Project Proposal on Developing a Smart Security System

CS1962

Engineering Skill Development

GROUP MEMBERS:

A.P.L.R.S.Akmeemana	180022T
M.D.M.D.P.Gunathilaka	180213F
K.A.C.M.Kodikara	180325B
U.D.P.Udawatta	180652A
G.D.S.U.Wimalaratne	180718H

25th October 2019

Table of Contents

1. Introduction

As a business, safety is a must. Theft is a serious workplace issue that requires extensive training in terms of security systems and proper protocol. Workplace theft comes in a variety of forms, therefore it is important to comprehensively address them all. Means of guarding against theft include recording with cameras, concise situational evaluation, involving law enforcement, proper supervision, and adequate prevention. With this project, we are going to ensure the safety of an entity.

Security is important for every commercial property to prevent robberies and thefts and to ensure safe business operations. If thefts are not prevented, it can be very costly and your business can suffer. Security systems can help prevent robberies and thefts and ensure the safe operations of your business. If you have not installed a security system, you should consider installing one now due to the following reasons.

i. Keeping Business Assets Safe

Owners do not want thieves to break into their commercial buildings and steal valuable assets. A security system can protect the business case as relevant authorities will be identified and police will arrive at the scene if thieves try to steal their belongings.

ii. Safe Cash Flow

Unethical employees steal cash and owners wonder why their business is suffering in spite of so many sales. With the help of security systems, they can monitor the activity of employees and ensure that they do not try to take the money that does not belong to them.

iii. Safe Working Environment

With security systems, owners can ensure that employees are safe from harm, especially if they are working in odd hours or late shifts when chances of thieves breaking in are higher. Employees will feel safe knowing that no harm can come to them while they work.

iv. Added Protection

Owners can leave the business's security on auto-pilot and take out any chance of external or internal burglary. Thieves would not try to break in when they know that the building is well protected by security systems and employees won't try to steal assets when they know that they'll get caught in doing so.

v. Focusing on Important Things

With a security system, owners do not have to worry about keeping an eye on business's safety as security agencies can continuously monitor your commercial building giving you a piece of mind. They can direct their efforts on other important things like building the customer base and maintaining profits, while a security system takes care of the business's safety.

2. Modern Smart Security Systems

A smart security system uses wireless technology, home networks, and the prevalence of mobile phones to integrate your security with day-to-day life. Essentially, it gives control of security back and makes it convenient and accessible.

- ***SimpliSafe*** [1]is a home security platform, comprising a vase-shaped base station, integrated siren and a slew of supporting sensors available to scatter around home. The device is designed to detect movement in the home, entry from doors and windows, as well as floods and fires. SimpliSafe is quick and easy to install and a cinch to expand, with a comprehensive range of sensors, optional security cameras, and even 24/7 professional monitoring. Arming and disarming the system is easy for the whole family, with a battery-powered keypad and key fob design. Best of all, thanks to a partnership with design gurus IDEO, SimpliSafe is one of the slinkiest security packages around.

- ***Nest Secure*** [2]provides a hub with a motion sensor and a satellite Nest Detect sensor for guarding windows, doors, and other areas. There is also a separate Tag device that lets people or pets pass by the sensors without setting them off. Buy as many sensors as you need, add some Nest cameras, and put together your system. However, the initial costs for buying Nest devices can be high.

- ***Protect America***[3]offers customizable plans that allow you to add all kinds of smart gadgets to your system, from door sensors to Amazon Echo devices. It all ships at once, and they install everything for you. Prices vary but tend to be a bit on the low side, and rates are locked in. If the other, more traditional home security brands don't do much for you, Protect America is worth a look.

3. The Proposed System

In this system, we propose to use PIR (Passive Infrared) sensors to detect the motion of a door or a window. The sensors send their Digital Outputs to the Arduino UNO board, which we use as the central microcontroller. We use a SIM900 GSM module connected with the serial communication of the Arduino board. We also use an alarm to get the attention of people around in an emergency. We use a display (16x2) and a keypad (4x4) to handle the user inputs. When the system is on, if a sensor detected motion, the system will start a 10 seconds countdown for the owner to enter the password and deactivate the system. If the password has not been entered before the timeout, the alarm will be on and a call will be made to the owner's phone number through the GSM module. When the owner turned the system back on, it will wait 30 seconds because if the system has been implemented in a shop, the owner needs some time to lock the doors and leave. The owner can also use SMS commands to turn the system ON/OFF. We use power from the main power supply and additionally, we can use a UPS. The user has the liberty of changing the following things.

1. The password
2. The countdown timer before the alarm (default is 10s)
3. The countdown timer before the system turned back on (default is 30s)
4. Owner’s phone number

We will create a user’s manual for this system.

4. Demonstration

Here we intend to make one main installment that contains all the circuit fragments except the PIR sensor segment. Then there are PIR sensor segments as many as needed to be connected to the main installment using conducting wires or we could use Bluetooth or Wi-Fi-based connection to connect segments if the user needs it to be wireless.

We expect to illustrate this in real life by installing it to a nearby door and walk through the processes such as what would happen in a case of a break-in, how to turn on or off the system, how to change the password.

5. List of components

The following items will be used for the implementation of the proposed system.

- Arduino UNO R3 board (Figure 1)
- Keypad (Figure 2)
- GSM module (Figure 3)
- Display (Figure 4)
- Buzzer (Figure 5)
- PIR sensor (Figure 6)
- Jumper wires (Figure 7)

Figure 1: Arduino UNO R3

Figure 2: Keypad

Figure 3: GSM module

Figure 4: Display

Figure 5: Buzzer

Figure 6: PIR sensor

Figure 7: Jumper wires

6. Budget Estimate

Item	Specification	quantity	Amount (LKR)
Arduino board	UNO R3	1	970.00
PIR sensor	HC-SR501	2	600.00
GSM module	SIM900A	1	3500.00
Buzzer	KY-012	1	100.00
Jumper wires (40 pins)	-	1	160.00
Power supply	-	1	500.00
Keypad	4x4 button membrane keypad	1	150.00
Display	16x2 LCD screen	1	350.00
			6330.00

7. Individual Team Member Roles

Gunathilaka M.D.M.D.P. (180213F)	- Electronic System Designing
Akmeemana A.P.L.R.S. (180022T)	- Testing
Kodikara K.A.C.M. (180325B)	- Programming
Udawatta U.D.P. (180652A)	- Quality Assurance
Wimalaratne G.D.S.U. (180718H)	- Final Product Designing

8. Duties and responsibilities of Each Role

- **Electronic System Designing:** Designs a suitable electrical and electronics system with the required components to accomplish the task.
- **Testing:** Confirm whether each stage of the project has been completed correctly and test the final product against various real life scenarios.
- **Programming:** Program the Arduino board to accomplish the required tasks. Ex: - Use a GSM module to send messages, Ring the bell, Identify the movements of doors.
- **Quality Assurance:** Keep tabs on the current situation of the project and check whether all the structures and mechanisms are up to standard.
- **Final Product Designing:** Design the overall appearance throughout the project to give a good looking creation. Introduce new ways to change the look.

9. References

[1] "SimpliSafe," SimpliSafe, [Online]. Available: https://simplisafe.com/. [Accessed 22 October 2019].

[2] "Nest and Google Home. Now under one roof.," Google, [Online]. Available: https://store.google.com/us/category/google_nest?hl=en-US&GoogleNest&utm_source=nest_referral&utm_medium=google_oo&utm_campaign=GS102516. [Accessed 22 October 2019].

[3] "Protect America," [Online]. Available: https://www.protectamerica.com/. [Accessed 23 October 2019].