QR-Code as a Medium for the Identification System of Dementia Patients

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ABSTRACT
Dementia is a condition where brain cells deteriorate and die faster than usual. It is not a part of the natural aging process. Unfortunately, there is currently no cure for dementia. One of the signs of an elderly person with dementia is a decline in their ability to recognize direction or stay oriented. It can be a real challenge when individuals with dementia venture out of their homes and then have difficulty finding their way back. In fact, it can be very concerning if they happen to wander away from home and then encounter strangers who they cannot provide their address to. This is a serious issue that needs to be addressed. For people with dementia, getting lost on the road can be a serious problem. However, this issue can be solved by attaching information to the person with dementia that includes their name, home address, the names of their family members, and even a contact number that can be used to reach their family. If a system is in place that allows people to recognize those with dementia, then this self-data can be incredibly helpful. One way to generate this information is by using a QR-Code (Quick Response-Code) technology. The purpose of creating this identification system is twofold: first, to assist the public in identifying individuals with dementia who may become lost on the street by providing information about their family; second, to establish a management model for missing individuals using QR codes. The research followed the Pressman model waterfall approach to identify research variables and obtain the best system model for recognizing people with dementia who are lost on the road using QR codes. The approach involved structured steps to uncover subtle variables. According to the research findings, the management of dementia can be improved through the use of QR-Codes. Specifically, scanning the QR-Code on a person with dementia's identification using an HP Android device will immediately display their identity and contact information. This contact information can then be used to reach out to the person's family members through either WhatsApp or phone calls. The use of QR-Codes to identify and report lost dementia patients on the road will be more beneficial if utilized by Panti Lansia, Dinsos, and other organizations providing treatment for individuals with depression, Alzheimer's, or temporary to permanent memory loss.

Keywords: Management, Dementia, Lost on the Road, QR-Code.

1. INTRODUCTION

Dementia is a condition that results in the deterioration and faster death of brain cells [1]. It is not a natural part of the aging process and currently, there is no known cure for dementia. One of the signs of dementia in older individuals is a reduced ability to recognize direction or maintain orientation due to the weakening of nerve cells in the brain, which affects cognitive abilities such as thinking.

Dementia is a condition that can cause a decline in mental, judgmental, and behavioral abilities. It can result in memory loss, reduced intellectual capabilities, and changes in personality. Dementia is more likely to occur in individuals aged 65 and above [1]. There are two main types of dementia: one caused by a combination of genetic risk factors and lifestyle, and another called vascular dementia (multi-infarct dementia) that is caused by multiple strokes.

Creutzfeldt-Jakob disease is a type of dementia that rapidly worsens over a period of weeks or months, caused by the presence of prions [2]. According to Roan, individuals with dementia may wander far from home and struggle to return, experience frequent falls, and have poor balance [3]. As a result, people with dementia require accompaniment when leaving their home. However, not all individuals with dementia have a companion at home, and those who are physically healthy may still have a strong desire to leave the house for fresh air or to run errands.

The problem of people with dementia leaving their homes alone and being unable to find their way back is a concern for society. If you encounter a confused person

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with dementia on the street, it's important to have a way to identify their condition. One solution is to have identifying information attached to them, such as their name, home address, and the name and contact number of a family member who can be reached.

QR-Codes (Quick Response-Codes) are a useful tool for storing information about people with dementia. This technology is widely used in Japan due to its ability to store more extensive data than traditional barcodes, allowing for the encoding of more information in the form of text [4-5].

Personal data of people with dementia can be stored in a QR code that can be easily embedded in objects like necklaces, watches, or bracelets. This allows individuals with dementia to carry their personal information with them wherever they go.

The purpose of the use of QR-Code as a media identification system for dementia patients for self-identification is:

1. Utilize QR-Code as a media system for identifying people with dementia by inserting information about people with dementia in it.
2. Make it easier for people to recognize self data of people with dementia based on the results of QR-Code scanning.

In today's world, the media plays a significant role in our daily activities, particularly in communication between individuals. It makes our daily tasks more manageable. The media serves as a platform for interpersonal communication.

When the media is utilized correctly, the information delivered will be received accurately by the listener, recipient, or reader. It is essential to use the medium that aligns with the interests of the recipient to avoid any misunderstanding.

To effectively utilize media, it is essential to comprehend its nature and purpose. Familiarizing oneself with various forms of media can also optimize their benefits.

QR code is an advanced version of the traditional bar code. It has become a popular means of digital communication in today's era and is used to store and transmit specific information.

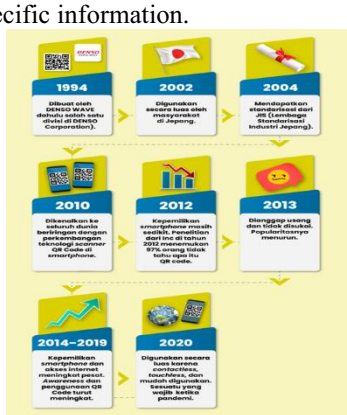

Figure 1. Development of QR-Code.

QR code is an abbreviation of quick response code, where the QR code itself is a two-dimensional barcode containing various information types. To open or read a QR code need a scanner. The scanner can be installed on the smartphone.

QR codes have a remarkable ability to store vast amounts of information, with a capacity of up to 2,089 digits or 4,289 characters, including special characters and reading marks. They offer numerous advantages, such as displaying text to users, opening URLs, and saving contacts to phone books. Compared to barcodes, QR codes can store more data, making them a more versatile option. The code itself is made up of black dots and white spaces arranged in boxes, each with its own meaning. When scanned with a smartphone, the information stored in the QR code will be displayed.

Barcodes and QR-Codes were first introduced in Japan in 1994. QR codes, also known as QR barcodes, are an advanced version of the traditional barcode. They can hold larger amounts of data and information compared to regular barcodes. QR codes were first introduced by Denso Wave. They are highly sophisticated, capable of storing data both vertically and horizontally and holding more data than a barcode. Reading the data in a QR code is easy with a simple scanner tool.

QR codes are box-shaped images that can be scanned using a QR code reader/scanner. This can be done with a smartphone camera. Once scanned, the code will be converted into a link that can be accessed on the phone screen. QR codes are commonly used by institutions and documents to store specific information. Some examples of documents that use QR codes include degrees, newspapers, and BBM apps.

There are two main types of QR codes: dynamic and static. Dynamic codes can be created without altering the code itself and are designed to be changed at a later time. On the other hand, static codes store information directly and cannot be modified once created. It's important to note that neither type of code can be contained within a fox.

Figure 2. Barcodes and QR-Code.

QR codes provide a convenient way for people to access data quickly without the need to manually enter the information contained within them. They can be used for a variety of purposes such as document validation, product identification, linking to websites and resources, storing contact information, and even as a payment tool.

In Indonesia, both governmental and private agencies are adopting QR code technology to validate important documents, provide links to websites and data storage, and facilitate other forms of digital communication.

To quickly authenticate certain documents, you can scan the QR-Code included in them. For instance, to

verify membership in an organization, you can easily scan the QR-Code on their KTA (Kartu Tanda Anggota).

Creating QR-Codes is simple using applications or websites that offer QR code creation services, such as https://www.qrstuff.com or https://qrcode.kaywa.com.

Creating QR-Codes can be done online, where several websites of service providers create QR Codes that can be visited. The steps to create QR-Codes are as follows:

Choose a QR Code Generator

Many websites are QR-Code generators. QR-Code Generator is a technology that provides a service to create QR codes. Websites that can visit include Kaywa, GOQR.me, Visualead, and QR Stuff. It should be noted that all such QR-Code generators have facilities that give the freedom to get a unique QR code.

Create the QR code and enter the link.

To create a QR-Code with a shape that resembles a particular brand logo, create it with an existing QR Code generator, or if you want to make a QR Code as a link to a particular website, the next step is to enter the desired URL link.

To enhance the effectiveness of QR codes as a means of sharing information, it's advisable to link them to a website. This is because websites have a wider reach and can be accessed by an unlimited number of people.

A website is an online platform that connects users to a variety of local and global documents which are commonly referred to as web pages. These pages contain hyperlinks that allow users to navigate from one page to another, whether they are stored on the same server or on servers located elsewhere in the world. Essentially, a website is an online page that provides information accessible to anyone connected to the internet.

In this particular study, the website served as a means to capture and receive information that was sent via QR code. This information was then loaded onto the website's pages in the form of self-information data for individuals with dementia. This data included the individual's name, place of residence, and contact information for their family members.

2. METHOD

The purpose of the research is to create a QR-Code system to identify people with dementia in the UPT Department of Social Affairs of Central Java Province's nursing home. The facility will be observed to understand how the system can help individuals with dementia who tend to forget and have difficulty finding their way back home.

The study gathered information about individuals with dementia by directly observing them at social shelters. The researchers used multimedia recording equipment and documented incidents and conducted interviews to collect data. This technique was used during the initial research or development phase.

Another study focused on developing a QR-Code system that could be used to identify patients with dementia. The researchers used an integrated website and conducted research to create a treatment model for individuals with dementia who may become lost while traveling.

This research approach follows the waterfall method as defined by Pressman. This systematic and sequential model for building software is often referred to as the "classic life cycle" and was first introduced by Winston Royce in 1970 as part of the generic model in software engineering.

This model carries out a systematic and sequential approach. It is called a waterfall because the stage after stage has to wait for the completion of the previous stage and go in sequence. The phases in the waterfall model, according to Pressman, can be seen in the following Figure 3:

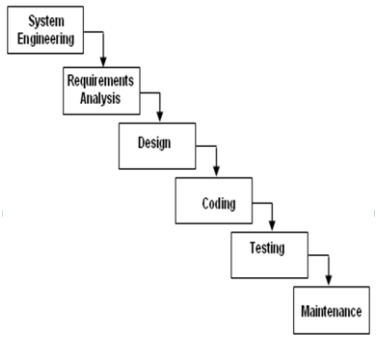

Figure 3. The Waterfall Method [6-7].

3. RESULT AND DISCUSSION

In the waterfall approach, the first stage is to perform information engineering and modeling, including the collection of research needs carried out in connection with the use of QR-Code as a device for self-identification of people with dementia who are lost on the road. Data or preliminary information is sought from the Household/Social Service:

1. House of Advanced Social Services "Wening Wardoyo" in Jl. Kutilang Raya No. 24 Telp (024) 6922289 Ungaran, Semarang
2. House of Social Services "Pucang Gading" in Jl. Pucang Elok VIII No.5 Telp (024) 6722341 Semarang.

As part of the research process, an analysis was conducted on the following:

a) The status of the RPSL, which was evaluated using data from the "Wening Wardoyo" and "Pucang Gading" Houses of Advanced Social Services.
b) Hardware and software specifications. The hardware used is a watch with a QR-Code printed on its wristband. The software used to build a website is PHP, JavaScript, and HTML.

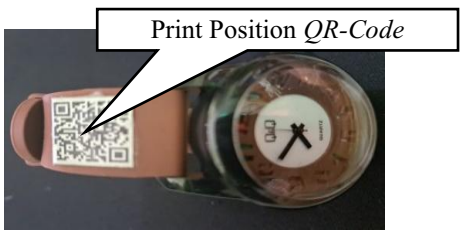

Figure 4. Shape of clock installing a QR Code.

c) This diagram illustrates the relationships involved in using the dementia self-identification system. For the identification and reporting of individuals with dementia who may be lost while out and about, it is important to establish connections between the various components of the QR-Code integrated website model. The components include:
   1. Rumah Pelayanan Sosial Lanjut Usia (RPSLU), especially the leader and part responsible for the operation of the RPSLU website
   2. Family Residents of RPSLU
   3. People who found RPSLU residents lost on the street

The relationship that exists should build the relationship as in the following picture:

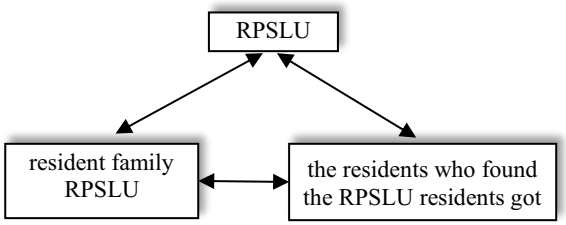

Figure 5. Relationships between elements.

The hardware and software are designed based on research needs analysis. This includes designing the identification system program architecture, scanner application system, and interface with Android-based smartphones. The goal is to provide information about people with dementia who may become lost on the road.

We developed a tracking system by connecting the QR-Code scanning results from QR & Barcode Scanner to the RPSLU website system. The website offers a menu with options for home, articles, and contacts. Here's what the website looks like:

Figure 6. Website for Dementia.

During the demonstration of the system, a scanner detected a QR code on a watch worn by a dementia patient. The scanner's results include RPSLU web links that can be accessed by anyone who finds the patient, providing information about the existence of people with dementia.

Figure 7. Clock Product and QR-Code Position.

When using a QR-Code scanner, you will receive a notification that links to a web page with information about identities and family contacts.

This was done in a study involving patients with dementia at RPSLU, where data entry included scanning a QR-Code on a watch. Here is an example of the QR-Code that was scanned:

Figure 8. QR-Code Input.

The scan results display https://lansia.inogi.web.id/b37aeb3 and selecting "Open browser" on the QR code will connect you to the RPSLU website. Here, you can view the identity information of the watch user on the HP, as shown below :

Figure 9. Data Result Scanning QR-Code.

Based on the QR-Code data, you can contact the RPSLU admin via WhatsApp or by sharing the current location where the lost dementia patient was found [8-12].

Based on the research findings, the system has proven to be effective. If a person with dementia gets lost, their QR-code enabled watch or bracelet can be scanned to connect with the admin RPSLU. This will provide information about the patient, as shown in Figure 7, on the Handphone inventor. Additional information can be obtained by contacting the admin RPSLU or the patient's family via WhatsApp or phone. When contacted via WhatsApp, the admin RPSLU or family's information will be displayed on the phone:

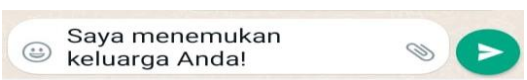

Figure 10. Information on WhatsApp Admin RPSLU or Family.

The system works efficiently by allowing the community to scan a QR-Code on a watch bracelet worn by a person with dementia who is lost on the road to living. This can be done using an HP Android phone with a QR & Barcode Scanner application installed, specific to the RPSLU.

4. CONCLUSION

The results of research on the model of identification and reporting of lost dementia patients on the road-based QR-Code integrated website are:

1. The system can facilitate the role and community to recognize and report a person with dementia who is lost on the road to RPSLU and/or his/her family.
2. Assisting the Advanced Social Services Home (RPSLU) to trace the existence of people with dementia who are lost on the road based on reports on the system from the QR-Code scanning results.
3. It can be a model of management of people with dementia who are lost on the road by the Social Services in each province or the district/city because the family of dementias can always communicate with the management of RPSLU through the website owned by RPSLU.

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