

Higher Nationals in Computing

UNIT 13

UNIT 13: COMPUTING RESEARCH PROJECT

ASSIGNMENT No.1

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Class: GCS0801_NX

Subject code: 1639

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Assignment due: March 2021

Assignment submitted: March 2021

ASSIGNMENT 1 FRONT SHEET

Qualification	BTEC Level 5 HND Diploma in Computing		
Unit number and title	Unit 13: Computing Research Project		
Submission date	March 2021	Date Received 1st submission	
Re-submission Date	March 2021	Date Received 2nd submission	
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Student declaration I certify that the assignment submission is entirely my own work and I fully understand the consequences of plagiarism. I understand that making a false declaration is a form of malpractice.			
		Student's signature	<i>huyen</i>

Grading grid

P1	P2	P3	P4	P5	M1	M2	M3	D1	D2

☐ Summative Feedback:

☐ Resubmission Feedback:

Grade:

Assessor Signature:

Date:

Internal Verifier's Comments:

Signature & Date:

ASSIGNMENT 1 BRIEF

Qualification	BTEC Level 5 HND Diploma in Computing		
Unit number	UNIT 13: Computing Research Project		
Assignment title	Proposing and conducting a research project		
Academic Year	2020 – 2021		
Unit Tutor	Le Ngoc Thanh		
Issue date	March 2021	Submission date	March 2021
IV name and date	Le Ngoc Thanh January 2021		

Submission Format:

Format: The submission is in the form of 1 document. You must use font *Calibri size 12*, set number of the pages and use multiple line spacing at 1.3. Margins must be: left: 1.25 cm; right: 1 cm; top: 1 cm and bottom: 1 cm. The reference follows the Harvard referencing system.

Submission: Students are compulsory to submit the assignment in due date and in a way requested by the Tutors. The form of submission will be a **soft copy** posted on <http://cms.greenwich.edu.vn/>

Note: The Assignment *must* be your own work, and not copied by or from another student or from books etc. If you use ideas, quotes or data (such as diagrams) from books, journals or other sources, you must reference your sources, using the Harvard style. Make sure that you know how to reference properly, and that you understand the guidelines on plagiarism. *If you do not, you definitely get failed*

Unit Learning Outcomes:

LO1 Examine appropriate research methodologies and approaches as part of the research process

LO2 Conduct and analyse research relevant for a computing research project

LO3 Communicate the outcomes of a research project to identified stakeholders

Assignment Brief and Guidance:

Scenario

The Internet of Things (IoT) is the term which refers to the ever-growing network of physical objects with embedded sensors which can connect together via the internet allowing communication to occur between these objects and many other Internet-enabled devices and systems.

The IoT is quickly becoming a necessary aspect of people's daily lives. Physical items can now sense and collect data which can be controlled through digital and smart technology. The IoT extends internet connectivity beyond traditional devices like desktop and laptop computers, smartphones and tablets to a diverse range of devices that can utilise embedded technology such as security systems, thermostats, cars, electronic appliances, lights, medical equipment etc. These devices, often called "connected" or "smart" devices, can talk to other related devices (machine-to-machine (M2M) communication) and act on the information they get from one another.

Along with the many benefits there is also considerable concern over the IoT which must be overcome in order to harness the power of this free flow of information.

This unit will enable students to explore the benefits of the IoT, the potential future developments, the most pressing challenges and how to overcome them.

Students are to choose their own research topic for this unit. Strong research projects are those with clear, well focused and defined objectives. A central skill in selecting a research objective is the ability to select a suitable and focused research objective. One of the best ways to do this is to put it in the form of a question. Students should be encouraged by tutors to discuss a variety of topics related to the theme

to generate ideas for a good research objective.

The range of topics discussed could cover the following:

- *Underpinning security and privacy issues and resolutions: data mining, data processing (e.g. GDPR), encryption (e.g. blockchain)*
- *Smart homes, smart buildings and smart cities etc and their impact on individuals and society.*
- *The future of IoT e.g. automate manufacturing, medicine and healthcare, virtual world, AI, machine learning etc.*
- *The IT infrastructure required to support IoT e.g. 5G, proliferation of sensors, interoperability*

You have to set **your own research question** in the research proposal based on the previous range of topics. The research question must be specific enough example: the audience of the research(job, age..), kind of devices(personal devices, household appliances, or combination of some kinds)

Marking Process

The assignment will be marked based on **holistic assessment** approach:

- *Holistic marking is when the tutor makes academic judgements on grading based on the assignment **as a whole and how criteria contribute to the quality of the work, rather than as individual parts***
- *Assessment criteria **are not completed** and marked as individual tasks.*
- *Assessment criteria are holistic in context but may also contain reference to specific content matter to provide guidance for the student if required*

Report structure

The recommended outputs of the research are two reports. The first report should cover at least the following sections:

1. Introduction the purpose of the research

Introduce the research' purpose, main aims and objectives of the project. What the research will do and don't

2. Literature review

- Discuss research methodologies: primary research, secondary research, qualitative, quantitative, scientific method, research processes, population in research...
- Specify which research methods will be used to carried out the research
- Do a secondary research about
 - *Discuss IoT: IoT and related products*
 - *AI in your selected topic (for example: the future of IoT, smart homes..)*
- Conclusion, propose **initial hypothesis** after the literature review and need to confirm in primary research

3. Primary research

- Design of primary research: which techniques will be used to collect data such as interview, questionnaire, experiment,...; the population of the research. All the data collected in this stage must be supplied in the appendix

4. Analyse the result of the primary research

- Provide the research 'result with diagrams, numbers
- It should confirm or reject the hypothesis in the literature part
- Provide recommendations for improving the system or future research which could enhance the results of the current research.
- Suggest the research's results to some audience (how it is useful for them)

5. Approved project proposal-appendix

6. Approved project plan-appendix

7. Ethical form

8. Other materials which collected while conducting primary research: interview scripts, audio, experiment notes-appendix

Learning Outcomes and Assessment Criteria		
Pass	Merit	Distinction
LO1 Examine appropriate research methodologies and approaches as part of the research process		LO1 & 2 D1 Critically evaluate research methodologies and processes in application to a computing research project to justify chosen research methods and analysis.
P1 Produce a research proposal that clearly defines a research question or hypothesis supported by a literature review. P2 Examine appropriate research methods and approaches to primary and secondary research.	M1 Evaluate different research approaches and methodology and make justifications for the choice of methods selected based on philosophical/theoretical frameworks.	
LO2 Conduct and analyse research relevant for a computing research project		
P3 Conduct primary and secondary research using appropriate methods for a computing research project that consider costs, access and ethical issues. P4 Apply appropriate analytical tools, analyse research findings and data.	M2 Discuss merits, limitations and pitfalls of approaches to data collection and analysis.	
LO3 Communicate the outcomes of a research project to identified stakeholders		
P5 Communicate research outcomes in an appropriate manner for the intended audience.	M3 Coherently and logically communicate outcomes to the intended audience demonstrating how outcomes meet set research objectives.	D2 Communicate critical analysis of the outcomes and make valid, justified recommendations.

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ASSIGNMENT 1 ANSWERS

LO1 Examine appropriate research methodologies and approaches as part of the research process

P1 Produce a research proposal that clearly defines a research question or hypothesis supported by a literature review.

In the past decades, significant advancements in the area of sensing, control, high-speed computing, and AI have led to the development of autonomous vehicles that drive themselves without human intervention. Nowadays, some autonomous vehicles have been created and everyone says that these autonomous vehicles make improved road safety, better traffic fluidity, reduction in the consumption of power and fuel. However, I wonder if those autonomous vehicles are really useful and safe as people say or not? So I did this research.

The objectives to achieve the aim:

- ✓ *What is AI?*
- ✓ *Is AI used popularly in daily life?*
- ✓ *What are Autonomous Vehicles?*
- ✓ *Why do use Autonomous Vehicles? Are Autonomous Vehicles utility and safety?*
- ✓ *What the challenges for Autonomous Vehicles?*
- ✓ *How important is AI in Autonomous Vehicles?*
- ✓ *Should or shouldn't users increase the use of Autonomous Vehicles?*
- ✓ *Improve Autonomous Vehicles base on people's opinion*

In short, the research aims to understand the usefulness and safety of autonomous vehicles. Then, improve autonomous vehicles based on the combination between IoT and AI. This adds knowledge for the trend now for me and support for my job in the future.

P2 & M2: Examine appropriate research methods and approaches to primary and secondary research. Discuss the merits, limitations, and pitfalls of approaches to data collection and analysis.

1. Research approach and methodologies

Have very many approaches and methodology to research such as qualitative, quantitative, secondary research, scientific method, research processes, primary research, classical waterfall, the population in research, etc.

1.1. Overview of Classical Waterfall

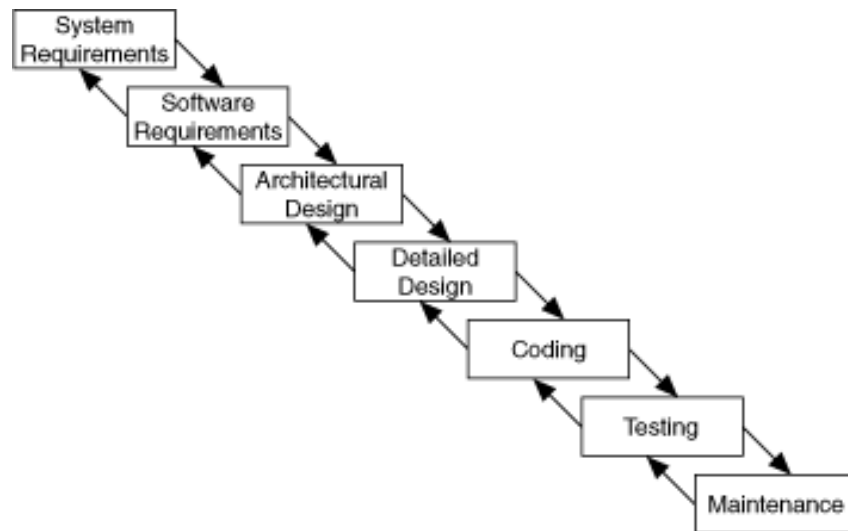


Figure 1: Phases of Waterfall Model in Software Engineering

This is a sequential model that divides software development into pre-defined phases. Each phase must be completed before the next phase can begin with no overlap between the phases. Each phase is designed for performing specific activities during the software development life cycle (SDLC) phase. It was introduced in 1970 by Winston Royce.

Researching using this model requires a thorough understanding of the problem and the requirements. Furthermore, it is suitable for short-term projects where time is a significant

constraint. For example, this model can be applied to developing a small web application or writing a small research project.

Table 1: Advantages & Disadvantages of Classical Waterfall

ADVANTAGES	DISADVANTAGE
<ol style="list-style-type: none"> 1. Before the next phase of development, each phase must be completed 2. Suited for smaller projects where requirements are well defined 3. They should perform quality assurance test (Verification and Validation) before completing each stage 4. Elaborate documentation is done at every phase of the software's development cycle 5. The project is completely dependent on the project team with minimum client intervention 6. Any changes in software are made during the process of the development 	<ol style="list-style-type: none"> 1. Error can be fixed only during the phase 2. It is not desirable for the complex project where requirement changes frequently 3. Testing period comes quite late in the developmental process 4. Documentation occupies a lot of time of developers and testers 5. Clients valuable feedback cannot be included with the ongoing development phase 6. Small changes or errors that arise in the completed software may cause a lot of problems

1.2. Overview of Secondary Research

This is a research method that involves using already existing data. Existing data is summarized and collated to increase the overall effectiveness of the research. Secondary research includes research material published in research reports and similar documents. These documents can be made available by public libraries, websites, data obtained from already filled-in surveys, etc. Some government and non-government agencies also store data that can be used for research purposes and can be retrieved from them.

Table 2: Advantages & Disadvantages of Secondary Research

ADVANTAGES	DISADVANTAGE
<ol style="list-style-type: none"> 1. Most information about secondary research is readily available 2. This is a less expensive and less time-consuming process 3. The data that is collected through secondary research, gives organizations or businesses an idea about the effectiveness of primary research. Hence, organizations or businesses can form a hypothesis and evaluate the cost of conducting primary research 	<ol style="list-style-type: none"> 1. Although data is readily available, credibility evaluation must be performed to understand the authenticity of the information available. 2. Not all secondary data resources offer the latest reports and statistics. Even when the data is accurate, it may not be updated enough to accommodate recent timelines. 3. Secondary research derives its conclusion from collective primary research data. The success of your research will depend, to a greater extent, on the quality of research already conducted by primary research.

1.3. Overview of Primary Research

This is a methodology used by researchers to collect data directly, rather than depending on data collected from previously done research. Technically, they “own” the data. Primary research is solely carried out to address a certain problem, which requires in-depth analysis.

Table 3: Advantages & Disadvantages of Primary Research

ADVANTAGES	DISADVANTAGES
<ol style="list-style-type: none"> 1. Data collected is first hand and is accurate 2. Primary research focuses mainly on the problem at hand 3. Data collected can be controlled 4. Is a time-tested method, should rely on the results that are obtained from conducting this type of research 	<ol style="list-style-type: none"> 1. Can be quite expensive to conduct 2. Can be many time-consuming 3. Sometimes just using one primary research method may not be enough

1.4. Overview of Qualitative research

Qualitative research is an approach to finding ways of describing and analyzing the culture and behavioral characteristics of individuals and groups of people from the researcher's perspective. The analytical approach involves questioning, etc. The interview is the practice of asking other people one to one question that is planned before.

Table 4: Advantages & Disadvantages of Qualitative research

ADVANTAGES	DISADVANTAGES
<ol style="list-style-type: none"> 1. More detailed 2. Unprompted feedback 3. Taps consumer creativity 4. The smaller sample needed 	<ol style="list-style-type: none"> 1. Less measurable 2. Can't generalize 3. Not repeatable

1.5. Overview of Quantitative research

Quantitative research is methodology research that collects quantifiable data following a systematic, then using mathematical or computational techniques and the result will be depicted by numerical. From this, we can predict the future of the problem. There are three core types of analysis: univariate, bivariate and multivariate. Univariate is analyzed by one variable, such as gender. Bivariate is analyzed by two variables, such as gender and age. Multivariate is analyzed by several variables, such as gender, age and education.

Table 5: Advantages & Disadvantages of Quantitative research

ADVANTAGES	DISADVANTAGES
<ol style="list-style-type: none"> 1. Objectivity 2. Easy to analyses 3. Ability to generalize 	<ol style="list-style-type: none"> 1. Big sample needed 2. Limited answers 3. Potential for bias 4. Wording is crucial

2. Select research approach/methodologies and evaluate (P2 & M1)

After going through the processes to analyze and select, we will use the classical waterfall model for this project since it can give a more predefined step-by-step approach to the research, which makes it easier to follow and keep track of things. However, it requires carefulness in the design process. In addition, in order to maximize the authenticity of the data in the research project, we decided to add use two methods: Primary Research and Secondary Research to conduct research. This means we will mix three methods together to effectively achieve the best. Using Primary Research, we are able to collect all the realistic information of the objects to support the aims of research by survey and interview, which means the document sources are updated and new. However, the authenticity in Primary Research is not as high as in Secondary Research. Because, the participants of the survey might not be honest or serious, which directly affects the reliability and objectivity of the data. On the other hand,

the information collected by Secondary Research is much more qualified and reliable because it has been accepted by professors or a reputed union. By using both, the result of this research project could be improved because they can support each other to overcome their self-own weaknesses. In short, using both three methods then the research will be more optimized. On the other hand, the qualitative method can also be used in the absence of prefigured data, but it involves many more different open-ended methodologies to build the data. And the quantitative approach is not preferred as the project timeframe is not long enough so the population of the gathered data can be very small. With that said, the waterfall model should be the most suitable for this research since it can give a more predefined step-by-step approach to the research, which makes it easier to follow and keeping track of things.

LO2 Conduct and analyze research relevant for a computing research project

P3 Conduct primary and secondary research using appropriate methods for a computing research project that considers costs, access, and ethical issues.

1. Secondary research

1.1. About Internet of things (IoT)

IoT is the most efficient and important technique for the development of solutions to issues. There are unlimited personal or business options. It includes sensors, software, network components, and other electronic devices. In addition, it also allows exchanging the data over the network effectively without human involvement to pass an IP address. **A thing** can refer to water management can be efficiently done using IoT with no wastage of water using sensors, a solar panel, a connected car with sensors that alert the driver to a variety of potential problems (*fuel, tire pressure, maintenance necessary, and more*), a biochip transponder (*think livestock*) or any sensor-equipped item that can capture and transmit data over a network. Can say, there are various products in this world that are made from IoT This includes air conditioners, even cars, or TV Like any other applications, blockchain can be applied to almost any field that is not just in crypto-currency.

1.2. AI

Through computer science, in contrast to the natural intelligence shown by humans, artificial intelligence (AI), also called machine intelligence, is intelligence displayed by computers. Leading AI textbooks describe the field as a "smart agents" study: any system that perceives

its environment and takes action that maximizes its chance to achieve its goals successfully. Colloquially, the term "artificial intelligence" is often used to describe machines (or computers) that imitate "cognitive" functions that people associate with the human mind, such as "reading" and "solving problems."

There are a lot of types of AI, but I will present about four kinds of AI like Reactive Machines, Limited Memory, Theory of Mind and Self-aware.

- **Reactive Machines:** *this is a long-standing AI system. It works based on the simulation of the human mind to respond to different stimuli. It means they cannot improve their actions based on previous experience because there is no memory-based function. For example, IBM's Deep Blue is a responsive AI system that defeated Grandmaster Garry Kasparov's chess in 1997.*
- **Limited Memory:** *in addition to his ability to react, Ai is also able to learn from historical data to make decisions. As such, these AIs will use the data in memory to learn through reference models and then learn how to solve problems in the future. This is pollution AI present-day. For example, An AI image recognition is trained using thousands of images and their labels to teach them to identify scanned objects. When an object is scanned by such an AI, it uses the training images as guides to recognize the meaning of the image presented to it, and it tags new images with increasing accuracy based on its "learning experience."*
- **Theory of Mind:** *unlike the two types of AI Reactive Machines and Limited Memory, the Theory of Mind is a level of AI that researchers are currently engaged in research and innovation. researchers so that AI can interact with users through clarifying feelings of demand, beliefs and thought processes. This means that AI must understand the human mind.*
- **Self-aware:** *this is a hypothesis about AI and also the goal that aims scientists. This hypothesis holds that AI can develop similarly to the human brain so that they can be self-aware, solve problems by themselves. It also has feelings of demand and belief as human beings. However, many people think that developing AI to this extent could threaten the existence of humans, affecting our lives in the future.*

A self-driving car, also known as an autonomous vehicle (AV), connected and autonomous vehicle (CAV), driverless car, robot-car, or robotic car, is a vehicle capable of sensing its environment and traveling safely with little or no human input.

There are six levels of autonomous vehicles as for following:

- **Level 0:** *This is No Automation level. The human driver's full-time performance of all aspects of the complex driving mission, even if improved by warning or interference systems.*
- **Level 1:** *This is the Driver Assistance level. Driving mode-specific execution of either steering or acceleration/deceleration using driving environment knowledge by a driver assistance system and with the assumption that the human driver can perform all remaining aspects of the complex driving mission.*
- **Level 2:** *This is the Partial Automation level. Driving mode-specific execution of steering and acceleration/deceleration systems using driving environment knowledge by one or more driver assistance systems and with the assumption that the human driver can perform all remaining aspects of the complex driving function.*
- **Level 3:** *This is the Conditional Automation level. The driving mode-specific output of all aspects of the dynamic driving function by an automated driving system with the assumption that the human driver can respond appropriately to a request for intervention.*
- **Level 4:** *This is a High Automation level. The driving mode-specific output of all aspects of the dynamic driving function by an automatic driving program, even if a human driver does not respond adequately to a request for intervention.*
- **Level 5:** *This is the Full Automation level. Full-time quality under all road and environmental conditions that can be controlled by a human driver by an automated driving system of all aspects of the complex driving mission.*

AI is used to allow cars to navigate and handle complex situations through traffic. It also makes it easier to ensure proper and safe driving with a combined AI system and other IoT sensors, such as cameras. Here is the role of AI in self-driving cars:

AI for Self-Driving Car Safety: AI applies a lot of part of life to get the confidence of the users, regulators, manufacturers before being used in self-driving cars. AI can be useful in cases where flesh and blood drivers are prone to making human errors by analyzing data feeds through their sensors. AI can score very well in areas such as:

- *Emergency control of the vehicle*
- *Cross-traffic detection*
- *Syncing with traffic signals*
- *Breaking in cases of emergencies*
- *Active monitoring of blind spots*

In the process of driving, there are many variables from the environment that AI needs to study more, so these functions only help your driving become safer. Therefore, it needs your controlling of the environment.

Curated Cloud Services Targeted for Individuals: AI can be used to accurately assess the vehicle's physical condition. For both:

- *Predictive maintenance*
- *Prescriptive maintenance can be assessed*

Accurate Feed for Regulators and Insurance Companies: Regulatory authorities and insurance companies may rely on automobile data to identify violations and complaints. AI can help identify:

- *Driver risk assessment: Using AI, the behavior of a driver can be accurately assessed and the cost of insurance could be adjusted accordingly based on the risk profile.*
- *Ease of claim: Vehicle data can be used to process claims more quickly in the event of accidents. E.G. Art Financial offers a Dingsunbao 2.0 AI-based video app that enables users to access their auto damage by using a smartphone camera to scan the damaged area of the vehicle.*

Monitoring the Driver and User Behavior: Based on data about the driver's habit of adjusting the position of the seats, mirrors, air and the songs played regularly, AI can predict and make the driver's options.

Advantages and disadvantages of self-driving cars

➤ **Advantages:**

- *Fewer road accidents: self-driving cars are programmed to assist the driver and they can adjust if the driver is distracted or disobeying traffic laws. This makes driving safer and minimizes accidents.*
- *Reduced traffic jams: Self-driving cars can communicate with each other to find the road without congestion.*
- *Supporting new drivers and the elderly to be able to drive more safely.*

➤ **Disadvantages:**

- *It is an expensive vehicle about 100.000 dollars.*
- *It makes old user to more base on them without their controlling which make driving isn't safe.*

The challenge for autonomous vehicles is the law for them:

Countries need a special law for autonomous vehicles that can make it difficult for lawyers and judges to debate who is responsible for autonomous vehicles.

For example, Germany has enacted a special law for autonomous vehicles. This law requires a driver behind the wheel during the test of autonomous vehicles on public roads to be ready to control the vehicle when necessary. The law has just passed to allow drivers not to put their hands on the steering wheel, their eyes do not need to look at the road, they can take advantage of surfing the web or checking email while the car is in self-driving mode or automatic braking. This law requires the vehicle to have a black box that records the journey of the vehicle to identify the driver or autopilot system that will be responsible at all times of the trip. This is especially important for assigning responsibility in the event of an accident. Drivers will be responsible for the accidents that occur when they operate the vehicle. On the other hand, If the system drives itself then the manufacturer will be responsible.

Another difficulty for autonomous vehicles is to create trust for users. Currently, autonomous vehicles are not widely available around the world, many people do not know AI or automated cars, so creating a trust for customers is a challenge for car companies to make autonomous

vehicles more popular around the globe. Autonomous vehicles also have to fold challenges when the price to own a car is quite high. There is an important challenge that car manufacturers need to overcome is the technology to create autonomous vehicles. Currently, many companies are researching and developing to improve self-driving cars and improve the level of autonomous vehicles.

1.4. Evaluate and analysis secondary research result (P3 & M2)

From the results of secondary research above, we can see that AI's development has gone through many stages. At present, AI has achieved much success and gradually become a technology trend in the future. Many new technologies are launched and applied by leading automobile companies. This proves that the application of AI to developing autonomous vehicles is entirely possible.

Especially, a few big companies in the world have started to apply AI to autonomous vehicles and have had success. Therefore, the development of autonomous vehicles is entirely possible. From the result, we also know that autonomous vehicles are safe and useful with features such as highway teammate, handsfree feature, automatic parking, etc.

Besides, car manufacturers must pass some problems to make autonomous vehicles become popular such as getting the trust of our customers, problems about legally, cost of the product, etc. Maybe, at someplace also, we will face some problems when autonomous vehicles become popular, especially the difficulty in determining whether a violation is caused by a vehicle owner or by a vehicle.

However, it is still important to determine whether the advantages and disadvantages of autonomous vehicles are the same as those provided by interviews with self-driving professionals or owners.

It is also important to understand the companies and technologies being developed by interviewing software developers. Especially need to know the challenges and effects when putting the car back into operation. From that, it can be affirmed whether autonomous vehicles are safe and can become popular or not. So, I did implement Primary research to clarify the above problem.

2. Primary research

2.1. Interview

Question 1. How are your opinions to improve autonomous vehicles?

Question 2. Should or shouldn't user increase the use of autonomous vehicles?

Question 3. Why do should use autonomous vehicles? Are autonomous vehicles utility and safety?

Question 4. If autonomous vehicles are used, will accidents be reducing?

2.2. Survey

List of question

What is your career?

How old are you?

- 1. Do you think autonomous vehicles are utility and safe?*
- 2. What function do you think autonomous vehicles need?*
- 3. If autonomous vehicles are popular, will you use them?*
- 4. What are the advantages of autonomous vehicles?*
- 5. What are the disadvantages of autonomous vehicles?*
- 6. Who do you think will be legally responsible when an accident occurs?*
- 7. Do you think autonomous vehicles can decrease accidents?*
- 8. Do you think if autonomous vehicles are used, they can or not solve traffic jams?*
- 9. Do you think autonomous vehicles are safe for other traffic participants?*
- 10. How do you feel about autonomous vehicles?*

2.3. Summary about interview/survey

First, we want to know if autonomous vehicles could affect life or not. That's why we have to make sure that the participants are those who understand some knowledge of autonomous vehicles, AI and IoT. This will help us know exactly what and how autonomous vehicles affect. We also set questions to know which field autonomous vehicles have a strong impact on. Lastly, we try to measure the awareness of the interviewer/surveyor about how autonomous vehicles affect their life.

2.4. Results analysis and conclusion

We will analyze the data and resources before that by using analytical tools if necessary to better understand the resources. Then see whether it meets the objectives which decide the success of the research. Finally, will give a conclusion or reflection for the research.

P4 Apply appropriate analytical tools, analyze research findings and data.

1. Analytical tools

We will use questionnaires to create the survey and the interview by google forms to collect new data. On the other hand, to better understand the data then we will draw a chart. There is one convenience that is when you use google forms then it will auto draw a chart for you based on the data it receives. Besides, due to COVID-19 so we will implement the interview online by messenger or ZALO and then we will base these pieces of information to write the report. In addition, to make the information in the report more reliable, we will refer to other documents like books, articles and the websites official. However, we also can use tools such as NumPy or Matplotlib to create scatter, histogram or other diagrams to analyze findings/data. All this can help us understand better our research and what we want to achieve at this project. In summary, we think that for our project then the chart is the best tool we can use in data analysis to implement our own reflection, evaluation about our research and findings.

2. Tools justification

To be able to confirm the research about this topic is exactly then we must provide knowledge and in-depth insight about it that we have. And to some extent, we can provide a certain depth by implementing it after researching. This helps us so much in our research when seeing whether AI and IoT is the solution to improve and develop autonomous vehicles since it is also one of the objectives in the research. On the other hand, tools for drawing diagrams and charts that are based on the dataset also help so much to our research because the findings are based on the type of data that can be analyzed through such methods. On a different side, it is mostly about theory, based on the document official maybe we almost completed all objectives given. Finally, we think that our own evaluation also can be a typical tool that helps us reflect on the findings and data. Indeed, the tools we proposed have the capability to confirm the research and they helped us so much in this project.

LO3 Communicate the outcomes of a research project to identified stakeholders

P5 & M3: Communicate research outcomes in an appropriate manner for the intended audience. Coherently and logically communicate outcomes to the intended audience demonstrating how outcomes meet set research objectives.

The intended audience for my research is everyone who has the need or is using autonomous vehicles and myself. Because traffic safety issue is now very important. Every day, there are dozens of accidents that take the lives of people. Autonomous vehicles improved the road safety of vehicle passengers and users by detecting pedestrians or cyclists and obstacles (speed bumps, puddles, potholes, etc.).

On the other hand, it also helps better traffic fluidity due to reception by the vehicle of optimized routes to avoid congested zones or to more easily find an available parking place. Besides, due of COVID-19 our income source is all reduced so autonomous vehicles is a useful solution when it saves fuel and energy.

Even though haven't quite hit widescale adoption of some of these technologies, many have been tested and prototyped and large-scale adoption seems imminent. Here's an overview of some of the major developments that are changing the transportation industry.

While autonomous vehicles will play a crucial role in the future of automotive, devices powered by IoT provide inclusive information about the condition and performance of each vehicle as well as the driver's behavior.

This technology will also help in fleet management by offering to a fleet manager real-time location monitoring of the fleet, tracking traffic conditions on the road, measuring weight/volume of cargo that the fleet is carrying, and providing time and driver management.

The IoT technology will enable cars to connect over an IoT network called CV2X (cellular vehicle to everything) that connects vehicles and smart transport systems with each other. Moreover, IoT in automotive will open new avenues for car manufacturers and buyers worldwide.

Research proposal

Table 6: Research proposal

Introduce some information	
Student Name: Trinh Thi Dieu Huyen	Student Number: GDD18606
Tutor: Le Ngoc Thanh	Date: 13/03/2021
Unit 13: Computing research project	
Propose title: The combination of AI and IoT in Autonomous Vehicles	
Section One: Title, objective, responsibilities	
<p>Research question:</p> <p>I wonder if those autonomous vehicles are really useful and safe as people say or not? Can self-cars become popular?</p> <p>Objectives</p> <ol style="list-style-type: none"> What is AI? Is AI used popularly in daily life? What are Autonomous Vehicles? Why do use Autonomous Vehicles? Are Autonomous Vehicles utility and safety? What the challenges for Autonomous Vehicles? How important is AI in Autonomous Vehicles? Should or shouldn't users increase the use of Autonomous Vehicles? Improve Autonomous Vehicles base on people's opinion. 	
Section Two: Reasons for choosing this research project	
<p>AI and self-driving cars are my concern. I like cars but I can't drive with cars so I want to know more about Autonomous Vehicles so that I can using it in the future. Besides, I</p>	

think that self-driving cars will be able to thrive in the future in both my country and the world so this research will help me in the future.

Section Three: Literature sources searched

The initial sources which could help me to answer those questions:

1. Howard, D. and Dai, D., 2014, January. Public perceptions of self- driving cars: The case of Berkeley, California. In Transportation Research Board 93rd Annual Meeting (Vol. 14, No. 4502, pp. 1- 16).
2. Schank, R.C., 1987. What is AI, anyway?. AI magazine, 8(4), pp.59-59.
3. Stone, P., Brooks, R., Brynjolfsson, E., Calo, R., Etzioni, O., Hager, G., Hirschberg, J., Kalyanakrishnan, S., Kamar, E., Kraus, S. and Leyton-Brown, K., 2016. Artificial intelligence and life in 2030. One Hundred Year Study on Artificial Intelligence: Report of the 2015-2016 Study Panel, p.52.
4. Daily, M., Medasani, S., Behringer, R. and Trivedi, M., 2017. Self- driving cars. Computer, 50(12), pp.18-23.
5. Tettamanti, T., Varga, I. and Szalay, Z., 2016. Impacts of autonomous cars from a traffic engineering perspective. Periodica Polytechnica Transportation Engineering, 44(4), pp.244-250.
6. Lutin, J.M., ITE, F. and Kornhauser, A.L., 2013. The revolutionary development of self-driving vehicles and implications for the transportation engineering profession. Cell, 215, pp.630-4125.
7. J3016, S. i. (2014). Automated driving levels of driving automation are defined in new SEA international standard J3016
8. ERTICO Newsroom. 2021. Self-driving vehicles and IoT services take the stage in Versailles
9. Guest Writer, 2021. AI is the Foundation of Autonomous Vehicles
10. Hitachi, L., 2021. IoT-enabled AI technologies for self-driving connected cars : Hitachi.

Section Four: Activities and timescales

1. Collect materials relating to the research's question and objectives
2. Complete research proposal
3. Get feedback from the Tutor about the research proposal
4. Milestone 1: submission of project proposal
5. Produce project plan
6. Writing literature review and represent the findings in term of hypothesizes
7. Check project progress: research proposal, plan, literature review
8. Preparation for primary research(to confirm the findings in the literature review or clarify the questions that might arise after the literature review)
9. Milestone 2: Get feedback from the Tutor about the plan of primary research.
10. Milestone 3: Get feedback from the Tutor about the result of the literature review
11. Conducting the primary research
12. Milestone 4: Represent the findings in primary research and get feedback from Tutor
13. Writing assignment 1 which contains LO1, LO2, LO3
14. Milestone 5: Submit assignment 1 -Draft
15. Milestone 6]: Submit assignment 1- Final
16. Writing Assignment 2 which contain LO4
17. Milestone 7: Submit assignment 2 -Draft
18. Milestone 8: Presentation- put everything together.
19. Milestone 9]: Submit assignment 2- Final

Activities to be carried out during the research project (e.g. research, development, analysis of ideas, writing, data collection, numerical analysis, tutor meetings, production of final outcome, evaluation, writing the report) and likely durations:

Milestone one:

Target Date(set by tutor) Milestone two:

Target Date(set by tutor):

Section Five: Research approach and methodologies

- Research process: Waterfall model
- Research classes: primary research and secondary research
- Research methods: interview, survey

Comments and agreement from tutor

Comments (optional): I confirm that the project does not work which has been or will be submitted for another qualification and is appropriate.

Agreed: (Name)(Date)

Comments and agreement from project proposal checker (if applicable)

Comments (optional):

Agreed: (Name)(Date)

Research plan

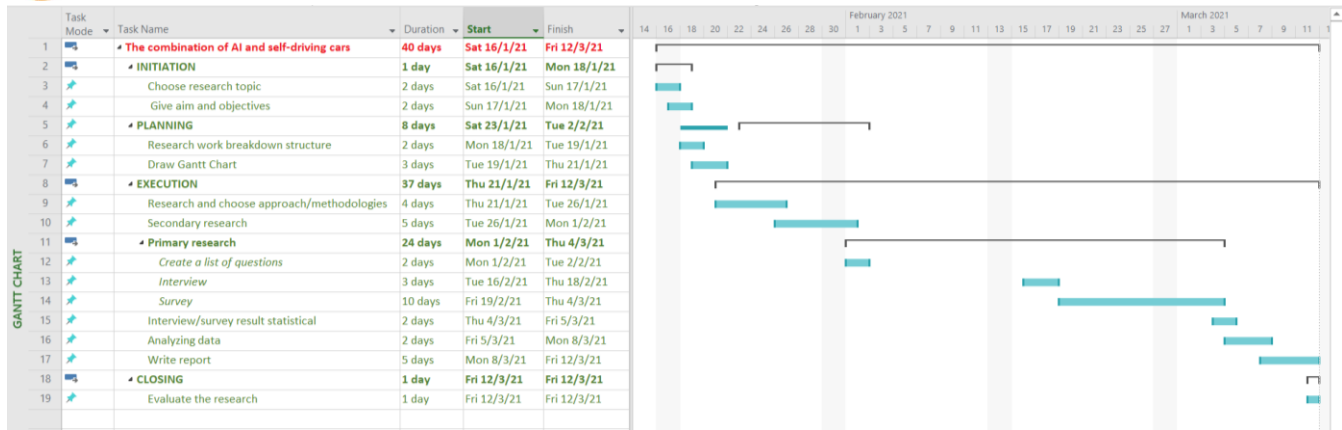


Figure 2: Gantt chart

Ethical form

Table 7: Ethical form

Section One: Basic details
Project title: The combination of AI and IoT in Autonomous Vehicles
Student name: Trinh Thi Dieu Huyen
Student number: GDD18606
Programme: Computing Research Project
School: University of Greenwich Vietnam
Intended research start date:
Intended research end date:
Section Two: Project summary
Please select all research methods that you plan to use as part of your project:
• Interviews: YES
• Questionnaires: YES
• Observations: NO

- Use of personal records: **YES**
- Data analysis: **YES**
- Action research: **NO**
- Focus groups: **NO**
- Other (please specify): **Not yet**
- Survey: **YES**

Section Three: Participants

Please answer the following questions, giving full details where necessary. Will your research involve human participants? **YES**

Who are the participants? Tick all that apply:

Children aged 12–16: **YES**

Young people aged 17–18: **YES**

Adults: **YES**

How will participants be recruited (identified and approached)?

Describe the processes you will use to inform participants about what you are doing: I try to connect by phone or through acquaintances.

How will you obtain consent from participants? Will this be written?

How will it be made clear to participants that they may withdraw consent to participate at any time?

- Through phone numbers, emails, or in-person meetings, you can give your opinion about my project.

Studies involving questionnaires:

Will participants be given the option of omitting questions they do not wish to answer?

Yes

If No please explain why below and ensure that you cover any ethical issues arising from

this:

Studies involving observation:

Confirm whether participants will be asked for their informed consent to be observed. **Yes**

Will you debrief participants at the end of their participation (i.e. give them a brief explanation of the study)? **Yes**

Will participants be given information about the findings of your study? (This could be a brief summary of your findings in general.) **Yes**

Section Four: Data storage and security

Confirm that all personal data will be stored and processed in compliance with the Data Protection Act (1998): **Yes**

Who will have access to the data and personal information? Only I can access the data and personal information.

During the research:

Where will the data be stored? The data be stored on my laptop and my phone Will mobile devices (such as USB storage and laptops) be used? **Yes**

If yes, please provide further details:

After the research:

Where will the data be stored? The data be stored on my laptop and my phone.

How long will the data and records be kept for and in what format? The data be stored for about 2 months. Will data be kept for use by other researchers? **NO**

If yes, please provide further details:

Section Five: Ethical issues

Are there any particular features of your proposed work that may raise ethical concerns? If so, please outline how you will deal with these:

It is important that you demonstrate your awareness of potential risks that may arise as a

result of your research. Please consider/address all issues that may apply. Ethical concerns may include, but are not limited to the following:

- Informed consent.
- Potentially vulnerable participants.
- Sensitive topics.
- Risks to participants and/or researchers.
- Confidentiality/anonymity.
- Disclosures/limits to confidentiality.
- Data storage and security, both during and after the research (including transfer, sharing, encryption, protection).
- Reporting.
- Dissemination and use of your findings.

Section Six: Declaration

I have read, understood and will abide by [insert center name] Research Ethics Policy: **Yes**

I have discussed the ethical issues relating to my research with my Unit Tutor: **Yes**

I confirm that to the best of my knowledge: The above information is correct and that this is a full description of the ethics issues that may arise in the course of my research.

Name: Trinh Thi Dieu Huyen

Date:

Please submit your completed form to:

Conclusion

For effective research and the success of a project, we need to create a comprehensive project management plan. First, we will identify the topic, aims and objective to achieve aims for that project. The second is to identify should use any research approach and methodologies to research. Note, we can use one method or also be able to mix many methods together as long as

our research approach and methodologies fit with our research project and it also must bring to effect best for our research project. In other words, it makes our process research to become more optimal. Finally, a conclusion and evaluation for each of our selections or decisions in this research project.

Summary, through this report, I have fulfilled all the criteria of each section, which have been marked as specific above, each section has been arranged in a certain order, thereby bringing the most intuitive look. Any questions please contact me via: *huyenttdgdd18606@fpt.edu.vn*

Evaluation

The information contained in the report and the research results is reliable because it is referenced from books, lecture slides and reputable websites. Besides, there is still some content that is evaluated in my opinion, it is viewed from an objective perspective and my level of understanding so there will be some not quite accurate.

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