';
  $con = new sql();

  $detected = $con->exec('select * from ActivityLogs
order by Id desc');
  $detected_len = count($detected);
?>
<link rel="stylesheet" href="plugin/table/table.css" />
<div style="font-weight:bold;margin-
bottom:10px;">Detected By Arduino</div>
<table id="tb">
  <thead>
    <tr>
      <th>no.</th>
      <th>Logs</th>
      <th>Date Detected</th>
      <th>Type</th>
    </tr>
  </thead>
  <tbody>
  <?php for($i = 0; $i < $detected_len; $i++): ?>
    <tr>
      <td><?php print $detected[$i]['Id']; ?></td>
      <td><?php print $detected[$i]['Logs']; ?></td>
      <td><?php print $detected[$i]['DateLogs']; ?></td>
      <td><?Php print $detected[$i]['Type']; ?></td>
    </tr>

  <?php endfor; ?>
  </tbody>
</table>
<script src="plugin/jquery/jquery.min.js"></script>
<script src="plugin/table/table.js"></script>
<script>
  $(document).ready(function(){
    $('#tb').DataTable();
  });
</script>
```

INDEX

```
<?php
  session_start();
  if (!isset($_SESSION['id']) &&
!isset($_SESSION['role'])) {
    print 'You are not Logged In! Click here to Login <a
href="/Login.php">Login</a>';
    header('location:login.php');
    exit;
  }
  if (isset($_GET['Logout'])) {
    session_destroy();
    unset($_GET['Logout']);
    header('location:login.php');
  }

  if (!isset($_GET['route'])) {
    header('location:?route=Home');
    exit;
  }

  class Route {
    private $route = '';
    public function __construct() {
      $this->route = isset($_GET['route']) ? $_GET['route']
: '';
    }
    public function getActive($myroute) {
      if ($this->route == $myroute) {
        // return active when the link is clicked
        return print 'active';
      }
      return print '';
    }
    public function getUrl() {
      return $this->route;
    }
  }
  $route = new Route();
?>
<!DOCTYPE html>
<html>
<head>
  <title></title>
  <style>
    *{outline:none;}
    .square{min-
      height:400px;}
    .link{display:inline;float:left;padding-right:1px;}
    .link a{background-
color:#00a6ff;color:white;padding:5px 15px 5px
15px;text-decoration:none;border-radius:5px;}
    .link a:hover{background-color:#0476b3;}
    .active {background-color:#0476b3 !important;}
    legend {font-size:15pt;font-
weight:bold;color:#039097;}
    fieldset{border-radius:10px;border-color:#f9a76c;}
    .success{color:green;padding:5px;border:1px solid
green;margin-top:2px;}
    .error{color:red;padding:5px;border:1px solid
red;margin-top:2px;}
    table{width:100%;}
    table, table tr, table tr td, table tr th{border:1px solid
grey;border-collapse:collapse;}
    table tr td{padding:5px;}
    table tr th{font-weight:bold;text-
align:left;padding:5px;}
  </style>
</head>
<body>
  <div>
    Logged In as <span style="font-
weight:bolder;"><?php print @$_SESSION['name'];
?></span> <a href="/?Logout"
style="padding:3px;background-
color:#2f93f1;color:white;">Logout</a>
  </div>
```

```
  <hr />
  <fieldset class="square">
    <legend>Dashboard</legend>
    <div style="padding:10px 10px 5px 0px;margin-
bottom:8px;font-weight:bolder;border-bottom:1px solid
#f9a76c;">Security and Fire Alarm Arduino Based
System</div>
    <div class="link">
      <a href="?route=Home" class="<?php $route-
>getActive('Home');  ?>">Home</a>
    </div class="link">
    <div class="link">
      <a href="?route=Activity" class="<?php $route-
>getActive('Activity');  ?>">Activity</a>
    </div>
    <?php if($_SESSION['role'] == 'Admin'): ?>
    <div class="link">
      <a href="?route=Settings" class="<?php $route-
>getActive('Settings');  ?>">Settings</a>
    </div>
    <?php endif; ?>
    <div class="link">
      <a href="?route=About" class="<?php $route-
>getActive('About');  ?>">About</a>
    </div>
    <div style="margin-top:50px;"></div>
    <div>
      <?php
      // Change by Get URL route
      switch ($route->getUrl()) {

        case 'Home':
          require 'home.php';
        break;

        case 'Activity':
          require 'Activity.php';
        break;

        case 'Settings':
          require 'settings.php';
        break;

        case 'About':
          require 'about.php';
        break;
        default:
          print 'Page Not Found';
        break;
      }
      ?>
    </div>
  </fieldset>
</body>
</html>
SETTINGS
<?php
  require_once 'sql.php';
  $con = new sql();
?>
<a
href="index.php?route=Settings&link=Device">Device</
a>
<?php $link = isset($_GET['link']) ? $_GET['link'] : ''; ?>
<?php
/*
** Deleting The Devices
**
*/
if (isset($_GET['remove'])) {
  // -- removing the device
  $con->exec("delete from device where devCode = :id
and role = 'dev'", [$_GET['remove']]);
  unset($_GET['remove']);

header('location:index.php?route=Settings&link=Device'
);
  exit;
}
/*
** Deleting The Devices
**
*/
?>
<?php if ($link == 'Device'): ?>
  <?php
    $msg = '';
    if (isset($_POST['createAccount'])) {
      // Submit the create account
      $code = isset($_POST['code']) ? $_POST['code'] : '';
      $name = isset($_POST['name']) ? $_POST['name']
: '';
      $pass = isset($_POST['pass']) ? $_POST['pass'] : '';
      $cpass = isset($_POST['cpass']) ? $_POST['cpass']
: '';
      $pass = trim($pass);
      if (strlen($pass) >= 6) {
        if ($pass == $cpass) {
          // okaye

          //$msg = '<div class="success">Success </div>';
          $cc = $con->exec('select * from Device where
devCode = :code', [$code]);
          if (count($cc) == 0) {
            // success
            $con->exec('insert into Device(devCode,
devPass, status, role, dateCreated, devName)
values(:code, :pass, :status, :role, :dt, :name)', [
              $code,
              md5($pass),
              '1',
              'dev',
              date('Y-m-d h:i:s'),
              $name
            ]);
            $msg = '<div class="success">New Device
Added!</div>';
          } else {
            // end of else query
            $msg = '<div class="error">Code is already
Exist!</div>';
          }
        } else {
          // else for checking if pass is confirmed
          $msg = '<div class="error">Mismatch
password!</div>';
        }
      } else {
        // else for len pass
        $msg = '<div class="error">Password must atleast
6 Char</div>';
      }
    }
    $device = $con->exec('select * from Device where
role = "dev"');
    $device_count = count($device);
  ?>
  <div style="margin-top:10px;">
    <form method="POST" style="border:1px solid
grey;width:180px;padding:10px;">
```

```
    <div style="font-weight:bold;border-bottom:1px solid
grey;margin-bottom:10px;padding:5px 5px 5px
0px;">Device Registration</div>
    <div>
      <label>Code</label>
      <input type="text" name="code"
placeholder="Device Code" />
    </div>
    <div>
      <label>Name</label>
      <input type="password" name="name"
placeholder="Device Name" />
    </div>
    <div>
      <label>Password</label>
      <input type="password" name="pass"
placeholder="Device password" />
    </div>
    <div>
      <label>Confirm Password</label>
      <input type="text" name="cpass"
placeholder="Confirm the password" />
    </div>
    <div style="margin-top:10px;">
      <button name="createAccount"
type="submit">Submit</button>
    </div>
    <div>
      <?php print $msg; ?>
    </div>
   </form>
   <div style="margin-top:10px;">
    <hr />
    <h3>Device List</h3>
    <table>
      <tr>
        <th>DevCode</th>
        <th>Name</div>
        <th>Action</th>
      </tr>
    <?php for ($i = 0; $i < $device_count; $i++): ?>
      <tr>
        <td><?php print $device[$i]['devCode']; ?></td>
        <td><?php print $device[$i]['devName']; ?></td>
        <td>
          <a class="delete"
href="?route=Settings&link=Device&remove=<?php
print $device[$i]['devCode']; ?>">Remove</a>
        </td>
      </tr>
    <?php endfor; ?>
    </table>
   </div>
  </div>
  <script>
   let del =
document.getElementsByClassName('delete');
   let dl = del.length;
   for (let i = 0; i < dl; i++) {
    del[i].addEventListener('click', function(evt) {
      if (confirm('Delete?')) return;
      evt.preventDefault();
    });
   }
  </script>
<?php endif; ?>
```

RECEIVE

```
<?php
// This is the receiver from the arduinode
date_default_timezone_set('asia/manila');
require 'sql.php';

class Arduino {
  private $con = null;
  public $Logs = '';
  public $Date = '';
  public $Status = '';
  public $DeviceId = '';
  public $Type = '';

  public $Code = '';
  public $Pass = '';

  public function __construct() {
    $this->con = new sql();
  }

  // Function for checking the login password and
username
  private function Auth() {
    $auth = $this->con->exec('select * from Device
where devCode = :code and devPass = :pass', [$this-
>Code, md5($this->Pass)]);
    if (count($auth) > 0)
      return true;
    return false;
  }
  public function Receive() {

  }
  public function Send() {
    // Once login save to the database the list of
detecteds
    if ($this->Auth())
      $this->con->exec('insert into ActivityLogs (Logs,
DateLogs, Type, DeviceId, Status)
values(:logs,:date,:type, :devId, :status)', [
        $this->Logs,
        $this->Date,
        $this->Type,
        $this->DeviceId,
        $this->Status
      ]);
    else
      print 'Wrong Device!';
  }
}
class Route {
  private $route = '';
  public function __construct($route) {
    $this->route = $route;
  }
  public function Run() {
    // Process goes here
    switch ($this->route) {
      case 'Send':
        // URL must =
?route=Send&type=type&code=code&pass=pass&logs
=logsmssg
        $arduino = new Arduino();
        // Code
        $arduino->Code = isset($_GET['code']) ?
$_GET['code'] : '';
        // pass
        $arduino->Pass = isset($_GET['pass']) ?
$_GET['pass'] : '';
        // Device Id
        $arduino->DeviceId = isset($_GET['code']) ?
$_GET['code'] : '';
```

```
        // Logs
        $arduino->Logs = isset($_GET['logs']) ?
$_GET['logs'] : '';
        // Date detected
        $arduino->Date = date('Y-m-d h:i:s');
        // Send from the arduino Board
        // Fire, Intruder , Login Devices
        $arduino->Type = 'fire';
        // Arduino Status Optional,, if 0 not send from sms,
1 success send from sms
        $arduino->Status = '1';
        // Send
        $arduino->Send();
      break;
      default:
        print 'Invalid URL';
      break;
    }
  }
}
// Initialization of the Class
$get = isset($_GET['route']) ? $_GET['route'] : '';
$route = new Route($get);
$route->Run();
```

ABOUT

```
<div> Version 1.0</div>
<div>Team</div>
<div></div>
```

SQL

```
<?php
class sql {
  private  $conf = [
    "SQL_TYPE"=> "sqlite",
    "HOST"    => "localhost",
    "DB_NAME" => "db",
    "DB_USER" => "root",
    "DB_PASS" => "",
    "SQLITE_DB" =>
"db".DIRECTORY_SEPARATOR."db.db"
  ];
  private $con;
  /* last id  */
  private $lid;

  private $flagopen = false;

  public function open() {
    if (!$this->flagopen) {
      if ($this->conf["SQL_TYPE"] == 'mysql')
        $this->con = new PDO($this-
>conf["SQL_TYPE"].':host='.$this-
>conf["HOST"].';dbname='.$this->conf["DB_NAME"],
$this->conf["DB_USER"], $this->conf["DB_PASS"]);
      else if ($this->conf["SQL_TYPE"] == 'sqlite')
        $this->con = new PDO('sqlite:'.$this-
>conf["SQLITE_DB"]);
      $this->con->setAttribute(PDO::ATTR_ERRMODE,
PDO::ERRMODE_EXCEPTION);
      $this->flagopen = true;
    }
  }
  public function exec($query, $data = []) {
    $this->open();
    $this->lid = "";
    $query = trim($query);
    /*
      $data = exec("select * from testdb where id = :id",
[id])
    */
    /* Gell matches  */
    preg_match_all("/:[a-zA-Z_]+/i", $query, $m);
    $m = isset($m[0]) ? $m[0] : [];
    $ml = count($m);
    $dl = count($data);
    if($dl != $ml) return print "array list not matches";

    $st = $this->con->prepare($query);
    if ($ml > 0)
      for ($i = 0; $i < $ml; $i++) {
        $st->bindParam($m[$i], $data[$i]);
      }
    $st->execute();
    /*   */
    if ($query[0] == 's' || $query[0] == 'S') {
      $st->setFetchMode(self::mode());
      $data = $st->fetchAll();
      $st = null;
      return $data;
    } else if ($query[0] == 'i' || $query[0] == 'I') {
      return ["id" => $this->con->lastInsertId()];
    }
    return [];
  }
  public function mode() {
    return PDO::FETCH_ASSOC;
  }
  public function close() {
    $this->con = null;
  }
  public function con() {
    return $this->con;
  }
}
```

Developer's Biodata

PERSONAL INFORMATION

Name	: **MARY CRISTAL S. ESPINA**
Place of Birth	: Bayongan, San Miguel, Bohol
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EDUCATIONAL BACKGROUND

Elementary	: New Los Angeles Elementary School
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Secondary	: Bulilis National High School
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Tertiary	: Bohol Island State University
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Developer's Biodata

PERSONAL INFORMATION

Name	: **EDMOND B. IBAOC**
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Developer's Biodata

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EDUCATIONAL BACKGROUND

Elementary	: Bien Unido Central Elementary School Poblacion, Bien Unido, Bohol 2011-2012
Secondary	: Pres. Carlos P. Garcia Technical Vocational School of Fisheries and Arts Puerto San Pedro, Bien Unido, Bohol 2017-2018
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Work Experience	: On-the Job Training LGU – Bien Unido Mayor's Office

Developer's Biodata

PERSONAL INFORMATION

Name	: **AIZA B. ROSALES**
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Father's Name	: Loreto A. Rosales
Mother's Name	: Anecita B. Rosales

EDUCATIONAL BACKGROUND

Elementary	: Nueva Esperanza Elementary School Nueva Esperanza, Bien Unido, Bohol 2006-2007
Secondary	: Bien Unido Academy Liberty, Bien Unido, Bohol 2010-2011
Tertiary	: Bohol Island State University Zamora, Bilar, Bohol 2021-2022
Degree Earned	: Bachelor of Science in Computer Science
Work Experience	: On-the Job Training LGU – Bien Unido Mayor's Office