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Design and Construction of Traditional Tribal Musical Instruments in Sumbawa With Augmented Reality Technology Android-Based

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ABSTRACT

Areas of various tribes have distinctive characteristics, such as those of the Sumbawa tribe. Dance arts and traditional tools are elements of the Sumbawa tribal culture. Apart from dance and traditional instruments, the Sumbawa tribe has unique arts, which we generally know as fairy tales (Sakeco), accompanied by the conventional Rebana musical instrument. The culture of the Sumbawa tribe is preserved by building an art studio as a place for its preservation. Sumbawa Regency, especially in Alas District, has a studio called Kemban Alas Art Studio. We can see cultural preservation using modern technology through social media, such as Facebook, Instagram, and TikTok. However, there is still very little preservation through social media regarding Sumbawa culture, such as the content in the press itself due to the influence of new cultures, which has caused the culture of various tribes, especially the Sumbawa tribe, to be little known by most people. The method used in this research is developing the Waterfall model of LifeL Cycle (SDLC) Software and qualitative data collection. This research aims to build an Android-based Augmented Reality application at the Kemban Alas Art Studio and assist the Art Studio in educating Sumbawa tribal culture using the Augmented Reality application. The result of this research is that researchers have completed the design and development of an application that uses Android-based Aulgmelnteld Reality technology as a medium for introducing the traditional music tool Sulkul Sulmbawa.

INTRODUCTION

Culture comes from the Sanskrit language, Buddhayah, the plural form of buddhi (mind or reason), interpreted as things related to the human mind and reason. Culture is a way of life that develops and is shared by a group of people and is passed down from generation to generation (Rianto, Sucipto & Gunawan, 2021)(Sanubari, Prianto & Riza, 2020)(Mulyadi, 2021). In Indonesia, which has tribes from various regions with unique cultures, we can see this from the arts in various regions, such as Aceh with its period dance, Gendang Belek from Lombok, and Nguri dance from Sumbawa. Apart from dance, each region has traditional instruments such as Genggong from Lombok, Rindik from Bali, and Serune from Sumbawa.

Areas of various tribes have distinctive characteristics, such as those of the Sumbawa tribe. Dance arts and traditional tools are elements of the Sumbawa tribal culture. Apart from dance and traditional instruments, the Sumbawa tribe has unique arts, which we generally know as fairy tales (Sakeco), accompanied by the traditional Rebana musical instrument. The Sumbawa tribe has a variety of traditional instruments in the field of music, such as Rebana, Serune, Genang, Gong, Santong Srek, and various other traditional instruments. The culture of the Sumbawa tribe is preserved by building an art studio as a place for its preservation. Sumbawa Regency, especially in Alas District, has a studio called Kemban Alas Art Studio.

Indonesian society, especially the Sumbawa ethnic community, must be competent in various fields in the increasingly modern era of globalization, especially in technology. Preserving a culture requires competent expertise in technology, which is needed in publications, archiving, and educational media. Modern technology can be accessed anywhere and anytime while connected to the internet. We can see cultural preservation using modern technology through social media, such as Facebook, Instagram, and TikTok (Asmiatun & Putri, 2020)(Firdaus et al., 2022). However, there is still very little preservation through social media regarding Sumbawa culture, such as the content contained in the media itself because of the influence of new cultures, which causes the culture of various tribes, especially the Sumbawa tribe, to be little known by most people.

Based on the explanation above, the researcher is addressing the challenges in art studios, which currently preserve culture by teaching art studio members only and using social media to mix it with existing new cultures. The proposed solution is to develop an application that can help preserve a culture that is not mixed with other cultures. This will be achieved by leveraging Augmented Reality technology, which will allow users to virtually experience traditional Sumbawa dances, play traditional musical instruments, and listen to traditional fairy tales. This research aims to

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empower the Art Studio to educate about the Sumbawa tribal culture using the Augmented Reality application.

LITERATURE REVIEW

The research results used as a reference in making this augmented reality application are from research on Augmented Reality Introduction to Traditional Sape Musical Instruments. Technological developments are increasingly rapid, and as we know, using smartphones from both young and old is very helpful in providing more detailed information about the Dayak tribe's musical instruments (Novia & Zalilludin, 2020). Research on Learning Media Applications to Get to Know Traditional Musical Instruments for Children Based on Augmented Reality on Mobile Devices. With this augmented reality application, users can recognize these traditional musical instruments based on their shape, and it can also make it easier to learn conventional musical instruments without having to go to the place where the traditional musical instrument is located (Triaji, 2021).

Research on Making Augmented Reality Applications as a Media for Introduction to Android-Based Javanese Gamelan Musical Instruments. Educational media helps students in the learning process in the presence or absence of educators in the educational process so that the use of educational media with Augmented Reality can directly provide learning wherever and whenever students want to carry out the learning process (Ismayani, 2020). Research on the Introduction of Bengkulu Traditional Musical Instruments Using Augmented Reality. There is a lack of information promotion media, so young people and the public do not know about traditional musical instruments. This application can introduce and promote conventional Bengkulu musical instruments to the community, especially Bengkulu City (Syam & Hidayah, 2020).

Research on the Introduction of Indonesian Traditional Musical Instruments Using Augmented Reality. This application can be a medium for introducing traditional musical instruments virtually using a smartphone device so that introducing traditional musical instruments can be more exciting and easy to apply, and AR can be used to introduce traditional musical instruments more interactively (Wiguna, 2019).

METHOD

Development Method

The software development method in this research is the Software Development Life Cycle (SDLC) Waterfall model. The following are the stages that are followed, namely (Setyasmara, 2020)(Ismayani, 2020):

a. Requirement

At this stage, system developers need to communicate to understand the software expected by users and the limitations of the software. This information is usually obtained through interviews, discussions or direct surveys. The author conducted direct surveys, discussions, and interviews with the resource person, Mr. Kaharuddin D.I.Sh, as the studio owner is located at his residence.

b. System design

The requirements specifications from the previous phase will be studied, and a system design will be prepared. System design helps determine hardware and system requirements and define the overall system architecture, such as deciding the computer, laptop or smartphone used or needed to create and use the system to be built.

c. Implementation

In this stage, the system first develops into small programmable units called units, which are integrated in subsequent stages. Each unit is developed and tested for functionality, referred to as unit testing. Such as using the DART programming language, Flutter framework, and so on according to the requirements of the system to be built (Novaliendry, 2020)(Huda, 2020)(Ridwan, 2020)(Syaputra & Ganda, 2020).

d. Integration and Testing

All units developed in the implementation phase are integrated into the system after testing is on each unit. After integration, the entire system is tested to check for any failures or errors.

e. Operation and Maintenance

In the final stage of the waterfall method, the finished software is run and maintained. Maintenance includes correcting errors that were not found in the previous steps. Improved implementation of system units and increased system services are new requirements. System maintenance is planned to be carried out every 3 to 4 months.

Data collection methods

Researchers use the data collection method to obtain data to help complete the research, while the method used in this research is qualitative (Jaya, 2020). The types of data used in this research are primary and secondary. That is:

a. Primary data

Primary data was obtained in two ways: by conducting observations to find out the existing conditions in the art studio and interviews to obtain the data needed for application purposes in the form of pictures of musical instruments.

b. Secondary Data

Secondary data (library study) is data collected from data sources or research carried out previously. In this research, researchers collected data obtained from various research references that had to becarried out previously

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carried out literature studies.

c. Data requirements analysis

There is also another support for making the application that will be made, namely data from a collection of events that are based on something real or what happened (facts), which can be in the form of numbers, letters, special symbols, or a combination of the three. Selingga forms a file that is interconnected to form information. The data needed in designing and building an application for Using Traditional Tools of the Sumbawa Tribe Using Android-based augmented Reality Technology is data from interviews with related sources in the form of materials that will be included in the application; apart from that, there is also data obtained from literature study to support and strengthen the primary data above.

RESULT

System Design

a. Use Case diagram

Use case diagrams to describe actor interactions with the system to be created. The following is a use case diagram of the system that the researcher will complete:

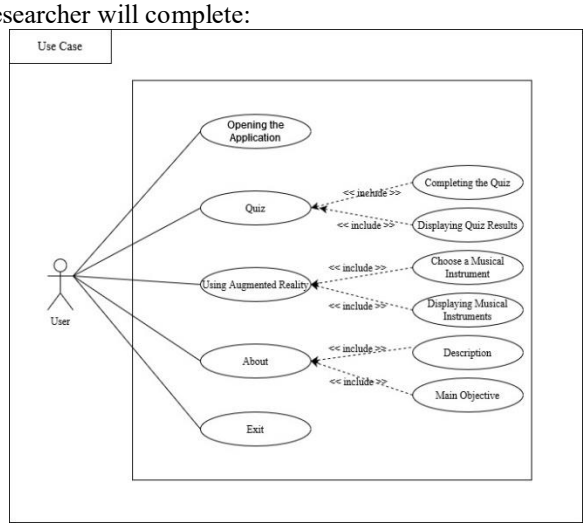

Figure 1. Use case diagram

This picture explains that the user starts the action by opening the application without logging in. The system will display the application start menu, followed by the user being able to carry out several actions, namely taking quizzes, using the AR Camera, and viewing information about the application.

b. 3 Dimensional Design

At this stage, there is a three-dimensional design of the musical instrument that will be introduced in this application, as follows:

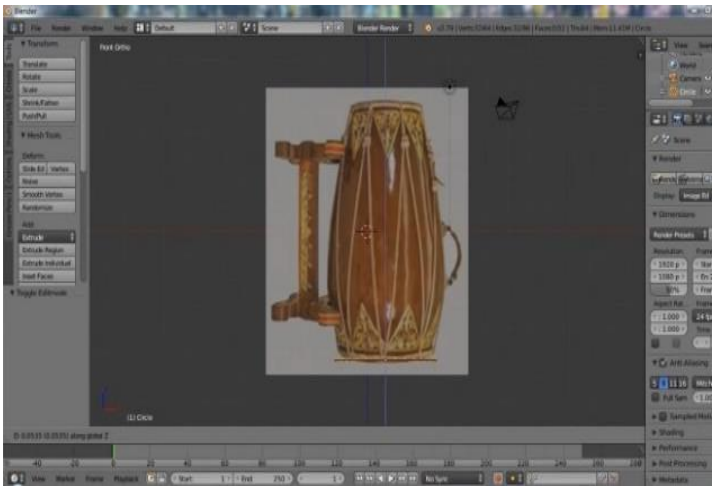

Figure 2. 3-dimensional design

The image above is an image of the 3D design of one of the musical instruments introduced in the application, namely the drum, which initially follows the shape of the original musical instrument. Then, it is made into a 3D shape

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using Bender supporting software.

c. User interface design

User interface design is the design of a system interface created by researchers. User interface design provides an overview of the page appearance of the application on the user's screen. The description of the interface design created in this application is as follows :

1. Display the initial menu

Figure 3. Main menu UI design

The image above is the initial menu design when the user enters the application. This page explains that the application displays the title and features, namely Sumbawa Culture and the Quiz, Augmented Reality, About and Exit features.

2. Display the quiz menu

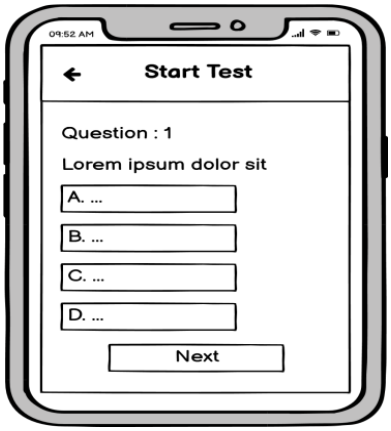

Figure 3. Quiz menu UI design

In this image, the system displays a quiz menu design where the user can answer several questions.

3. Implementation

Based on the results of system planning, system design, and user interface design that have been carried out, at this stage, development and testing of the application are carried out based on the design that has been made as follows:

a. App logo display

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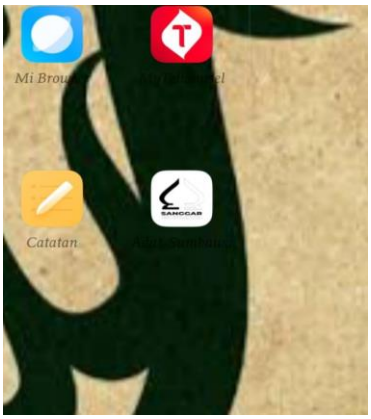

Figure 5. Application logo

The display above is a display of the application logo rounded by the researcher, an application for introducing traditional Sumbawa tribal musical instruments.

b. Initial appearance of the application

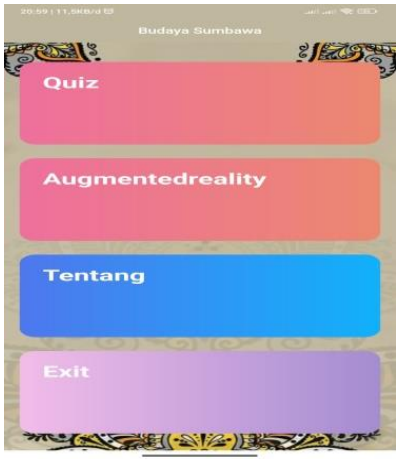

Figure 6. Main menu interface

The display above is when the user opens the application, and the system displays several menus that can be accessed by the user, namely the Quiz menu and Augmented Reality—about and Exit.

c. Quiz menu display

Figure 7. Quiz menu interface

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The display above is when the user selects the quiz menu, where the user can play the quiz provided by the system by answering several questions about traditional Sumbawa tribal musical instruments.

d. Augmented reality menu display

Figure 8. AR menu interface

The display above is a display of the augmented reality menu where there are several menus in it, such as drum, gong, and pelompong musical instruments, which, if one of them is selected by the user, will immediately be directed by the system to open the camera to scan the 3D marker of the musical instrument being accessed.

e. AR 3D AR menu display

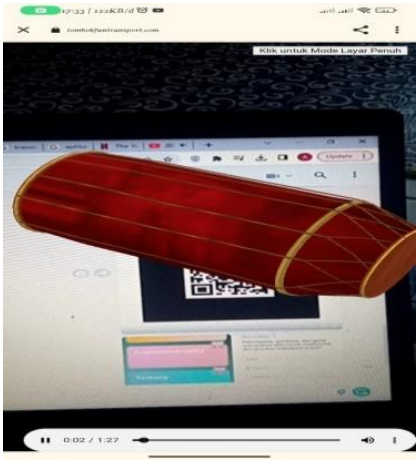

Figure 9. 3-dimensional view of the drum

DISCUSSION

Next, a testing phase is carried out to carry out a trial evaluation process for installing and running applications that have been built into Android smartphones. Testing of this application has been carried out on four Android smartphone devices with different operating system versions. If there is a problem with the Telrsel application, repairs will be carried out until the application can run and function as it should.

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f. AR menu functional testing

Table 1. AR functional testing

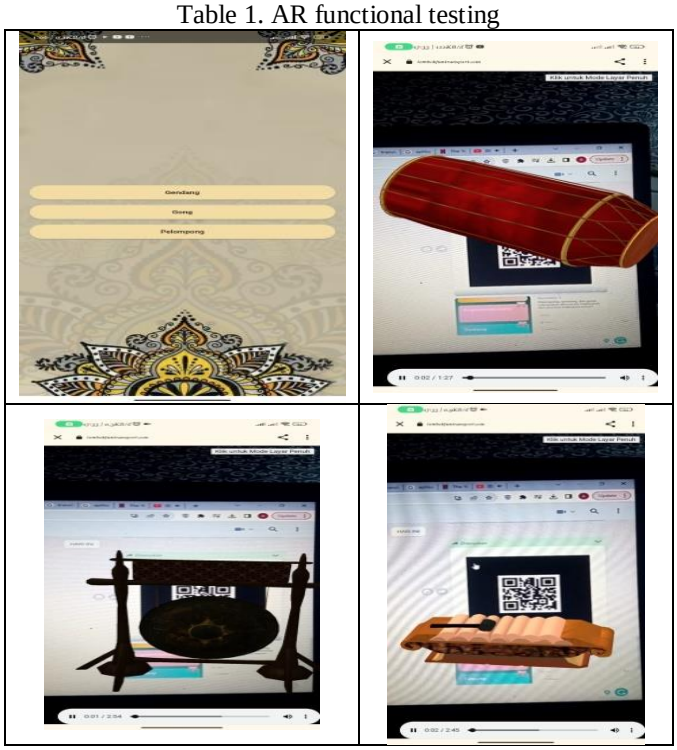

Table 2. AR functional testing

No	*OS Android*	Description	Results	Failed
1	*Snow Cone(12 SP1A.210812.016)*	*Marker*	✓	
		Audio	✓	
		Teks	✓	
2	*Tiramisu (13)*	*Marker*	✓	
		Audio	✓	
		Teks	✓	
3	*Oreo (8.1.0)*	*Marker*	✓	
		Audio	✓	
		Teks	✓	
4	*Q (10 QKQ1.191014.001)*	*Marker*	✓	
		Audio	✓	
		Teks	✓	

Table 3. Marker detection distance testing

No	Distance *(CM)*	Success	Fail
1	10	✓	
2	20	✓	
3	30	✓	
4	40	✓	

No	Rotation	Result
1	0°	Successfully detected marker
2	45°	Successfully detected marker
3	90°	Successfully detected marker

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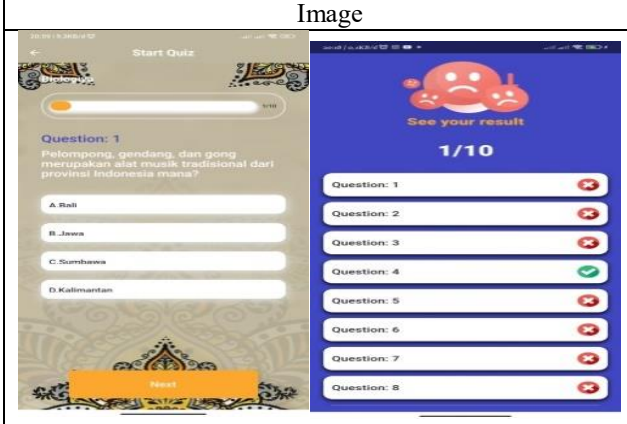
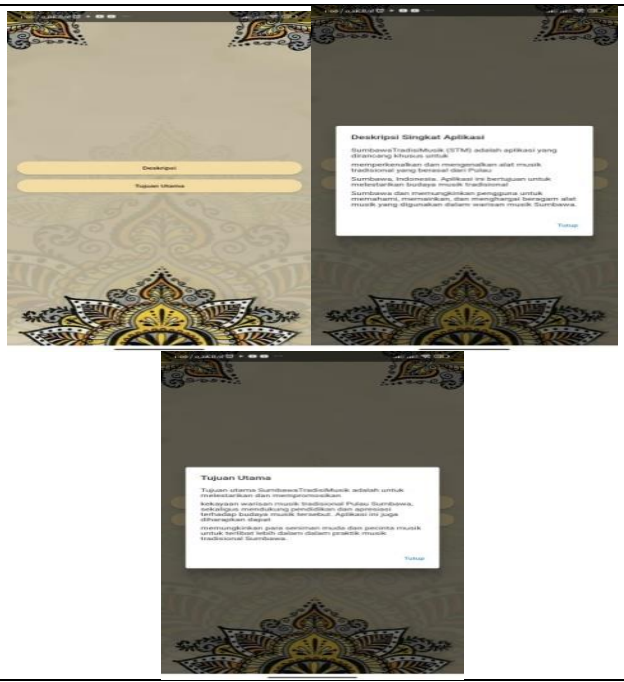
Table 4. Functional testing

Image	Caption
	The image to the side explains that the test on the quiz menu can be run and displays the information as it should.
	The image below explains that the test on the about menu can be run and displays information as it should, starting from the description submenu and the main purpose submenu.

CONCLUSION

The author has completed the design and development of an application that uses Android-based Augmented Reality technology as a medium for introducing traditional Sumbawa tribal musical instruments. This application can display 3D objects from several Sumbawa musical instruments and can play audio on each musical instrument, where in testing this application can run properly on Android-based smartphones with different operating system specifications. In the test, namely in the form of distance and camera rotation testing which is very influential, it can be concluded that camera distances ranging from 10cm to 40cm markers can be detected, and marker rotations ranging from 0° to 90° can be detected. All functions can run as expected, such as marker, audio, text, 3D model, and rotation functions so that they can display the desired information. Suggestions for developing this application in the future are as follows: In the future, you can make additions such as a description of each musical instrument, what material it is made of, etc. Able to build 3D objects more precisely and perfectly to look the same as real traditional musical instruments. The appearance design of the application can be made even more attractive than the current application.

REFERENCES

Asmiatun S, Wakhidah N., & Putri A.N. (2020). Penerapan Teknologi Augmented Reality Dan GPS Tracking Untuk Deteksi Jalan Rusak. Deepublish. https://books.google.co.id/books?id=coHRDwAAQBAJ

Firdaus M.B., et.al. (2022). Augmented Reality Pengenalan Alat Musik Tradisional Sape. Jurnal Integrasi, 14(2), 75–80. https://doi.org/10.30871/ji.v14i2.4041

Huda A.N. (2020). Teknik Multimedia dan Animasi. UNP Press.

E-ISSN : 2807-9035
Volume 4, **Number** 2, November 2024
https://doi.org/10.47709/brilliance.v4i2.4210

https://books.google.co.id/books?id=59ZbEAAAQBAJ.
Ismayani A. (2020). Membuat Sendiri Aplikasi Augmented Reality. Elex Media Komputindo, https://books.google.co.id/books?id=HV%5C_aDwAAQBAJ.
Jaya I.M.L. (2020). Metode Penelitian Kuantitatif dan Kualitatif: Teori, Penerapan, dan Riset Nyata. Anak Hebat Indonesia. https://books.google.co.id/books?id=yz8KEAAAQBAJ.
Mulyadi. (2021). Antara Teknologi dan Teologi. Rajawali Pers. PT. Raja Grafindo Persada. https://books.google.co.id/books?id=sv4ZEAAAQBAJ
Novaliendry D. (2020). Pengenalan Visualisasi 3D Blender 2.80. Penerbit CV. Sarnu Untung. https://books.google.co.id/books?id=-hcREAAAQBAJ
Novia L., & Zalilludin D. (2020). Aplikasi Media Pembelajaran Mengenal Alat Musik Tradisional Untuk Anak-Anak Berbasis Augmented Reality Pada Perangkat Mobile. Jurnal IKRA-ITH Informatika, 5(1), 15–21.
Rianto A.N., Sucipto R.D, & Gunawan. (2021). Pengenalan Alat Musik Tradisional Lampung Menggunakan Augmented Reality Berbasis Android (Studi Kasus : SDN 1 Rangai Tri Tunggal Lampung Selatan). 2(1), 64–72.
Ridwan B. (2020). Konsep dan Perancangan Aplikasi: Membangun Aplikasi Mobile Menggunakan Flutter. Syiah Kuala University Press. https://books.google.co.id/books?id=qBFhEAAAQBAJ
Sanubari T., Prianto C. , & Riza N. (2020). Odol (one desa one product unggulan online) penerapan metode Naive Bayes pada pengembangan aplikasi e-commerce menggunakan Codeigniter. Kreatif. https://books.google.co.id/books?id=s4j%5C_DwAAQBAJ
Setyasmara N. (2020). Internet of Things (IoT) Sistem Peringatan Dini Bahaya Kebakaran berbasis Android dan Arduino. Jurnal Multi Media Dan IT, 5(2). https://doi.org/10.46961/jommit.v5i2.418
Syam S., & Hidayah A.K. (2020). Pengenalan Alat Musik Tradisional Bengkulu Menggunakan Augmented Reality. Jurnal Processor, 15(2), 127–134. https://doi.org/10.33998/processor.2020.15.2.875
Syaputra R., & Ganda Y.P.W. (2020). Happy Flutter: Membuat Aplikasi Andorid dan iOS dengan Mudah menggunakan Flutter – Udacoding. https://books.google.co.id/books?id=VYurDwAAQBAJ
Triaji A. (2021). Pembuatan Aplikasi Augmented Reality Sebagai Media Pengenalan Alat Musik Gamelan Jawa Berbasis Android. Jurnal Multimedia dan IT Vol 5, No 2, https://ojs2.polimedia.ac.id/index.php/jommit/article/download/446/289.
Wiguna R.D.Y. (2019). Pengenalan Alat Musik Tradisional Indonesia Menggunakan Augmented Reality. Jurnal Mahasiswa Teknik Informatika, 3(1), 396–402.