

# Learning Application System in Building Curved Side Space Based on Augmented Reality

**Imam Fatoni<sup>1</sup>**

Sekolah Tinggi Manajemen Informatika dan Komputer (STMIK) Kalirejo Lampung

**Donny Muda Priyangan<sup>2</sup>**

Sekolah Tinggi Manajemen Informatika dan Komputer (STMIK) Kalirejo Lampung  
donnymudapriyangan89@gmail.com

**Ian Harum Prasasti<sup>3</sup>**

Sekolah Tinggi Manajemen Informatika dan Komputer (STMIK) Kalirejo Lampung  
ihp.harum8@gmail.com

## Abstract

Most students of SMP Ma'arif 3 Bangunrejo find difficulties to learn curved side spaces because they do not know for sure the spaces, formulas, and characteristics of these spaces. In this case, new innovations in learning application media are needed to make students happier, more interested and easier to learn. Therefore, we need a learning application system to implement the material about curved side space. This study aims to produce an Augmented Reality (AR) based learning application system. The process of developing this learning application uses the SDLC (Systems Development Life Cycle) method, namely the Planning, Analysis, Design, Implementation, Testing, and Maintenance stages. Data were collected through observation, documentation, and interview techniques. The results of this study indicated the Augmented Reality (AR) based learning application system for curved side space can be a learning tool for students independently because it is more practical, effective and support students' understanding of Augmented Reality-based curved side space material.

**Keywords:** learning application system; Augmented Reality

## INTRODUCTION

The development of information technology is currently growing rapidly. Almost all fields related to human activities use easier, more effective, and more efficient ways through the use of technology. Advances in science and technology have made humans try to overcome all the problems around them and facilitate their work. Over time it has changed old habits into new habits. In the world of education, students' habits in using sophisticated gadgets have changed their learning styles that depend on the internet. This results in teachers having to be more creative in the learning process. One form of technological development in learning is Augmented Reality (AR).

Mubarok (2019) stated that, "Augmented Reality is a technology that aims to combine digital content created by computers with the real world in realtime". Users could see two-dimensional or three-dimensional objects projected into the real world with the help of tools such as computers or android phones. Augmented Reality can be used in almost all areas of

life. One of the implementation is in the education sector. Learning will be more effective and more interesting in case using Augmented Reality because it can display the three-dimensional virtual spaces of the desired object against the real world through the android smartphone camera. The subjects that require learning media are mathematics, especially on spaces material.

The spaces is one of the materials where to better understand it we need a direct description of the spaces. Pratiwi (2015) said, "Spaces is a mathematical spaces that has content and volume". Spaces is divided into build flat side space and build curved side space. What is included in the category of building curved side space is spaces that has at least one curved side. Each type of curved side space construct has its own spaces, area formula, and volume. Students more easily understand the curved side of the building material if there are images of spaces packaged in learning media, moreover that it can be more effective.

The research conducted by Alamsyah and Kridiawan in 2021 entitle "Application Development as a Learning Media to Build Spaces at Elementary/Junior High School Level Using the Augmented Reality Marker Method". The result of the research are that the application built can make it easier for students to understand spaces learning materials and this application is equipped with a quiz feature that can be used as a benchmark to determine the level of students understanding of the learning material. Another research was conducted by Mubarok in 2019 entitle "Design and Manufacture of Android-Based 3D Space Learning Applications by Utilizing Augmented Reality". This research produces an application system that uses development research methods (Research and Development) Toward Use Case Diagram system design, coding using Android Studio IDE, and making 3D builds using Blender.

In the current research, the researcher purpose create a learning application system on building curved side space using Augmented Reality which will be implemented at SMP Ma'arif 3 Bangunrejo. The result of the research above, learning media is very necessary, especially in mathematics lessons, because many students consider mathematics a difficult and boring subject. The results of the pre-survey at SMP Ma'arif 3 Bangunrejo, Bangunrejo District, most students find it difficult to learn to build curved side spaces because the students do not know exactly the spaces, formula, and characteristics of building these spaces, in other hand new innovations are needed in learning application media to make students happier, more interested and easier to learn. According to Habibi and Karnovi (2020) "An application is a ready-to-use program that can be used to execute a number of commands from the application user himself

Based on the problems above, the learning application system about curved sided spaces is needed. Therefore, the reseacher is interested in conducting a research entitled "Learning Application System on Building Augmented Reality-Based Curved Side Space".

## **METHOD**

### **Design**

The research method that will be used by the researcher is the SDLC (Systems Development Life Cycle) model. In software engineering and systems engineering, is the process of creating and changing systems as well as the models and methodologies used to develop these systems. SDLC is used to build the system therefore that it can run according to what is expected. SDLC

is also a pattern taken to develop software systems, consisting of Planning, Analysis, Design, Implementation, Testing, and Maintenance stages.

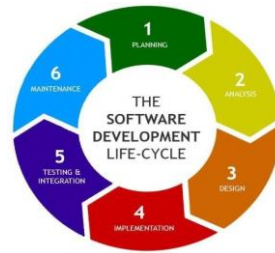


Figure 1. SDLC Stages

### Instrument

The data collection researchers carried out observations, interviews and documentation. In this research, the researcher obtained primary data sources directly from mathematics teachers in the form of information from interviews regarding the material for building curved side spaces. While secondary data sources are obtained data from various reference sources of books, ebooks, previous research taken from journals through internet media.

### RESULT AND DISCUSSION

#### Splashscreen Page View



Figure 2. Splashscreen Page View.

Main Page Display



Figure 3. Main Page Display

AR Start Page View

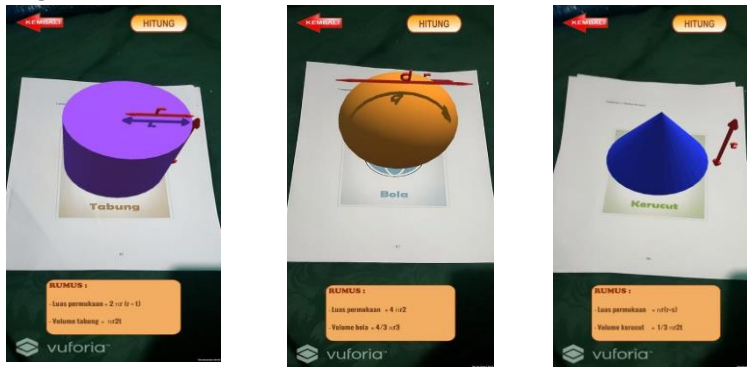


Figure 4. AR Start View

Material Page View

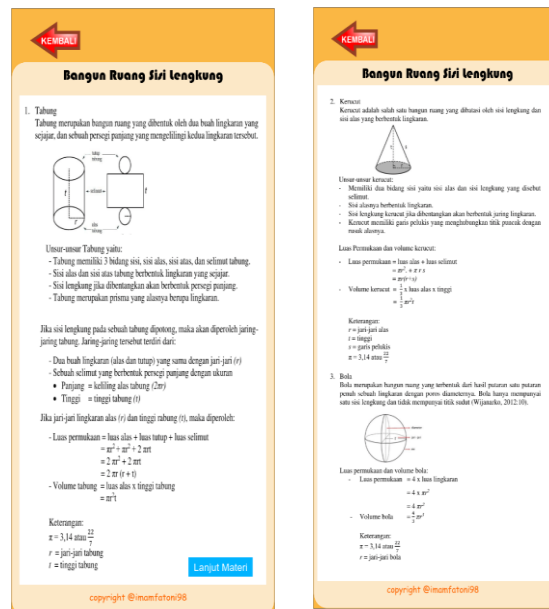


Figure 5. Material Page View

### Guide Page View

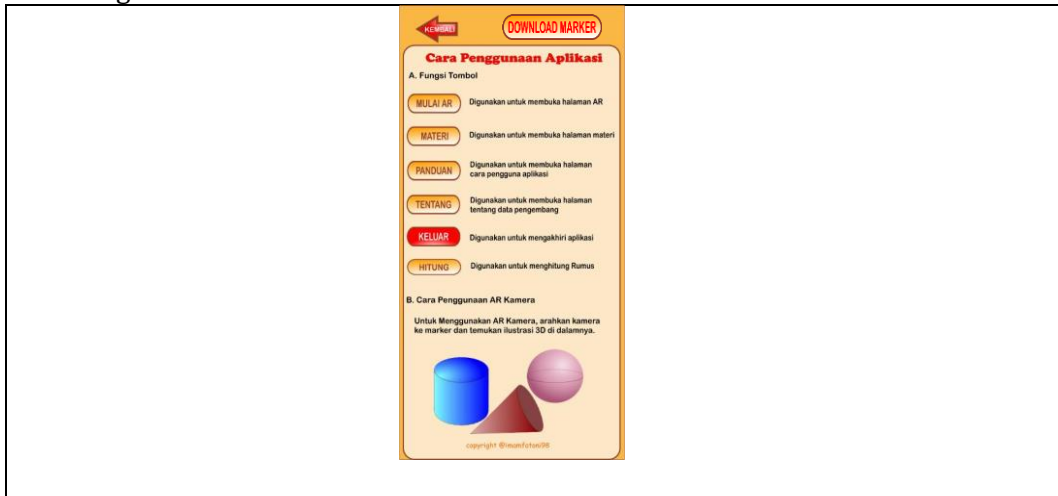


Figure 6. Guide Page View

### About Page View



Figure 7. About Page View

### Exit Page View



Figure 8. Exit Page

## Program Installation Implementation

At this stage, the installation of learning applications on curved side spaces based on Augmented Reality. Installation is done by first moving the android APK (Android Application Package file) that has been saved to the mobile SDCard memory. Furthermore, the researcher installs it on an Android type Smartphone device .

1. The first step is to tap or click the icon ARBANGUNRUANG.apk

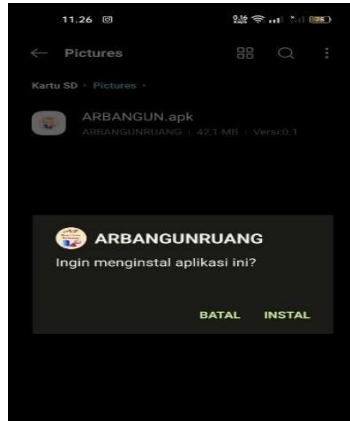


Figure 9. Install view

2. Then the Verification display will appear as below. For installation, click Install anyway.

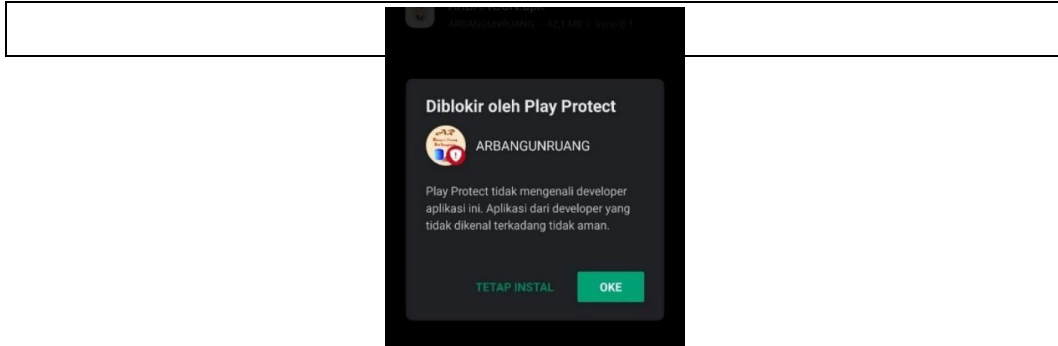


Figure 10. Verification View

Then a display will appear as below. The installation has been completed.

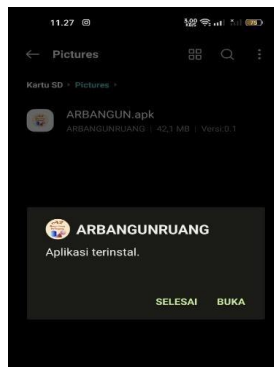


Figure 11. Finish Page Display

Test cases and results contain an explanation of the test plan that has been prepared in the test scenario. This test is carried out in a blackbox by paying attention only to the input into the system and the output of that input. The following is an explanation of each test item contained in the test scenario:

Table 1. Test Results

No	Test Items	Sekenario uji	The results Expected	Result Testing
1	Display Splashscreen	Open Beginning of application	Display a splashscreen	succeed
2	AR Start Menu	Choose the AR start menu	Display AR pages and enable AR cameras, detect <i>markers</i> and display 3D objects	succeed
3	Material Menu	Select the material menu	View the information page About Build Space Material curved side	succeed
4	Guide Menu	Choose a menu guide	View the information page man ner Application Usage	succeed
5	About Menu	Choose the about menu	View the information page data Application Developer	succeed
6	Exit Menu	Choose the exit menu	Show a "You're Sure You Want to Sign Out" notification and terminate the application	Succeed

Based on the results of testing through blackbox cases and questionnaires, the result can be concluded that the system has been free from syntax errors and functionally issued results that are as expected, namely being a means of learning students independently because it is more practical, effective and supports students' understanding of Augmented Reality-based curved side room building material. According to Ani (2020) Augmented Reality is a technology that combines computer-made objects, two-dimensional or three-dimensional, into the real environment around the user in realtime.

Identical with research conducted by Alamsyah and Kridiawan in 2021 entitle "Application Development as a Learning Media to Build Spaces at Elementary / Middle School Level Using the Augmented Reality Marker Method". The result of the research are that the application built can make it easier for students to understand learning materials, build space, and this application is equipped with a quiz feature that can be used as a benchmark to determine the level of student understanding of learning material. According to Arif (2017) the system is a collection of any components that are interconnected with each other and work together harmoniously to achieve a certain goal

## CONCLUSION

Based on the results of research on the Augmented Reality-based curved sided geometry learning application system, it can be concluded that: 1) In the process of creating a learning application system to build a curved side space based on Augmented Reality, the SDLC (Systems Development Life Cycle) method is used. The SDLC method starts from the planning stage. At this stage, information about the object to be studied is collected either from books or journals as a source of information. After that, proceed to the next stage, namely the analysis stage. At this stage, thinking and finding solutions to existing problems is carried out by designing an application. Next is the system design stage, this stage is carried out to make a complete picture or design. Then the implementation stage, this stage applies the design by programming the design results, the coding process using the C# language, the compiler using Unity 3D and making 3-dimensional builds using Blender. The last stage is to test the application that has been successfully created. 2.) The effectiveness of this application system, testing was carried out using the blackbox method. The result of the test are that the application made is in accordance with the design, so that this learning application passes the blackbox test. This application also received good responses from students and teachers, because with this application, it makes alternative learning media facilities so that teachers can carry out the learning process to build innovative and effective curved side spaces, thus making it easier for students to understand the material, happier, more interested, and can increase student interest in learning

## REFERENCES

- Akram, R., & Asmita, T. (2021). Analisis Sistem Aplikasi Supply Chain Management Telkom (SCMT) Untuk Teknisi di PT Telkom Kandatel Langsa. *Jurnal Informatika dan Teknologi Komputer*, Vol.02No.02(2021), 70-74.
- Alamsyah, N., & Krisdiawan, R.A. (2021). Pembangunan Aplikasi Sebagai Media Pembelajaran Bangun Ruang Tingkat SD/SMP Dengan Menggunakan Metode Marker Augmented Reality. *Jurnal Nuansa Informatika*, Volume 15 Nomor 1, Januari 2021, 23-31.
- Ani, I. (2020). *Membuat Sendiri Aplikasi Augmented Reality*. Jakarta: PT Elex Media Komputindo.
- Ardhianto, E., Hadikurniawati, W., & Winarno, E. (2012). Augmented Reality Objek 3D Dimensi dengan Perangkat Artoolkit dan Blender. *Jurnal Teknologi Informasi DINAMIK* Volume 17, No. 2, Juli 2012, 107-117.
- Arif, M. (2017). *Pemodelan Sistem*. Yogyakarta: CV Budi Utama.
- Faiztyan, I. F., Isnanto, R. R., & Widiyanto, D. E. (2015). Perancangan dan Pembuatan Aplikasi Visualisasi 3D Interaktif Masjid Agung Jawa Tengah Menggunakan Unity 3D. *Jurnal Teknologi dan Sistem Komputer*, Vol. 3, No. 2, April 2015, 207-212.
- Fitriani, H., Nurmiati, S., & Utomo, A.N. (2016). Pengembangan Aplikasi Website Perpustakaan Dengan SMS Gateway. *Jurnal Rekayasa Informasi*, Vol. 5, No.1, April 2016, 14-23.
- Habibi, R., & Karnovi, R. (2020). *Tutorial Membuat Aplikasi Sistem Monitoring Terhadap Job Desk Operational Human Capital*. Bandung: Kreatif Industri Nusantara. Jakarta: ARC Media.
- Mubarok, Z. (2019). Perancangan Dan Pembuatan Aplikasi Pembelajaran Bangun Ruang 3D Berbasis Android Dengan Memanfaatkan Augmented Reality. *Computers And Its Applications Journal*, Vol. 2, No.1, Juni 2019, 29-38.



Muharam, M., & Persada , A. G. (2020). Implementasi Penggunaan Website Sebagai Media Informasi dan Media Pemasaran Hasil Pertanian dan Peternakan Desa Sumberejo. *AUTOMATA*, Vol 1, No 2 (2020), 1-4.

Pratiwi,S.(2015).RangkumanPentingIntisari4MataPelajaranUtamaIPA