

POLITEKNIK UNGKU OMAR

CYBERGATE SMART SAFETY HELMET

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CIVIL ENGINEERING DEPARTMENT

SESSION 1 2023/2024

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**This report is presented to Civil Engineering Department as fulfilling a
part of the reward conditions of the Civil Engineering Department**

CIVIL ENGINEERING DEPARTMENT

SESSION 1

2023/2024

DECLARATION OF AUTHENTICITY AND OWNERSHIP

CYBERGATE SMART SAFETY HELMET

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2. I admitted that this project and intellectual properties are masterpieces/original designs without taking or imitating others' masterpieces/original designs.
3. I agreed to relinquish ownership of the intellectual property of the smart safety helmet to Politeknik Ungku Omar to fulfill the requirement of awarding a **Civil Engineering Diploma** to me.

Made and acknowledged

by the said;)

Muhammad Aiman Bin Mohammad Nor)

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In front of me, NOOR RASHIDAH BINTI NOORDIN (800802-08-5604)

As project supervisor on the date.....)

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APPRECIATION

Alhamdulillah, thanks to God for His blessings, favours, and graces, we finally completed the proposal for our Final Year Project 1, the Smart Safety Helmet. In preparing this full report, there are too many challenges and challenges that we had to face, but we will make it a valuable lesson and experience because our tiredness is finally worth it if this report is finally completed perfectly and successfully. A heartfelt speech of appreciation and endless thanks to our supervisor Mrs. Noor Rashidah Binti Noordin for helping us in various ways throughout the course of this study. Thank you also to our panel which is Mrs. Dayana Safra Binti Mohd. Sopian. Without you, this study could not be completed. Finally, thank you also to my fellow comrades-in-arms for your support and encouragement throughout the course of this study. Not forgetting those who are directly and indirectly involved. Thank you.

ABSTRACT

Cybergate Smart Safety Helmet is an innovative safety helmet instead of a regular safety helmet. It is upgraded by adding GPS and QR codes that can be used to facilitate the accident management process at construction sites. For example, GPS we put to facilitate the process of searching for victims at the construction site if the victim is buried in concrete rubble or the like. Next, our function of placing a QR code is to facilitate the process of identifying the victim's identity if the victim's identity cannot be identified. The first objective of this product is to design a smart safety helmet that provides a QR code and adds GPS using Sketch up. The second objective of creating this product is to produce a new innovative smart safety helmet QR code and GPS to help the management in terms of worker safety in construction and our third objective is to test the function of the safety helmet with a QR code and GPS by distributing a questionnaire to construction workers.

Our questionnaire consists of 3 sections, which are section A, section B, section C, and section D. For section A 58.8% of males and 41.2% of females answered for this questionnaire. This is normal because males are more attracted to engineering than females. The difference is not a big gap between genders.

For section B, respondents thought that the product never be seen yet at the market. This question proved that Cybergate Smart Safety Helmet is original idea. While 39.6% of respondent said they seen the product. They maybe seen the design but different function of the safety helmet.

For section C, half of respondents, which is 86.7% agreed that when accident happened, it is very hard to find and identify the victims. As mentioned in problem statement, accident happened in construction site in very high every year.

For section D, Cybergate Smart safety helmet is easy to operate as agreed by 81.2% respondents. This safety helmet is convenient to use by the workers. But for some

respondents, they thought the safety helmet is hard to use since the helmet does display to them yet or they were never exposed to how to use the GPS very well.

In conclusion, Cybergate Smart Safety Helmet technology has the potential to reduce accidents and injuries in a variety of industries by providing workers with real-time data, alerts, and warnings. Despite these limitations, the project found that Cybergate Smart Safety Helmet can significantly improve worker safety by providing them with real-time data, alerts, and warnings. Smart Safety Helmet can also be used to monitor employee performance and identify areas for improvement. Smart Safety Helmet can also help reduce the cost of accidents and injuries, as well as increase productivity in various industries.

These are some suggestions for further research to further strengthen the research findings in the field under study:

1. Adds advanced head-up display (HUD) camera tools, voice control and noise cancellation technology.
2. Adds a front-facing camera, an integrated audio system and advanced sensors for impact detection. It also offers a smartphone app to enhance the overall riding experience.

ABSTRAK

Cybergate Smart Safety Helmet ialah topi keledar keselamatan yang inovatif dan bukannya topi keledar keselamatan biasa. Ia dinaik taraf dengan menambah GPS dan kod QR yang boleh digunakan untuk memudahkan proses pengurusan kemalangan di tapak pembinaan. Contohnya GPS kami letak untuk memudahkan proses pencarian mangsa di tapak pembinaan sekiranya mangsa tertimbus dalam runtuhan konkrit atau sebagainya. Seterusnya, fungsi kami meletakkan kod QR adalah untuk memudahkan proses mengenal pasti identiti mangsa sekiranya identiti mangsa tidak dapat dikenal pasti. Objektif pertama produk ini adalah untuk mereka bentuk topi keledar keselamatan pintar yang menyediakan kod QR dan menambah GPS menggunakan Sketch up. Objektif kedua penciptaan produk ini adalah untuk menghasilkan kod QR dan GPS, topi keledar keselamatan pintar yang inovatif bagi membantu pihak pengurusan dari segi keselamatan pekerja dalam pembinaan dan objektif ketiga kami adalah untuk menguji fungsi topi keledar keselamatan dengan kod QR dan GPS. dengan mengedarkan borang soal selidik kepada pekerja binaan.

Soal selidik kami mengandungi 3 bahagian iaitu bahagian A, bahagian B, bahagian C dan bahagian D. Bagi bahagian A 58.8% lelaki dan 41.2% perempuan menjawab soal selidik ini. Ini adalah perkara biasa kerana lelaki lebih tertarik kepada kejuruteraan berbanding wanita. Perbezaannya bukanlah jurang yang besar antara jantina.

Bagi bahagian B, responden berpendapat bahawa produk itu tidak pernah dilihat di pasaran. Soalan ini membuktikan bahawa Cybergate Smart Safety Helmet adalah idea asli. Manakala 39.6% responden mengatakan mereka melihat produk tersebut. Mereka mungkin melihat reka bentuk tetapi fungsi topi keledar keselamatan yang berbeza.

Pada bahagian C, separuh daripada responden, iaitu 86.7% bersetuju bahawa apabila kemalangan berlaku, adalah sangat sukar untuk mencari dan mengenal pasti mangsa. Seperti yang dinyatakan dalam pernyataan masalah, kemalangan berlaku di tapak pembinaan dengan sangat tinggi setiap tahun.

Bagi bahagian D, Cybergate Smart Safety Helmet adalah mudah dikendalikan seperti yang dipersetujui oleh 81.2% responden. Topi keledar keselamatan ini mudah digunakan oleh pekerja. Tetapi bagi sesetengah responden, mereka berpendapat topi

keledar keselamatan sukar digunakan kerana topi keledar itu masih belum dipaparkan kepada mereka atau mereka tidak pernah didedahkan dengan cara menggunakan GPS dengan baik.

Kesimpulannya, Cybergate Smart Safety Helmet berpotensi untuk mengurangkan kemalangan dan kecederaan dalam pelbagai industri dengan menyediakan pekerja dengan data masa nyata, makluman dan amaran. Walaubagaimanapun, projek ini mendapati bahawa Cybergate Smart Safety Helmet ini boleh meningkatkan keselamatan pekerja dengan ketara dengan memberikan mereka data masa nyata, makluman dan amaran. Cybergate Smart Safety Helmet juga boleh digunakan untuk memantau prestasi pekerja dan mengenal pasti bahagian untuk penambahbaikan. Cybergate Smart Safety Helmet juga boleh membantu mengurangkan kos kemalangan dan kecederaan, serta meningkatkan produktiviti dalam pelbagai industri.

Berikut adalah beberapa cadangan kajian lanjutan bagi mengukuhkan lagi dapatan kajian dalam bidang yang dikaji:

1. Menambah alat kamera paparan kepala termaju (HUD), kawalan suara dan teknologi pembatalan hingar.
2. Menambah kamera menghadap hadapan, sistem audio bersepadu dan penderia lanjutan untuk pengesanan impak. Ia juga menawarkan aplikasi telefon pintar untuk meningkatkan pengalaman menunggang secara keseluruhan.

LIST OF CONTENTS

CHAPTER	CONTENTS	PAGES
	STATEMENT OF AUTHENTICITY AND PROPRIETARY RIGHTS	I - IV
	APPRECIATION	1
	ABSTRACT	2 - 5
	CONTENT	6 - 7
	LIST OF TABLES	8
	LIST OF FIGURES	9 - 10
1	INTRODUCTION	
	1.1 Introduction	11
	1.2 Study Background	12
	1.3 Problem Statement	13 - 15
	1.4 Study Objectives	15
	1.5 Research Questions	16
	1.6 Scope of Study	16
	1.7 Importance of Study	17
	1.8 Definition of Terms/Operative	18
	1.9 Summary	19
2	LITERATURE REVIEW / FIELD	
	2.1 Introduction	20
	2.2 Introduction of Safety Helmet	21 - 29
	2.3 Introduction of QR code	30 - 34
	2.4 Introduction of GPS	35 - 39
	2.5 Summary	40
3	METHODOLOGY / DESIGN	
	3.1 Introduction	41
	3.2 Project Study Design	42
	3.2.1 Study Types Project	43 - 45
	3.2.2 Real Types Project	45 - 47
	3.3 A Pilot Study	47
	3.4 Conclusion	48

4	REASEARCH FINDINGS AND DISCUSSION	
	4.1 Introduction	49
	4.2 Introduction of result and data analysis	50
	4.2.1 Data Analysis	51 - 57
	4.3 Discussion	58
5	CONCLUSION AND RECOMMENDATION	
	5.1 Introduction	59
	5.2 Conclusion	59 - 60
	5.3 Recommendation	60 - 61
	5.4 Summary	62
6	REFERENCES	63
7	APPENDIX	64 - 66

LIST OF TABLES

TABLE NO.	TITLE	PAGES
2.2	Categories of GPS	39
3.1	Questionnaire comfort and Function of Smart Safety Helmet	44
3.2	Section and Total Number of Items Found	44
3.3	Methodology Flow Chart	46

LIST OF FIGURES

FIGURES NO.	TITLE	PAGES
1.1	Article of Accident at Construction Site	14
2.1	Safety helmet or hard hat	14
2.2	The inventor of safety helmet	22
2.3	Part of safety helmet	22
2.4	Bump cap	23
2.5	Safety helmet – light weight	24
2.6	Safety helmet – standard	25
2.7	Safety helmet – industrial	26
2.8	Safety helmet – climbing helmet	27
2.9	Safety helmet – high performance industrial	28
2.10	Safety helmet – anti static	29
2.11	Masahiro hara	30
2.12	UPC barcode	30
2.13	Neo Reader	32
2.14	Quick Mark Barcode Scanner	32
2.15	GPS Work	36
3.1	Design Project	41
4.1	Percentage of respondent gender	52
4.2	Percentage of nationality	52
4.3	Total Position of respondent	53
4.4	Percentage of working experience	53
4.5	Percentage of respondent seen design	64
4.6	Percentage of design suitability	54
4.7	Percentage of necessity upgrade	55
4.8	Percentage of comfortability	55
4.9	Percentage of uses product	56

4.10	Percentage of hard to find victims	56
4.11	Percentage of accessibility the product	57
4.12	Percentage of lifespan	57

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

Construction sites frequently have unstable working surfaces, especially those that are elevated from the ground, placing workers in dangerous environments. The industry recorded the highest number of fatalities in the country's economic sector in 2018 alone. According to Safety and Health Department (DOSH), there were 3911 accidents and 169 fatalities in the construction industry in 2018. Safety is a concern for many workers because accidents can happen at any time on a construction site. Due to severe injuries, we are unable to identify the dead bodies of workers. As a result, the GPS and QR code on the helmet can aid concerned parties in determining the identity of the worker by scanning the QR code there. The next step can be taken by the parties involved by scanning the QR code.

1.2 BACKGROUND STUDY

A smart safety helmet with QR code and GPS is the tool to make it facilitates users mostly on construction sites who work or who are mainly workers related to engineering in terms of their safety at the workplace, which cannot be expected in the event of an accident that can involve death or can injure workers at work. A smart safety helmet with a QR code and GPS function can assist concerned parties in determining the identification of workers by scanning the QR code on the provided helmet. The wearer's workplace safety may be affected using this Smart Safety Helmet. If there is an accident, such as a building collapse, and it is challenging to find victims in a pile or where the victim is, this may make it easier to search for victims. GPS is a very useful instrument in the technological world of today, used to locate the victim and QR codes that may be scanned on a phone to identify or recognize the victim.

1.3 PROBLEM STATEMENT

In the current globalized and modernized period, the majority of people use technology to make their everyday lives easier in a variety of ways, such as in the fields of industry, education, and defense. No matter how old or young, people are constantly coming up with fresh ideas and inventive methods to improve society and speed up and ease daily tasks.

In this discussion, we will debate about employee safety and a creative solution in solving the problem to find the victim of the victim involved in the collapse incident at the construction site and identify the victim.

Real-time monitoring and improved communication technologies are still critically needed to lower risk and accidents in a variety of industries, even in the face of advancements in workplace safety procedures. Conventional safety helmets are unable to instantly notify employees and managers of potentially hazardous situations or occurrences that may occur to the wearer. Because of this, there is a pressing need for smart safety helmets that have communication modules, smart sensors, and data analysis capabilities to help proactively identify, report, and prevent potential safety hazards. These helmets would ultimately improve workplace safety and lower the number of accidents and injuries that occur there.

For instance, the people involved have trouble determining the victim's identity and location when an accident happens during construction, refer to figure 1.1 . In numerous instances, accidents occur at construction sites when the victim's name is unknown. Everyone wants to be as safe as possible these days. The idea is to incorporate GPS and QR tags to safety helmets to make them more advanced.

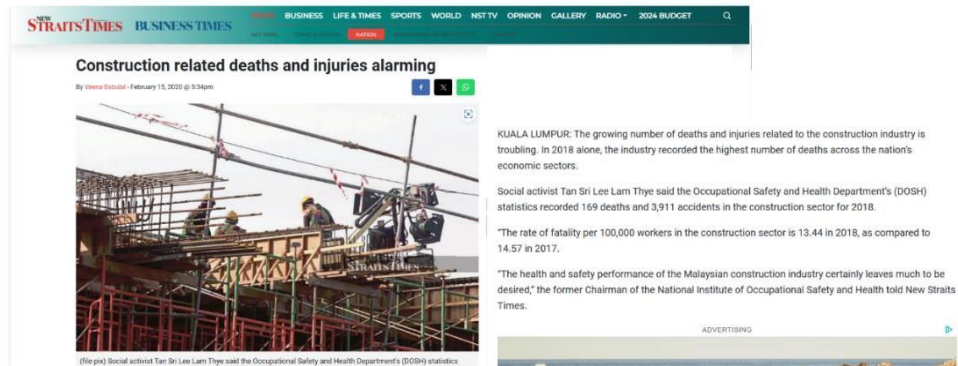


Figure 1.1 : Article of Accident at Construction Site

Here we attach a case as an example that we can see to evaluate the importance of innovation to the existing safety helmet, which is the case of the Warehouse Collapse in the construction process near Balik Pulau, Penang.



Figure 1.2: Accident at Construction Site

BALIK PULAU: At the logistics warehouse construction site in Batu Maung here, four construction workers who were initially thought to be buried beneath the debris of beams are reportedly still alive and escaped out of panic.

The issue was verified, according to state deputy police head Datuk Mohamed Usuf Jan Mohamad, by their employer and the foreman who was present when the tragedy occurred last night.

Four of them appear to still be alive and running out of terror, based on our impression. We shall so end the search and rescue mission.

"They might not have a permission because they ran away in the Bayan Lepas area. He just said at the scene of the event, "We have arrested them and we will look into this further.

As demonstrated by the aforementioned case, if the safety helmet is already equipped with GPS and a QR code, it can at least assist in locating the victim's last known location and facilitate the authorities' efforts to focus their search efforts in a more targeted area. Additionally, if the hat has a QR code, it can aid in identifying the victim's identity by accessing the code. Thus, we are hoping that the concept of incorporating GPS and QR codes as a novel innovation on safety helmets would prove successful and contribute to increased worker safety.

1.4 OBJECTIVE PROJECT

1. To redesign a smart safety helmet that provides a QR code and GPS using sketch up.
2. To produce smart safety helmet with new innovation QR codes and GPS to aid management in terms of worker safety in construction.
3. To test the functionality of safety helmet with QR code and GPS by distribute a questionnaire to community.

1.5 PROJECT/STUDY QUESTIONS

1. How can safety helmets be improved to provide better protection to the wearer?
2. What are the specific safety standards that this helmet complies with, and how do they ensure workers' safety?
3. What is the recommended lifespan of this helmet, and how do the workers know when it is time to replace it?
4. Can you provide instructions on how to properly fit and adjust the helmet to ensure maximum safety?
5. Are there any specific activities or situations where this helmet is not recommended, and why?
6. Is this helmet compatible with other safety gear, such as eye and ear protection, and how can I ensure optimal performance when using them together?

1.6 SCOPE OF THE PROJECT

The scope of the safety helmet with GPS Tracker and QR Code is focused on construction sites where a person or operations accidental dropping or loss of material, tool, and equipment, a barricaded or posted demolition, and overhead exposed energized conductors nearby. This helmet adds a QR Code with identity information and a GPS Tracker for the use of workers in charge at the construction site. This is because when an accident happens at a construction site, either bad or not, the victim information should be gathered of all standers who may have witnessed the accident other than that, he should make sure to record the significant aspects of the accidents including time and place.

1.7 IMPORTANCE OF THE PROJECT

Wearing a safety helmet is extremely important when working in hazardous environments, particularly in the construction industry.

A safety helmet protects the head from injury caused by falling objects, debris, and impacts. It also reduces the risk of head injuries caused by accidents such as slips, trips, and falls.

In addition, safety helmets can protect workers from electrical hazards, extreme temperatures, and harmful chemicals. They can also provide visibility and prevent workers from getting injured in low-light environments.

The use of safety helmets is vital in ensuring the safety and well-being of workers in the workplace. Employers have a responsibility to provide adequate safety equipment and enforce safety policies to prevent accidents and injuries.

1.8 DEFINITIONS OF TERMS/OPERATIVE DEFINITIONS

A safety helmet, also known as a hard hat, is a type of personal protective equipment (PPE) designed to protect the head from hazardous impact and penetration. It is commonly used in industries such as construction, manufacturing, and mining to protect workers from falling objects, debris, and other potential head injuries. Safety helmets typically consist of a hard outer shell made of plastic or other durable materials and an interior suspension system that helps absorb and distribute impact forces. They may also include additional features such as ventilation, chin straps, and reflective markings for increased visibility.

A safety helmet is a personal protective equipment (PPE) that is designed to protect the wearer's head from potential impact, collision, and penetration hazards. It is commonly used in workplaces like construction sites, mines, and industrial settings, as well as in outdoor activities like sports and biking. The helmet usually consists of a shell, suspension system, and chinstrap, and is made to absorb and distribute the force of an impact to the head, reducing the risk of head injury. Proper use of safety helmets can greatly increase an individual's safety and reduce the risk of serious or fatal head injuries.

1.9 SUMMARY

The safety helmet project is focused on developing and manufacturing high-quality safety helmets for workers in various industries. The helmets are designed to protect the head from impacts and other workplace hazards, ultimately helping to prevent head injuries and accidents.

The project likely involves designing the helmets, testing them to ensure they meet safety standards, and manufacturing them in large quantities. Additionally, the project may include marketing and sales efforts to promote the helmets to potential customers.

It is important to note that safety helmets are an essential component of workplace safety, particularly in industries such as construction, mining, and manufacturing where workers are exposed to various hazards. The safety helmet project has the potential to make a significant impact on worker safety and well-being.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION OF LITERATURE REVIEW

A literature review is a piece of academic writing that demonstrates an understanding of the academic literature on a specific topic placed in context. A literature review also includes a critical evaluation of the material, this is why it is called a literature review rather than a literature report. It is a process of reviewing the literature, as well as a form of writing.

To illustrate the difference between reporting and reviewing, think about television or film review articles. These articles include content such as brief synopsis of the key points of the film or program plus the critic's evaluation. Similarly, the two main objectives of a literature review are firstly the content covering existing research, theories, and evidence, and secondly your critical evaluation and discussion of this content.

Usually, a literature review forms a section or part of a dissertation, research project, or long essay. However, it can also be set and assessed as a standalone piece of work. The steps involved in this research journey are selecting a research question, searching the literature that has been published in the area, managing the literature search results, synthesizing the research literature, writing an assessment review, rethinking, refining and reworking your review in an interactive process until you are satisfied.

2.2 INTRODUCTION OF SAFETY HELMETS

Safety helmets or hard hats, refer to Figure 2.1, are designed to protect the head against falling objects and the side of the head, eyes, and neck from any unexpected impacts, bumps, scrapes, and electrical exposure. Head protection is a must and there to stay forever as industry needs to work to take care of the economy and thus cannot stop its functioning. But at the same time accidents of such a nature are common in the industry, some are reported, and some are not. The facts are that the head, being the most critical part of the body, needs protection all the time.[1]



Figure 2.1: Safety Helmet or Hard Hat

Statistical data regarding occupational accidents show that the most common cause of head injuries is impacted by sharp and hard items. The consequences of such an occurrence depend principally on the kinetic energy impact and the shape and hardness of the material encountering the head. Injuries caused by mechanical factors may affect the skin on the head, skull, brain, and segment of the spinal cords. In extreme cases, these injuries may lead to permanent disability or even a person's death.[2]

2.2.1 HISTORY OF SAFETY HELMETS

Edward W. Bullard is the one who invented the hard hat or safety helmet, refer to Figure 2.2, the first commercially available industrial head protection device. Bullard's lightweight, non-conducting hard hat design was sturdy enough to withstand many falling objects. This invention has since become a mandatory piece of equipment for protecting millions of workers around the world.[3]



Figure 2.2: The Inventor of The Safety Helmet

How does a safety helmet protect the head it has a hard shell which is taking care of the impacts, and the inner harness provides a snug fit of the skull as well as it provides cushioning between the inner of the shell and the wearer's head. A chinstrap to hold the helmet in place by way of the in and a sweatband to absorb sweat while use. The ventilation parts provide air ventilation across the skull while working long hours and amidst high-heat areas, refer to Figure 2.3.[2]

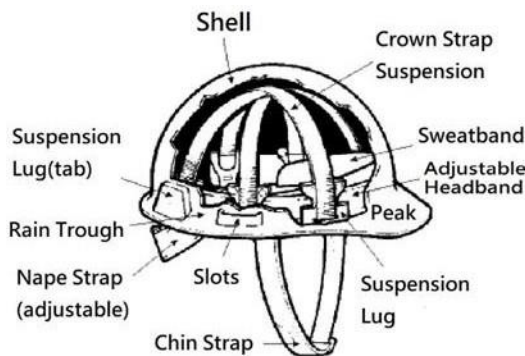


Figure 2.3: Parts of Safety Helmet

2.2.2 THE DIFFERENT TYPES OF SAFETY HELMET

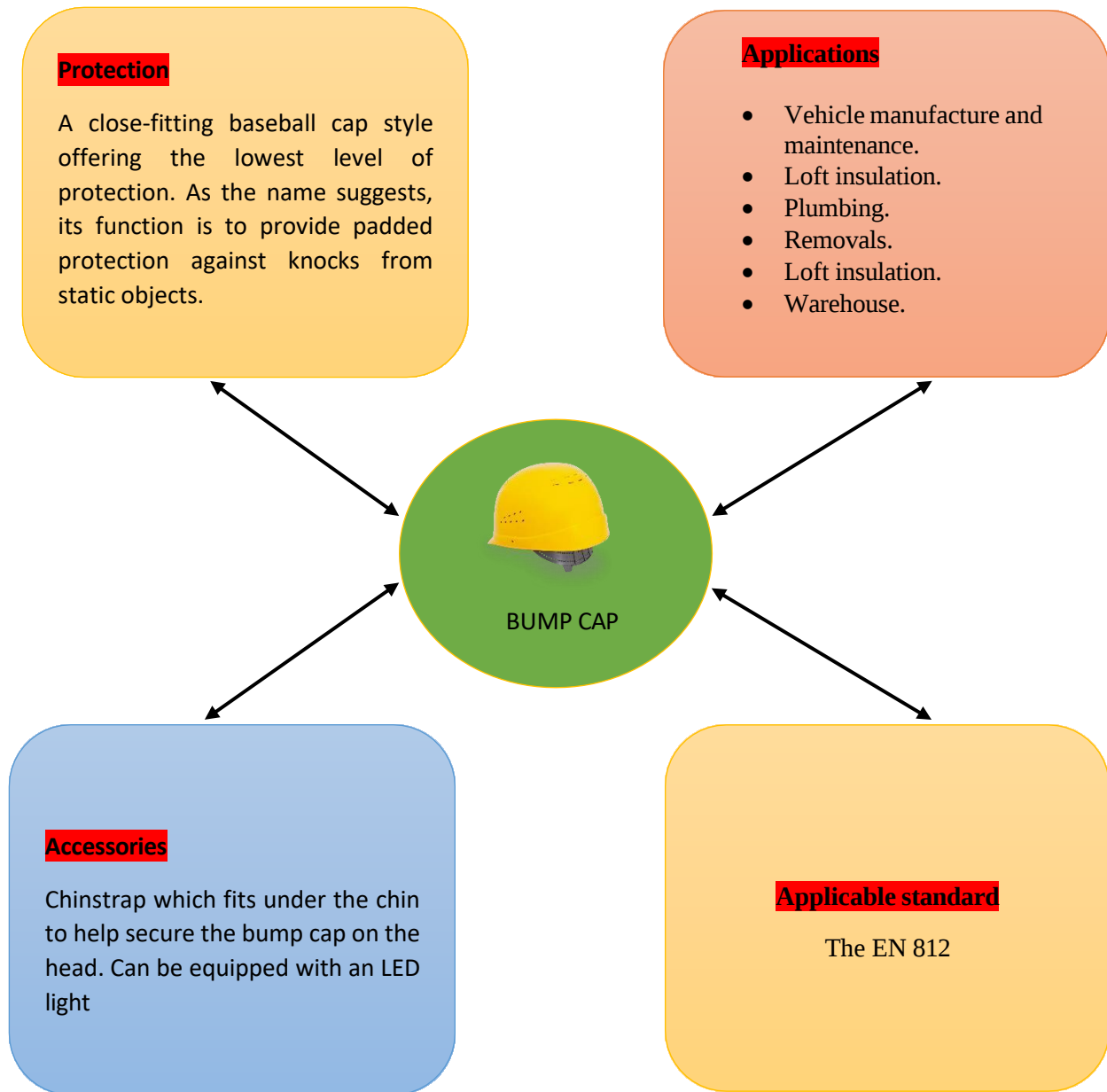


Figure 2.4: Bump Cap

c

Protection

In recent years, lightweight helmets have become more popular. Being light, there is less material in them, so they are useful when there is a very low risk of anything falling on the head, such as in low-rise construction, utilities, and highway maintenance. For someone working on the side of the roadway, or telephone or electrical engineers inspecting a cabinet, or a worker lifting a duct cover in the road, there is no actual danger of anything falling, but a helmet is needed in case a stone or another loose object flies up and hits their head.

Accessories

Many applications include helmet attachments, and these often bring different performance characteristics from the “stand-alone” item to be attached. An example of this might be earmuffs, whereby a headband version and a helmet-attachment version are offered. The different mountings result in differing noise attenuation performances. These are generally covered by the standard for the attachment type, e.g., hearing, eyewear etc

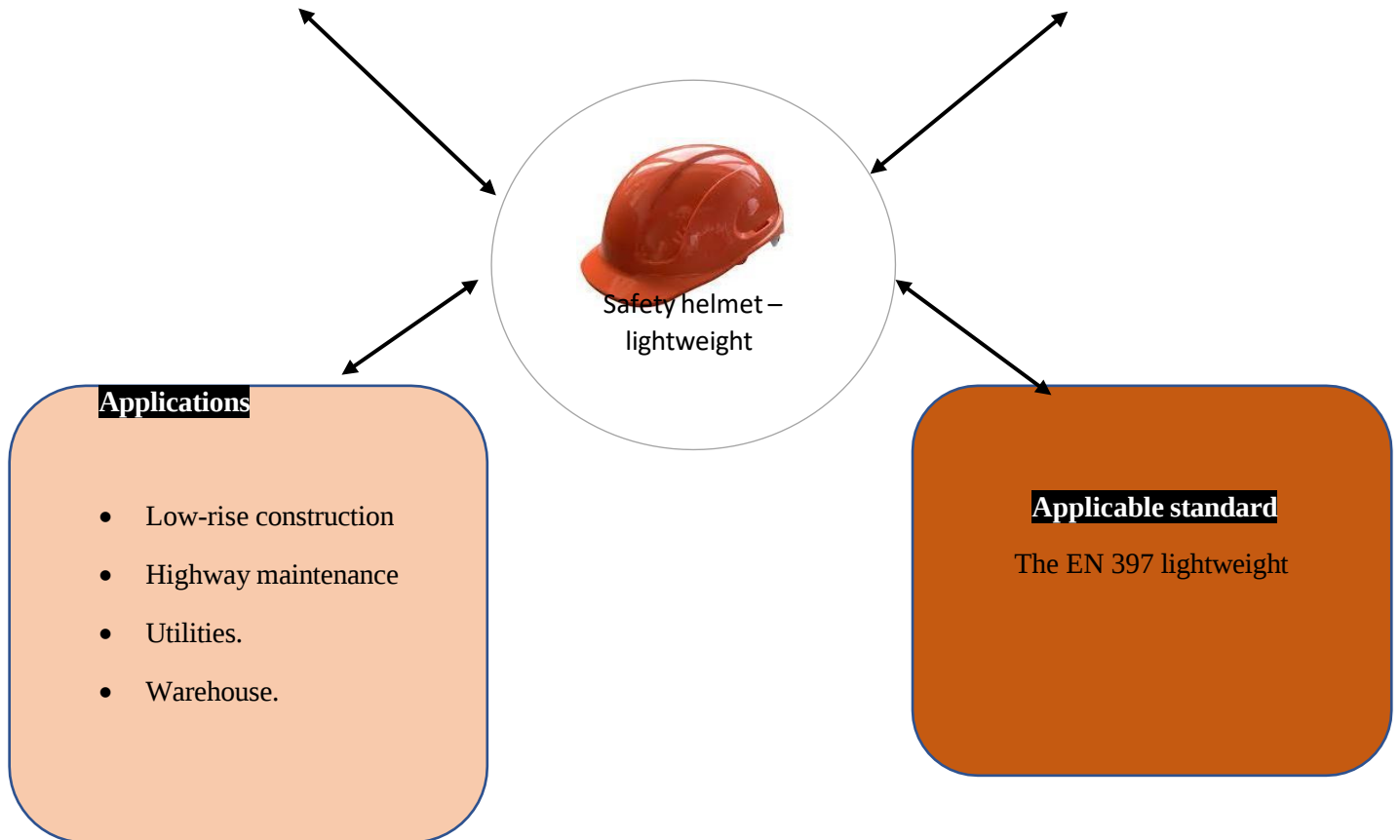


Figure 2.5: safety helmet - lightweight

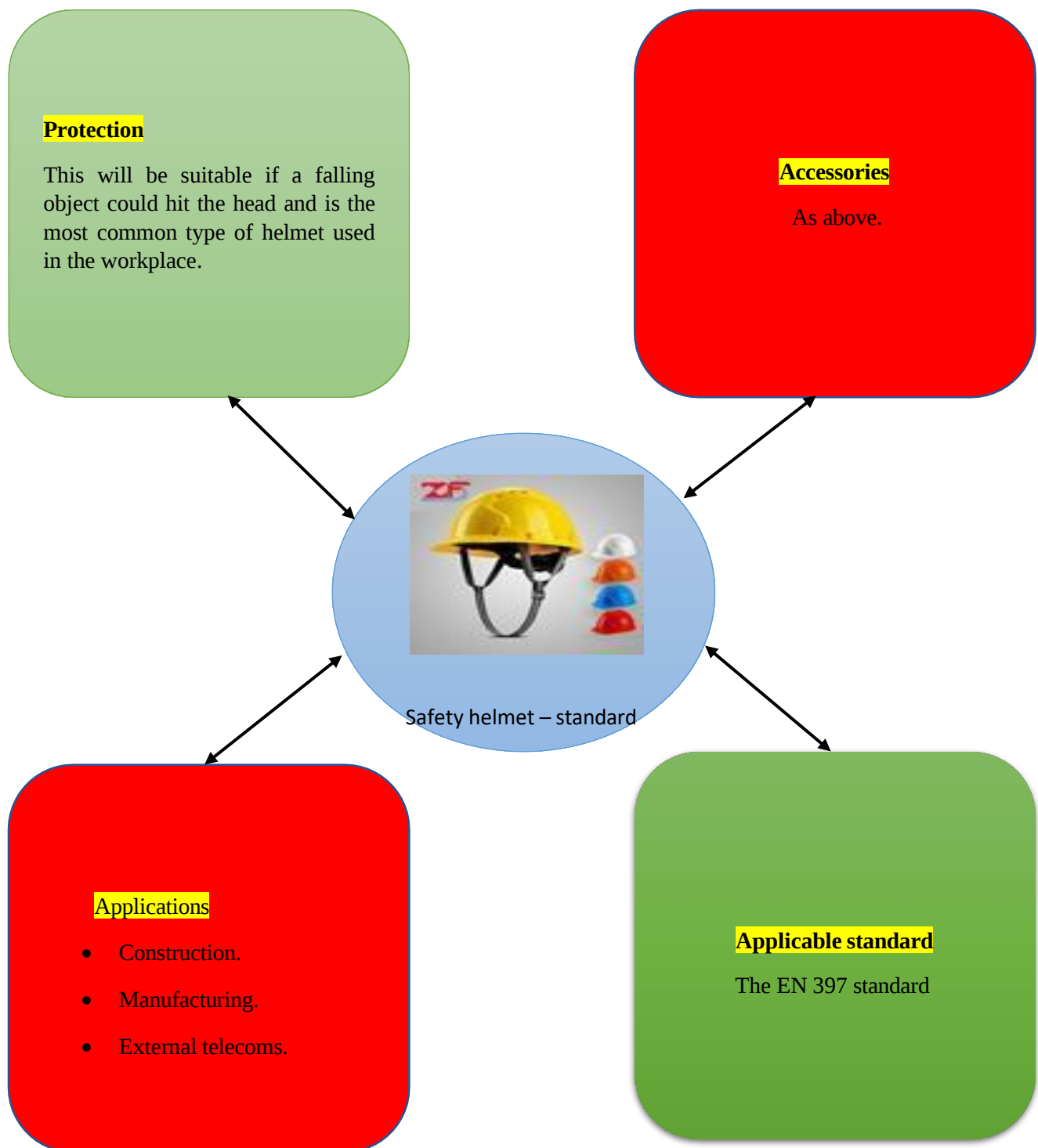


Figure 2.6: Safety helmet – standard

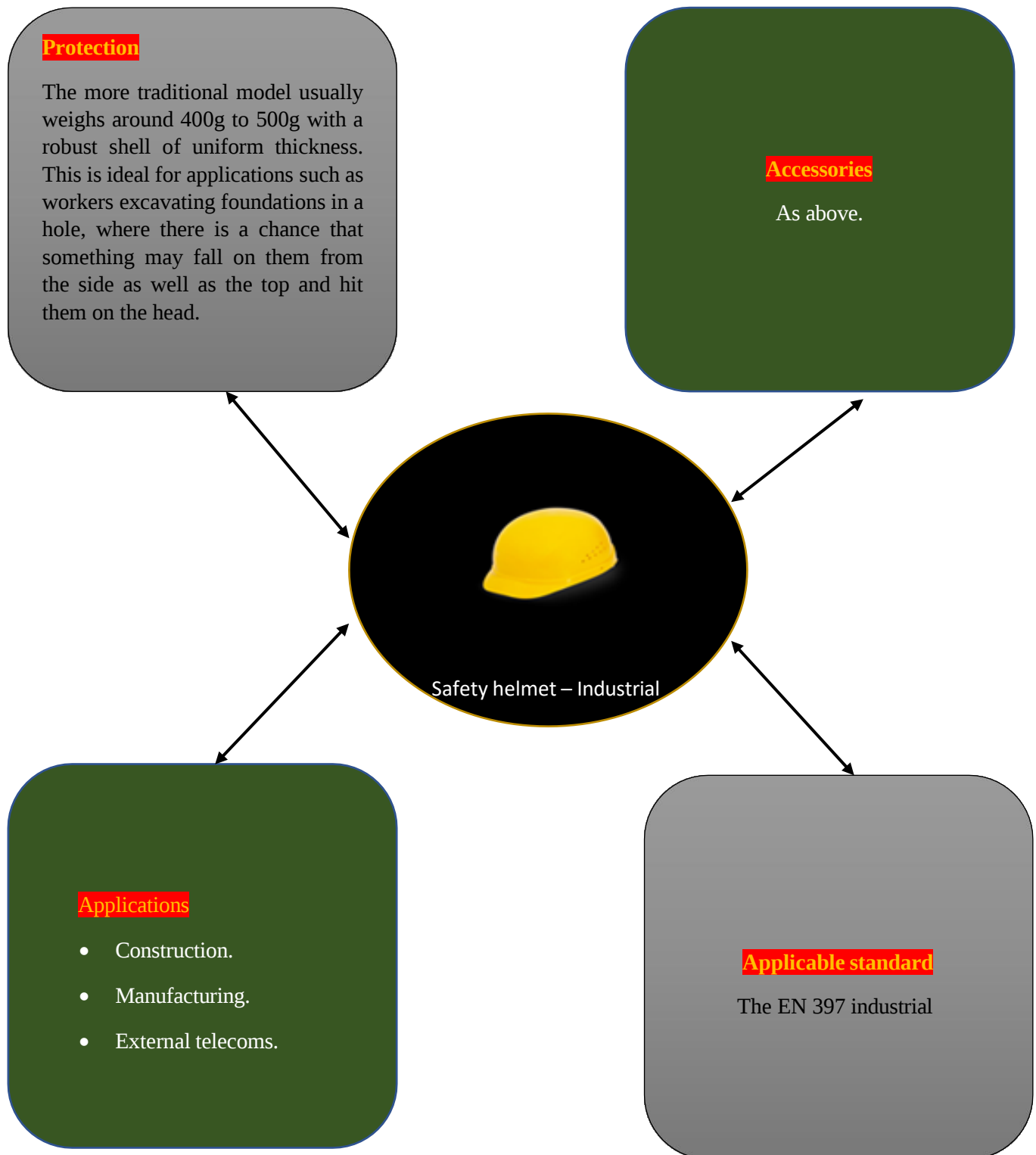


Figure 2.7: Safety helmet - industrial

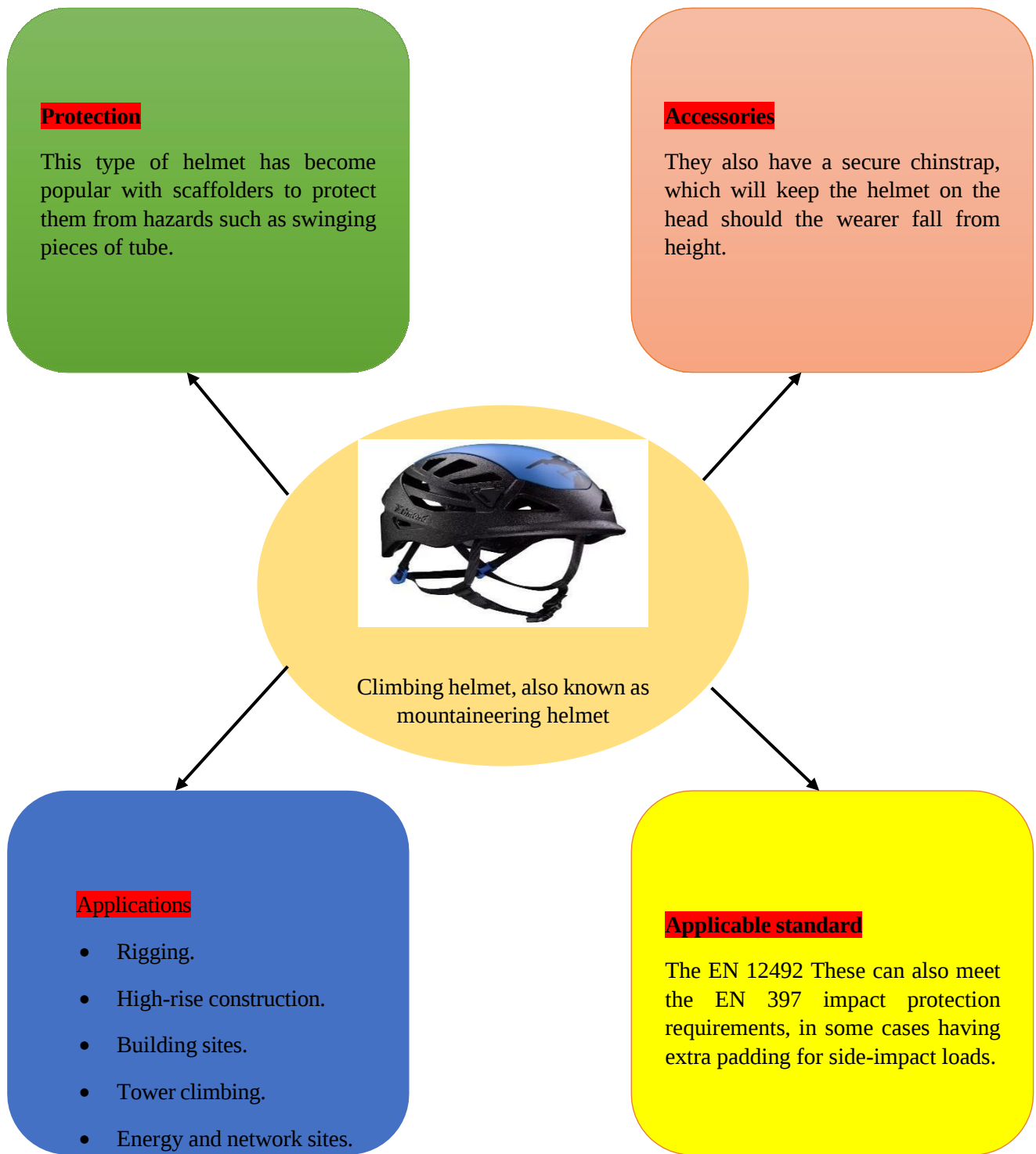


Figure 2.8: Safety helmet – climbing helmet

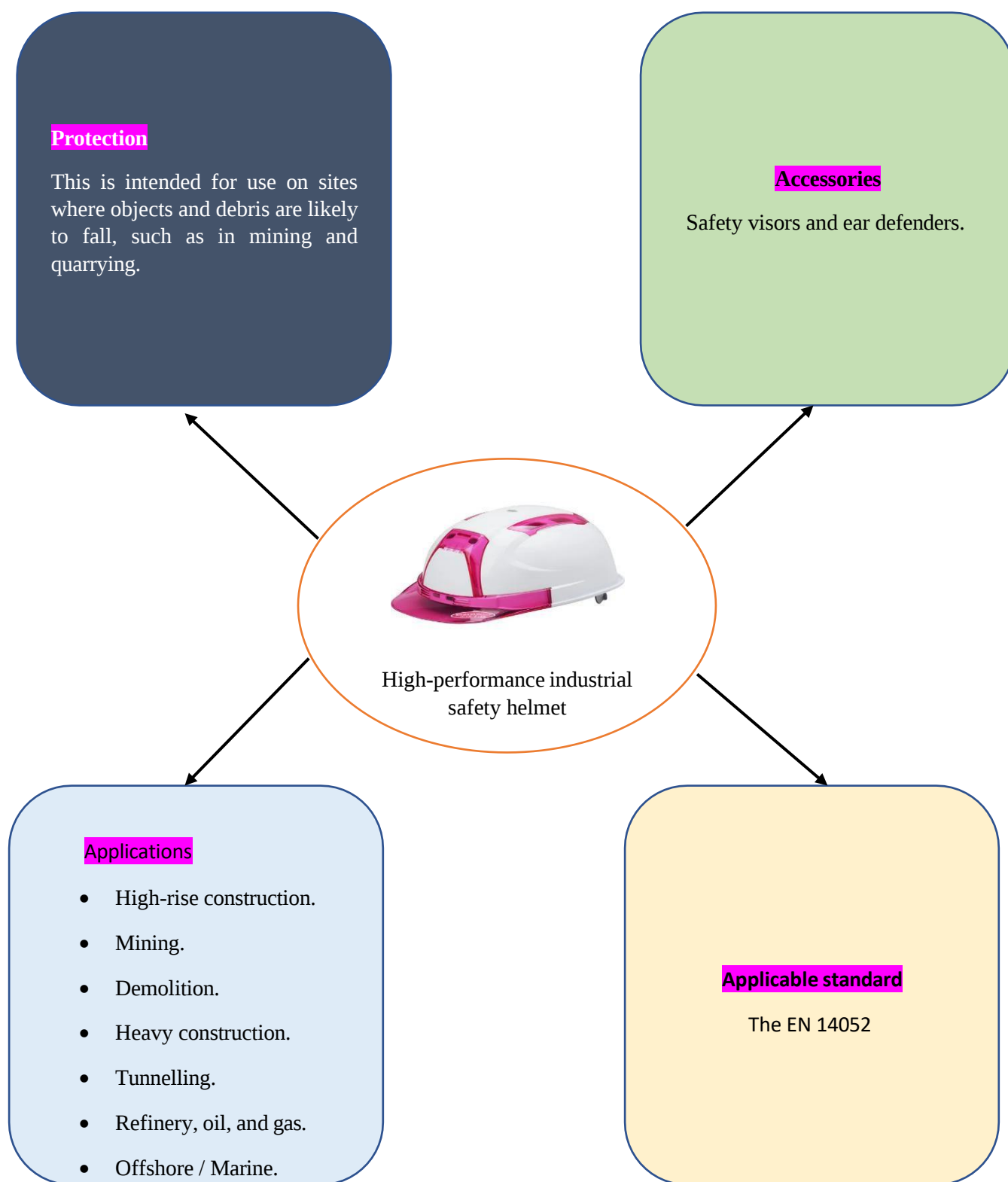


Figure 2.9: Safety helmet – high performance industrial

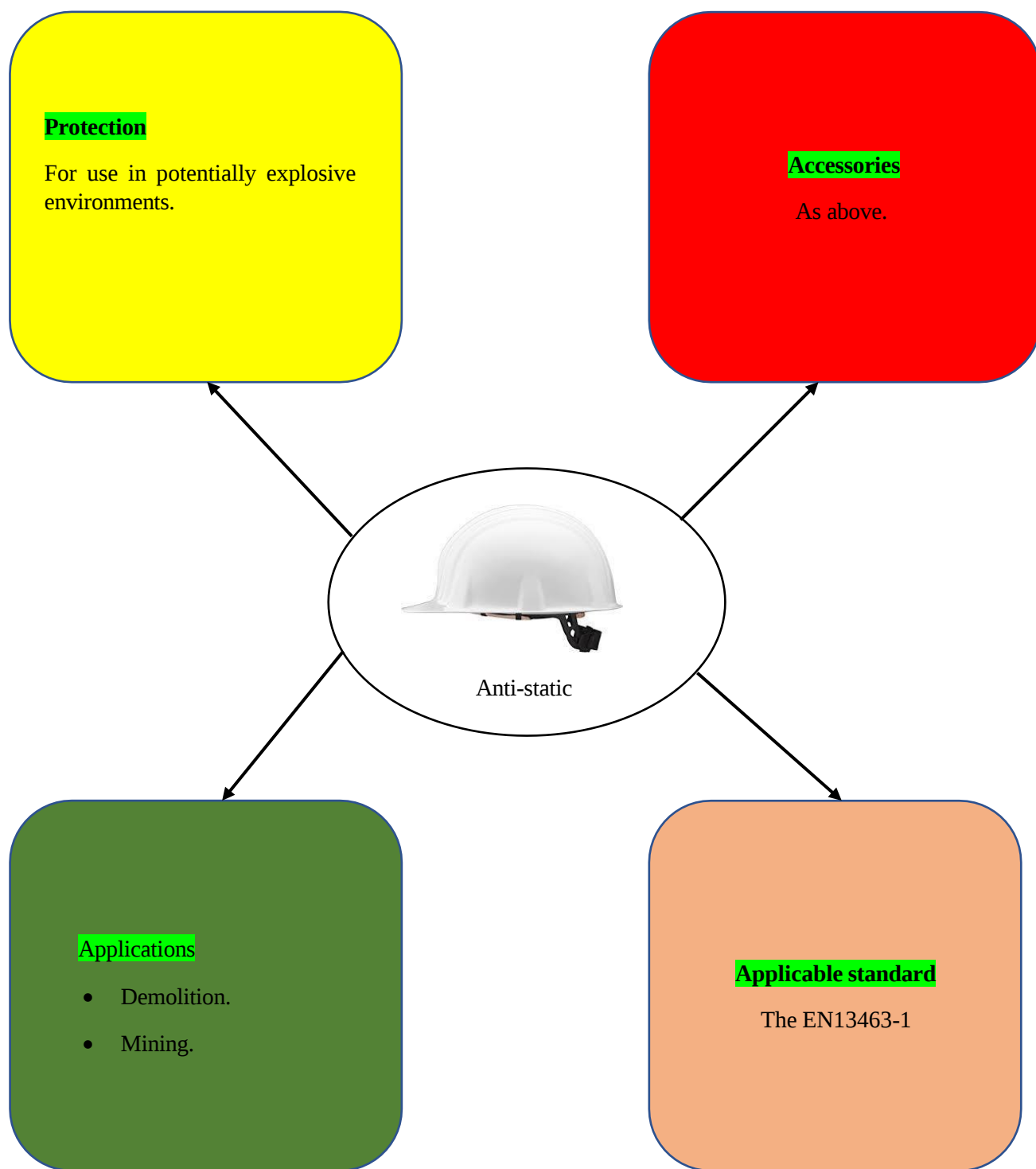


Figure 2.11: Safety helmet anti static

2.3 INTRODUCTION OF QR CODE (QUICK RESPONSES CODE)

A QR code known as a quick responses code is a type of matrix barcode invented in 1994 under a team led by Masahiro Hara, refer to Figure 2.11, by Japanese company, Denso Wave for use as labels for automotive parts. A barcode is a machine-readable optical image that can contain arbitrary information. Often used as a label. In practice, a QR code often contains data for a locator, identifier, or tracker that points to a website or application. QR codes use four standardized encoding modes which are numeric, alphanumeric, byte/binary, and kanji to store data efficiently, extensions may also be used. The quick responses system became popular outside the automotive industry due to its fast readability and greater storage capacity compared to standard UPC barcodes, refer to Figure 2.12. Applications include product tracking, item identification, time tracking, document management, and general marketing.[4]



Figure 2.11: Masahiro Hara



Figure 2.12: UPC barcode

A QR code consists of black squares arranged in a squares grid on a white background, including some fiducial markers, which can be read by an imaging device such as a camera, and processed using Reed-Solomon error correction until the image can be appropriately interpreted. The required data is then extracted from patterns that are present in both the horizontal and vertical components of the image.[5]

2.3.1 TYPE OF QR CODE (QUICK RESPONSES CODE)

There are two types of QR codes which are static QR code and dynamic QR code. Generating a static QR code is free, and the number of scans provided is unlimited. However, the cons of static QR code are it only suitable for one-time use as the user cannot edit the embedded data. After generating the static QR code, the user cannot change the information contained within the code. They also cannot track the number of scans and the scanner's device and location. Meanwhile, a dynamic QR code allows users to track, edit and update embedded data. This saves a lot of time, effort, and money. With a dynamic QR code, the user can change the data or information on it even if the code has already been posted. You can also track QR code performance. Dynamic QR code give you access to real-time scans such as the number of scans, scan location, scan times, and devices used. A dynamic QR code can be password protected, scan notifications via email, and integrate with analytics tools and other software.[6]

2.3.2 HOW DO QR CODE WORK

A QR code works similarly to barcodes at the supermarket. Each QR code consists of black squares and dots which represent different pieces of information. When scanned, the unique pattern on the barcode translates into human-readable data. This transaction happens in seconds. Users must scan the code with a QR reader or scanner, although nowadays most people scan QR codes with smartphones. On the off chance your phone doesn't have the capability, there are plenty of free apps for QR scanning like Neo Reader and Quick Mark Barcode Scanner, refer to Figures 2.13 and 2.14.[7]

Firstly, the QR code is created by encoding the desired information, such as a website URL, contact details, or product information, into a specific pattern using a QR code generator. When the QR code is scanned, the reader's software analyzes the pattern and converts it back into the original information. This information can then be used to perform various actions, such as opening a website, adding a contact, or displaying product details. QR codes are widely used in marketing, advertising, and inventory management due to their ability to store large amounts of data and their ease of use.



Figure 2.13: Neo Reader



Figure 2.14: Quick Mark Barcodes Scanner

2.3.3 COMMON USE OF QR CODE

QR codes are everywhere we go, and they can be used for several purposes. They are used on product packaging to provide information about the product or give access to coupons, and use on business cards, posters, and brochures to share contact details such as websites, social media, and email. Other than that, it is also used as a marketing tool for branding advertisement, campaigns, and promotion. QR codes can be integrated into print media like billboards, magazines, or leaflets. For payment, QR code are used for mobile banking and making payments with your phone. Lastly, it's used to provide temporary access to files or online content. QR codes are a versatile tool that can be used for a variety of purposes.[4]

2.3.4 TYPES OF QR CODE

QR codes come in the same figure but with different functions. It can improve user experience by using the QR code types. There are many QR code types such as URL QR code, vCard QR code, File QR code, social media QR code, Menu QR code, H5 editor QR code, multi-URL QR code, App Store QR code, Wi-Fi QR code, Audio QR code, Facebook, YouTube, Instagram, and Pinterest QR code and many more. Starting with the URL QR code. URL QR code contains a specific website's address, by scanning the QR code, it will redirect you automatically to the website. Udoes ser no need to manually enter the web address. The second QR code type is the vCard QR code. Users can generate a vCard QR code and attach it to their business cards. vCard QR helps download contact information by instantly showing it on the device. Next is the File QR code. This QR code lets users generate QRs for various file formats, including PDF, JPEG, PNG, MP4, E, Excel and Word.

These documents are stored on a computer's hard drive or online. Since QR files are dynamic, users can view and edit the data stored in them. Then, social media QR code is a QR code that can save all your social media profiles. It's a powerful solution for users to find their business on social media easily. When users scan the QR code, all embedded social media pages automatically appear on their smartphones on a single screen. Next is Menu QR code. A Menu QR code is one of the most effective solutions for restaurant owners. It allows customers to access the restaurant menu via mobile devices. The menu appears on the customer's phone after scanning the QR code. This helps business owners reach more customers as QR code menu scanning is easy and promotes contactless payments and more efficient customer service.[6]

Next is the H5 editor QR code. With an H5 QR code solution, user can design their landing page without buying a domain name for web hosting. This no-code solution is best for businesses looking to grow their customers through QR code marketing. Other than that, a multi-URL QR code is one of the best features of a dynamic QR. It offers a more personalized user experience as users are guided and redirected based on their language, number of scans, time, and location. For example, for language, if users scan in China, they're redirected to a Chinese website. If they scan a QR in Thailand, the code will take them to the Thai version. Just make sure the QR code generator offers multiple languages for this type of campaign. This QR code is meant for businesses that want to create global campaigns to offer different products, goods, services, or even websites to people worldwide.[6]

2.4 INTRODUCTION OF GLOBAL POSITIONING SYSTEM (GPS)

The Global Positioning System (GPS) is a satellite navigation system that operates in space. It gives position and timing information in all-weather situations, anyplace on or near the earth when four or more GPS satellites have an unobstructed line of sight. Around the world, the system provides essential capabilities to military, governmental, and commercial customers. It is managed by the US government and is freely available to anyone with a GPS receiver.

GPS is a satellite-based navigation system comprised of a network of 24 satellites orbited by the United States Department of Defence. GPS was originally meant for military usage, but the government made it available for public use in the 1980s. GPS works 24 hours a day, in any weather, wherever in the world. There are no subscription or set-up fees for using GPS.

2.4.1 GLOBAL POSITIONING SYSTEM HISTORY

GPS has its origins in the Sputnik era when scientists were able to track the satellite with shifts in its radio signal known as the "Doppler Effect." The United States Navy conducted satellite navigation experiments in the mid-1960s to track US submarines carrying nuclear missiles. With six satellites orbiting the poles, submarines were able to observe the satellite changes in Doppler and pinpoint the submarine's location within a matter of minutes.

In the early 1970s, the Department of Defense (DoD) wanted to ensure a robust, stable satellite navigation system would be available. Embracing previous ideas from Navy scientists, the DoD decided to use satellites to support their proposed navigation system. DoD followed through and launched its first Navigation System with Timing and Ranging (NAVSTAR) satellite in 1978. The 24-satellite system became fully operational in 1993.

Today, GPS is a multi-use, space-based radio navigation system owned by the US Government and operated by the United States Air Force to meet national defense, homeland security, civil, commercial, and scientific needs. GPS currently provides two levels of service: Standard Positioning Service (SPS) which uses the coarse acquisition (C/A) code on the L1 frequency, and Precise Positioning Service (PPS) which uses the P(Y) code on both the L1 and L2 frequencies. Access to the PPS is restricted to US Armed Forces, US Federal agencies, and selected allied armed forces and governments. The SPS is available to all users continuously, worldwide, free of any direct user charges. The specific capabilities provided by SPS are published in the Global Positioning System Performance Standards and Specifications.[8].

2.4.2 HOW GPS WORKS

GPS satellites circle the Earth twice a day in a precise orbit. Each satellite transmits a unique signal and orbital parameters that allow GPS devices to decode and compute the satellite's precise location. GPS receivers use this information and trilateration to calculate a user's exact location, refer to Figure 2.15. Essentially, the GPS receiver measures the distance to each satellite by the number of times it takes to receive a transmitted signal. With distance measurement from a few more satellites, the receiver can determine a user's position and display it electronically to measure your running route, map a golf course, find a way home, or adventure anywhere.

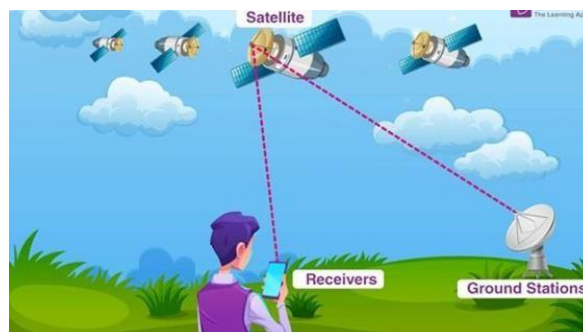


Figure 2.15: GPS work

GPS is now integrated into a wide range of gadgets, including smartwatches, satellite communicators, autos, boats, and others. A GPS receiver must be latched onto the signal of at least three satellites in order to calculate 2D latitude and longitude positions and track movement. The receiver can determine your 3D position, which is your latitude, longitude, and altitude, when four or more satellites are in view. A GPS receiver will often track eight or more satellites, however this varies on the time of day and where you are on the planet. Some devices can perform all of this from the palm of your hand. After determining the user's location, the GPS unit may calculate various data such as speed, bearing, track, trip mileage, distance to distance, sunrise and sunset times, and more.

2.4.3 HOW ACCURATE IS GPS

Because of their parallel multichannel architecture, today's GPS receivers are exceptionally accurate. When first turned on, our receivers quickly lock onto satellites. They keep tracking locks even in densely forested areas or in urban areas with towering buildings. Certain atmospheric variables and other error sources can reduce GPS receiver accuracy. Garmin GPS receivers typically have an accuracy of 10 metres. On the ocean, accuracy is considerably better because there are no impediments to interfere with the signal.

The Wide Area Augmentation System (WAAS) improves the accuracy of a Garmin GPS receiver. By giving corrections to the atmosphere and satellite positions, this capability can enhance accuracy to more than 3 metres. There is no additional equipment or charge necessary to use WAAS satellites.

2.4.4 GPS SIGNAL

GPS satellite signals are incredibly weak by the time they reach the Earth's surface. The signals travel by line of sight, meaning they will pass through clouds, glass, and plastic but will not go through most solid objects, such as buildings and mountains. However, modern receivers are more sensitive and can usually track through houses.

In recent years, GPS has added frequency, named L5, to satellites being launched. This advanced signal has more power and better tracking characteristics than the original L1 signal. Recent Garmin GPS receivers are now using L5 to improve accuracy and reliability. This multi-band solution both L1 and L5 provides improvement under trees or in urban canyons.

A GPS signal comprises three kinds of information. Pseudorandom code, ephemeris data, and Almanack data are all available. A pseudorandom code is an identification code that indicates which satellite is providing data. On your device's satellite page, we can see which satellites we are receiving signals from and which satellites you are receiving signals from. Following that, ephemeris data is required to establish a satellite's position and provides essential information about the satellite's health, the current date, and the time. The Almanack data then tells the GPS receiver where each GPS satellite should be at any point across several months and displays orbital information for those satellites as well as every other satellite in the system.

2.4.5 MOST COMMON TYPES OF GPS TRACKING

GPS tracking is becoming more common every day. About every smartphone has GPS capability. Many companies rely on some form of GPS to move products from one location to another. GPS is even showing more capabilities like monitoring a volcano or feeling an earthquake. GPS is a valuable tool that can help businesses and people of all types. Most GPS device fits into two types of categories:[9]

Table 2.2: Categories of GPS

Personal	Commercial
This type of GPS is meant for one person to use. Most of these items are meant to be tracked by one person.	This type of GPS is meant for multiple people to track or is an integral part of company duties. These GPS devices have specific software solutions. Commercial GPS devices use very specific data.
Common Examples: GPS in cell phone devices Animal GPS trackers Keychain GPS tracker Wearable GPS trackers Portable GPS	Common Examples: Asset trackers ELD devices OBD GPS trackers Personalized GPS applications

2.5 SUMMARY

Based on the problem statement that has been identified, we construct many effective ideas to overcome those problems some workers face during work time. We can use it to invent helpful and innovative products that can be of service to consumers. Then, those ideas that gave benefits others need to activate as soon as possible to overcome problems during work. After ideas and sketches of the product be done, several functions need to build on to generate practical and user-friendly. We add a GPS system and QR code to make work easier for consumers to use during work.

This smart safety helmet can facilitate the user during work or when an accident happens, it can help the third-party to rescue victims. Other than that, the cost to design this helmet is also reasonable and adaptable.

CHAPTER 3

METHODOLOGY

3.1 INTRODUCTION

A methodology is an approach or guideline that is used to help in solving problems. According to 'Homby' (1985) methodology is a set of methods used to research a specific research subject. Therefore, in this section, the researcher will discuss about the study sample., research instruments, and procedures or processes to analyse data to obtain results for the well water quality studied. In this case, the researcher will also be able to find out whether the studied well water is suitable or not for use by the population according to the results of the study conducted. Therefore, this chapter will explain the steps taken to solve the "Smart Safety Helmet" problem. For a clearer understanding of its implementation, the methodology will be shown in the form of a flow chart.

The design of this Smart Safety Helmet was designed based on the suggestions and discussions of group members. This innovation must consider the original aspects and theories in building this Smart Safety Helmet. The resulting design must not be so complicated, light, and easy to carry. The selection of components is based on research and testing so that this Smart Safety Helmet can function perfectly. In fact, safety and comfort aspects are also prioritized.



Figure 3.1 Design Project

3.2 RESEARCH DESIGN

This study was conducted using an experimental design Research as a guide to ensure the objectives of the study are achieved and then answer the research questions. The purpose of this study is to see the extent of the impact of the use of QR code safety helmets on employees. The researcher has made a comparison of two teaching methods, namely teaching in the form of animation software and normal (traditional) teaching methods. Therefore, the most appropriate study design used for this study is an experimental study. Accordingly, data collection was done using a mixed-method approach, namely qualitative and quantitative methods. The quantitative approach used by the researcher in this study is to collect data through pre and post-test instruments and questionnaires. Apart from that, a qualitative approach is also used in this study, which is by observing and interviewing several respondents who work at the construction site to further strengthen the findings of the study.

For researchers, both methods can provide accurate and clear information and potentially meet the requirements of the research questions made. The materials we will use in our project are only three, which are safety hats, QR codes, and GPS.

3.2.1 STUDY TYPE PROJECTS

a. Data analysis methods

Sampling techniques were employed in this study to distribute questionnaires among 30 construction site workers. The purpose of these questionnaires was to assess the usability and functionality of the Smart Safety Helmet. The chosen sampling technique was purposive sampling.

b. Data collection methods

The data collection method utilized in this research/project was quantitative, using a questionnaire. The questionnaire was created using the Google Form application and distributed online to the respondents. The questionnaire consisted of three parts.

Section A of the questionnaire focused on collecting demographic information from the respondents, including gender, email, and age. The respondents were required to mark and fill in the provided spaces.

Part B of the questionnaire aims to assess the functional level of the Smart Safety Helmet from the perspective of construction site workers. The respondents are required to answer the questionnaire items by indicating their level of agreement on a Likert 4 scale. The scale ranges from 1 (strongly disagree) to 4 (strongly agree). This approach allows us to determine the percentage of agreement among the respondents regarding the specified items in the questionnaire. Each respondent is allowed to select only one answer for each item.

Part C of the questionnaire focuses on evaluating the comfort level of the Smart Safety Helmet. Similar to Part B, Part C also utilizes a 4-point Likert scale for scoring. Respondents are required to provide their feedback on various aspects related to the comfort of the helmet and select only one answer for each item. The scoring method for this section follows the same approach as described in Part B.

Table 3.1: Questionnaire Comfort and Function of Smart Safety Helmet

SCALE	VALUE
1	Strongly disagree
2	Do not agree
3	Agree
4	Agree

Before distributing the questionnaire to the respondents, relevant information about the Smart Safety Helmet was given to give a clear picture. The amount of time required by respondents to answer the questionnaire is free according to the time respectively. The following Table 3.3 shows the distribution and order of the three sections and the total number of items found in the questionnaire provided.

Table 3.2: Section and Total Number of Items Found In The Questionnaire

SECTION	ITEM	NUMBER OF ITEMS
SECTION A	(Respondent Demographics)	
	Gender	1
	Email	2
	Age	3
SECTION B	The functional level of the Smart Safety Helmet from the point of view and perspective of the workers at the construction site.	5
SECTION C	The comfort level of the Smart Safety Helmet from the point of view and perspective of the workers at the construction site.	5
TOTAL		16

c. Data analysis methods

After obtaining all the information needed to achieve the objectives of the study, the analysis process was carried out. The data available and received from the form validity was analysed in assessing the percentage of expert agreement. Face validity and validity content are two validations that will be evaluated, and the validation form will be given to experts where he uses a 4-point Likert scale. Expert agreement percentage can be assessed using the content validity calculation formula as follows:

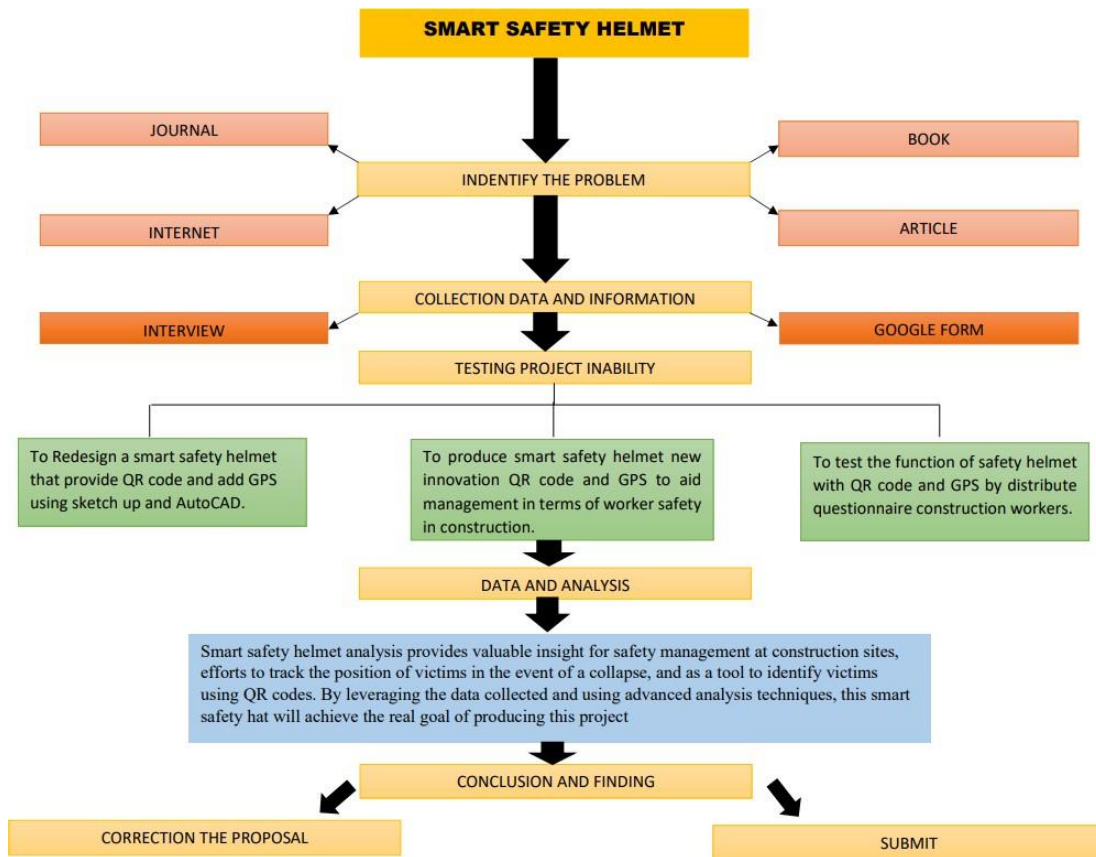
$$\frac{\text{Total Score Expert}}{\text{Maximum Score}} \times 100\% = \text{Percentage of achievement}$$

3.2.2 REAL TYPES OF PROJECTS

a) Project production method/process/technique

To make this project successful, several steps need to be done and need to be followed to ensure that the project will be done smoothly and successfully. It follows the project objective to achieve it. It is to redesign a smart safety helmet that provides a QR code and GPS, to produce smart safety helmet with QR code and GPS to distribute the questionnaire to construction workers. If there are problems, this flow chart should be referred to help before or during the project. The existence of this flow chart, it encourages a more organized and systematic use of time because it can follow all instructions so accurately and perfectly. The steps that need to be followed are as follows:

Table 3.3: Methodology Flow Chart



b) Materials and equipment

The materials used for the project are a smart safety helmet, a QR code, and GPS. QR codes and GPS are used as the main materials for this project. Without a QR code and GPS, our project cannot be implemented. We have used technological facilities to complete our project. The material that has been used for the project to run smoothly is the safety helmet. Without a safety helmet, our aim to make this project a success would not have gone smoothly. Finally, the equipment we use is AutoCAD and Sketch-up applications. These materials are used to produce sketches or images of our projects. AutoCAD and sketch up are platforms to empower our project sketches to show and share what our projects look like. we use the tools in AutoCAD and sketch-up apps to create, reflect and show what our projects will look like. AutoCAD and sketch-up applications are used to make our project successful. All the necessary information has been entered into the application for the design of our project.

3.3 A pilot study

In this study, a pilot study was conducted first before conducting the actual study. The purpose of the pilot study conducted before conducting the actual study is to assess the level of reliability and appropriateness as well as the relevance of the included items. in the questionnaire. This pilot study involves a total of 30 workers at the construction site and it aims to obtain a satisfactory reliability value using Cronbach's Alpha. A 4-point Likert scale was used in the questionnaire where there were four evaluation scales used involving a score of Strongly Disagree (1), Disagree (2), Agree (3), and Strongly Agree (4).

3.4 Conclusion

In the initial stage, research design, data collection methods, research instruments, data sampling techniques, and data analysis methods are made systematically. In the methodological study, we can find the facts and information to support the research instrument and describe it more clearly.

After the analysis of the data is done, it is important to make a conclusion or conclusion about the results and hypothesis that is whether the project produced is effective or not.

CHAPTER 4

RESEARCH FINDINGS AND DISCUSSION

4.1 Introduction

The collection of safety-related information and study data is essential to the successful process of this smart safety helmet project to advance and address worker safety-related concerns on construction sites. For that reason, data collection is done in a planned and detailed way, for example by creating a Google form to collect information. This is important to ensure the authenticity and integrity of the data so that it can accurately reflect the project being worked on.

To accomplish the project objectives that have been established at the beginning of the project, the analysis approach employed will be explained in this chapter. Subsequent recommendations in the project improvement process will consider the issues raised in this chapter.

4.2 Introduction of result and data analysis

For this section of this chapter, the researcher will attempt to gather information by using primary sources and secondary sources. primary sources are obtained from observation and the spread of questionnaires. While secondary sources are collected from the internet and journals. The purpose of this chapter is to provide more information about the test's overall flow in attaining its objective from start to finish. The techniques employed rely on the results of the test that was conducted. The experiment is utilized in this study to collect test data and assess the data gathering using Google Forms.

Before all else, it is important to disprove that the Cybergate Smart Safety Helmet yields the desired outcomes. To create a system that interacting and interrelated elements that act according to a set of rules to form a unified whole. The Cybergate Smart Safety Helmet enables third parties to collect data of accident victims and track the victims by using the GPS provided. The benefit of operating this Cybergate Smart Safety Helmet is tracking the victims of accidents easier when GPS is provided. It can reduce the requirement of third parties and save time. Also, the technology is a relatively basic, simple way to install yet easy to operate.

1. 1 Primary Data

Information collected by means of primary sources is not obtained anywhere else except through the efforts of the researchers themselves.

1. 2 Questionnaire

The use of a questionnaire is very important and suitable to collect an abundance of data. Data collected can be used to visualize a graph that is presentable and simpler to compare with each other. Around 50 people will answer the questionnaire about the Cybergate safety helmet and give an opinion about it on the last questionnaire.

1. 3 Secondary Data

Secondary data is obtained from past studies. These are in the form of written sources such as journals, articles, and the internet. Except will be taken to support the researcher's study.

4.2.1 Data Analysis

The data has been analyzed by using Google Forms to collect feedback on our product. There are 4 parts of the questions, starting with applicant information, followed up with the design of Cybergate Smart safety helmet, analysis of QR code and GPS innovations, and the function of Cybergate Smart safety helmet. There are 50 persons involved in this analysis. The opinion of locals indicates that this product is appropriate and useful to use at the construction site.

The product has been tested on some people and received feedback about this product. The safety helmet needs to improve the GPS placement to comply with the wearer's comfort. Then, the product has been affixed inside the top of the safety helmet.

The main purpose of this data analysis is to answer the last objective which is to test the function of a safety helmet with a QR code and GPS by distributing a questionnaire to the community. Background respondents are important because in this form have a target, so by this background respondents can determine whether the respondent is reaching the target audience or not. Furthermore, this questionnaire needs to be answered by certain respondents. This product is built specifically for construction workers and contractors.

Section A:

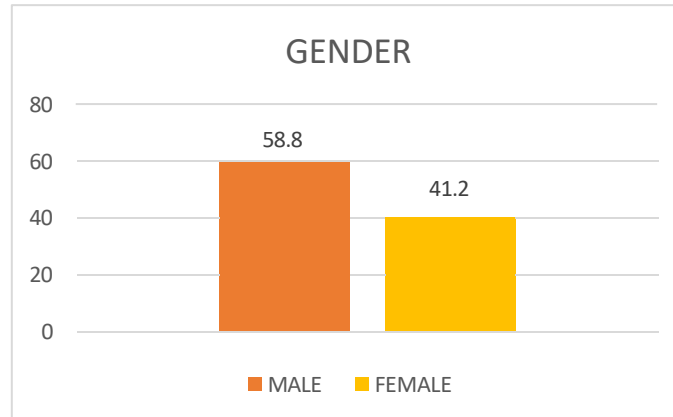


Figure 4.1: Percentage of respondent's gender

The first chart is respondent's gender, where the males are more than females which is 58.8% of males and 41.2% of females. This is normal because males are more attracted to engineering than females. The difference is not a big gap between genders.

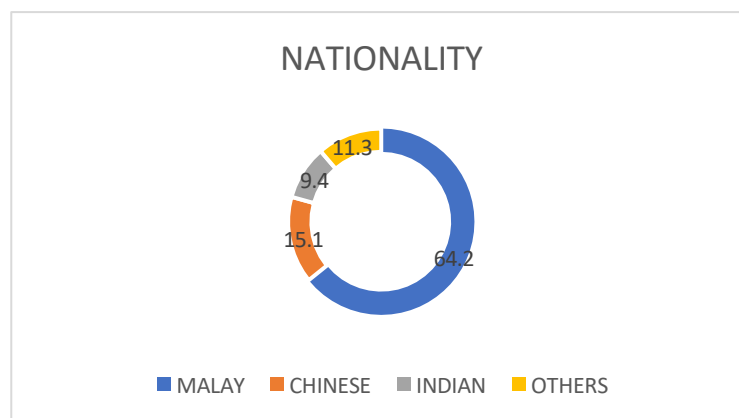


Figure 4.2 : Percentage of nationality

Referring to Figure 4.2, majority the worker of construction is Malay. This is because Malay nationality has higher percentage than others nationality which is 64.2%. Chinese nationality percentage is 15.1% compared to Indian which is 9.4%. Then, 11.3% is migrant workers. As example, Indonesian, Bangladeshis, Nepal, Myanmar, and Sri Lanka.

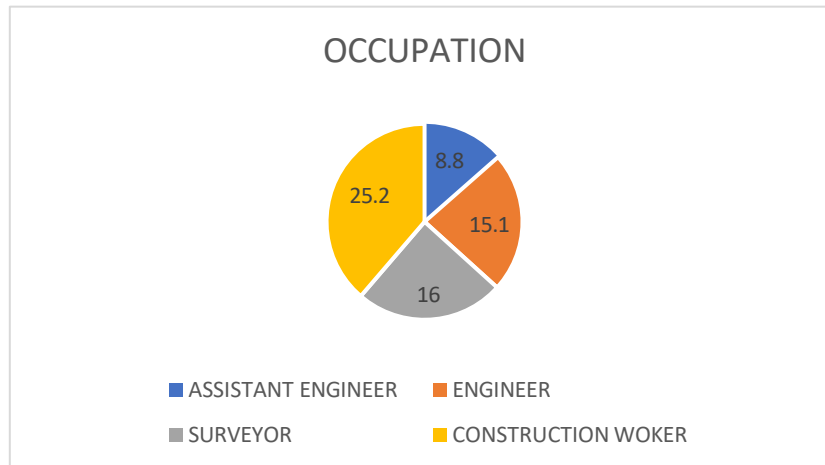


Figure 4.3: Total Position of Respondent

Refer to Figure 4.3, the total position of occupation is majority of them are construction worker which is 25.5% more than others occupation. This is because the product targeted wearer is construction worker. Construction workers are the one who always faced construction accident at working site. Followed by surveyor 0.9% more than engineer. Engineer and assistant engineer is the one who give instructions to construction workers in charge so that they have more opinion on the product.

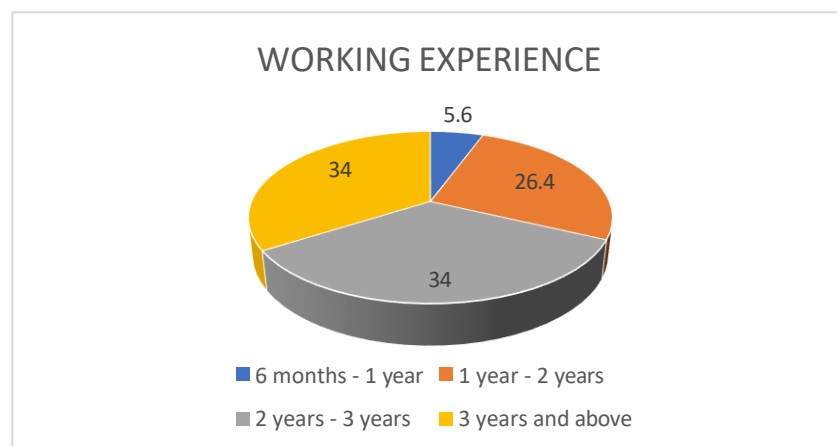


Figure 4.4: Percentage of working experience

Next pie chart is about working experience, refer to Figure 4.4, majority of respondents has been working 2 years to 3 years and above while 1 year to 2 years has higher percentage than 6 months to 1 years which is 20.8 %. From the figure, the respondents had much experience working at construction site to answer the questionnaire.

Section B:

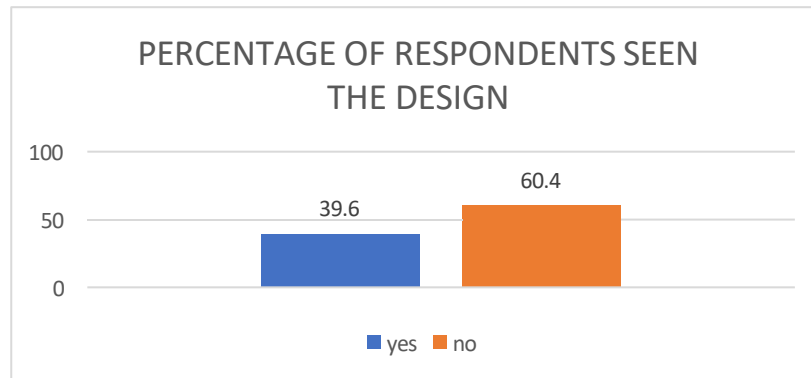


Figure 4.5: Percentage of Respondent seen the design

Based on Figure 4.5, 32 respondents thought that the product never be seen yet at the market. This question proved that CyberGate Smart Safety Helmet is original idea. While 39.6% of respondent said they seen the product. They maybe seen the design but different function of the safety helmet.

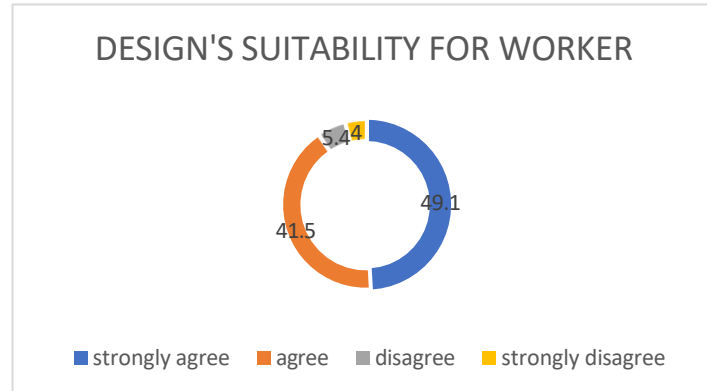


Figure 4.6: Percentage of Design's Suitability

Figure 4.6 shown the percentage of respondent who is agreed that the design is suitable for construction worker to wear during working hours. About 90.6% agreed the design is suitable for construction worker to wear. Around 9.4% disagreed the design is suitable for because there is some weakness of the design. However, the weakness of the design can be fixed.

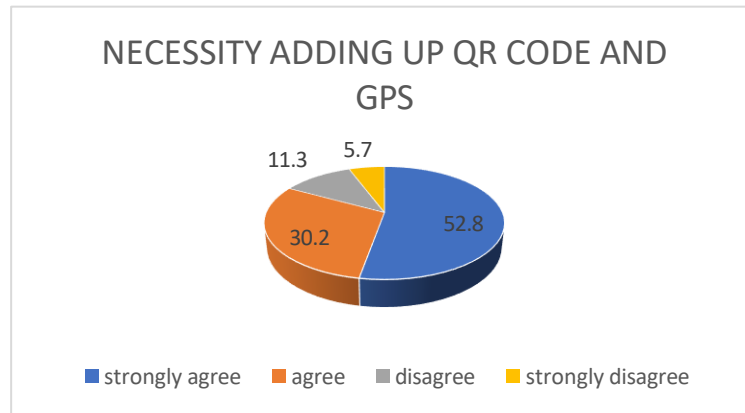


Figure 4.7: Percentage of Necessity Adding Up QR code and GPS

Refer to Figure 4.7, 83% of respondents thought it is necessary to add up a QR code and GPS on safety helmet. Based on the problem statement, it is hard to find and identify the workers when accident. By adding up GPS, it is very helpful to third parties find the victims and the QR code is very eager to help to identify the identity of victims. However, there are 17% disagree of the design. This happened because they have their own opinion and ways to find and identify the information of victims.

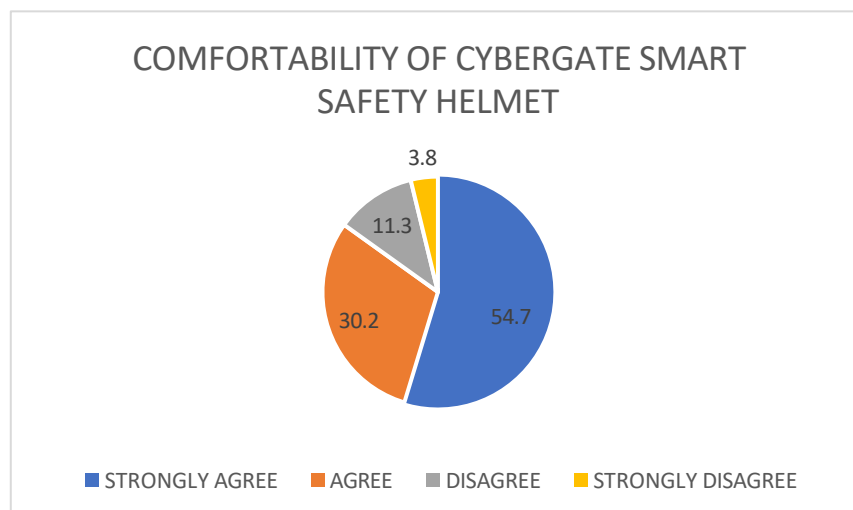


Figure 4.8: Percentage of Comfortability of Cybergate Smart Safety Helmet

84.9% of respondents said the design of CyberGate Smart Safety Helmet is reached the wearer's comfortability, referring to Figure 4.8. While 15.1% respondents said otherwise. The respondents had they own opinion on the product. This happened because they haven't tried on the product yet. Only some of the respondents tried the product.

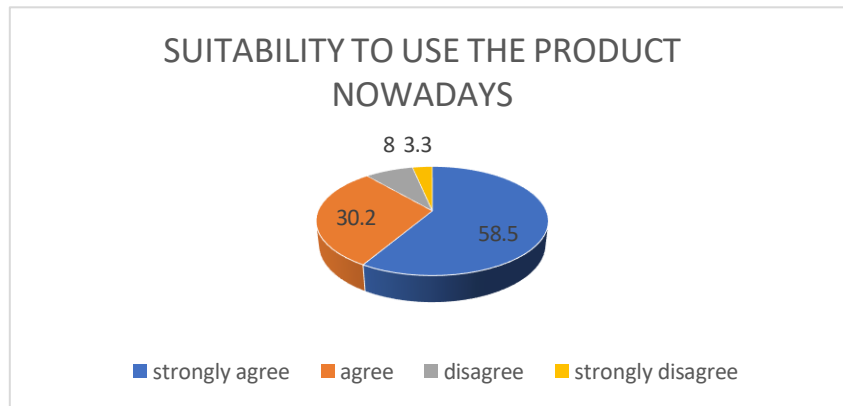


Figure 4.9 : Percentages of Uses the Product Nowadays

CyberGate Smart Safety Helmet is very suitable to use nowadays. There is 88.7% respondents agreed of this convenience safety helmet to be use at construction site. By upgrading the safety helmet, it can make things become easier.

Section: C

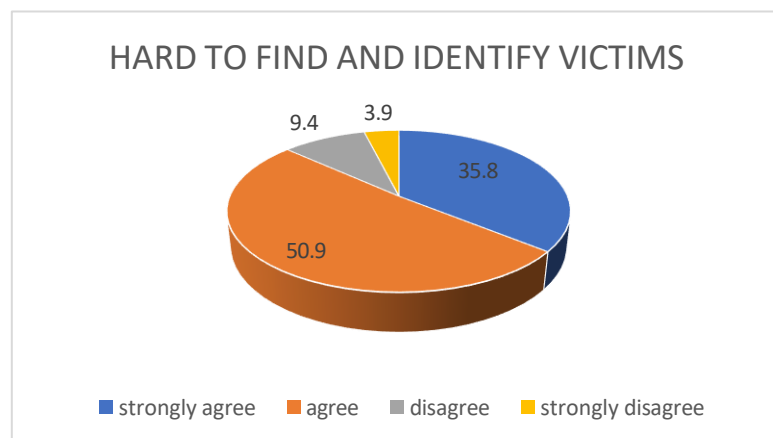


Figure 4.10: Percentage of Hard to Find and Identify Victims

Refer to Figure 4.10, half of respondents, which is 86.7% agreed that when accident happened, it is very hard to find and identify the victims. As mentioned in problem statement, accident happened in construction site in very high every year.

Section D:

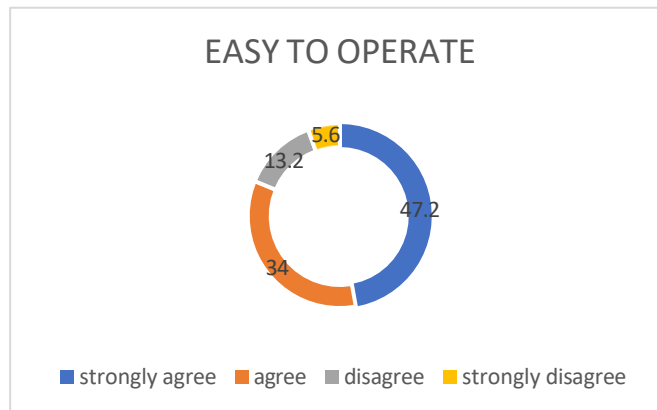


Figure 4.11: Percentage of accessible the product

Cybergate Smart safety helmet is easy to operate as agreed by 81.2% respondents, refer to Figure 4.11. This safety helmet is convenient to use by the workers. But for some respondents, they thought the safety helmet is hard to use since the helmet does display to them yet or they were never exposed to how to use the GPS very well. Instruction will be conducted to the wearer.

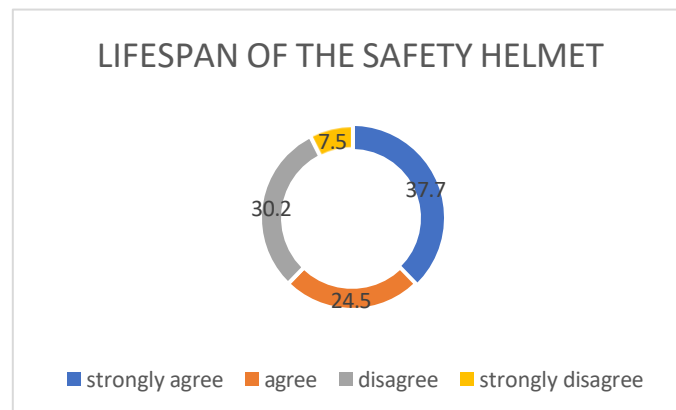


Figure 4.12: Percentage of Lifespan of Safety Helmet

For the lifespan of Cybergate Smart Safety Helmet, it is confirmed that the lifespan is very long but for the GPS, it only needs to change battery if the GPS cant be operated. Refer to Figure 4.12, around 37.7% disagreed about the lifespan of safety helmet and total of respondent who agreed is 62.2%.

4.3 DISCUSSION

Smart safety helmets, also known as high-tech helmets, aim to improve the wearer's safety by incorporating various sensors and electronics. Their goal is to reduce the risk of accidents and injuries in various industries, such as construction, mining, and sports. The research findings in this study can be linked to the findings of previous studies related to the effectiveness of smart helmets in improving employee safety and performance.

One theory related to smart helmets is the concept of Personal Protective Equipment (PPE), which refers to equipment designed to be worn by workers to protect them from hazards in their work environment. Smart helmets represent an innovative approach to PPE, as they combine traditional PPE design with advanced technological features. Previous research in this area has found that smart helmets can be effective in reducing the risk of accidents by providing workers with better visibility of their surroundings and greater awareness of potential hazards.

Another related theory is the concept of human-machine interaction, which involves designing intuitive and easy-to-use interfaces. Previous research has shown that workers who use smart helmets that integrate seamlessly with the workplace may be more likely to follow safety protocols, leading to a safer work environment.

In summary, research findings on smart safety helmets can be linked to previous research findings and theories related to the effectiveness of smart helmets in improving safety and performance as well as the concept of PPE and human-machine interaction.

CHAPTER 5

CONCLUSION AND RECOMMENDATION

5.1 INTRODUCTION

Cybergate Smart Safety Helmet technology was developed to provide workers with real-time data, alerts, and alerts to improve workplace safety and performance. However, the implementation and use of Cybergate Smart Safety Helmet in real-world applications is still limited due to several challenges, such as high cost, lack of interoperability, usability issues, and maintenance and repair problems. Despite these challenges, Cybergate Smart Safety Helmet has the potential to significantly reduce accidents and injuries, improve worker safety, increase productivity, and reduce accident and injury costs.

5.2 CONCLUSION

This paper proposes the design and architecture of a new concept of a safety helmet named Cybergate Smart Safety Helmet. The advantage of this project is that it combines QR codes and GPS on safety helmets which offer several benefits. QR codes allow quick access to information, such as emergency contacts or user details. GPS can track the location of workers for safety and efficient resource management. Together, they improve worker safety, streamline communications, and provide valuable data for monitoring and response in the event of an emergency. In conclusion, the Cybergate Smart Safety Helmet offers significant advances in protecting individuals in a variety of industries and activities. This Cybergate Smart Safety Helmet integrates modern technologies, such as built-in sensors, real-time monitoring systems and communication capabilities, to ensure the safety of the wearer.

The integration of QR codes and GPS in the Cybergate Smart Safety Helmet enables the detection and prevention of potential hazards. For example, they can detect the location of victims involved in a landslide accident at a construction site, it can alert users and related parties to take immediate action. The Cybergate Smart Safety Helmet also knows the information of workers on the construction site such as name, age, identity card and occupation on the construction site.

The real-time monitoring system in Cybergate Smart Safety Helmet can detect victims involved in accidents caused by negligence on construction sites. This proactive approach allows companies to identify victims and take appropriate action immediately. This allows the wearer to communicate with supervisors or colleagues. Important information on the QR code helps supervisors recognize employees.

Overall, the integration of intelligent features in the Cybergate Smart Safety Helmet represents an important step forward in protecting individuals in various industries. By enhancing hazard detection, monitoring the wearer's well-being, and facilitating communication, the Cybergate Smart Safety Helmet contributes to creating a safer work environment and reducing the risk of accidents.

5.3 RECOMMENDATION

These are some suggestions for further research to further strengthen the research findings in the field under study:

1. Adds advanced head-up display (HUD) camera tools, voice control and noise cancellation technology.
2. Adds a front-facing camera, an integrated audio system and advanced sensors for impact detection. It also offers a smartphone app to enhance the overall riding experience.
3. Smart helmets can be supplemented with built-in Bluetooth communication, allowing workers to make hands-free calls, listen to music and communicate with other riders in the group. It also comes with a built-in microphone and speaker.

4. Combining safety features with smart lighting. It includes integrated LED lights at the front and rear for enhanced visibility, turn signals and automatic brake lights.
5. Adds a built-in speaker, LED lighting for visibility and a handlebar remote to ensure easy access to its features while riding.
6. More research and development are needed to overcome the limitations of Smart Safety Helmet technology and improve its effectiveness in real-world applications.
7. Employers should invest in Cybergate Smart Safety Helmet training and user support to ensure proper use and effective implementation of the technology.
8. Standard rules and guidelines for the use of Cybergate Smart Safety Helmet need to be developed to ensure the security and effective implementation of the technology in various industries.
9. Cybergate Smart Safety Helmet suppliers should explore cost-effective manufacturing methods and user-friendly designs to improve the use of Cybergate Smart Safety Helmet in various industries.
10. Cybergate Smart Safety Helmet providers should also focus on interoperability and integrate Cybergate Smart Safety Helmet with existing systems in the workplace to ensure the accuracy and effectiveness of data collection and analysis.
11. In conclusion, Cybergate Smart Safety Helmet technology has the potential to significantly improve workplace security and performance, but implementing Cybergate Smart Safety Helmet in real-world applications needs to be preceded by a comprehensive strategy that addresses the challenges and limitations of the technology. Further research and development are also important to increase the use and effectiveness of Cybergate Smart Safety Helmet in various industries.

5.4 SUMMARY

Cybergate Smart Safety Helmet technology has the potential to reduce accidents and injuries in a variety of industries by providing workers with real-time data, alerts, and warnings. However, the project found some limitations and challenges in the use of Cybergate Smart Safety Helmet, such as high cost, lack of interoperability, usability issues and maintenance and repair problems. These challenges need to be addressed before Cybergate Smart Safety Helmet can be fully adopted in real-world applications.

Despite these limitations, the project found that Cybergate Smart Safety Helmet can significantly improve worker safety by providing them with real-time data, alerts, and warnings. Smart Safety Helmet can also be used to monitor employee performance and identify areas for improvement. Smart Safety Helmet can also help reduce the cost of accidents and injuries, as well as increase productivity in various industries.

The project recommends that further research and development should be carried out to overcome the limitations of Cybergate Smart Safety Helmet technology and improve its effectiveness in real-world applications. In addition, the development of standard regulations and guidelines for the use of Cybergate Smart Safety Helmet can also play an important role in increasing acceptance and ensuring secure implementation of Cybergate Smart Safety Helmet. Employers should also invest in Cybergate Smart Safety Helmet training and user support to ensure proper use and effective implementation of the technology

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APPENDICES

a. Questionnaire

CyberGate Smart Safety Helmet

Assalamualaikum dan Salam Sejahtera. We are students from Politeknik Ungku Omar (PUO), Diploma of Civil Engineering wish to conduct a survey for our Final Year Project (DCCS0194) to collect data on your current working environment. The purpose of this survey is to gain feedback/opinion about our product.

1. Please answer all questions genuinely
2. The collected data will only be used for the purpose of this report and your identity will remain anonymous.
We highly appreciate your willingness to spend your time filling out this form.

syamimiatika63@gmail.com Tukar akaun

* Menunjukkan soalan yang perlu dijawab

1. GENDER

☐ MALE
☐ FEMALE

2. NATIONALITY

☐ MALAY
☐ CHINESE
☐ INDIAN
☐ OTHERS

3. AGE

☐ 20 - 30
☐ 31 - 40
☐ 41 - 50
☐ 51 AND ABOVE

4. OCCUPATION

Jawapan anda

5. How long have you been working in your current workplace ?

☐ 6 months - 1 year
☐ 1 year - 2 years
☐ 2 years - 3 years
☐ 3 years above

Seterusnya Kosongkan borang

6. Have you ever seen a smart safety helmet design like this ? / Adakah anda pernah melihat reka bentuk topi keselamatan seperti ini ?

☐ Yes
☐ No

7. Is this design suitable for construction site workers to wear ? / Adakah reka bentuk ini sesuai untuk dipakai oleh pekerja tapak pembinaan ?

☐ STRONGLY AGREE
☐ AGREE
☐ DISAGREE
☐ STRONGLY DISAGREE

8. Is this design suitable for architect to wear ? / Adakah reka bentuk ini sesuai dengan arkitek ?

☐ STRONGLY AGREE
☐ AGREE
☐ DISAGREE
☐ STRONGLY DISAGREE

9. Do you think it is necessary to upgrade a safety helmet by adding a QR code (include worker's data) and GPS ? / Adakah anda fikir topi keselamatan perlu dinaik taraf dengan menambahkan kod QR (data pekerja) dan GPS ?

☐ STRONGLY AGREE
☐ AGREE
☐ DISAGREE
☐ STRONGLY DISAGREE

10. Does Cybergate smart safety helmet design comply with user comfort ? / Adakah reka bentuk Cybergate Smart Safety Helmet mematuhi keselesaan pengguna ?

☐ STRONGLY AGREE
☐ AGREE
☐ DISAGREE
☐ STRONGLY DISAGREE

11. Do you think CyberGate smart safety helmet suitable for nowadays use ? / Adakah anda rasa Cybergate Smart Safety Helmet sesuai untuk diguna masa kini ?

☐ STRONGLY AGREE
☐ AGREE
☐ DISAGREE
☐ STRONGLY DISAGREE

12. When construction collapsed, do you think it is hard to search and identify the worker's identity ? / Apabila terjadinya runtutan di tapak pembinaan, adakah anda rasa sukar untuk mencari dan mengenal pasti pekerja ?

☐ STRONGLY AGREE
☐ AGREE
☐ DISAGREE
☐ STRONGLY DISAGREE

PART C : ANALYSIS ON INNOVATION OF QR CODE AND GPS

Google Borang

2:21

13. Does GPS and QR code work really well on safety helmet ? / Adakah GPS dan QR kod berfungsi dengan baik pada topi keselamatan ?

☐ STRONGLY AGREE
☐ AGREE
☐ DISAGREE
☐ STRONGLY DISAGREE

14. Can Cybergate Smart Safety Helmet make it easier to locate victims ? / Adakah Cybergate Smart Safety Helmet dapat memudahkan mengesan lokasi mangsa kemalangan ?

☐ STRONGLY AGREE
☐ AGREE
☐ DISAGREE
☐ STRONGLY DISAGREE

Kembali Seterusnya Kosongkan borang

Jangan pernah kali serahkan kata talian melalui Borang Google

2:21

PART D : FUNCTION OF CYBERGATE SMART SAFETY HELMET

15. CyberGate Smart Safety Helmet easy to operate / Cybergate Smart Safety Helmet mudah dikendalikan

☐ STRONGLY AGREE
☐ AGREE
☐ DISAGREE
☐ STRONGLY DISAGREE

16. Do you think the lifespan of this helmet long lasting ? / Adakah anda rasa jangka hayat topi keselamatan ini bertahan lama

☐ STRONGLY AGREE
☐ AGREE
☐ DISAGREE
☐ STRONGLY DISAGREE

2:21

☐ STRONGLY AGREE
☐ AGREE
☐ DISAGREE
☐ STRONGLY DISAGREE

17. Is this design interesting ? / Adakah reka bentuk ini menarik ?

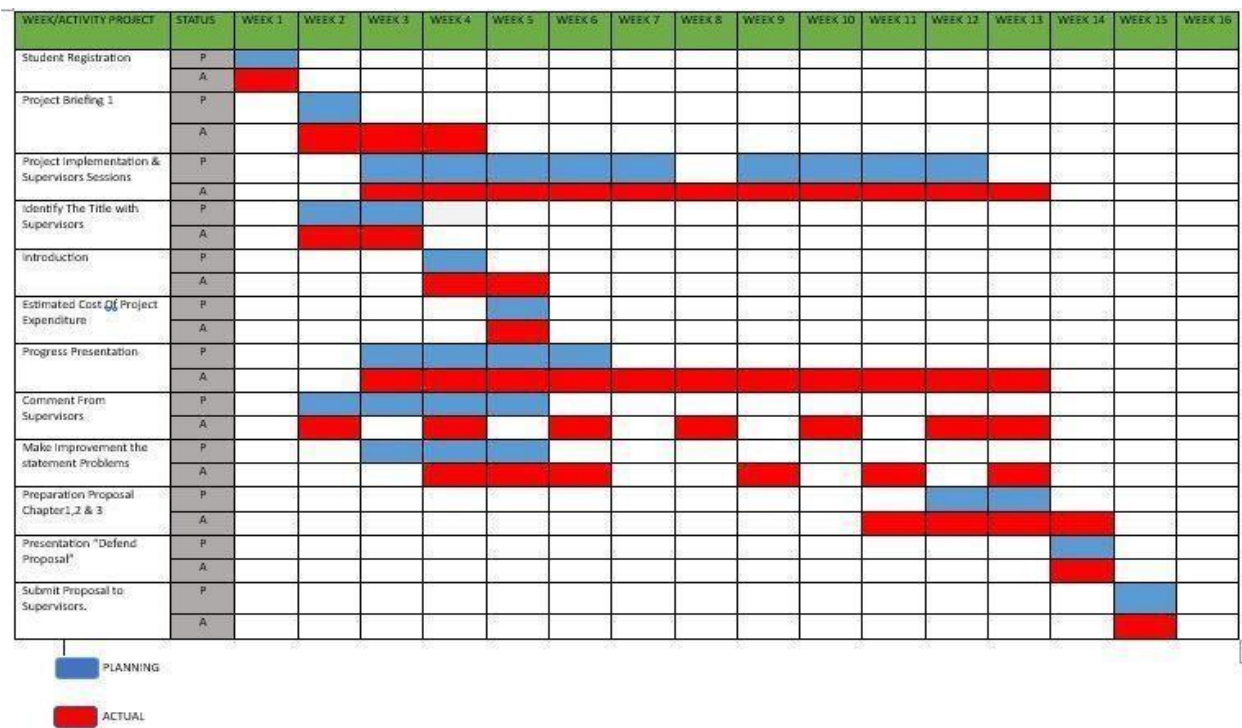
☐ STRONGLY AGREE
☐ AGREE
☐ DISAGREE
☐ STRONGLY DISAGREE

18. Is there any recommendation / opinion for our product?

Jawapan anda

Kembali Serah Kosongkan borang

b. Gantt Chart FYP 1 and FYP 2



Week/ Activity Project	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12	Week 13	Week 14	Week 15
1. Student Registration	actual														
2. Project Briefing		plan													
3. Submission of calendar and logbook		actual	actual												
4. Project implementation and supervision session		actual	actual	actual	actual	actual	actual	actual	actual	actual	actual	actual	actual	actual	
5. Students submit 25% project report				actual	actual										
6. Students submit 50% project report							actual	actual							
7. Progress presentation session							actual	actual							
8. Preparation for final presentation (last report, poster, presentation slide, MyMOHES form)											actual	actual	actual		
9. Preparation poster for exhibition											actual	actual	actual		
10. Final presentation														actual	
11. Final report improvement															actual
12. Submission final year report								actual	actual	actual	actual	actual	actual	actual	actual

 actual
 plan

c. Total of cost

BIL	MATERIAL	QUANTITY	PRICE PER UNIT	TOTAL
1.	SAFETY HELMET	1	15.00	15.00
2.	GPS	1	38.00	38.00
3.	QR CODE	1	8.00	8.00
				61.00