ASSIGNMENT 1: CRP

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I. INTRODUCTION
  1. Introduction
     Without a doubt, technology has changed a lot of our daily lives. New technologies such as computers, the Internet, wireless devices, and social networks have become a part of most people's lives regardless of age or gender. The quality of life is increasingly improved thanks to extremely useful applications of IT in general and IoT in particular. The effectiveness of IOT-applied products and the features integrated in them are all towards a common goal of creating a modern and advanced life, more specifically to improve the health and well-being of people. We believe that technology should improve lives, not to distract from it. We are committed to giving everyone the tools they need to develop their own sense of digital well-being. So life, not the technology in it, remains front and center.
  2. Problem review
     As mentioned in the first part, of this proposal, I will conduct research on the applications and benefits of SmartHome when applying IoT to people's lives. The IoT network is a global infrastructure serving the information society, supporting intensive (computing) services through objects (both real and virtual) that are connected to each other through information technology existing information and communications are integrated. Basically, the Internet of Things provides intensive connectivity for devices, systems, and services, which is far more efficient than concurrent machine transmission. Supports a variety of protocols, domains, and applications. Connecting these embedded devices (also smart devices) is expected to usher in an era of automation in almost all industries, from intensive applications such as smart grids to large-scale applications other fields such as smart home, smart city.
II. LITERATURE REVIEW
  1. Research methodology
     Research methods are specific procedures or techniques used to identify, select, process, and analyze information about a topic. In this study, I will use two argumentative methods that allow the reader to critically assess the overall validity and reliability of a research study, primary research, and secondary research. At the same time in secondary research, I will also use qualitative and quantitative research to clarify the problem
  2. Research process
     There are a variety of approaches to research in any field of investigation, irrespective of whether it is applied research or basic research. Each particular research study will be unique in some ways because of the particular time, setting, environment, and place in which it is being undertaken. Nevertheless, all research endeavors share a common goal of furthering our understanding of the problem, and thus all traverse through certain basic stages, forming a process called the research process.
     The Research Process is a process of multiple scientific steps in conducting the research work. Each step is interlinked with other steps. The process starts with the research problem at first. Then it advances in the next steps sequentially. Generally, a researcher conducts research work within seven steps. In research work, primarily, you require a Research Proposal. It is because the proposal approves the research project whether you achieve the ability to conduct research or not. So when you write a research proposal, present the detailed plans and specific objectives of your research correctly.

The research process consists of a series of actions or steps necessary to effectively carry out research and the desired sequencing of these steps. The chart shown in Figure well illustrates a research process. The chart indicates that the research process consists of a number of closely related activities.

These 8 stages in the research process are;
- Identifying the problem.
- Reviewing literature.
- Setting research questions, objectives, and hypotheses.
- Choosing the study design.
- Deciding on the sample design.
- Collecting data.

- Processing and analyzing data.
- Writing the report.

Choosing the best alternative in terms of time constraints, money, and human resources in our research decision is our primary goal. The key to a successful research project ultimately lies in iteration: the process of returning again and again to the identification of the research problems, methodology, data collection, etc. which lead to new ideas, revisions, and improvements.

Often, by discussing the research project with advisers and peers, one will find that new research questions need to be added, variables to be omitted, added or redefined, and other changes to be made. As a proposed study is examined and reexamined from different perspectives, it may begin to transform and take a different shape. This is to be expected and is an essential component of a good research study. Besides, it is important to examine study methods and data to be collected from different viewpoints to ensure a comprehensive approach to the research question.

3. Scientific research

Research conducted to contribute towards science by the systematic collection, interpretation, and evaluation of data and that, too, in a planned manner is called scientific research: a researcher is the one who conducts this research. The results obtained from a small group through scientific studies are socialized, and new information is revealed concerning diagnosis, treatment, and reliability of applications. The purpose of this review is to provide information about the definition, classification, and methodology of scientific research.

Classification of Scientific Research

Scientific research can be classified in several ways. Classification can be made according to the data collection techniques based on causality, relationship with time, and the medium through which they are applied.

According to data collection techniques:

- Observational
- Experimental

According to causality relationships:

- Descriptive
- Analytical

According to relationships with time:

- Retrospective
- Prospective
- Cross-sectional

According to the medium through which they are applied:

- Clinical
- Laboratory

4. Population in research

All research questions deal with issues that have a lot to do with important groups of individuals known as the study population.

A research population is generally a large collection of individuals or subjects that are the main focus of a scientific inquiry. Research is done for the benefit of the community. However, because of the large population size, researchers often cannot test each

individual in the population because it is too expensive and time consuming. This is why researchers rely on sampling techniques.

It is also understood as a well-defined collection of individuals or objects known to have similar characteristics. All individuals or objects in a given population usually have a common, binding trait or trait.

Usually, the description of the population and the general binding characteristics of its members are the same.

5. Primary research

Primary research is data that is obtained first-hand. This means that the researcher conducts the research themselves or commissions the data to be collected on their behalf. Primary research means going directly to the source, rather than relying on pre-existing data samples. This type of research is particularly relevant where the data collected needs to be specific to the context.

There are many ways of gathering primary research. The most suitable method will depend on the questions you want to answer and the problem you're trying to solve. The most common primary market research methods are interviews, surveys, focus groups and observations. Here are some types of primary research:

- Interview
  Interviews take the form of a one-to-one or small group question and answer session, which can be conducted over the phone or in a face-to-face environment. Interviews are most useful where a large amount of information needs to be collected from a small sample of subjects. Interviews are often used to obtain information from an expert about a specialist topic.

- Surveys
  Surveys are most frequently conducted online and offer a convenient and cost-effective solution where a response is required from a larger population. Questions are pre-written, offering the respondent little flexibility if their answer doesn't fit (making functionality such as skip logic essential) and response rates can be variable. The length of a survey is a delicate balance: if a survey is too long, participants may get bored and leave the survey incomplete. However, if the survey is short, not enough data will be collected to form a full picture.

- Focus groups
  Focus groups are used to collect data from a small group of people who are often subject matter experts in the topic of research. Discussion is initiated between the group members to discover their thoughts. This method is commonly used by businesses to gain insight into niche markets and learn about their customers

- Observations
  Observations are carried out impartially, by simply observing an event and taking organized notes. In this method, there is no direct interaction between the researcher and the subject. This method removes the potential bias which could be encountered during an interview or survey as the encounters observed are genuine reactions.

Advantages and disadvantages of primary research:

- Advantages of primary research:
  - More up to date: The researcher collects data at the time were needed. This is different from secondary data, where there is more time lag between data

collection and publication. Besides, researchers can also update data regularly, as needed. More relevant. Researchers take data by the objectives and questions they want to answer.
- Confidential: Only researchers have access to data. Other people cannot use it without their permission. Also, researchers can sell data to other parties for money. It is one of the business models of several research companies. They collect some primary data and sell it to several clients. They incur a one-time cost but can sell the same data to multiple parties.
- More controllable: Indeed, primary research is also biased. However, some of it is within the control of researchers. For example, in choosing a sample, they control the selected respondents and the data collected, so they are more representative. That is difficult to get from secondary data.
- Disadvantages of primary research:
  - Expensive: Researchers have to spend more to get to the data. The amount depends on the preparation or the primary research method used. The number and geographic reach of respondents also affect costs.
  - Time-consuming: Surveys and interviews, may take several days, depending on the number of respondents. After the data is obtained, the researcher must enter the data, clean it, and put it in a database. They may also have to classify answers to some open-ended questions. On the other hand, secondary data is faster to obtain, process, and analyze.
  - Lower variety. Primary data contains only the topics under study. In contrast, secondary data is more varied because it comes from various sources.
  - Invalid sample. Sampling errors render work pointless. Although there were no problems with the questionnaire or respondents' answers, an unrepresentative sample produced biased conclusions. So, choosing the right sample is the initial and critical stage of the research.
6. Secondary research
Secondary research is a common approach to a systematic investigation in which the researcher depends solely on existing data in the course of the research process. This research design involves organizing, collating, and analyzing these data samples for valid research conclusions. Secondary research is also known as desk research since it involves synthesizing existing data that can be sourced from the internet, peer-reviewed journals, textbooks, government archives, and libraries. What the secondary researcher does is to study already established patterns in previous researches and apply this information to the specific research context.
Common secondary research methods include data collection through the internet, libraries, archives, schools, and organizational reports.
- Online Data
  Online data is data that is gathered via the internet. In recent times, this method has become popular because the internet provides a large pool of both free and paid research resources that can be easily accessed with the click of a button. While this method simplifies the data gathering process, the researcher must take care to depend solely on authentic sites when collecting information.
- Data from Government and Non-government Archives

Researchers may also gather useful research papers from governmental and non-governmental archives, and these archives often contain verifiable information that provides useful insights about different research contexts. The challenge, however, is that such data is not always available due to a number of factors.

- Data from Libraries
Research materials can also be accessed through public and private libraries. Think of a library as an information repository containing a collection of important information that can be used as valid data in different research contexts. Usually, researchers donate several copies of the thesis to public and private libraries; especially in academic research cases. In addition, business directories, newsletters, annual reports and other similar documents can be used as research data, collected and stored in the library, in both soft and hard copies.

- Data from Institutions of Learning
Educational institutions such as schools, faculties and colleges are also an excellent source of secondary data; especially in academic research. This is because a lot more research is done in educational settings than in other fields.

Advantages and disadvantages of secondary research:

- Advantages of secondary research
    - Easily Accessible With secondary research, data can easily be accessed in no time; especially with the use of the internet. Apart from the internet, there are different data sources available in secondary research like public libraries and archives which are relatively easy to access too.
    - Secondary research is cost-effective and is not time-consuming. The researcher can cut down on costs because he or she is not directly involved in the data collection process which is also time-consuming.
    - Secondary research helps researchers to identify knowledge gaps that can serve as the basis of further systematic investigation.
    - It is useful for mapping out the scope of research thereby setting the stage for field investigations. When carrying out secondary research, the researchers may find that the exact information they were looking for is already available, thus eliminating the need and expense incurred in carrying out primary research in these areas.

- Disadvantages of secondary research
    - Questionable Data: With secondary research, it is hard to determine the authenticity of the data because the researcher is not directly involved in the research process. Invalid data can affect research outcomes negatively hence, it is important for the researcher to take extra care by evaluating the data before making use of it.
    - Generalization: Secondary data is unspecific in nature and may not directly cater to the needs of the researcher. There may not be correlations between the existing data and the research process.
    - Common Data: Research materials in secondary research are not exclusive to an individual or group. This means that everyone has access to the data and there is little or no "information advantage" gained by those who obtain the research.

- It has the risk of outdated research materials. Outdated information may offer little value especially for organizations competing in fast-changing markets.

7. Primary & secondary research – the differences

Parameters of Comparison	Primary research	Secondary research
Conducted by	Primary Research is conducted by the person himself who requires the information.	Secondary Research is not done by the researcher himself. He interprets and utilizes already published data.
Source	Surveys, door-to-door questioning, interviews, etc. are the sources of primary research.	The researcher finds information from already gathered and published sources, such as journals, dissertations, etc.
Research objective	It is conducted for the collection of raw data for the specific goal at hand. It is tailored for that purpose only.	The objective of secondary research is to gather information from various antecedent materials.
Cost and Time	It involves high cost as it needs to gather from sources. And it is a time-consuming process.	It is a very economical method of doing research and requires less time for assembling data.
Tools involved	The tools used to conduct this are questionnaires, interviews etc. as it is more dependent on interaction.	The tools used here are mobile, laptop and other electronic devices with internet facility.

8. Qualitative and Quantitative research
   a. Qualitative research
      Qualitative research is research that provides insights and insights into the problem posed. It is an exploratory, unstructured research method that studies highly complex phenomena that cannot be elucidated by quantitative research. Qualitative research often answers "how" and "why" questions about a phenomenon, behaviour, experience, attitudes, intentions and motivations, on the basis of observations and interpretations solutions, to figure out how people think and feel. This is a form of research in which the researcher gives more weight to the participants' views.

Advantages	Disadvantages
• The problem is seen from an insider's perspective: The important role that researchers play will help us better understand issues that quantitative research is easy to overlook. Qualitative research helps to clarify	• Limitations on the reliability of the research results: • The time required to collect and analyze data for a qualitative study is quite long and difficult. The researcher must have a good understanding of the research area as

the factors of behavior and attitudes of research subjects. • Because qualitative research uses unstructured research methods, flexibility is very high. • Help discover useful information quickly. • The duration of a qualitative research project is usually shorter and less costly than that of a quantitative research project.	well as the techniques of digging and analyzing to obtain the most accurate and valuable information without making the surveyor feel uncomfortable. • Because it is subjective, the generalization of research results to the whole is limited. • The transparency of qualitative research is lower than that of quantitative research for example for some sensitive issues, the researcher will keep the respondents' identities private.

b. Quantitative research

   Quantitative research is a form of research based on the methods of the natural sciences that generates numerical data and hard facts. It aims to establish a cause and effect relationship between two variables using mathematical, computational and statistical methods. Research is also known as empirical research because it can be measured accurately and precisely. The data collected by the researcher can be divided into categories or ranks, or it can be measured in units of measure. Graphs and tables of raw data can be built with the help of quantitative research, making it easier to study and analyze the results.

Advantages	Disadvantages
• Scientific objectivity: Quantitative data can be explained by statistical analysis, and since statistics are based on mathematical principles, the quantitative method is seen as the scientific and rational method. Therefore, quantitative research is perfectly suitable to test the proposed hypotheses. • The high reliability of the research results, the high representativeness, so the quantitative research results can be generalized to the sample population. • Quick analysis: Analysis software makes it possible to process large amounts of data quickly and accurately. Minimizing technical errors that may arise due to human factors in data processing.	• Quantitative research does not clarify the phenomenon of behaviors. • Surveyor Subjectivity: Researchers may miss valuable survey details if they focus too much on testing hypotheses. • Contextual errors can affect survey content. The quantitative research method assumes that people's behavior and attitudes do not change with context. However, the subject's response may change depending on different contexts. • Quantitative research uses more complex research methods than qualitative research, so it takes more time to design research procedures. • Because a large sample is needed to generalize to the population, the cost of conducting a quantitative study is

	often very large, much higher than that of a qualitative study.

   c. Key differences between qualitative and quantitative research
- Qualitative research is an investigative method that aims to develop an understanding of people and the social sciences, to find out how people think and feel. A scientific and empirical research method used to generate numerical data, using statistical, logical, and mathematical techniques is known as quantitative research.
- Qualitative research is holistic while quantitative research is specific.
- Qualitative research follows a subjective approach where the researcher is intimately involved, while the approach of quantitative research is objective since the researcher is not involved and tries to correct the findings. Observe and analyze the topic to answer the question.
- Qualitative research is exploratory. Contrast with quantitative research which is conclusive.
- The reasoning used to synthesize data in qualitative research is inductive while in the case of quantitative research, the reasoning is deductive.
- Qualitative research is based on purposeful sampling, where small sample size is chosen to understand the concept of the goal. On the other hand, quantitative research relies on random sampling; where a large representative sample is chosen to extrapolate the results to the population as a whole.
- Verbal data were collected in qualitative research. In contrast, in quantitative research, measurable data is collected.
- Investigation in qualitative research is a directional process, not in the case of quantitative research.
- The elements used in the analysis of qualitative research are words, images, and objects while that of quantitative research are numerical data.
- Qualitative Research is carried out with the aim of understanding and discovering ideas used in ongoing processes. In contrast to quantitative research, the aim is to examine cause-and-effect relationships between variables.
- Finally, the methods used in qualitative research are in-depth interviews, focus groups, etc. In contrast, the methods used in quantitative research are structured interviews and observations.
- Qualitative research develops initial understanding while quantitative research proposes a final course of action

9. About IOT in SmartHome
   a. What is IOT?

      The Internet of Things, or IoT, refers to the billions of physical devices around the world that are now connected to the internet, all collecting and sharing data. Thanks to the arrival of super-cheap computer chips and the ubiquity of wireless networks, it's possible to turn anything, from something as small as a pill to something as big as an aeroplane, into a part of the IoT. Connecting up all these different objects and adding sensors to them adds a level of digital intelligence to devices that would be

otherwise dumb, enabling them to communicate real-time data without involving a human being. The Internet of Things is making the fabric of the world around us more smarter and more responsive, merging the digital and physical universes.

b. The history of the IOT?

The true IoT history started with the invention of the internet—a very essential component—in the late 1960s, which then developed rapidly over the next decades.

- The 1990s

   In 1990, John Romkey connected a toaster to the internet for the very first time with a TCP/IP protocol. One year later, University of Cambridge scientists came up with the idea to use the first web camera prototype to monitor the amount of coffee available in their local computer lab's coffee pot. They programmed the webcam to take pictures of the coffee pot three times per minute, then send the images to local computers, thus allowing everyone to see if there was coffee available.

   The year 1999 was easily one of the most significant for IoT history, as Kevin Ashton coined the term "the internet of things." A visionary technologist, Ashton was giving a presentation for Procter & Gamble where he described IoT as a technology that connected several devices with the help of RFID tags for the supply chain management. He specifically used the word "internet" in the title of his presentation in order to draw the audience's attention since the internet was just becoming a big deal at that time. While his idea of RFID-based device connectivity differs from today's IP-based IoT, Ashton's breakthrough played an essential role in the internet of things history and technological development overall.

- The 2000s

   At the beginning of the 21st century, the term "internet of things" came into widespread use by the media, with outlets like The Guardian, Forbes, and the Boston Globe making mention of it. Interest in IoT technology was steadily increasing, which led to the 1st International Conference on the Internet of Things held in Switzerland in 2008, where participants from 23 countries discussed RFID, short-range wireless communications, and sensor networks. Moreover, several major developments fostered the IoT evolution. One was a refrigerator connected to the internet that was introduced by LG Electronics in 2000, allowing its users to shop online and make video calls. Another essential development was a small rabbit-shaped robot named Nabaztag created in 2005 that was capable of telling the latest news, weather forecast, and stock market changes.

- The 2010s

   The IoT boom was supported by its addition to the Gartner Hype Cycle for emerging technologies in 2011.

   In the same year, IPv6—a network layer protocol that is central to IoT—was launched publicly.

   Since then, interconnected devices have become widespread and commonplace in our everyday lives. Global tech giants like Apple, Samsung, Google, Cisco, and General Motors are focusing their efforts on the production of IoT sensors and devices—from interconnected thermostats and

smart glasses to self-driving cars. IoT has found its way into almost every industry: manufacturing, healthcare, transportation, oil & energy, agriculture, retail, and many more. This dramatic shift has us convinced that the IoT revolution is right here, right now.

As of today, IoT platforms maintain a stronghold on their position among the top trends in this year's Gartner Hype Cycle, along with virtual assistants, connected homes, and level 4 self-driving cars. The technology will reach its plateau of productivity in 5–10 years.

c. What is SmartHome in IOT?

Smart home, sometimes also called home automation, is a specific branch of IoT that focuses on home appliances and devices. Smart home devices can therefore be anything from lights, thermostats, robotic vacuum cleaners, and home security devices, to connected refrigerators that know when you are running low on milk. Some will even display recipes on the fridge door according to what is already on hand at home!

Life is more and more modern, the needs of people are increasing day by day. Smart home in Vietnam was born to meet this need. Smart home systems are the result of scientific and technological developments. Smart home installation brings a lot of benefits with many outstanding functions. Helping you enjoy a comfortable and modern life.

- Smart home installation helps control electronic devices with remote control
  Smart home helps each family's life become more modern. This system helps you easily control electronic devices in the house using remote. For example fans, televisions, air conditioners, entertainment systems. You can control these devices at the same time even when you are not at home.

- Set up the light system control system information
  With just a few simple steps on your phone or computer, you can quickly control the home appliance system. In addition, the lighting system can be controlled. You can manually set up situations such as: when the door opens, the light comes on, the light comes on when someone is there, the light goes off when the person leaves, or wherever you go, the light comes on.

- Installing a smart home to help control air conditioners and water heaters remotely
  The function of turning on and off the air conditioner and water heater remotely, helps you somewhat understand this concept. With smart home technology, you can set the time frame, adjust the temperature of the air conditioner and water heater to suit your needs. They will automatically work according to your settings. With this function, you can control the devices remotely and don't have to worry about forgetting to turn off the air conditioner, water heater

- Automatic garden watering system control
  With smart home technology, you can rest assured that your indoor garden is always fully cared for and at the right time. The automatic watering system will be set to the time you want. You can turn it on and off remotely with your phone.

- Control home appliances by voice

Installing a smart home, you can control everything in your home with your own voice. Very convenient and easy.

d. Advantages and disadvantages of SmartHome

Advantages of SmartHome	Disadvantages of SmartHome
- Simple and easy to use: When you have not had much exposure to smart technology devices, many of you will probably worry that controlling and using this smart home is extremely difficult and takes a lot of brainpower. But in reality, this worry does not exist because SmartHome is designed to be extremely simple so that the owner can easily manipulate the control with a light touch on supported applications or simply go out voice commands with virtual assistants without having to do it in person. Therefore, SmartHome is completely suitable for all audiences, including the elderly and children. - Remote management: SmartHome devices and platforms all have management applications, remote control and provide context for the whole smart home. At the same time, these apps allow you to adjust the state of your home's items with just one touch, wherever you are. Besides, this model is also beneficial for families with elderly or young members. You will feel more secure about their safety through the image on the interface and the status of the appliances in the family. - Save time: SmartHome with an automation system helps to optimize every action and time when handling work. This means that the amount of work to be done will be significantly reduced and you can use the resources of your time to relax and enjoy or do the things you enjoy. - Energy saving: SmartHome is equipped with smart home appliances that have outstanding advantages in saving electricity. Furthermore, the remote control optimizes	- High investment cost One of the biggest limitations that SmartHome faces is the very high total initial investment cost of the owner. This makes it difficult for most low- and middle-income people to access. This is also the main reason why SmartHome is still in the process of being widely applied and developing and the young economy is still facing many difficulties. - Difficult to reach the elderly Elderly people often have difficulty in contacting new things such as automation technology, so they often refuse to learn about SmartHome as soon as they know it. This is one of the difficult issues that makes SmartHome devices manufacturers always strive to reduce complexity, improve user experience, and make it suitable and useful for all ages and backgrounds degree. - Security needs to be improved Cybersecurity is always a worry and is the reason why people refuse to own a SmartHome because the loss of network security has been happening a lot. Hackers can easily attack smart devices via the Internet and control the operation of devices, the most dangerous are cameras and smart locks. Although SmartHome has always improved its security mode, it still cannot guarantee that network security is absolutely safe. So before owning a smart home, users always consider this issue.

your power consumption. Besides, you can also set the timer to turn on/off electrical appliances easily and quickly. - Modern and luxurious living space: SmartHome is equipped with the most modern and advanced technology household appliances to create a sense of comfort and convenience for owners and their loved ones. Not only that, the devices are delicately, compactly and beautifully designed not only to optimize the space problem but also to bring modernity and luxury to the whole house. SmartHome fully meets the owner with a comfortable, modern and luxurious living space. - Security system: One of the great advantages of SmartHome is the security system and typically the camera with infrared thermal sensor and powerful warning capabilities to help protect your home in the safest way. Intrusion warning will be done automatically through activating the security mode for the camera at the time frames you choose to help ensure the security of the house when you rest or leave the house.	

According to the smart home ranking criteria of market research, the smart home systems in the world today mostly belong to the Home Automation group. The highest level of a smart home is Connected Home. In the last few years, technology giants such as Microsoft, Apple, Google, Samsung... are urgently looking for ways to capture the largest "piece of cake" in the smart home market, which is forecasted by ABI Research to have a large scale to more than 40 billion USD by 2020. Like Google's acquisition of Nest (a maker of smart temperature controllers and smoke alarms), Samsung launched a self-contained smart home system in its devices or near this is Apple's introduction of the HomeKit smart home application development platform.

But through my experience and research on smart home, I was surprised to find that SmartHome product is a complete smart home system - Connected Home, connecting all kinds of devices in the house. . In other words, with SmartHome products, we are not the followers and consumers of the world's technology as it has been for a long time, but can completely become the leader in technology trends.

III.   PRIMARY RESEARCH

Below I have built a user survey using qualitative and quantitative questions to best collect information for later research:

Survey on Smart Home System

Customer information is the basis for determining the success of the project. For us, understanding the needs and desires of our customers is an important first step before a project is planned, deployed and installed. We always approach and implement projects according to a professional 4-step process: Understanding Needs, System Design, Implementation, Service and Support. Therefore, your information in this survey is extremely valuable to us.
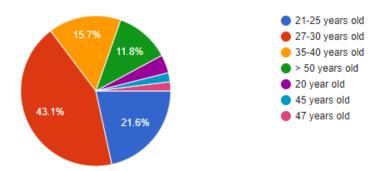
Survey Link:
https://docs.google.com/forms/d/175Rojmdk8byEG92ErIPBbGs3dLm8RQlNK4xrBiSRs8g/edit

Question 1: Your age:

Your age:

○ 21-25 years old

○ 27-30 years old

○ 35-40 years old

○ > 50 years old

○ Other:

51 responses

Regarding the first question about age, 43.1% of survey participants are between 27-30 years old. The proportion of people aged 21-25 who conducted this survey accounted for 21.6%. 15.7% is the proportion of 35-40 year olds. In addition, the proportion of people > 50 years old who conducted this survey was 11.8%. Besides, there are also a small number of other age groups conducting the survey.
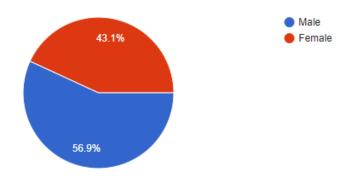
In general, it can be seen that the age of participating in the survey is very diverse, but the common point here is that they are all interested in SmartHome and especially young people between the ages of 27 and 30 with the rate of 43.1%. From that ratio, it can be seen that young people's grasp of technology is very good today and they are gradually transforming and applying technology to their lives.

Question 2: Gender:

Gender:

○ Male

○ Female

Gender:

51 responses
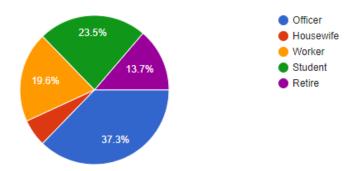

Male
Female

43.1%

56.9%

The survey respondents for this question are mostly male when accounting for 56.9% compared to 43.1% are female.

Question 3: Your Career:

Your Career:

○ Officer

○ Housewife

○ Worker

○ Student

○ Retire

Your Career:

51 responses

This question has an investigative nature about the occupation of the surveyed people. 37.3% said they are office workers working during office hours, 23.5% are students. The proportion of workers accounted for 19.6% and Retire was 13.7%. A small percentage said that they only stay at home to do housework (5.9%).
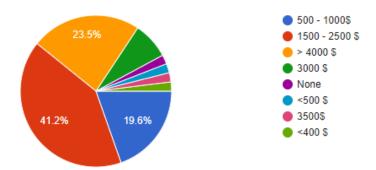
Based on the above ratios, it can be seen that the majority of survey respondents are office workers, but besides that, the percentage of students interested in this survey is also quite high when accounting for 37.3% of the total percentage of respondents rate above.

Question 4: Your monthly income:

Your monthly income

○ 500 - 1000$

○ 1500 - 2500 $

○ > 4000 $

○ Other: _____

Your monthly income

51 responses

- 500 - 1000$
- 1500 - 2500 $
- > 4000 $
- 3000 $
- None
- <500 $
- 3500$
- <400 $

Salary/income is very important to the life of every person. It is one of the determinants of quality of life. In the question of monthly income, 41.2% said that their income ranges from 1500-2500$/month, 19.6% is the rate for people with 500-1000$/month. People with income >4000$ per month accounted for 23.5%. Others said their income is stable $ 3000/month. A very small percentage shows that their income ranges only from $300-500/month.

In general, it can be seen that the income level of most people is very high, the proportion of people with income > 4000 accounts for 23.5% of the total rate. The growth momentum is increasing every year, leading to an increase in the average income of people. From there, it can be seen that their lives are more and more stable and develop in the direction of advanced modernity.

Question 5: Do you want to rent/buy SmartHome with price?

Do you want to rent/buy SmartHome with price?

○ 10000 - 15000 $

○ 20000 - 35000 $

○ 50000 - 100000 $

○ >150000 $

Do you want to rent/buy SmartHome with price?

51 responses

Legend:
- 10000 - 15000 $ (blue)
- 20000 - 35000 $ (red)
- 50000 - 100000 $ (orange)
- >150000 $ (green)

Pie chart values: 29.4%, 15.7%, 13.7%, 41.2%

In this question, people who choose to buy SmartHome at the price of 10000 - 15000 $ account for 41.2%. 29.4% said they want to buy SmartHome for >150000$. It can be seen that their income is very stable and their life is improving very quickly. The cost to own a SmartHome usually ranges from $10,000 or more, but with these two impressive ratios, it can be seen that owning a SmartHome is not too difficult.

In addition, we also collected some important information in this question as 13.7% indicated that they want to buy SmartHome with a cost of 25000-30000$. The remaining 15.7% choose to pay 50000-10000$ to own a smart home

Question 6: Are you interested in SmartHome? Where do you usually get information about SmartHome?

Are you interested in SmartHome? Where do you usually get information about SmartHome?

Your answer

Are you interested in SmartHome? Where do you usually get information about SmartHome?

50 responses

Yes, TV show

Im really interested in SmartHome. I get the information througt internet

I am quite interested in Smarthome. I often hear it through social networking sites.

Yes , I'm very interested with SMH because it bring us many convinece and where I live SMH is not popular

Yes, I often find out information about Smart Home through technology information pages

Yes,

In this question we can collect the most detailed opinions of people about SmartHome. Based on the above answers, it can be seen that most people are very interested in SmartHome, which also means that people are moving towards a smarter and more advanced life by using products that integrate technology in general and SmartHome in particular. SmartHome is gradually becoming more popular and more convenient. Along with that, its benefits are immense.

Question 7: If you are interested in SmartHome, how much do you plan to build/buy?

If you are interested in SmartHome, how much do you plan to build/buy?

Your answer

If you are interested in SmartHome, how much do you plan to build/buy?

50 responses

As mentioned above, my income is only average, so now I want to rent a smart house for about 5000-8000$/month

more than 3000$

more than 100000$

10000$

Because the construction cost is too high, I want to rent SmartHome for $1000-1500/month

100.000$

I want to build SmartHome for 100000-150000$

>3000$

Following the above question are everyone's opinions on the reasonable cost to build/buy a smart home. It can be seen that the majority of surveyors offered a price that is considered reasonable when they have a need to own a smart home of $ 10000 - 200000. A price is not small, but it can be said that their income is very good because their choice is always within their ability to pay. Life is gradually improving when the average income of each person is very high.

However, some of them think that they want to experience the smart features of SmartHome before making a decision to build/buy them. It is also extremely understandable because they may be exposed to modern technologies for the first time, so they inevitably make basic mistakes when using SmartHome's smart devices and features. They will make a decision to invest in building / buying them if they feel suitable after experiencing.

Question 8: If you care about the quality of SmartHome, what factors do you care about? (Aesthetics, security, features, maintenance issues, ...)

If you are interested in SmartHome, how much do you plan to build/buy?

Your answer

If you care about the quality of SmartHome, what factors do you care about? (Aesthetics, security, features, maintenance issues, ...)

50 responses

I think everything because they play an important role in a smart home

security and features

features

Investors

For me about the quality of SmartHome, what I pay most attention to is aesthetics and security

Security, Maintenance issues

The first thing I care about is the quality of the house, the space of the house, followed by the aesthetics of the house. The last is the price

Maintenance issues

Features

This question is related to the quality assessment of SmartHome. Users have given their opinions about the features that they think are outstanding of SmartHome compared to ordinary homes. Based on the answers, it can be seen that the two features users are most interested in are security and aesthetics.

Security is always the first choice because modern life always has potential dangers from burglars breaking into the house and stealing property. But with SmartHome, that will be greatly reduced because the security camera system is very intelligently integrated, one of which must be the smart camera bell system that can work even without internet. That's great and that's the difference of SmartHome.

In terms of aesthetics, SmartHome is now always designed in a modern and luxurious style and can meet all the supposed requirements from the most demanding customers. The higher the cost, the more customers can own luxurious and comfortable SmartHomes.

Question 9: If you are interested in the service quality of SmartHome, what factors do you usually pay attention to? And why? (consultation, maintenance service, promotion,...)

If you care about the quality of SmartHome, what factors do you care about? (Aesthetics, security, features, maintenance issues, ...)

Your answer

If you are interested in the service quality of SmartHome, what factors do you usually pay attention to? And why? (consultation, maintenance service, promotion,...)

50 responses

All of that because I like Technology.

Quality is always my first criterion

Maintenance service, because most of the devices in the house are smart devices, unfortunately one of them has a problem that old people like me can't fix.

technology is applied to that house

Geographical factors, people here. Issues around the building .building management board...

Consultation.

the first is the price, the 2nd criterion will be safety and security, the 3rd criterion that is important to me is aesthetics

The most important thing to me is the maintenance service issue because a normal house does not have the optimal maintenance service feature like SmartHome

The key question of this survey is related to the service quality of SmartHome when customers use it. There are many opinions given but it is all about the best solutions. Some customers said that the quality of maintenance service is the most important because it will be difficult for them to repair some smart devices in SmartHome. Some other answers commented that all services in SmartHome are important because it is a population consisting of many devices - smart features.
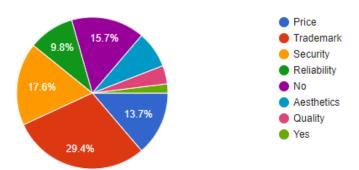
Through the above objective opinions, it can be seen that SmartHome is gradually being accepted and used more and more widely by people.

Question 10: When choosing to use SmartHome, which criteria do you prioritize:

When choosing to use SmartHome, which criteria do you prioritize: *

○ Price

○ Trademark

○ Security

○ Reliability

○ Other: _____

Submit   Clear form

When choosing to use SmartHome, which criteria do you prioritize: *

51 responses

Legend:
● Price
● Trademark
● Security
● Reliability
● No
● Aesthetics
● Quality
● Yes

Pie chart values: 15.7%, 9.8%, 17.6%, 29.4%, 13.7%

The last question in the survey is related to the criteria for selecting SmartHome. Looking at the results, it can be commented that the ratios are not too different from each other. 29.4% is the percentage of people who choose Trademark when choosing to use SmartHome. 13.7% of people are interested in Price when choosing SmartHome, Security is also noticed by the majority of users (17.6%). 15.7% said that they choose SmartHome without paying attention to any criteria. It is the trust of our customers for us.

A small percentage of attention goes to Reliability (9.8%) and 13.7% goes to Aesthetics. There are still some customers who are interested in other criteria such as: quantity, auto,...

Through this question, it can be seen that most users are interested in the criteria that are considered the most important in building SmartHome. They rely on the most objective factors to evaluate and make the most optimal choices.

Through the above survey, I have collected a lot of important information for future research. In general, IoT is growing and being widely applied in life. SmartHome is considered as one of the leading trends of IoT application. Potential customers who take the survey also give very objective opinions and that is extremely important to me. All information of survey takers will be absolutely confidential when conducting this survey.

IV.   CONCLUSION

Through this Assignment 1 I presented methods to research on my project - IOT in SmartHome. I have done primary research with a survey and evaluation form on it, besides, I have also done secondary research so that I can study in more detail about other aspects that the project brings to life. I finally came up with a Research Proposal Form to present my project timelines.

V.   PROPOSAL FORM

Research Proposal Form

Student Name: Do Van Thai   **Student Number**: BHAF190165

Tutor: Bui Duy Linh   **Date**: 29/10/2021

Unit 13: Computing research project

Propose title: Smart home

Section One: Title, objective, responsibilities
Research question: What is the role of IoT in smart home?   How important is IoT in life? **Objectives** • What is a smart home? • How does Smarthome work? • What benefits does a smart home bring to people? • How much does it cost to install a Smarthome smart home? • How long does it take to install a Smarthome system?

● When the power is out, does the Smarthome system still work normally?
● If there is a problem in the central system, will the house be in danger or malfunction?

Section Two: Reasons for choosing this research project
Reasons for choosing the project
● I am interested people's quality of life in the 4.0 era
● I am interested in the potential of IoT in general and its application in practice in particular (Smart Home): Technology 4.0 is creeping into the real estate sector and forming the concept of a very popular Smarthome product line. Many consumers, especially young people, prefer
● SmartHome is currently the most widely applied application around the world: Smart home is considered an inevitable development trend of the residential real estate market in the future. According to a report by Zion Market Research, in 2016, the global smart home market reached a value of about 24.1 billion USD and is expected to reach 53.45 billion USD in 2022. The average growth rate is above 14.5 %/year.
● I have development projects based on IoT applications into Smart Home

Section Three: Literature sources searched
The initial sources which could help me to answer those questions:
1. https://www.cornerstoneprotection.com/skybell-doorbell-camera/..
2. https://www.digiteum.com/iot-smart-home-automation/

Section Four: Activities and timescales
1. Collect materials relating to research's question and objectives
2. Complete research proposal
3. **Milestone 1[11-11]**: Get feedback from the Tutor about the research proposal
4. Produce project plan
5. Writing literature review and represent the findings in term of hypothesizes
6. Check project progress: research proposal, plan, literature review
7. **Milestone 2[19-11]**: Get feedback from the Tutor about the plan of primary research.

8. **Milestone 3[19-11]**: Get feedback from the Tutor about the result of literature review
9. Conducting the primary research
10. **Milestone 4[21-11]**: Represent the findings in primary research and get feedback from Tutor
11. Writing assignment 1 which contains LO1, LO2
12. **Milestone 5[23-11]**: Submit assignment 1 -Draft
13. **Milestone 6[15-12]**: Submit assignment 1- Final
14. Writing Assignment 2 which contain LO3, LO4
15. **Milestone 7[19-12]:** Submit assignment 2 -Draft
16. **Milestone 8[30-12]:** Submit assignment 2- Final

Section Five: Research approach and methodologies

- Research process: Sequential
- Research classes: Quantitative and Qualitative
- Research methods: Survey and case study

Comments and agreement from tutor

[This part not for student]

Comments (optional):

I confirm that the project is 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)
[This part not for student]   Comments (optional):   Agreed: .... (Name)   .... (Date) ....

VI.   REFERENCE

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