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SECTION 08

PROJECT – PHASE 1 (PROJECT PROPOSAL)

INTERNET OF THINGS (SMART HOME)

LECTURER: DR. IZYAN IZZATI BINTI KAMSANI

GROUP NO: 3

NAME	MATRIC ID
WAN MUHAMMAD AIMAN BIN WAN MUHAMAD FAISAL	A21EC0237
MUHAMMAD THORIQ BIN KAHAIRI	A21EC0096
MUHAMMAD FAHMI BIN ROSLEE	A21EC0285
AFIQ FAHMI BIN ROSLAN	A21EC0153
AARON TAN	A21EC0152

TABLE OF CONTENT

PROBLEM BACKGROUND

1.1 Overview of Project

This project is primarily focused on the Internet of Things (IoT), specifically smart homes. What is the internet of things? The IoT is a network of interconnected computing devices, mechanical and digital machinery with unique identifiers (UIDs) and the ability to transfer data without requiring human-to-computer or human-to-human interaction. The devices in IoT can accomplish most of the work without human interaction but individuals still can communicate with the devices. For example, users can set them up and give them instructions or they can remotely access data on specific devices.

Then, what exactly is a smart home? A smart home is a convenient house setting in which appliances and equipment can be managed remotely using a mobile or other networked device from anywhere with an internet connection. A smart home's devices are connected through the internet, allowing the user to handle features such as temperature, home security, lighting and a home theatre remotely. Self-learning capabilities are included in smart home devices, allowing them to learn the owner's routines and make modifications as desired.

Our report will explain how the smart home system works premised on this low-fidelity prototype project. From the project's limitations, cloud architecture, and benefits. This project's sole purpose is to make human life easier and better in the future. Humans no longer need to worry about non-productive tasks at home and instead focus on important jobs.

1.2 Problem Statement

Everyday duties at home may leave you fatigued. As simple as cleaning the floor, switching on the air conditioning and the light or even the lock door. Imagine all of that can be managed from far away and happen autonomously. The devices at home can interact with each other. Data from the devices are kept in the cloud and will be analyzed using machine learning and artificial intelligence (AI). Using this technology, gadgets can learn and adapt to the user's routine in order to meet the user's needs.

1.3 Proposed Solution

The smart home comes in handy for solving the aforementioned problem statement. All of the above can be achieved with a smart home system, but it comes at a cost. It's not simple, and the system is still pricey for the time being. It can give security, energy efficiency, and convenience of use with a smart home. It also provides remote interface to home appliances to provide control and monitoring as long as the devices are connected to the internet such as smartphones, laptops and even smartwatches. That is currently the preferred answer for now and in the future to have a better home.

1.4 Objectives

Making Home As a Safe Place

Safety means freedom from harm or the danger of harm. All people are responsible to provide safe conditions and individuals' safety in their house. Smart security can monitor and be able to alert no matter where you are such as for leaks, for leaving the garage door open, for smoke, for when someone rings your doorbell, or for if you left something plugged in that really should have been turned off before you left the house.

Why security system is important? It is important to protect your home and your family from burglars or intruders. Based on the statistics, Criminal Investigation Department director Abd Jalil Hassan said a total of 5,518 individuals were arrested over house burglaries during the MCO period between March 18 and June 27, and of the number, 3,572 people were unemployed. Maintaining a safe and healthy environment at home is a top priority.

Save on Energy Costs and Eco-friendliness

With smart home capabilities, we can set things like lights, air conditioners and other appliances on schedules to make sure we are not wasting energy. Saving electricity and eco-friendliness is very important. Knowing how to use electricity can reduce the impact of pollution. Obviously, by minimizing the use of energy-producing sources of nature, you are adding an edge to the natural greenery. Some examples of ways electricity production can poison the environment include acid rain, soot, carbon dioxide, toxic gases and tarnished land. It's also a great way to save money as we do not need to spend all our money just to pay our bills.

Enhance Accessibility

You can operate all your appliances and mechanisms from a centralized point if you have a decent internet connection, a cell phone, or any other device. The primary way this works is by integrating all your devices with a centralized smart home control system. Once everything is under one umbrella, you can stop juggling remotes and manage everything from one device. This could be your smartphone, a tablet, or a wall panel. Regardless of which control device you use, everything becomes more streamlined. You can operate everything remotely due to the clever connectivity between your household equipment. The connection to the internet allows the end-user, resident, to communicate with the smart home to get current information and remotely activate tasks.

Optimize Inhabitant Productivity

One of the ways smart homes make people productive is that you don't have to keep moving around the house to do things. All the tedious and non-productive work inside your home can be completed at the touch of a button. Furthermore, you are free of frequent interruptions and distractions. You can utilize the saved time at your discretion doing things that interest you.

Improve Wellness

Smart home fitness technology would be great that can help you exercise more effectively, keep track of your weight, and even improve your form. Furthermore, smart thermostats can maintain humidity levels in the home, reducing the spread of coronavirus particles for example. Moreover, technology such as a temperature sensor, pulse oximeter, and microphone in one device with heart rate and blood pressure will monitor and automatically send mobile reports to your doctor.

1.5 Scopes

Smart homes will be the necessity of the coming generation. It is time-saving, energy-saving, and beneficial for elderly or handicapped people. It will add comfort to the life of hardworking people which they deserve. The home automation industry is growing rapidly, and it has to go way long. Improvement is needed in terms of smart home data. Hackers could potentially access the homeowner's network, leading to worse attacks or data exfiltration. With great security, the consumers will not be concerned about the privacy of the data shared by their smart home devices anymore. The next step would be to extend this system to automate a large-scale environment, such as offices and factories.

SYSTEM BOUNDARIES

2.1 Limitation

High Installation Costs

A smart home is a great way to increase our daily life efficiency. But some problems arise with it. The disadvantage is they can cost you a lot of money. The installation cost is relatively high since it can reach tens of thousands of ringgits. However, smart homes may save you money in the long run due to the energy savings. Thus, it is crucial to consider the short-term and long-term benefits if you decide to put your money into the initial cost of this technology.

Maintenance and repair issues

The smart home also gives some problems when it requires maintenance or repairs. Especially if you live in rural areas with hardly any people, it might be hard to find someone who can fix issues regarding smart homes because many technicians don't have the skill in this field. Moreover, the items for replacement may also be hard to find. Thus, in the worst-case scenario, you might have to fix the problems yourself, which could make it worse.

Reliable internet connection is crucial

Another downside is that smart homes need a fast, reliable and stable internet correction to work as intended. For example, suppose you live in a place with a lousy internet connection. In that case, your smart devices may not respond to the signal sent from your controller. This problem also makes it impossible for you to control your smart devices from a significant distance, such as your office or generally when you are outside.

Security issues

Smart home technologies also can't run away from security issues since a band of thieves or hackers could hack into your smart home server and open the lock to steal what's inside your home. What's more dangerous is that they can also steal your data. Thus, even though a smart home is convenient, the security issues that come with them are pretty scary for you and your family.

Privacy concerns

Lastly, many people criticize smart homes since they claim there might also be significant privacy issues related to them. For example, suppose you use a voice-recognition system that listens to what you say all day. In that case, the companies may gather your data to be used for their benefit. Therefore, if you value your data and privacy highly, you might want to reconsider risking yourself giving away your data to third parties.

2.2 Major User Views

User views are the list of users and for every one of them, the functions or requirements they need of a database system. For the Smart Home, there are 5 major user views which are the manager, administrator, assistant, buyer or client and the guest.

User View	Requirements
Manager	• To carry out searches on staff's activity (Manager, Administrator and Assistant). • To report on the information of time control by Buyer/Customer/Guest. • To maintain, add or delete data on staff.
Administrator	• To maintain the database. • To modify the data. • To view the information of the devices and sensors. • To control the control equipment for the devices and sensors.
Assistant	• To view, track and report on the real-time receiving gateway of the devices and sensor's information.

Buyer/Client	• To control the control equipment for the devices and sensors. • To modify specific data regarding usage of devices and sensors.
Guest	• To control the control equipment for the devices and sensors but very limited access or no access depending on the client.

Table 1

PROJECT PLAN

3.1 Cloud Architecture

Home Condition

Typically, a smart home is designed with several sensors to monitor the environment. The sensors contained a signal processor, a communication interface, and a cloud infrastructure host. Each sensor is used to capture one or more measurements. For example, a sensor can monitor temperature and light while others calculate the humidity for a specific region and its distance to each object exposed to it. All sensors help the user collect data and save it from being used anywhere and at any time.

Controlling Home Appliances

A person can manage all home appliances on a cloud service infrastructure. The service will allow the user to control smart devices by connecting them to actuators for devices that require movement. In contrast, devices that don't need it will directly be controlled from the cloud. An actuator is a device that uses a form of power to convert a control signal into mechanical motion. An example device that uses an actuator is electric locks in the doors. In comparison, devices that don't need it are speakers with music.

Example Of Cloud Architecture

Building owners often use these technologies in public door locks since they used a system that allowed only authorized people to get in. They used an RFID card and an RFID reader to achieve this. The authorized person with an id card scanned it via an RFID reader. The scanned id is then sent to the cloud system through the internet. The cloud will then compare the scanned id to the authorized ids in the database.

3.2 Cloud Architecture Diagram

To explain all the services and data management described before, we can see the figure below on how the components are composed in the system.

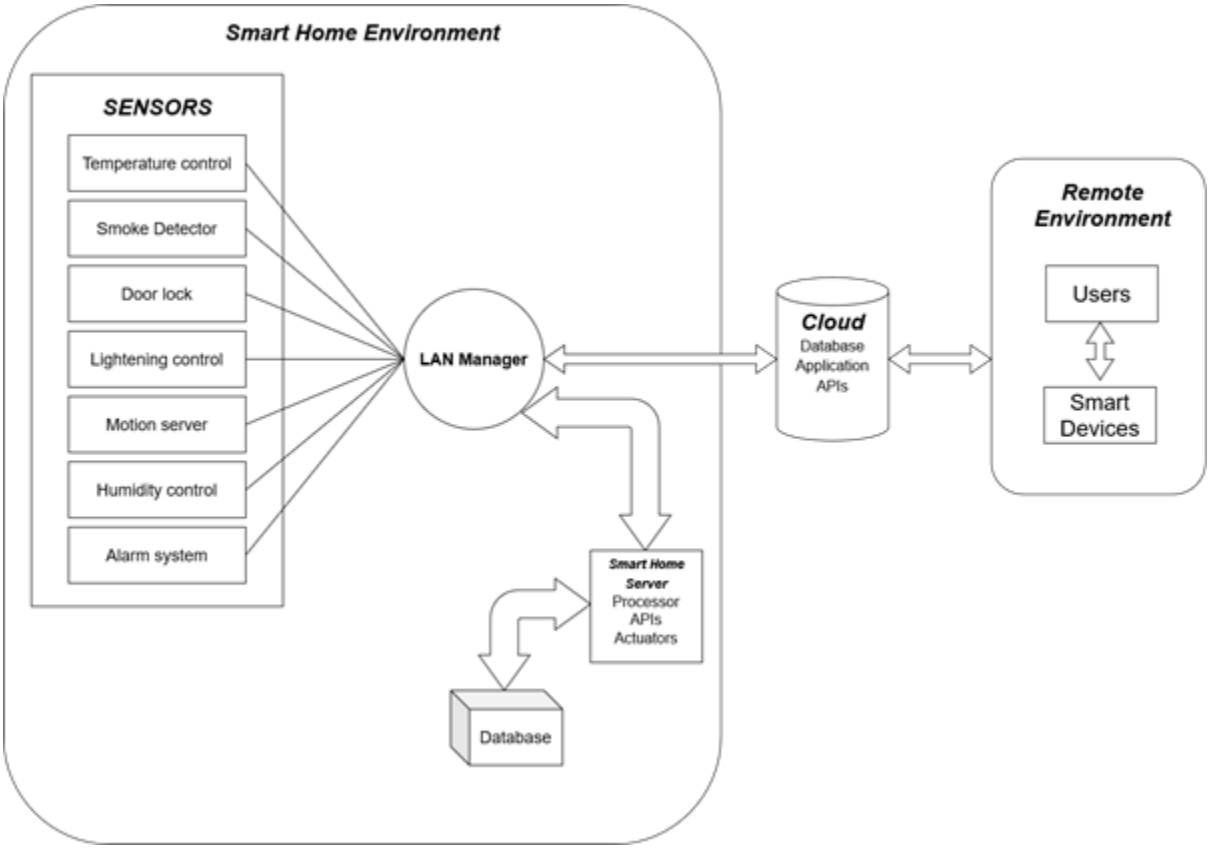

Diagram 1

First of all, the sensors collect data from the environment. Since the sensor is not connected to the cloud, the data is only transferred to the local home server. Then, the server will use the processor to process information received from the sensors. The processor can also be connected to the cloud if an application requires more resources. after that, the actuators will run commands from the server or the smart devices

3.3 Gantt Chart

The Gantt Chart of our progress throughout the project is shown below:

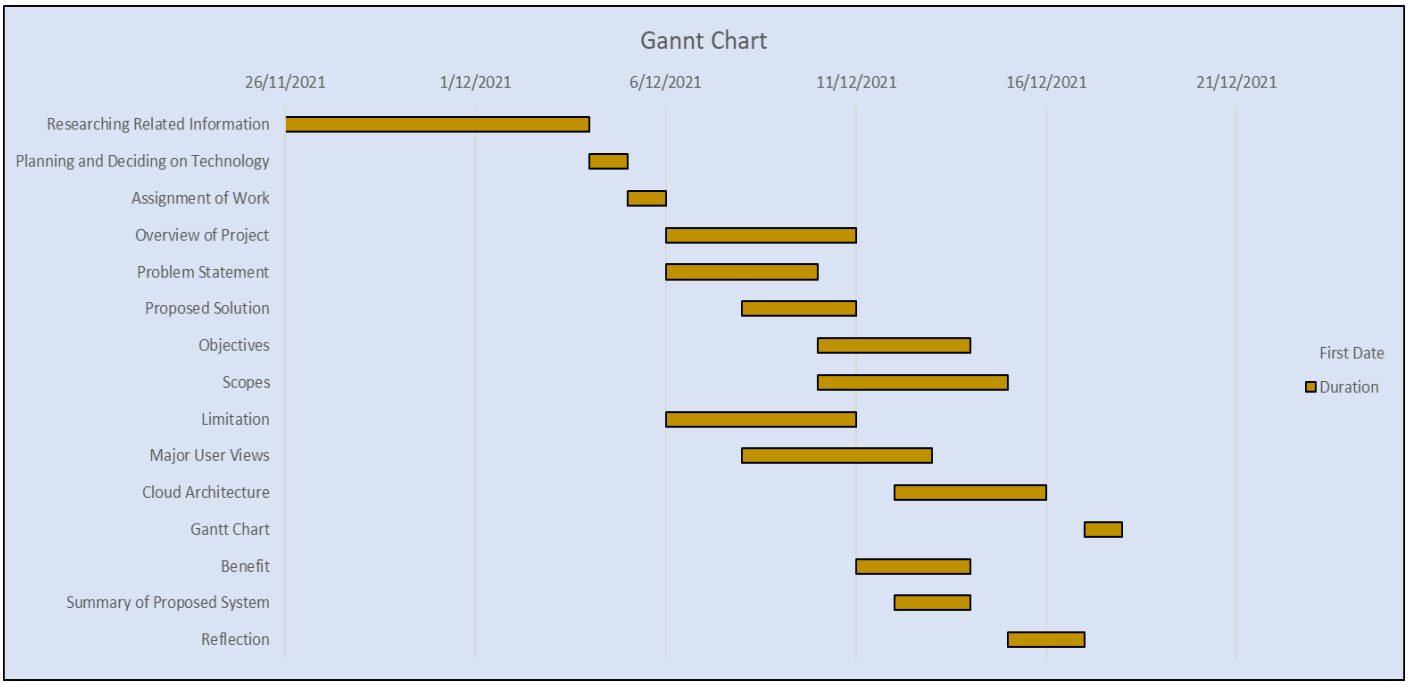

Chart 1

BENEFIT AND SUMMARY OF PROPOSED SYSTEM

4.1 Benefit

The proposed system can provide the users with many benefits such as reducing error due to computerized there is fewer possibilities error. Furthermore, it can also reduce the paperwork because the proposed system only required less paperwork. Apart from that, by doing the proposed system, it can increase work speed due to automation of some parts of the system. Another point is it also provides the user's graphical user interface (GUI) for better interface and experience. On top of that, the proposed system gives users information by searching about the product, sales, and others that become comparatively easy to the users.

4.2 Summary of Proposed System

In general, the proposed system refers to a set of operable computer programs that will perform most of the functional requirements contained in this request of the proposal (RFP) without modification. The proposed system should include system interfaces and conversion tools, as well as third-party software products provided or recommended by the contractor to correctly design, develop, test, train, implement, interface, adjust and operate the proposed solution. The proposed system should include document management, workflow, rules engine and customer relationship management functions. But in our project, the purpose of the proposed system is to explain what we are going to do with this project. What is our project? What's new in our project besides existing things? And how we will do it. In short, the proposed system is explaining our project in more detail and to be precise.

REFLECTION

5.1 Reflection

We have learned a lot about why smart homes are so important towards the advancement of 4.0 IR. As we all know, the smart home which is one of the cloud architecture developments has proven that it can give a lot of benefits to the user. The biggest advantage of having a smart home system is it can maximize our home security. Home automation systems can connect with automated door locks, surveillance cameras and other security measures throughout your home. The users can just activate the security system from mobile or any devices that support the remote-control functionality. The users can also choose to receive security notification alerts on their important devices and also monitor the security system in real-time. Not only that, but it can also provide the users easier remote access due to the existence of controlling home appliances function. It can ease the users to access any appliances or devices that relate to the smart home without needing to physically press the button to turn it on or off.

However, the users may just use the remote controller or use the provided apps to control it from far. Furthermore, being able to know the home condition can also increase the energy efficiency. The sensor technology that can control heat and lights is very crucial in order to reach the best energy efficiency throughout the day. Thus, our country must be prepared to adapt to the innovation of IoT devices that will benefit the masses.

CITATION

6.1 Citation

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