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Assessment Weightage & Type

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LASER LIGHT SECURITY

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I confirm that I understand my coursework needs to be submitted online via Google Classroom under the relevant module page before the deadline in order for my assignment to be accepted and marked. I am fully aware that late submissions will be treated as non-submission and a mark of zero will be awarded.

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1. INTRODUCTION

The most basic demand of each human is the need for security. Every day, the world of technology evolves. The security of people's well-being and the safety of their possessions, houses, and treasures is a worry as the globe becomes increasingly electronically linked. A calm existence requires the sense that one is safe and that everything in society is in order.

Only in Nepal were 2,874 burglaries reported in 2018-19, up from 1,628 the previous year, representing a 43.3% rise in the number of burglaries. More than half of the crimes were perpetrated in broad daylight, particularly in the Kathmandu valley, in vacant homes and rented apartments of working families. (Anon., n.d.)

The Laser Security Alarm System may be a viable solution to the above-mentioned issues. This system has the potential to play an important role in the security and defense industries, ranging from the protection of simple household objects to the security of a company's most precious assets. The security system will also be made to send out notification alarms when there is a breach in the system. This will come in handy when no one is in range to hear the security alarm go off.

1.1. Problem Scenario

Technology has gone far beyond what it was previously. Security is an important factor nowadays. Every day, the world's technology advances. The criminal organization also improves its technology in order to carry out its operations. As a result, in order to protect criminals, security systems must change over time. The presence of an alarm security system in our homes, hospitals, schools, companies, and industries has shown to deter most burglars. Criminals often target defenseless structures rather than those secured by security alarm systems. However, this project of laser security focuses on small scale security.

1.2. Project as a solution

To cover a limited area, laser light is employed. Laser light has been shown to travel long distances without being dispersed. It is also visible only at the source and incidence point; elsewhere, it is invisible. These two traits contribute to the advancement of a modern security system known as "laser security."

When a person or item crosses the laser line, the security alarm sounds and the focus light illuminates to focus on the intruder. A secure barrier of single laser light may be established by using a mirror at each corner for reflection. It is made up of manually switchable sensors and a basic alarm mechanism.

Since laser lights are not that visible and can travel longer distance, it works as a good security system for a small-scale security purpose. If this system were to be installed on a larger scale, it can be expensive.

2. Aims and Objectives

2.1. Aim

The main goal of the project is to build a simple and affordable laser security alarm system using an Arduino Uno, a laser light, an LDR, and a buzzer, as well as to demonstrate its usefulness in protecting against invasion.

2.2. Objectives

i. To understand the operation of the Arduino, LDR, and Buzzer.
ii. To serve as an extra layer of security in unattended homes.
iii. To investigate and demonstrate the operation of a laser security alarm system.
iv. Create an easy-to-use and cost-effective security system.
v. To reduce theft and burglary in unattended homes.
vi. To serve as a perimeter alarm system around properties, alerting individuals in the area of any physical entry.

3. Expected outcomes and Deliverables

The laser security system will be comprised of five primary components; the laser, a light dependent resistor (LDR), a buzzer, an Arduino and a GSM shield. A laser is a focused light source that emits a single color of light in a straight line.

Before being reflected to the LDR, a single laser beam will be reflected by mirrors positioned in particular places. If the light is stopped and does not fall on the LDR for whatever reason, the LDR quickly transmits a signal to the Arduino UNO. This signal passed to the Arduino activates the electric buzzer. A battery attached to the Arduino powers all of the components in this security alarm system.

When hit by laser light, the LDR detects it and emits a voltage. When the laser beam stops and is unable to reach the LDR, the voltage output of the LDR changes, which the Arduino detects and triggers the buzzer. This alarm will then be sent to the user’s mobile with the help of GSM shield.

4. Project risks, threats and contingency plans

Not every project goes as planned. Every project has a collection of events connected with it that impede the effective completion of the project; these occurrences are known as project risks. Some of the risks and threats that maybe faced are listed below;

4.1. Risk and threats:

i. Technical and hardware during development or deployment.
ii. The laser light not hitting on the LDR and hitting elsewhere.
iii. The buzzer goes off only if the laser is obstructed. It can be a failure if the intruder passes without obstructing the laser.
iv. Power issue, the main source of this system comes from a 9-volt battery, if the battery dies when users are not around, there is no security.
v. Network failure, the GSM shield which will be in connection with the user's phone may sometimes not be able to send notification alarms due to network issues.

4.2. Contingency planning:

i. Using and deploying devices correctly to overcome technological failure. To boost redundancy, backup gear should be obtained.
ii. Properly placing and firmly fixing the laser light so as it does not move even slightly.
iii. Making sure that the security system covers the area in such a way that there is no place to sneak in through without obstructing the light.
iv. A backup battery should be kept and regularly checking the battery.

5. Methodology

5.1. Evolutionary Prototyping

The evolutionary prototyping technique has been selected for this project. Any type of modification is welcome in the prototyping technique, and the product may be created to account for the changes. Some outdated elements that were examined might be deleted in order to make the project more effective, efficient, practical, and market ready. It is also one of the top alternatives for developers since it makes it simple and reasonable for developers to design the product and make adjustments as needed.

Innovation is widespread in IOT systems, and with new ideas come new adjustments, allowing the system to be more adaptable. Design, testing, and improvement are what enable innovation and modifications that will finally please the client. The prototype can be altered several times as the client's needs evolve over time. In the framework of this system, the evolving prototype process also accepts criticism from internal and external supervisors. (teach-ict, 2022)

Advantages		Disadvantages	
i.	The design of this model is adaptive.	i.	Because to the constantly changing client needs, it has weak documentation.
ii.	Errors are easily detected.	ii.	There may be an excessive variety in requirements.
iii.	It has the ability to actively include users in the development phase.	iii.	Customers may request that the final product be provided shortly after seeing an initial version.

(Upadhyay, 2020)

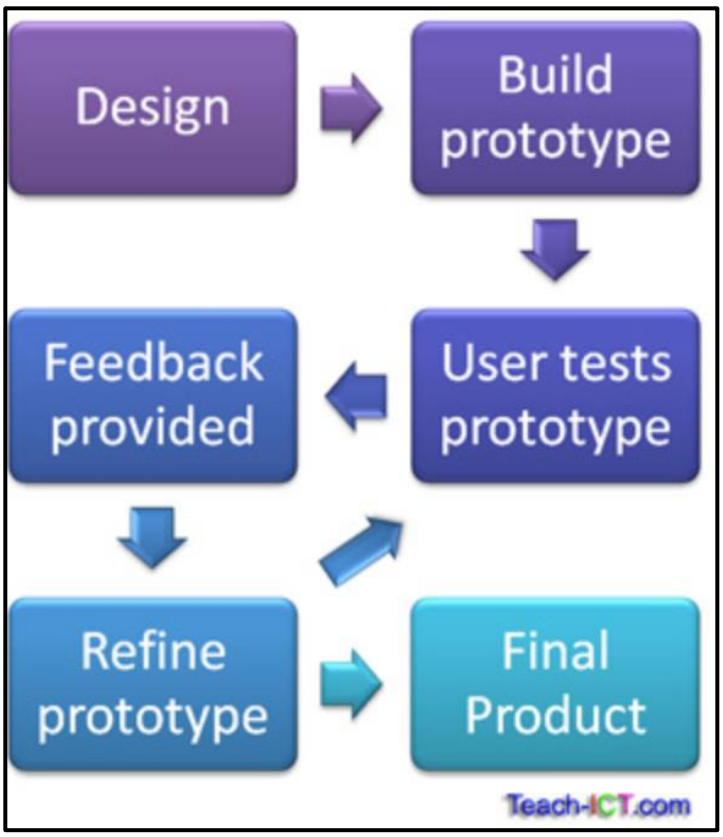

Figure 1: Evolutionary Prototyping (teach-ict, 2022)

The reason for choosing this methodology are as follows:

i. It is simple to understand and apply in my project.
ii. It will assist in managing the project's progress and tracking its status.
iii. It will aid in upgrading and evaluating the system in accordance with the needs of the clients.
iv. It will aid in the recovery of faults.
v. It will assist me in accepting the system's alteration.

6. Resource Requirement

6.1. Hardware requirements

i. A laptop or a computer.
ii. An Arduino UNO
iii. A GSM Shield
iv. Laser Light
v. Buzzer

vi. Light Dependent Resistor (LDR)

vii. Battery

viii. Wires

ix. Switch

6.2. Software requirements

i. Programming language: C/C++

ii. Arduino software

iii. Documentation software

7. Work breakdown structure

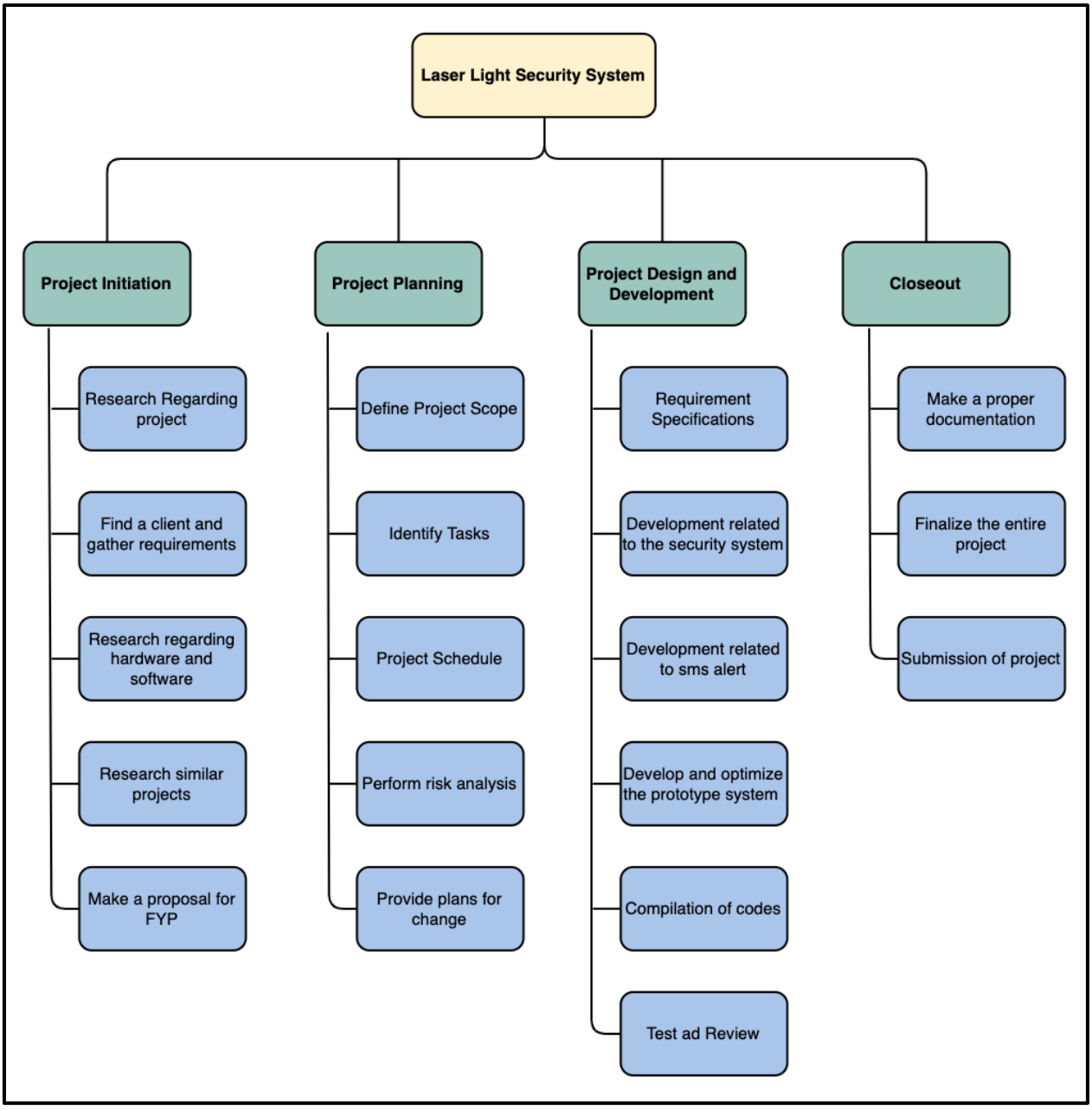

Figure 2: Work Structure Breakdown

8. Milestone

- Milestone 1: Topic Finalization and Research

  The first milestone that was achieved was the finalization of the topic. This is done so as to have more focus on the project. Research is started after the finalization of the topic.

- Milestone 2: Proposal submission

  The final proposal submission will provide an idea of how the complete project will be structured. This emphasizes the most important parts of the completed projects. It also outlines the project's first requirement.

- Milestone 3: Client Finalization

  The client finalization is a crucial milestone because the project is dependent on the client's requirements. The adjustments are performed depending on the client's specifications.

- Milestone 4: Interim Report

  The interim report is initiated following the submission of the proposal. It is mainly based on the proposal and goes into further detail about the subject. The interim report is a significant portion of the report.

- Milestone 5: Complete development of Laser Security system

  This is the completion of the major part of the project development where the whole system is developed.

- Milestone 6: Complete development of the alarming and automated alarm notification codes

  After the whole system is developed, the codes to run the system is developed. Once the system is ready to go, an automated notification alarm has to be developed.

- Milestone 7: Finalize the development

  All development procedures are concluded depending on the client's evaluation and requirements. Until this point, every unit has been tested and reviewed.

- Milestone 8: Complete testing

  This milestone concludes the final testing of the created item. From this point on, the development is complete.

- Milestone 9: Complete documentation

  The project documentation, which is the most significant aspect of the project, has been finished. The paperwork is complete and ready for submission.

- Milestone 10: Submit project

  With the completion of the documentation, the overall project is reviewed for the last time before being submitted to the RTE

9. Project Gantt Chart

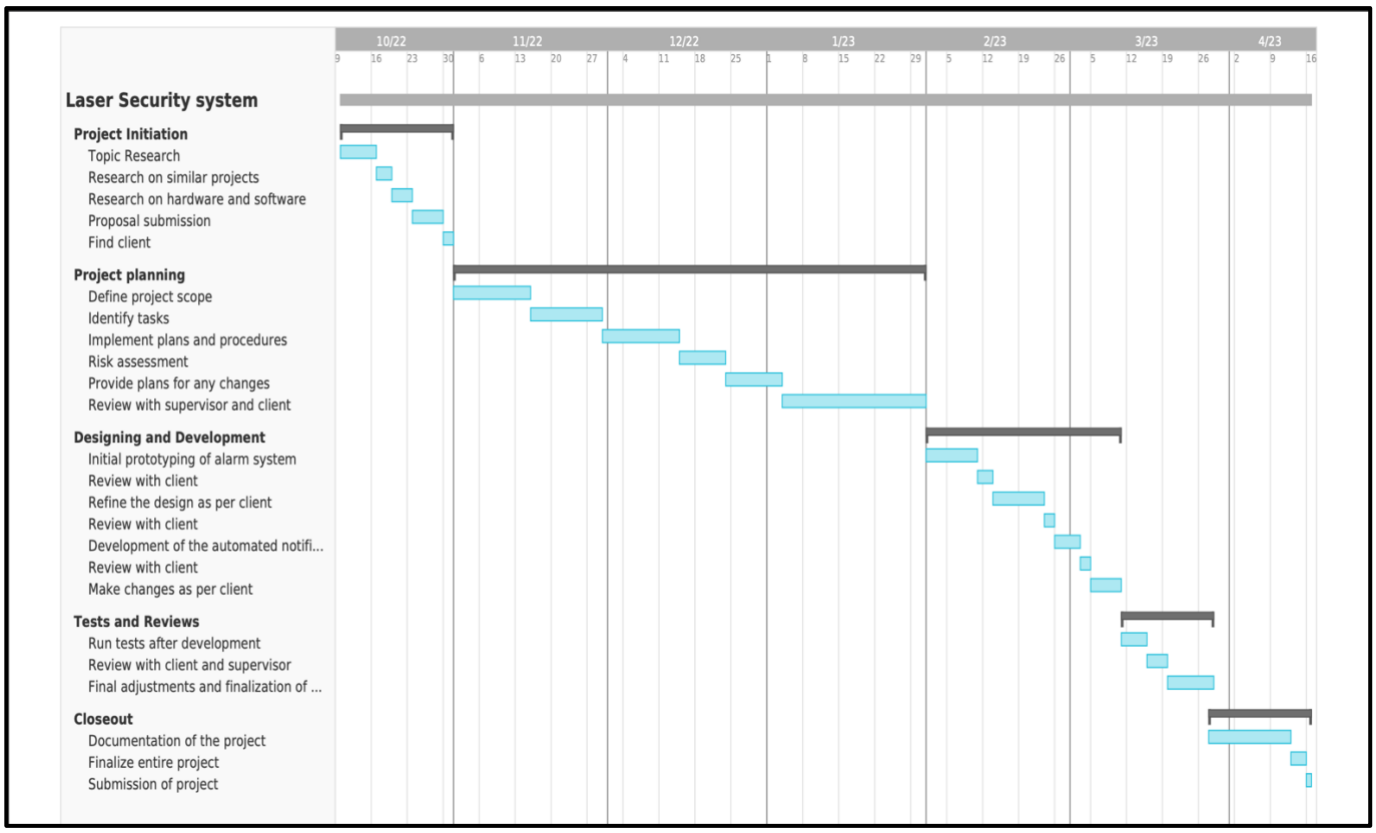

Figure 3: Gantt Chart

10. Conclusion

Laser security systems protect us against crime and theft in our daily lives. As a result, individuals install them in order to be safe, secure, and sound. Various electronic securities can be used for home security and safety as well as in other critical jobs. It's a terrific opportunity to save labor while also reducing electrical waste.

The "Laser Security Device" is a useful aid system. Using this strategy, robbery, theft, and crime may all be prevented to a large extent. Avoiding thieves preserves our financial assets, thus this strategy protects us from any risks. The laser and LDR System are very sensitive and have a broad working range.

The system detects laser light as it travels over the LDR connected to the circuit. The alert or siren sounds if the light beam is disturbed in any manner. With the help of GSM shield, an alarm notification can also be sent to the user when the alarm goes off. This extremely reactive approach is well suited to surveillance, industrial applications, and smart environments because to its low computational needs.

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13. Appendix

13.1. Considered methodologies

a. Agile methodology:

It is a process in which the need and its solution emerge via the collaborative activity of teams and the client. The activity is divided into numerous phrases, and continual improvement and iteration are accomplished by communicating with stakeholders. Sprints are the names given to the split parts. (Keefe, 2022)

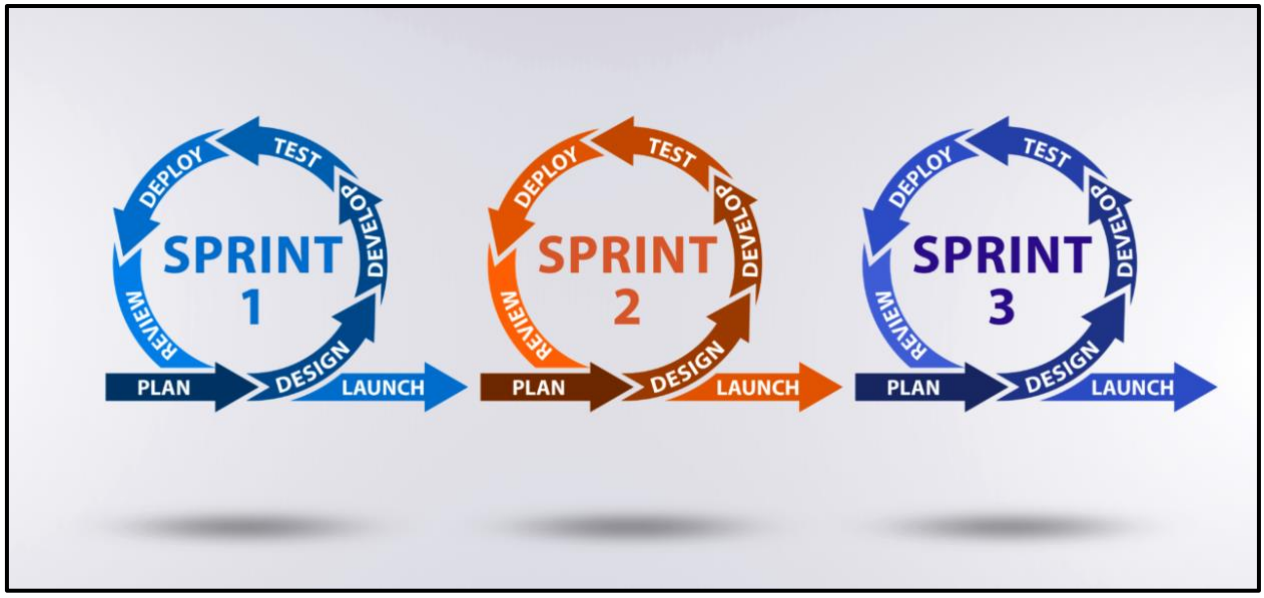

Figure 4: Agile methodology (Adam, 2022)

Its advantages and disadvantages are as follows:

Advantages	Disadvantages
i. The delivery of software is continuous with the Agile process.	i. Agile methodologies need minimal paperwork.
ii. Customers are pleased since functioning software features are given to them after each Sprint.	ii. When using Agile approach, the requirements are not always explicit, making it difficult to forecast the desired outcome.
iii. Customers may inspect the operational feature that met their expectations.	iii. Because of the ever-changing characteristics, there is always the chance of the project continuing forever.

(Upadhyay, 2020)

b. Waterfall methodology:

The waterfall technique is a linear project management strategy in which client requirements are collected at the start of the project and then a sequence of tasks plan is developed to suit those needs. The waterfall model gets its name from how every phase of the project flows into the next, like a waterfall.

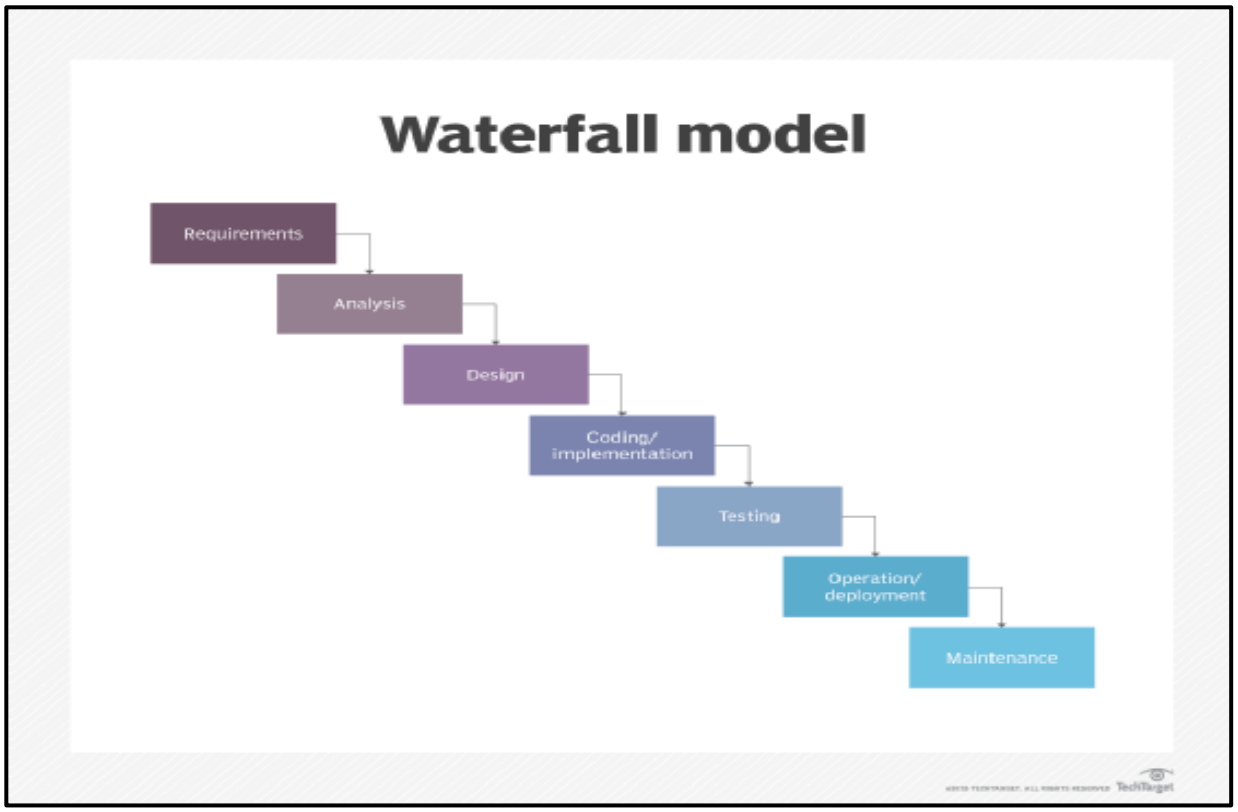

Figure 5: Waterfall methodology (Lutkevich, 2022)

Its advantages and disadvantages are as follows

Advantage	Disadvantage
i. The criteria are defined clearly and properly, and they stay constant throughout the project's development.	i. All needs must be known before to development, which significantly slows project start-up.
ii. Detailed documentation of each development step offers resistance to changes in human resources - a new developer may rapidly obtain all required knowledge.	iii. A lack of flexibility makes it difficult, if not impossible, to make modifications while developing.
iv. The start and finish locations for each phase are predetermined, making it simple to track progress.	ii. To reach the project's deadline, rigorous management and continuous monitoring are required.

(LVIVITY , 2018)

13.2. Resource requirement elaborated

i. Hardware requirement

a. Laptop or a computer:

To program the system and document the project's details, a laptop or desktop computer with an internet connection is required.

b. An Arduino UNO:

In the project, Arduino is a microcontroller board and serves as the central system since it is configured to regulate and direct all of the sensors as well as analyze the data.

c. A GSM Shield

GSM shield connects an Arduino to the internet, through which an Arduino can send or receive SMS and even make calls. This will help in sending an SMS when the buzzer is alarmed.

d. Laser Light:

The laser light acts as the barrier of security. The light lands on the LDR and when the light is interrupted or does not land on the LDR, the Arduino will trigger the buzzer.

e. Buzzer:

A buzzer is an auditory signaling device that is commonly used as an alarm, timer, and other similar functions. When the link between the laser and the LDR fails, the LDR sends a signal to the Arduino, which activates the Buzzer, which sounds a high-pitched alarm.

f. Light Dependent Resistor (LDR):

A light-dependent resistor (LDR), is a variable resistor or light sensor device that decreases resistance when illuminated and increases resistance when exposed to darkness. Because of its light sensitivity, it immediately sends a signal to the Arduino if the light is interrupted and does not fall on the LDR, even for a short period of time.

g. Battery:

In this project a 9V battery will be used. The battery will be the power source of this project.

h. Wires:

To link devices in this project, connecting cables are utilized. Connecting wires allow an electrical current to travel from one point on a circuit to another because electricity requires a medium to flow through. The majority of connecting cables are made of copper or aluminum.

i. Switch:

A switch is a device that is used to connect and disconnect electrical circuits. It is the little button that switches on and off electronics. Switches are most commonly employed in electrical applications. Switches are commonly seen in electronic devices.

ii. Software requirements

a. Programming language: C/C++

C/C++ is the programming language that will be used for programming the project.

b. Arduino software:

It is an open-source software where the codes are written down in C language and is uploaded to the Arduino board in use. It is used to help program the project.

c. Documentation software:

The documentation process involves the use of a variety of tools. Microsoft Word, snipping tools, draw.io, Gantt chart, etc.

11/26/22, 14:44

14. Originality report

COURSE NAME

CS6P05 - FYP - Subekshya Pradhan and Prabe Hada

STUDENT NAME

FARHAN IBRAHIM

FILE NAME

Final Year Project

REPORT CREATED

26 Nov 2022

Summary

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2 of 4 passages

Student passage FLAGGED

When a **person or** item crosses **the laser line, the security alarm** sounds **and the focus light** illuminates **to focus** on **the** intruder. **A** secure barrier **of single laser light** may be established **by using** a …

Top web match

When any **person or** object crossover **the laser line the security alarm** will ringing **and** also **the focus light** will "on" **to focus the** entrance of unauthorized person. We can make **a** security boundary **of**… laser security alarm thesis - SlideShare https://www.slideshare.net/yashkumarsingh1426/laser-securityalarm-thesis-61790868

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3 of 4 passages

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…the laser is obstructed. It can be a failure **if the intruder passes without obstructing the laser**.

Top web match

If the intruder passes without obstructing the laser, it is considered as a failure. In order to secure a larger area, we need more lasers and corresponding sensors.

Laser Security System - Electronics Hub https://www.electronicshub.org/laser-security-system/

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4 of 4 passages

Student passage FLAGGED

…sent to the user when the alarm goes off. **This** extremely **reactive approach is well suited to surveillance, industrial** applications, **and smart environments** because to its low computational needs.

Top web match

This highly **reactive approach** has low computational requirement; therefore, it **is well suited to surveillance, industrial** application **and smart environments**. 27.

Laser Security System Project report - SlideShare
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