



Faculty of Computer Science and Information Technology

SMART FENCE INTEGRATED SECURITY SYSTEM

Vikneshwaran Elanseliyan

Bachelor of Computer Science with Honours (Network Computing)

2020

SMART FENCE INTEGRATED SECURITY SYSTEM

VIKNESHWARAN ELANSELIYAN

This project is submitted in partial fulfillment of the requirements for the degree of
Bachelor of Computer Science with Honours
(Network Computing)

Faculty of Computer Science and Information Technology
UNIVERSITI MALAYSIA SARAWAK

SISTEM PAGAR PINTU PINTAR KESELAMATAN BERSEPADU

VIKNESHWARAN ELANSELIYAN

Projek ini merupakan salah satu keperluan untuk Ijazah Sarjana Muda
Sains Komputer dan Teknologi Maklumat
(Pengkomputeran Rangkaian)

Fakulti Sains Komputer dan Teknologi Maklumat
UNIVERSITI MALAYSIA SARAWAK 2020

FORM B

UNIVERSITI MALAYSIA SARAWAK

THESIS STATUS ENDORSEMENT FORM

TITLE SMART FENCE INTEGRATED SECURITY SYSTEM

ACADEMIC SESSION: 2019/2020

VIKNESH WARAN A/L ELANSELIYAN

(CAPITAL LETTERS)

hereby agree that this Thesis* shall be kept at the Centre for Academic Information Services, Universiti Malaysia Sarawak, subject to the following terms and conditions:

1. The Thesis is solely owned by Universiti Malaysia Sarawak
2. The Centre for Academic Information Services is given full rights to produce copies for educational purposes only
3. The Centre for Academic Information Services is given full rights to do digitization in order to develop local content database
4. The Centre for Academic Information Services is given full rights to produce copies of this Thesis as part of its exchange item program between Higher Learning Institutions [or for the purpose of interlibrary loan between HLI]
5. ** Please tick (✓)

- CONFIDENTIAL (Contains classified information bounded by the OFFICIAL SECRETS ACT 1972)
- RESTRICTED (Contains restricted information as dictated by the body or organization where the research was conducted)
- UNRESTRICTED

E. Vicky
(AUTHOR'S SIGNATURE)

Permanent Address

46, Jalan Beladau 42,
Taman Puteri Wangsa,
Ulu Tiram, Johor

Date: 11/8/2020

Validated by

Dr. Lau Sei Ping
(SUPERVISOR'S SIGNATURE)
Dr. LAU SEI PING
Senior Lecturer
Faculty of Computer Science and Information Technology
Universiti Malaysia Sarawak

Date: 12 August 2020

DECLARATION

I hereby declare that this project and its contents are my original work except for that information which have been cited and quoted are extracted from other sources with the provided reference.



.....
(VIKNESH WARAN ELANSELIYAN)

11 DECEMBER 2019

ACKNOWLEDGEMENT

First of all, I am grateful to The Almighty God for establishing me to complete this Final Year Project.

I wish to express my sincere thanks of gratitude to Dr. Lau Sei Ping, Supervisor of my final year project who gave me the golden opportunity to do this wonderful project as my Final Year Project on the topic of Smart Fence Integrated Security System. I am sincerely appreciation to Dr. Lau for his constant encouragement towards me. I extremely grateful and indebted to him for his expert, sincere and valuable guidance and encouragement extended to me.

I take this opportunity to record our sincere thanks to all the faculty member of the Faculty of Computer Science and Information Technology for their help and encouragement. I also thank my mother for her unceasing encouragement and support. I would like to thank my course mate for sharing their knowledge which helped me to finish my first part of final year project.

I also place on record, my sense of gratitude to one and all who, directly or indirectly, have lent their helping hand, spiritual support and guidance through the journey to complete my first part of Final Year Project within the time given.

ABSTRACT

Fence as perimeter security for a property plays an important role in protecting their own assets. However, the current fence that has been implemented in most of the building or property still become a worrisome to most of the owner in protecting their own land. Scenario becomes worst to those who cannot visit their own asset due to their abroad job. Although, there are many fence security system has been proposed and been implemented, but for chain link fence, it does require some improvement. Therefore, a security system called Smart Fence Integrated Security System is extended from the current chain link fence and designed in Final Year Project 1 by considering the reliability and the secure level in protecting the perimeter of a property. The methodology used in this proposed system is Waterfall model. In order to obtain a deep understanding for the proposed system, a literature review has been conducted with four reviewed systems. After reviewed, requirements will be gathered through observation and reviewed system in requirement analysis phase. In system design phase, context data flow diagram, flowchart of system, block diagram, and system architecture and for smart fence integrated security system were drawn. In the end of Final Year Project 1, the idea and design of proposed system have been identified. The significance of this project is to detect whether someone is trying to trespass into the property and deter the climb over by having siren to make an alert and bring cautious people surrounding there. The developed system will allows the owner of the property or the asset to receive notification in his or her smartphone once there is any trespassing occurs in that specific property.

ABSTRAK

Pagar sebagai keselamatan keliling untuk harta memainkan peranan penting dalam melindungi aset mereka sendiri. Walau bagaimanapun, pagar semasa yang telah dilaksanakan di sebahagian besar bangunan atau harta tanah masih menjadi masalah kepada kebanyakan pemilik dalam melindungi tanah mereka sendiri. Senario menjadi terburuk kepada mereka yang tidak dapat melawat aset mereka sendiri kerana pekerjaan di luar negara. Walaupun terdapat banyak sistem keselamatan pagar yang telah dicadangkan dan dilaksanakan, tetapi untuk pagar pautan rantai, ia memerlukan sedikit peningkatan. Oleh itu, sistem keselamatan yang dipanggil Sistem Pagar Pintu Keselamatan Bersepadu diperluaskan dari pagar pautan rantai semasa dan direka dalam Projek Tahun Pertama 1 dengan mempertimbangkan kebolehpercayaan dan tahap yang selamat dalam melindungi perimeter harta benda. Metodologi yang digunakan dalam sistem yang dicadangkan ini adalah model Waterfall. Untuk mendapatkan pemahaman yang mendalam mengenai sistem yang dicadangkan, kajian literatur telah dijalankan dengan empat sistem yang dikaji semula. Selepas disemak, keperluan akan dikumpulkan melalui sistem pemerhatian dan kajian semula dalam fasa analisis keperluan. Dalam fasa reka bentuk sistem, rajah aliran data konteks, carta aliran sistem, gambarajah blok, dan sistem seni bina dan untuk sistem pintar bersepadu sistem keselamatan bersepadu. Pada akhir Projek Tahun 1, idea dan reka bentuk sistem yang dicadangkan telah dikenalpasti. Kepentingan projek ini adalah untuk mengesan sama ada seseorang cuba menceroboh harta itu dan menghalang pendakiannya dengan mempunyai siren untuk memberi amaran dan membawa orang-orang yang berhati-hati di sekitarnya. Sistem yang dibangunkan akan membolehkan pemilik harta atau aset itu menerima pemberitahuan dalam telefon pintarnya apabila terdapat sebarang pencerobohan berlaku di dalam harta tertentu itu

TABLE OF CONTENTS

CHAPTER 1: INTRODUCTION	1
1.1 Introduction	1
1.2 Problem Statement	2
1.3 Project Objective	2
1.4 Methodology	2
1.5 Scope	4
1.6 Significant of Project.....	4
1.7 Project Schedule	5
1.8 Expected Outcome	6
1.9 Project Outline.....	6
1.9.1 Chapter 1: Introduction.....	6
1.9.2 Chapter 2: Background & Literature Review	6
1.9.3 Chapter 3: Requirement Analysis and Design	7
1.9.4 Chapter 4: Implementation and Testing.....	7
1.9.5 Chapter 5: Conclusion and Future Work	7
CHAPTER 2: BACKGROUND & LITERATURE REVIEW	8
2.1 Introduction	8
2.2 Selecting suitable prototyping platform	8
2.3 Overall view on existing systems.....	9
2.3.1 Alarm - afence Security Electric Fence.....	10
2.3.2 Border Security System.....	11
2.3.3 Wireless Perimeter Fence Security System.....	14
2.3.4 Detecting Intrusion in Large Farm Lands.....	15
2.4 Critical Review on existing systems.....	18
2.4.1 Alarm - afence Security Electric Fence.....	18
2.4.2 Border Security System.....	18
2.4.3 Wireless Perimeter Fence Security System.....	19

2.4.4	Detecting Intrusion in Large Farm Lands.....	19
2.5	Comparison between existing and proposed system.....	20
2.6	Summary	21
CHAPTER 3: METHODOLOGY		22
3.1	Introduction	22
3.2	Customised waterfall model for proposed project	23
3.2.1	Requirement Analysis	24
3.2.1.1	Functional Requirement.....	24
3.2.2	System Design.....	24
3.2.2.1	System Architecture	25
3.2.2.2	Block Diagram... ..	26
3.2.2.3	Flowchart Diagram... ..	27
3.2.2.4	Context Data Flow Diagram... ..	29
3.2.2.5	Hardware Requirement... ..	30
3.2.2.6	Software Requirement.....	31
3.2.3	Implementation	32
3.2.4	Integration and Testing	32
3.3	Summary.....	33
CHAPTER 4: IMPLEMENTATION AND TESTING		34
4.1	Introduction	34
4.2	Hardware Implementation	34
4.2.1	ESP-Wroom-02 Pocket 8266 D1 Mini Wi-Fi Module.....	35
4.2.2	Gyro Sensor	36
4.2.3	Buzzer.....	36
4.2.4	Android Phone.....	37
4.3	Software Requirements and Programming Language Used.....	38
4.3.1	Arduino IDE	38
4.3.2	Blynk App.....	39

4.4	Hardware Assembly.....	40
4.4.1	Gyro Sensor Integration with D1 mini Wi-Fi Module	41
4.4.2	Buzzer Integration with D1 mini Wi-Fi Module	42
4.5	Hardware Configuration	42
4.5.1	Configuration of Gyro Sensor	43
4.5.2	Configuration of Buzzer	43
4.5.3	Configuration of LED light	43
4.5.4	Configuration of NodeMCU.....	45
4.6	Android Application Development	45
4.6.1	Creating Account	46
4.6.2	Creating New project.....	46
4.6.3	Project and device configuration.....	46
4.6.4	Push Notification Alert.....	46
4.7	Testing	48
4.7.1	Hardware Testing.....	48
4.7.2	Functional Testing	49
4.7.2.1	Unit Testing	50
4.7.3	Non-functional Testing.....	51
4.7.3.1	Usability Testing.....	51
4.8	Summary.....	53
	CHAPTER 5: CONCLUSION AND FUTURE WORKS.....	54
5.1	Introduction	54
5.2	Objective Achievement	54
5.3	Project Limitations	55
5.4	Future Works	55
5.5	Contribution.....	55
5.6	Conclusion.....	56
	REFERENCES.....	57

List of Figures

Figure 1.1. Development of Waterfall model...	3
Figure 1.2. Duration and Gantt Charts for FYP 1.	5
Figure 1.3. Duration and Gantt Chart for FYP 2.....	6
Figure 2.1. Alarm based - electric security fence system.....	11
Figure 2.2. Working principle of the Ultrasonic Sensor.....	12
Figure 2.3. Flowchart of the Border security system.....	14
Figure 2.4. Wireless Fence system concept... ..	15
Figure 2.5. Experimental deployment of a virtual fence along the perimeters of a lawn... ..	16
Figure 2.6. Micro Controller based Sensor Module	17
Figure 3.1. Customised Waterfall Model.....	24
Figure 3.2. System Architecture of the system... ..	25
Figure 3.3. Block Diagram.....	26
Figure 3.4. Flowchart of Making Alert... ..	28
Figure 3.5. Flowchart of Sending Notification... ..	28
Figure 3.6. Context Data Flow Diagram of the System.....	29
Figure 3.7. Simple Alert Notification.....	31
Figure 3.8 IDE Interface.....	32
Figure 4.1 ESP-Wroom-8266-Wi-Fi Module.....	35
Figure 4.2 MPU 6050 Gyro Sensor.....	36
Figure 4.3 Buzzer.....	37
Figure 4.4 Android Phone.....	38
Figure 4.5 Arduino IDE.....	39
Figure 4.6 Blynk App.....	40
Figure 4.7 Complete Electrical Diagram of Smart Fence Integrated Security System device	41
Figure 4.8 Fully Assembled prototype of Smart Fence Integrated Security System... ..	45
Figure 4.9 Creating account for Notification Alert.....	46
Figure 4.10 Creating a new project.....	47
Figure 4.11 Push notification of Smart Fence Integrated Security System.....	47
Figure 4.12 Push notification popped up on owner's smartphone.....	48

List of Tables

Table 2.1. Comparison between Raspberry Pi and Arduino.....	9
Table 2.2. Distance measured of certain measurement.....	13
Table 2.3. Comparison Table between existing and propose system....	20
Table 3.1. Hardware Requirements.....	30
Table 3.2. Software Requirement.....	31
Table 3.3 Specification of active buzzer	32
Table 4.1 Gyro sensor’s pin type and its connection	43
Table 4.2 Buzzer pin type and its connection	43
Table 4.3 Hardware test cases for Smart Fence Integrated Security System.....	50
Table 4.4 Test case for Blynk application.....	51
Table 4.5 Test case for Gyro Sensor	51
Table 4.6 Usability Test Results	53
Table 5.1 Achievements for the Project Objectives.....	55

CHAPTER 1 INTRODUCTION

Perimeter Security

Physical protection is a term used to outline the integration of humans, tactics, and gadget for asset safety in opposition to threats and dangers. Fischer et al (2008) define bodily protection as to protect itself in opposition to theft, vandalism, sabotage, and unauthorized get entry to. According to Smith (2006) he stated that physical protection describes the bodily measures designed to shield people, to prevent unauthorized get entry to to belongings, and to defend belongings from harm, and robbery. To identify an interloper, perimeter security is the principal line of protection. Boundaries or fence are appropriate as it is sensible to anticipate that individuals from the general population, including kids, are probably going to trespass and could endure damage in the event that they did as such. There is a critical danger of damage or demise to trespassers in most of the quarries. Obstructions ought to consistently be given at quarry limits which are close to schools, universities, shops or numbers of homes. Perimeter Protection is certainly the principal line of defense in a physical security plan for a property or office. In any case, an assessment of the threat assessment of the office together with the risk the executives strategy will decide the job of the perimeter in the security management plan. Physical hindrances will prevent a weak interloper, however will just postpone a decided individual (Smith, Clifton & David,2013).

Fences are the typical structure of perimeter barrier used to secure the property of an association. Fences are commonly unobtrusive and snappy to fabricate, even the surveillance monitor can be coordinated through the prevention, and divider can seek after the limit and be planned into various shapes, and may be redesigned with security fencing, razor wire, or bested with anti - climbing devices. In any case, fences are not good as physical boundaries as they won't usually stop vehicle entrance. They are additionally in like manner vulnerable to cutting, the nature of their improvement helps scaling, and they can be tunneled under with the exception of if additional boundaries, for instance, plinths can be said.

One of the drawback of fences are it require a significant level of support to be set up based on the land or the place condition (Perimeter Protection, n.d.). Security fencing can be introduced over a steel fence by holding it on expansion arms implemented over the fence. Single-barbed wire fence can be introduce outwards of the edge being ensured, though doublebarbed wire was build on V- formed expansion arms. Barbed wire fencing is introduced to give added trouble to anybody who willing to try to scale a fence.

1.1 Problem Statement

Living in this era, security become a most concern among all of us. Physical security that is able to safeguard people, prevent trespassing or climbing over, and to protect our assets and property is indeed vital. In order to solve this we need a fence security system which can overcome all this conflicts and crime. The current chain link fence is less secure and the safety is not guaranteed. This lead to in which thief or burglar can easily climb over the fence due to no proper security is applied. The weakness of chain link fence is it is susceptible to cutting, not solid or static enough as days passes by and adding to the worse scenario it does not able to withstand high pressure or high tension. So, a new idea needed to implement in order to overcome this obstacles by building a smart fence integrated security system.

1.2 Objective

1. To detect someone is climbing on the chain link fence.
2. To deter the trespasser by having siren alert once there is movement detected on the chain link fence.
3. To notify the owner if someone is trying to trespass or climbing on the fence

1.3 Methodology

Methodology is a collection of methods being used to develop this project. The knowledge of methodology helps to track the flow of the project easily. Waterfall methodology is the most suitable methodology for this project. Waterfall model was invented by Winston W. Royce on 1970. This model is also known to be linear- sequential life cycle model. It is easier to use and interpret. It has six phases as shown in Figure 1.1 below. In this model each phase depends on the previous phase. For example, the output of the first phase will become input for second phase. Therefore, no overlapping between the phases will occur. Before the software development life cycle (SDLC) is approach, Waterfall model is already introduced (Software Testing Help, 2015).

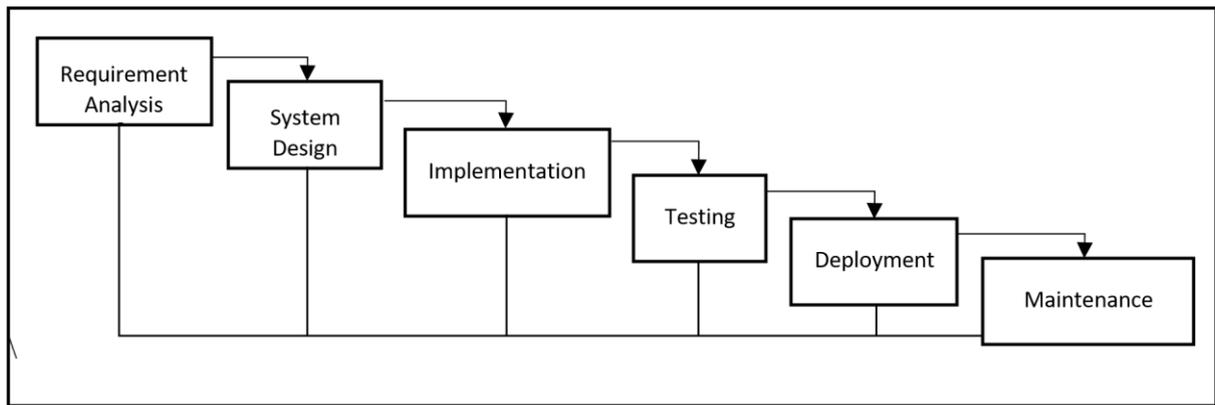


Figure1.1 Waterfall model (adapted from Software Testing Help, 2015).

The design and the method are explained to meet the purpose of this project which are to develop smart fence integrated security system to deter trespassing using the Arduino Integrated Development Environment (IDE) programming, Arduino Uno board, and sensors.

In this project, the task perform are partitioned into few stages. First of all is to construct hardware development by utilizing Arduino IDE. For programming part, Java C++, and C language is utilized to build the command so as to get the best outcomes. Programming language can be utilized to indicate the precise instructions where the central preparing unit (CPU) will follow and proceed with progress.

Later, transfer the programming code into Arduino Uno and all factors that need to utilize is record on it. The programming interprets and sends guidelines on what to do. The input information and the output is declared. After the procedure has been complete, the program will examine and run in the Arduino IDE to distinguish and identify if there have any error in programming before uploading to Arduino Uno. The following step is to transfer through universal serial bus (USB). The USB-to-sequential connector chip or cable is executed through USB interface. After sending the instructions through USB to Arduino Uno, the programming will investigate again to the electronic segment to works. Stage III is the equipment which is to fabricate the system.

Next, the fabrication of system is done. The components used to come up with the hardware are Arduino Uno, load sensor, motion sensor, and breadboard. The Arduino is the main part of the hardware. It can be connect simply to the gadgets you used to upload the code with a USB cable or power it with alternating current (AC) to direct current (DC) adapter in order to get started. It function as to read inputs that are programmed into it and turn it into an output to run the hardware successfully.

Load sensor is used to detect the weight or force apply on it. Load cells are commonly formed metal parts that have strain measures paste to them. The strain measures are resistors that make differences their resistance when they are bent. At the point, when the metal load bends, the obstruction of the load cell changes (the HX711 estimates this little change in opposition precisely).

Motion sensor is utilized to distinguish an individual moving around roughly 10m from the sensor. It is only a normal average value as the real identification range can meet somewhere in the range of 5m and 12m. This sensors has three pins, a ground, a VCC for controlling up the module and a yield pin which help to respond if an item is identified. Additionally it has two potentiometers. One for altering the sensitivity, and the other one for modifying the time the yield signal remains high when article is distinguished. This time can be movable too to permit how speedy it ought to respond. Last one is breadboard. Breadboard is utilized to effectively interface the electrical segment and wires together in Arduino. The segments wires are connected into the breadboard by placing the wires into the gaps.

1.4 Scope

The scope of this project is mainly concentrating on building up smart secure chain link fence security system. Besides that, this project also focusing on making alert or notify the owner if any trespassing occur in the owner premises. The concept approach is more reliable and safer compare to previous version of the chain link fence security system.

1.5 Significant of Project

The significant of this project is that, to improvise fence (chain link) security system by using Arduino. By building this system it will able to deter the trespasses from trespassing the owner's property and certainly more secure can be guaranteed in the chain link fence security system. By implementing this project, definitely can preserve the integrity of your security strategy. Besides, this perimeter security can be implement by everyone for their own property so that when the owner is not available or went to outstation their property is still in safe and secure as always. This security system is safe and does not need to worry of children who if they touch or apply force on the fence as there will be a range of pressure set on this system where it will only alert if someone apply force which is more than the preset value.

1.6 Project Schedule

The project schedule is a timeframe needed to complete the overall proposed final year project throughout first and second semester of the academic year 2019/2020. In this project, Gantt chart is used to demonstrate the total timeline consume for FYP 1 and FYP 2 together with the resources needed. All the documentations of this project are gathered within 5 main chapters. Figure 1.2 and figure 1.3 shows the roughly time Gantt chart development of the Final Year Project.

TASK NAME	START DATE	DAYS TO COMPLETE	FINISH DATE
Brief project Description	19-Sep	9	29-Sep
Full Project Proposal	29-Sep	16	19-Oct
Research on project	29-Sep	4	03-Oct
Analyse project requirements	04-Oct	4	09-Oct
Determine outlines and project scope	10-Oct	4	15-Oct
Determine Methodology	16-Oct	4	19-Oct
Chapter 1: Introduction	19-Oct	6	26-Oct
Chapter 2: Literature Review	26-Oct	16	16-Nov
Review, journals and existing analysis	26-Oct	8	06-Nov
Documentation	07-Nov	8	16-Nov
Chapter 3: Methodology	16-Nov	17	08-Dec
Submission of Final report of FYP 1	08-Dec	7	15-Dec

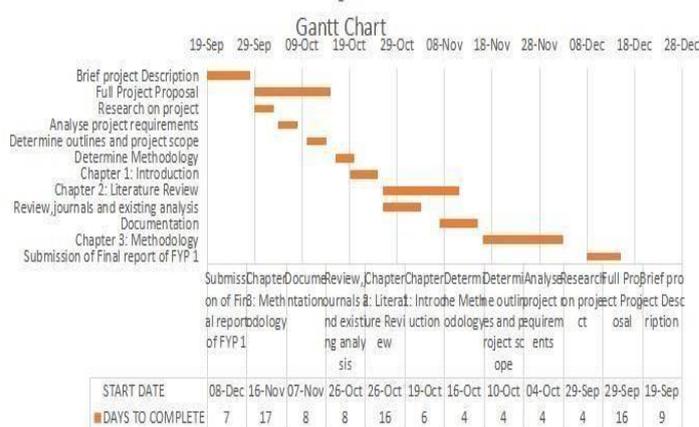


Figure 1.2 shows the Duration and Gantt Chart for FYP 1

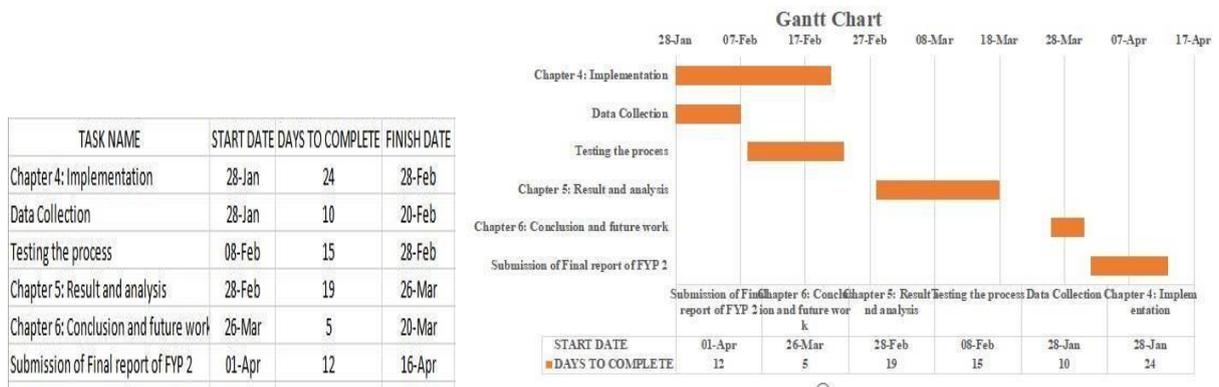


Figure 1.3 shows the Duration and Gantt Chart for FYP 2

1.7 Expected Outcome

This system is expected to produce a smart fence security system which capable of identify trespassers and can provide warning by making siren or notifying the owner. The way how it works will be recorded and will be improvise if there is any malfunction or errors. At the end of this project, a smart chain link fence integrated security system will be delivered.

1.8 Project Outline

Chapter 1: Introduction

This chapter explains the overview of the proposed project. This chapter consist of problem statement, objectives of project, the methodology involved, scope of project, significant of project, project schedule, and the expected outcome of this project. The problem statement explains on the challenges and problems faced by current security system and the reason behind it to come up with a more efficient method. The objective explains about this projects goal while the scope describes the techniques used to obtain more improvise security system.

Chapter 2: Background and Literature Review

Chapter 2 discuss about the literature review based on existing techniques and procedures, articles, related papers, and journals. In the end of this chapter, techniques and features used in current method, what they have already come up with and at last the impression learned on the significant techniques. Apart from

that, the advantage and limitations of the existing system as well as reason of choosing this method compare to the other methods.

Chapter 3: Requirement analysis and Design

In this chapter, the steps or methodology used throughout the project to develop the proposed system. Basically, in this chapter, the techniques implemented to build the fence security system is vividly explained. Besides, an overview of the design and tools required for this project execution as well as the some logic and related diagrams are attached together in this chapter.

Chapter 4: Implementation

Chapter 4 is about the detail of implementation technique and should be describe well. This chapter basically involve external and internal design as well the technology (if any) used. Apart from that, this chapter is where the prototype that has been designed is tested in the real environment and the evidence will be taken if necessary for the result obtained.

Chapter 5: Conclusion and Future Work

This chapter consider the last chapter where the whole technique developed will be discuss that can marks the improvisation and brings benefit to people and environment. This chapter also describe on the improvements should be recommended for future work and emphasize on limitation that faced throughout the project. At the end of this chapter, dedication and contribution throughout the project will be emphasized as well.

CHAPTER 2: BACKGROUND & LITERATURE REVIEW

2.1 Introduction

This chapter is about literature review and background study of this project. The objective of this chapter is to briefly explain on the description of functionalities, review and analysis on existing fence security system that is already in market to ensure the user of this system would able to understand how existing system works and comparison were made. This chapter also provide information such as providing the skills, idea, inspiration, knowledge and cognitive thinking in doing research and investigation. Therefore, this helped to develop the project by providing the basic idea to kick start the project. A good groundwork of research on existing system, technologies, supporting software, hardware tools and programming language was required to accomplish and develop the system successfully. The strength and weakness of the existing system were identified for a comparison purpose.

There is a various type of fence security system available in market as a commercial product. However, the requirement of the existing system does not satisfy user needs. There is still a room for development in existing system and the comparison will identify the needs and help to improve the proposed system. This chapter will outline more details on how the existing system works.

2.2 Selecting suitable prototyping platform

Selecting suitable prototyping platform for this project is a crucial part. Choosing unsuitable prototyping platform will cause worst consequences for this project. Most suitable prototyping platform selected based on requirement of this project and ability of the platform.

Table 2.1 below shows the comparison between two prototyping platforms.

Table 2.1: Comparison between Raspberry Pi and Arduino

Specification	Raspberry Pi	Arduino
Board Types	Single Board Computer (SBC)	Microcontroller
Sensor interface	Difficult to interface with sensors	Easy to interface with sensors
Cost	Expensive	Low cost
Connectivity	Easy to connect with internet using ethernet cable or USB Wi-Fi module	Require external hardware and proper coding to connect with internet
Storage	Raspberry Pi does not have onboard storage, required external SD card	Arduino have onboard storage
Programming language	Recommended programming language is python. C, C++, python, ruby are pre-installed	Use C, C++
Port availability	No analogue input port	Have 6 analogue input port

Based on the comparison above, Arduino is the suitable prototyping platform for this project. Arduino uses microcontroller board types which is good in controlling small devices (such as sensors, LEDs, motors, and other components). This is because Arduino can easily interface with sensors due to analogue port availability in it. Normally, sensors have two kind of inputs which is digital and analogue. Raspberry Pi does not have analogue ports. In term of economical wise Arduino is low cost compare to Raspberry Pi. The drawback of Arduino is required external hardware and perfect coding to connect with internet. However, proposed project using Wi-Fi module not GSM Module. Moreover, Arduino using C or C++ programming and have onboard storage. Therefore, Arduino chosen for this proposed project.

2.3 Overall view on existing systems

Trespassing issue due to no proper fence security implemented is a common factor we are facing for many years. Many engineers and developers are keep developing many prototypes to solve this problem at residential and industrial

building. Therefore, many prototypes are creating year to year by adding new features on it. For this project 3 related existing system are chosen for literature review. Those system are selected and will be discussed in detail in aspect of their functionalities and features used as implementation purpose of the proposed system. Each of the system have its advantages and disadvantages. Following are those existing system to be reviewed :

- i. Alarm-aFence Security Electric Fence
- ii. Border Security System using Arduino & Ultrasonic Sensors
- iii. Wireless Perimeter Fence Alarm System
- iv. Detecting Intrusion in Large Farm Lands and Plantation Using Virtual Fences

2.3.1 Alarm - aFence security electric fence

The basic thought of this project is to make an alarm by making alert if there is a trespasser is attempting to climb over the property so that there is move made quickly if there are individuals around the site of the structure or the property. In this project, motion sensor is utilized to distinguish the movement apply on the chain link fence. On the off chance that anybody attempt to move over the fence by applying some development and weight wavering there will be electric stun stimulated to that specific trespassers. The X Stop BA80D DC 12V electrified barrier sensor is utilized to invigorate electric impulses forces all through the barrier. At the point when a trespasser or any creatures is attempting to reach the electric wire, the electric flow goes through the trespasser or the creature to the ground, along the electrical circuit.

The continuous electrical flow coursing through the wire is sufficient enough that the trespasser will remember the stun and will never attempt to climb over to the barrier or the property again. The fence must be well-structured and built to absorb some pressure from trespassers. Since the Earth itself makes up half of the electrified barrier circuit, it is essential to have a properly installed ground circuit. The electrically charged fence wire must not be permitted to come into contact with bushes, tall grass, and some other conductive articles on a continual basis. This precaution is important or else the electric impulse from the fence wire will lose its "shocking" control, making it short out. Figure 2.1 underneath shows a similar equipment set up of this task.

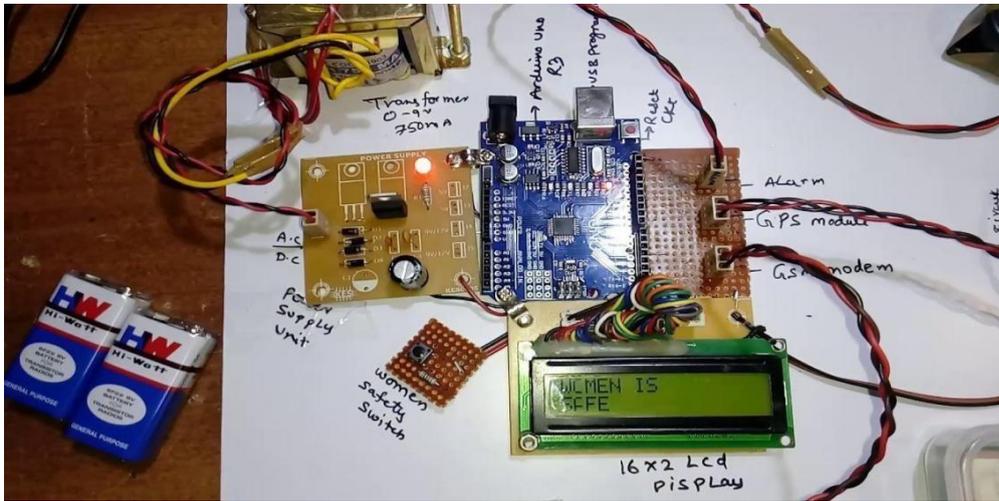


Figure 2.1: Alarm based electric security fence system

2.3.2 Border Security System using Arduino & Ultrasonic Sensors

Border Security System using Arduino & Ultrasonic Sensors is designed and developed by Amit Kumar, Anchal Baranwal, Arun Kumar, K. Brijesh Kumar, Dhanajay Mishra, Deepu Kumar, and Associate Professor Varun Singhal. The fundamental thought of this project is identify interruption by making alerts and terminating the laser mounted on hold following robot. This system is effectively implemented on the homes for the individual home security and in the banks, storing areas, safes, vaults, and so forth. This system is totally mechanized which needs only two or three individuals for help reason. This system has ultrasonic sensors which go about with respect to the acknowledgment of the interruption.

As they are mounted over the territory segments. The sensors persistently turn back and forward in the scope of specific degrees (30-160) and show the interruption over the radar within its area. This is another sets of sensors which sense the interruption and show over the LEDs and actuation of the caution. As the sensors identify the interruption, RF transmitter sends sign to the beneficiary and line following robot arrive at the marginal and again distinguish the interruption by sensor mounted over it. When it identifies, the laser will fire towards the gatecrasher and kill it. The ultrasonic sensor that utilized in this project are HCSR04. The controlling modules are Arduino UNO board and the laser utilized is diode laser. The HC-SR04 ultrasonic sensor modules have transmitter and collector. The HCSR04 ultrasonic sensor uses sonar to choose division in extents of 2cm to 400 cm or 1" to 13 feet.