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Future IoT based on Smart Mirror: A Literature Review

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ABSTRACT: This paper discusses Future IoT based on Smart Mirror which is useful in various fields of human life. Smart mirrors were developed using Arduino and Raspberry Pi for further development. In the future this technology will be useful to help humans do their jobs such as in health, sports, learning and so on. To interact with smart mirrors, users can use voice or face recognition. In addition to the smart mirror, the future of IoT can also be used as a smart home where objects will be connected to the internet. Smart Mirrors and IoT can also help in people's daily lives such as can be used for smart parking. In implementing IoT in the future, the challenges that will be faced are very diverse, such as the accuracy of analysis, data security and so on. These challenges must be prevented and their impact minimized so that IoT can be of maximum use in the future. This literature will discuss the benefits of applying IoT in the future as well as its application, Sensor and microcontroller on IoT and Smart Mirror and also discuss the problems that may arise from this IoT technology in the future.

Keywords: IoT, Smart Mirror, Sensor, Microcontroller, Problem.

I. INTRODUCTION

Nowadays technology almost dominates all human life. Technology helps human life in various aspects. Nowadays technology is increasingly being developed, one of which is the Internet of Things (IoT). With this technology, we can connect the internet with objects to exchange information. This interaction utilizes internet connectivity by being connected continuously. Such communication can take the form of data exchange or remote control without requiring interaction from human to human or from human to computer devices. Many devices are connected to the internet such as laptops, smartphones, computers, and others. IoT is a combination of sensors [1]. IOTs utilizes various sorts of innovations including remote like RFID , ZigBee module just as wired associations like 3g, LTE . Various kinds of microcontroller used to make a move in the advanced world to physical world . Taking a case of SmartAppDoorLock framework a client or the proprietor will tap on a connection or lock/open catch on versatile application or pc with the goal that it will make a move to the physical world and will open/lock the entryway according to as order [Smart Environment using Internet of things (IOTS) - A Review].

By controlling the device remotely and connecting to an internet connection, it can open up opportunities to connect and integrate the original world with the digital world using sensors that can identify objects that have Radio-Frequency Identification Tags (RFIDs) or other [2]. Then the sensor is connected with several devices to forward information that will be analyzed and used to make decisions and produce relevant products. There are several main benefits in IoT, which are improved customer engagement, which is useful to improve user experience with tools that are shown to all actions, then technical optimization that helps the development and improvement of technological functions so that technology can continue to develop, and reduce waste that can make devices make decisions or follow orders given in real time which results in very effective information management and decision making. The architectural form of IoT is explained in Fig. 1.

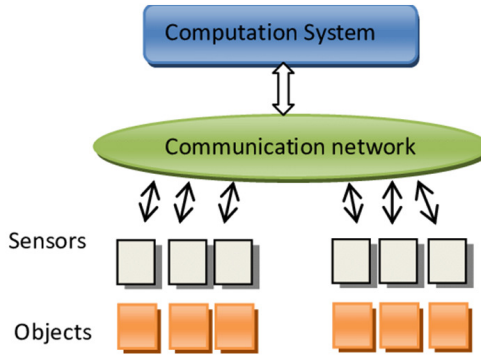

Fig. 1. Basic IoT Architecture

The use of IoT in recent years has not been very popular and is not yet widely known by the public. But over time, the technology that uses IoT will be more and more widely known by the public. With the technology that is connected to IoT, it can help and facilitate people's lives in general, because IoT can be applied in various fields. For example, IoT can detect traffic accidents and will automatically contact the hospital so that the ambulance will come to the accident site without having to be contacted first [3]. it can also be used as a reminder for humans, for example IoT technology is applied to the refrigerator, if the food supply runs out it will automatically be reminded [4].

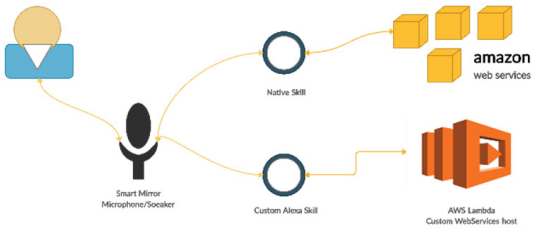

Fig. 2. System voice command [6].

In recent years, there have been several technologies from IoT that have emerged. One of them is a smart mirror. This technology is a mirror that can display information needed by users such as weather forecasts, the latest news, schedule of activities and others [5, 7]. But not only display information, now the technology has been increasingly developed. For example, As shown in Fig. 2, using voice control to give commands such as turning off or turning on lights, opening windows and turn on the tv. Or facial recognition that is used to recognize the user's face, analyze moods, emotions and others [6, 8].

This study has a gap because previous studies only focus on reviewing smart mirrors in several fields and see differences between the types of smart mirrors while in this study aims to find out what will be provided by smart mirror-based IoT in the future by reviewing various benefits which can be given in different fields by looking at the differences between the types of IoT used.

This paper is organized as follows. In part 2, we discuss the basic workflows of IoT. Part 3 discuss about application of IoT. Part 4 advantages and disadvantages of the journal. Part 5 is the conclusion.

II. METHODS

The method used in this research is in the form of literature review, the purpose of selecting this method is to define and study the literature about Future IoT Based on Smart Mirror that is most relevant for this research

A. Authorship

The selection of literature for this research is focused on the publisher of the article, IEEE. In the selection of this literature produced 30 research articles. Which will be distinguished based on the keywords.

In [1-8] it discusses more deeply about IoT and its use. In [1] discusses the basic workflow of IoT, its architectural form and possible applications. Then, in [2] explain and propose the use of small RFID reader for mobile RFID service and examples of applications that use it. In [11] explains about the architectural form on IoT, technology on IoT, and security and privacy issues. In [16] describes the architectural design of IoT in Cloud Computing. On [5] describes the implementation of IoT on a glass called a smart mirror. This journal aims to review the application of smart mirrors in their fields by comparing their differences.

In [4-5] describes the application of IoT. In [3] describes the use of the IoT system in the hospital system to improve operational efficiency and productivity and management capabilities of all programs. In [4] describes the implementation of IoT on the refrigerator. In [9] discusses the design of vehicle toll payments using the IoT system so that toll payments are more practical and easier. In [10] discusses the use of IoT in the health sector which can be useful to reduce costs and reduce hospital visits. In [12-13] describes the use of an IoT system at home (smart home) that can control and monitor the electronic devices in the house easily using an internet connection. In [14] explained about intelligence toilet management using the IoT system which serves to improve the quality of toilet use and reduce toilet use time. In [15] discusses making remote teleoperation using an IoT system that relies on an internet connection. In [17] discusses the use of IoT in automotive that is, the use of biometric sensors.

In [6-8] discusses the use of the IoT system on Smart Mirror. These journals are more focused on the IoT system on smart mirrors. In [6] discusses the use of a voice controller as an authentication security system. In [7] discusses the development of smart mirrors to control home electrical appliances with network connections between devices. In [8] discusses the application of smart mirror for face recognition authentication systems and provides relevant news information and in accordance with user interests

III. APPLICATION OF IOT

At present the application of IoT is very widely applied in human life. IoT has produced many new technologies that facilitate and help humans. One of its applications is the Vehicle Toll Payment based on IoT, the IoT based payment system is based on the selection of source and destination points and calls web services on a centralized web application [9]. In addition, the application of IoT is also useful in the health sector by using a technology called IoThNet [10]. In addition to the development of technology, the Smart Mirror system emerged based on the concept of the Internet of Things (IoT). This smart mirror technology is based on Arduino which was developed specifically to enable users to manage and control objects and objects, with humans through speech recognition [18, 1]. Smart Mirror was developed to make it easy for users to manage things and control the use of electrical appliances at home with a network connection that is connected with voice control [7, 6, 20, 21]. Not only for households, smart mirrors are also useful in the medical field, fashion field, academic field, and sports field [5]. In the health field smart mirrors are used to track a person's health status from time to time. The data collected by researchers can be used further to detect patterns of health problems, such as recurrence of health problems over a period of time, and to make lifestyle recommendations. Early detection of health problems is very important to prevent further medical complications. Besides being able to detect health problems early on, smart mirrors in the health sector can also make it easier for patients to schedule meetings with medical specialists using the features available from the smart mirror. In the field of sports, smart mirrors can be useful to help referees supervise matches and provide fairer and more honest results. Referees can make it easier to monitor the game because smart mirrors can detect violations and other things that are the rules of the sport, for example in the world of basketball, a smart mirror can help the referee determine whether a player crosses the line or not. IoT can help to create an E-Parking system. The smart parking solutions gives a driver a chance to book

a parking slot even when he is not in vicinity of the parking slot [Smart Parking System Based On Internet of Things: A Review].

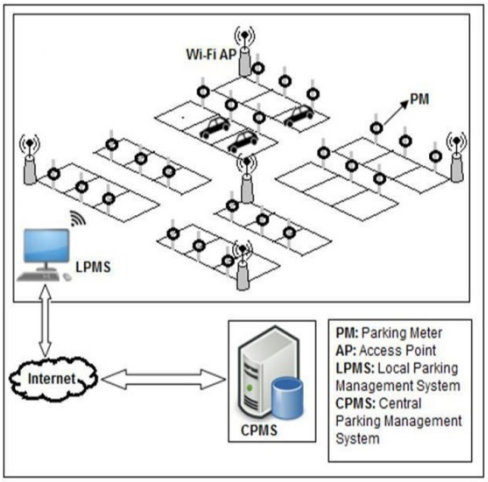

Fig. 3. E-Parking System [Smart Parking System Based On Internet of Things: A Review].

A. Challenge and Opportunities

In implementing IoT technology, there will certainly challenges and opportunities. The challenges that will be found are related to the security sector. Surrounding Security Subsystem (SSS) is used to prevent intruding actions or actions that enter the community illegally. The subsystem can detect the size and accurate location of the accident through the sensing terminals which can exclude false signals automatically [22]. With privacy in IoT technology, the system must be able to ensure that data can only be controlled by the appropriate user, and no other user can access or process data that is not his right [11]. In addition to the security challenges that will be faced in implementing IoT is how to improve the sustainability of IoT [23]. Apart from data security and user privacy issues, IoT implementation also has challenges in the accuracy of the analysis. In using smart mirror technology as an example, when detecting which diseases and diseases will emerge, accurate analysis of the smart mirror is required. If the analysis produced by this technology is wrong, it will have a negative impact on the patient and can endanger the patient's life. In the use of IoT technology, this technology can be very useful and beneficial for human life. This technology can be useful for making a refrigerator where it is a smart refrigerator which is useful for curb food wastage. This smart refrigerator is useful for Recognizing food additions, Recognizing food deletions, Assessing freshness of food, Notifying users about rare products, and Monitoring product lists [IoT Based Novel Smart Refrigerator to Curb Food Wastage]. Apart from being used for smart refrigerators, IoT technology can also be useful for monitoring public toilets using the Arduino embedded system to integrate ultrasonic sensing components to detect the correct use of the toilet, as well as using a button component to detect whether the toilet has been flushed after use [14].

Fig. 4. Smart Toilet Flow Chart [14].

B. RFID Technology

In IoT RFID is useful for recording or checking a condition in accordance with what is ordered by the program. Data collection is done by installing sensors at various points as needed. RFID can be useful in the perception layer of IoT to identify and track objects and exchange information [11]. In general, RFID, as a non-contact communication technology, is used to identify and track objects without contact. It supports a short-range radio signal server data exchange [9, 24]. To activate IoT services, the spread of RFID technology is a very important factor [24, 25]. RFID innovation incorporates HF RFID innovation, which is driven by the NFC Forum and normalization, and UHF RFID innovation, which is normalized by ISO and EPC global. HF RFID innovation, called NFC, is predominantly utilized in financial and medical fields. UHF RFID is for the most part utilized in coordination the board, area following, and legitimacy check. In general, tags used in RFID technology are delegated detached, semi-dynamic, and dynamic sorts. These labels comprise of incorporated circuit, chip, receiving wire and memory. Most versatile RFID frameworks comprise of transponders or tags, readers or interrogators, and back-end host systems. Numerous examinations have been completed to make sure about the security of the remote channel between the pursuer and the tag. By the by, the RFID label utilizes a hash-based XOR work in correspondence to empower basic and financially savvy security control [2]. One of the applications of RFID in IoT is the E-Parking system. The smart parking system consists of stopping direction and booking for the drivers. It requires a portable application which empowers a client to book a stopping space before coming to the stopping region [28].

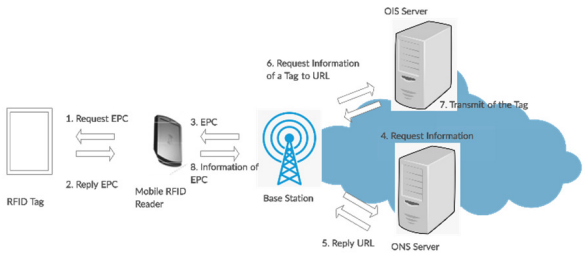

Fig. 5. Mobile RFID Network Architecture Overview [2].

C. Microcontroller

There are several microcontrollers on the IoT, namely Arduino and Raspberry Pi. Raspberry Pi is a PC based board which runs Raspbian Linux appropriation. It very well may be associated precisely as a PC to a mouse, console, and screen to process records. This Raspberry Pi can be used as a mini desktop computer, file server, access point, DNS server, multimedia player, and can be used to create various technologies such as smart door locks, smart plugs, and smart thermostats. Raspberry Pi is widely used in IoT technology because it is relatively inexpensive and affordable. Raspberry Pi has two models: model A and model B. In general, the Raspberry Pi Model B has a RAM storage capacity of 512 MB. The difference between models A and B lies in the storage module used. Model A uses 256MB of storage and model B's storage is 512MB [6].

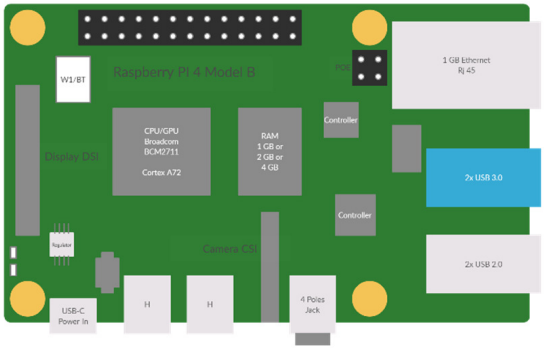

Fig. 6. Raspberry Pi Architecture.

Arduino is viewed as an improvement board for ESs which comprises of a 8-piece microcontroller, USB programming interface, and information/yield (I/O) pins [18]. Arduino itself is useful for recording all information and sending this information via wi-fi on the microcontroller [21]. The Arduino board itself with some pre-modified usefulness is viewed as an unadulterated ES. In this way, special purpose shields are utilized to include the Internet availability [29]. Arduino Uno function is made to make it easier to do prototyping, program the microcontroller, make sophisticated microcontroller-based tools and etc.

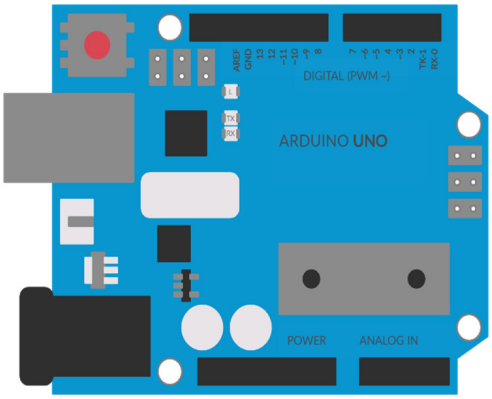

Fig. 7. Architecture of Arduino Uno.

D. IOT Sensor

Many automation activities can be found in everyday life and of course all these functions are equipped with a device called a sensor. This tool is a device that supports and responds to changes in the environment and the results of responses are collected for processing [30]. A sensor can be classified as an input transducer because it converts physical energy into electrical signals. In IoT design, this sensor plays an important role. Because the sensor can collect data and share this data with all connected devices and allows the device to work independently. However, sensors have different functions and uses, so the use of these sensors must be adjusted to the IoT device being designed.

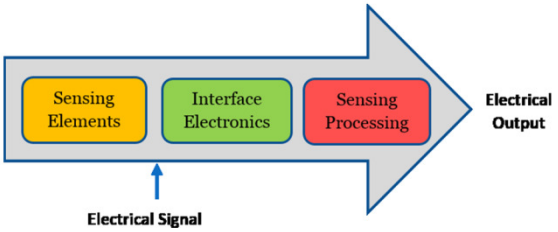

Fig. 8. Sensing elements and corresponding electrical signal [30].

There are various sensors commonly used in IoT from simple to complex: Temperature Sensor, this sensor is useful for detecting a temperature and humidity. There are several types of temperature sensors, namely DHT 11, DHT 22, DS18B20, and others. Each type of temperature sensor has a difference in the accuracy of temperature or humidity calculations and also the price. Proximity Sensor or so-called proximity sensor which can detect the presence of objects that are nearby without any physical contact that occurs. Pressure Sensor, this sensor can detect changes in water and gas, such as detecting pressure in a water system. Water Quality Sensor, on this sensor water quality can be detected by monitoring the ions contained in the water. Chemical Sensor, this sensor is used to show chemical changes in water and air. Gas Sensor, this sensor is similar to chemical sensors but this gas sensor is specifically used to see changes in air quality and detect the presence of gas levels. Motion sensor, a sensor that is used to detect motion in an area and convert this movement into electrical energy. Gyroscope Sensor, this sensor is used to measure the rotational speed around the axis. This sensor is usually used to navigate and monitor the orientation of an object. Humidity Sensor. Infrared Sensor, this type of sensor detects the surrounding environment by detecting infrared radiation, this sensor can also measure heat emissions, usually used in the health sector, electronic devices, and others. The last one is optical sensor, in this sensor electromagnetic energy such as light is converted into electrical signals. An example of its application is the vehicle when you want to park, the sensor will detect any obstacles or obstacles. [30]

IV. ADVANTAGES AND DISADVANTAGES

By implementing IoT in the future this can provide various benefits in human life. IoT can help human life in various aspects such as in the fields of health, sports, learning and so on [5, 10, 26]. In addition to these fields, IoT can also be applied in daily life such as at home. IoT on smart mirror based home. This technology was

developed to make it easy for users to manage things and control the use of equipment connected to electricity at home through an internet connection [27]. Besides that, the problem that often exists in daily life is parking. To overcome the problem of parking, there are a variety of new smart parking technologies applied. Smart parking solutions give the driver the opportunity to reserve a parking space even though he is not near the parking lot [28]. But this smart mirror based IoT technology also has disadvantages because it requires a fee that is fairly expensive and difficult to assemble and create good and useful products.

A. Advantages

In this paper has the advantage, namely, in this paper discusses research that aims to find out what will be provided by smart mirror-based IoT in the future by reviewing the various benefits that can be provided in various fields by looking at the differences between the types of IoT used. Apart from focusing on smart mirrors, researchers also discussed the technologies used in IoT such as the Raspberry Pi and Arduino. Researchers also discussed IoT technology that has now been implemented such as a smart home where in this technology the technology of objects at home will be connected with internet and so on.

B. Disadvantages

In this paper has the disadvantage that is only limited to review without any real practice carried out and based on surveys from papers that are used as a reference by researchers.

V. CONCLUSION

Technology is very important in human life, especially in the field of IoT. It will continue to develop in effective decision making according to orders. The application of IoT is now beginning to be known by many people because of its usefulness which is very helpful for life in all aspects, one example of the floating IoT is the smart mirror that will help people to start the day, by displaying the information needed, the smart mirror will continue to develop with voice control that will later be connected as a smart home, such as turning off the lights and others. This research looks at what the magic mirror can do for the future.

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