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# Smart Home Automation Towards the Development of Smart Cities

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*Abstract*

*This research aims to know the effect of electronic service quality, product, price, promotion on customer satisfaction in the Lazada.co.id online store customers in Jakarta. Electronic service quality, product, price, promotion is a things into consideration and provide value to customers in choosing an online store as a destination shopping. In this study the author uses an online questionnaire method against 235 respondents or Lazada.co.id customers. Then conducted an analysis of the data obtained in the form of a descriptive analysis, quantitative analysis include the assay validity, reliability test, test of goodness of fit, and the analysis of the model of measurement SEM (Structurak Equation Modelling) using Software AMOS 22.0. From a study of 235 respondents, results of the study indicate significant influence between the influence of the interactions in five variables, namely (1) Electronic Service Quality affects Satisfaction, (2) Product affect Satisfaction, (3) Price affect Satisfaction, (4) Promotion affect Satisfaction*

*Keywords: Electronic Service Quality, product, Price, promotion, customer satisfaction, customer loyal*

## 1. Introduction

*Home automation system is a system that controls by the smart device using a mobile application. It can control home appliances such as light, fans, air conditions, and smart security locks, etc. Bluetooth or Wi-Fi technology will be used to control things remotely. Many people were thinking about that technology is taking a really huge part of our lives. It does! we're living in a modern generation where smart and intelligent systems are necessary to be there wherever we are to make our lives easier and much better, for example, we can do many things faster, better, and more accurate.*

*Keywords: Smart Home, Internet of Things, Smart Cities, Arduino, Mobile Apps.*

## 1. Introduction

Through the years when smart systems were the only topic that all people talking about, a group of some persons had an idea to improve the living style and taking modern technology into consideration. They found out that it would be great if houses will have something similar to the way of human-like. For example, we might forget to turn the lights off, so, we will pay money for that and we will be regret at the end of the month, so they had somehow an idea of having a Home Automation Systems. Home Automation Systems are applications that have the accessibility to the whole house's controls, such as, lights, TV, AC, garage, doors, and so on. Home automation management systems have always future hints. Lights will turn on when entering the room, Fans will be activated when the temperature is too low, Allow the family members to enter the house throw security looks that can detect all of the family members. Mostly, people will think this is unreachable, they will say it's impossible but actually, it is true! The way that people think is different from the way that we think as developers, they think it needs a

lot of devices to control the entire house fields, but, it doesn't. All we need is one smart device to install the application that was programmed for a specific house and then you can run this app as you want. Home automation systems built to be structured as the user required, it is reachable. Now instead of turning all of these controls off by going to each button and switch them off, you can just use your smart device and switch whatever you want off, indeed, it will reduce the time you take to make sure about all of your house's area and check all of the controls. Our systems will also have less cost compared with any normal electricity powers in case of power safety. No matter how big is your house, the system is capable of more than you will ever imagine.
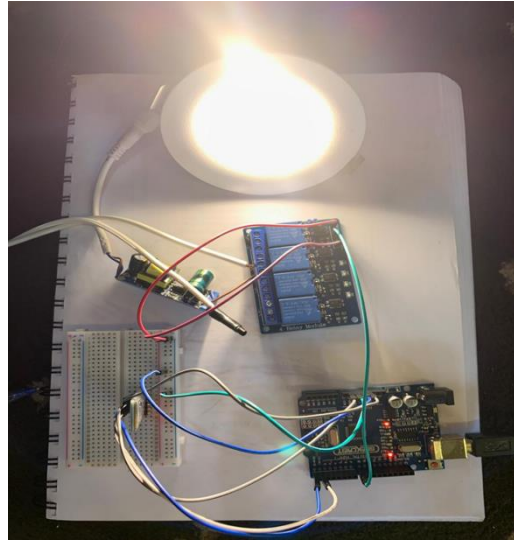


Figure 1. Home Automation System Block Diagram

## 2. Literature Review

The Internet of Things(IoT) during the last few years was used so widely in the smart house systems. By controlling almost all appliance and security. The system consists of Arduino Uno Board, PIR sensor, temperature sensor, gas sensor, power select, and web applications. GSM is used to communicate the microcontroller and the web page and facilitates energy management. It also monitors the type of device encountered at home and activates the operations. The sensor parameters will be stored in the cloud. The system also can be used in mobile health care, traffic management, and so others. In the 21st century, there was a man that had an idea which allowed him to access all the devices. Now we can even access the internet with only one click. Home automation is a mobile application for safety and proper use of a human. In the last 10 or more years ago, we used to switch the home appliances manually. Based on the difficult access. At the beginning of this new automation, it was not considered an effective method yet. As technology has improved this system to control by Bluetooth modules. The problem with using Bluetooth is that it has a limit of the wireless range, also a chance of interference with other devices using Bluetooth. In advance, they made this kind of automation to be used using Android by android mobile phones. Lately, they figured out a system that can control and monitor the home appliances using any device which has an internet connection.

In the last years, home automation has achieved a really great job and increased the comfy of a lifestyle. Smartphones are used to control all of their home appliances. You can communicate with all the home's controls using a smart device including new techniques. We never forget how the home automation has extremely grown, these systems have been created to improve the comfortability of a lifestyle especially for those who are elderly and disabled these systems are designed by using a single controller that owns the ability control interconnected appliances such as lights, TVs, and so on. The most interesting thing is that you can control all of these appliances easily by using smartphones. Home automation systems could be controlled throw some methodologies such as Bluetooth and Wi-Fi. Bluetooth is a technique that is secured and low cost as well. The hardware will be using an Arduino BT board and cell phone is wirelessly using Bluetooth. The smartphone uses the application that allows the

user to control these appliances. The system also uses passwords to make sure it's not going to be used by some others.

Voice recognition also implemented by a researcher. Android OS has a built-in voice recognizing feature ability to control the home appliances from user voice commands. The application converts the voice into a text after that it sends that message to Bluetooth module that is connected to the Arduino. The great thing of this voice application transmit is that the user only needs to pronounce the application name throw the microphone and say the commands that he wanted to do such as turn the light ON or OFF.  By using this kind of home control, the user doesn't have to do anything except saying the words that the application will recognize to achieve these commands.

In this research, they've explained how the home automation system works. this system works in smart devices using android application and gives the user some services to make this technology easy for controlling the house. These services are connected and used by connecting the smart devices via Bluetooth technology but it can handle only 24 devises at most at the same time with more than 100m range of Bluetooth signals. but the problem in this research is that the signal has a limited range to be controlled and it will not work with a big distance, also, it's not supported by Wi-Fi.
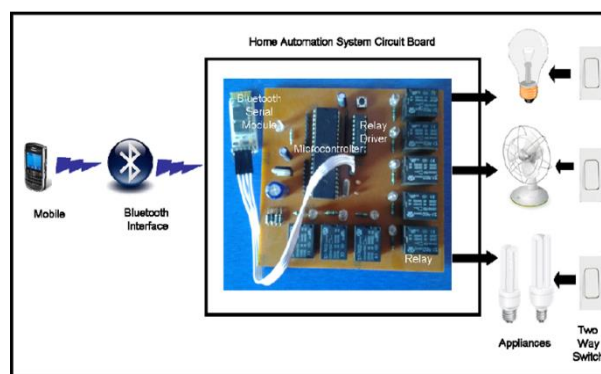


Figure 2. Home Automation System Structural Diagram

### 3. Smart Home Automation System Components

The following are the main components of Smart Home Automation System.

- ❖ User interface
- ❖ Smart device
- ❖ Arduino
- ❖ Android application-based Wi-Fi

Even though the system has the security part which is more I like, it can detect the family members using scan face by saving them in the database and recall that part while scanning, so it will immediately open the door when any member of the family is there. During the calculation of the percentage and of having a large amount of wasted electricity power in the last few years, and some other information that the current systems have. Our aim is to have the ability to let everyone lives on his own lifestyle, erasing the fear of thieves and the shock after looking at the energy bill. No matter how hard we will work, no matter how much they want us to risk, our point is walking away after recognizing the perfect smile of those users we have. We would define the problem as follow: -

1. The common property of success and the ability to make the house as less energy cost as possible such as having the safety power mood that will detect if there is no one inside a room for a couple of minutes it will immediately shut the power off.
2. The tragedies happened to houses by thieves at late nights especially when the owners are not there because of their house doesn't provide any security systems.

The home automation systems will provide the need and the user requirements to handle all of these problems and tragedies that could happen in life. Sometimes we can do something to handle these

problems. But, sometimes we're so far away from home. Therefore, the best way to think about while you have this situation is by using these modern systems, and it will be as follow: -

1. The system will reduce power consumption.
2. The system will also reduce manual power.
3. The system will work efficiently and effectively.
4. The system will work in real-life time.
5. The system is a real challenge for people.
6. The system has also powerful security.
7. The system will also include scanning cameras to support both cases which are recognizing the family members and recording any sense of the presence of other people who are rounding the house.

In order to fill the gap of wasting the power of electricity in the houses, we have the idea of saving this cost of electricity which has been a problem in the last few years. Also, the security needed, especially when the owners are far away from home in case of traveling or other reasons. Two main objectives will be covered along with this project:

1. Building an application to control the houses' appliances.
2. Based on Wi-Fi connecting the house with the application.

The Functional Requirements are summarized as follows.
1. Ability to process data according to user choice.
2. Ability to apply the user commands immediately.
3. Ability to switch on and off the power.
4. Ability to recognize family members.
5. Ability to access Arduino using a smartphone. The nonfunctional requirement is as follows.
6. Accuracy.
7. High security.

## 4. Software Development Methodology

In this research, we use waterfall model, " It defines some basic tasks, which are carried out in sequence requirements definition, architecture design, detailed design, implementation, component verification, integration verification, and requirements validation. Each task results in documents or other artifacts that are used as specifications for the next task, e.g. the detailed design specification forms the basis for implementation task. In the "ideal" form, one task should be completed before the next starts. There are however variants with overlapping tasks, and these are probably used more in reality. Implementation starts when some of the detailed design is ready, component tests when components are implemented. The following tools are used in the development of the system.

circuito.io : is a software that uses to design the block diagrams and electronic circuits.
Tinkercad : It is a software that uses to design the hardware.
draw.io     : It is used to design UML diagrams.
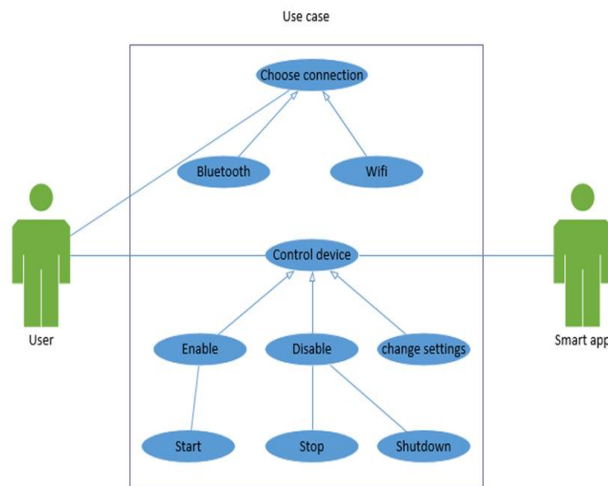Erdplus     : is used to design an entity relationship diagram.

Figure 4. Use case diagram between User and Smart App

The following hardware is required to develop the home automation system.
  ➢ Smart Device: tablets or any smart device.
  ➢ Connection: Which can be supported by Bluetooth or Wi-Fi.
  ➢ Arduino Uno board: to connect the appliances with the system.

The Following Software required
  ➢ Android studio: to create the interfaces, and implementation of the program.
  ➢ Operating system:  Android.
  ➢ Arduino software: upload the codes into the Arduino board.
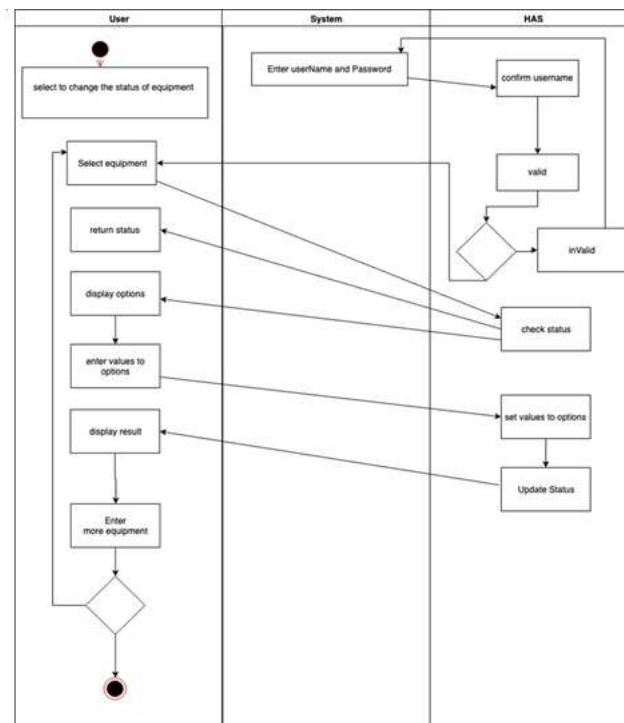  ➢ Database: SQL server management studio to creating the database.



Figure 5. Activity diagram of the system

development community with a stable and common design language that could be used to develop and build computer applications" (bell.2003) In this report, we use three types of UML models, which are:

Use case diagram: "A use case illustrates a unit of functionality provided by the system the main purpose of the use-case diagram is to help development teams visualize the functional requirements of a system, including the relationship of "actors" (human beings who will interact with the system) to essential processes, as well as the relationships among different use cases.

Activity diagram: "Activity diagrams show the procedural flow of control between two or more class objects while processing an activity.

Entity Relationships Diagram: "is used for describing data and the relationship between different entities in a database. It creates a visual map outlining process requirements and detailing connections among entities and their attributes.
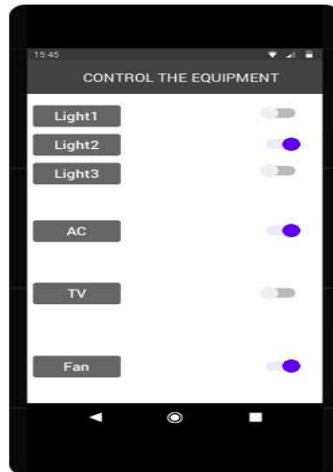
Block Diagram: a high-level diagram used in engineering too. It's also used to create new systems or improving an existing system.
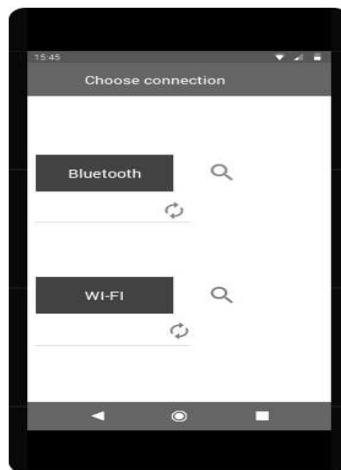


(a)
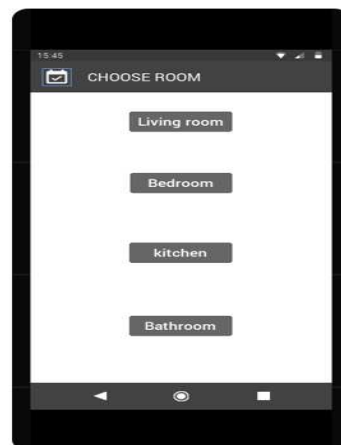


(b)

(c)

Figure 6. Interfaces of smart app

Our system has made to help the oldest and disabled people. It can be used by many users as it shows in the report. The system is created to do whatever the user wants for controlling the house's equipment using a smart device that can be supported by our programming language.

## 5. Conclusion

Smart systems are a designation that is given to the people which make their lives easier to improve the quality and execution, this research aims to provide a new hybrid solution for smart houses that is combine mobile application and an Arduino, because Smart houses are always focusing on leveling up the usability security as well, with the use of this solution for giving people the chance to control their own houses it will be a helpful method to achieve the goal of our system. as we mentioned before our system will give the chance to the user to choose either Bluetooth or Wi-Fi in this report our system will work only on Bluetooth we will be working in the next project for combining the Bluetooth and Wi-Fi together in the same application as the user wishes. Also, our full application system will be ready in the next report as a full version and we will cover more details about our methods and implementation of our system.

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