

**REAL TIME AUGMENTED REALITY BASED TOOL
FOR DIGITAL MEDIA PRODUCTION**

Project Id : 2021-075

Individual Project Proposal Report

B.Sc. (Hons) Degrees in Information Technology

Department of Information Technology

Sri Lanka Institute of Information Technology

Sri Lanka

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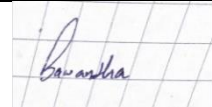
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February 2021

Declaration

We declare that this is our own work and this proposal does not incorporate without acknowledgement any material previously submitted for a degree or diploma in any other university or Institute of higher learning and to the best of our knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text.

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Abstract

The media field is one of the most talked about and eye-catching fields today. There are many media outlets in Sri Lanka and in the world and each of them strives to convey their news to their audience in a simple and clear manner. Today, many media outlets use a variety of technologies to present information to the audience in a more creative way. One of its techniques is to use Augmented Reality to illustrate news events during news broadcasts. It costs a lot of money and a lot of time for media organizations today to do this. Employees of media organizations also must work hard to get used to the tools and technology and learn how to work with them. The solution is to use this tool to do the job at a lower cost and to minimize the time and effort involved. This will also enable smaller media outlets and channels that broadcast their live broadcasts via YOUTUBE to use this tool. In a television news broadcast, it is important to improve visual attraction. One of the ways is to have 3D objects in a newsroom to explain daily news in more attractive and modern way. Even though some channels tend to use such innovative technology, they must spend a large budget and need planning beforehand. So, the use of this technology has become a challenge to use in daily news programs. Therefore, this system of object placement in live news program will provide an easier way and budget friendly system to add creative elements (3D objects and graphs) in a daily news broadcast.

Keywords: 3D objects, 3D charts, News production, live news production, visual elements, Augmented Reality, object placement.

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1 Introduction

Unlike a radio broadcast, the television broadcast is a combination of both audio and visual aspects. Through a television broadcast, the news presenters and news creators can use visual benefits to attract viewers and deliver the news more clearly. With the busy lifestyle of the society many people watch the news at the end of the day with a busy and tired mindset and sometimes might not pay attention vocal delivery of the news. Having a news delivery with more attractive visual elements can keep the viewers attention throughout the news program and help the viewers to understand the news more easily. Though this research our system focuses on creating and improving visual aspect of the daily news item.

This paper includes a budget friendly, time efficient approach to add 3D elements to a live news broadcast. Currently some channels in Sri Lanka spend a separate budget and time to improve the attractiveness of their daily news broadcasts. But not all local channels can separate their budget to improve the attractiveness of news delivery. So, they only focus on delivering correct news with the basic attractive elements such as showing images on the screen or in their background screens, bringing physical items to the news studio and comparing and by creating simple animation videos to explain the news. These basic attractive elements are used by all most all news channel around the world.

Our approach is to use modern technical items such as Augmented Reality and 3D objects to improve the live news delivery more eye catching. Currently some news channel tried to use these types of visual improvements, but they have done by planning before hand and recorded separately. This not applicable in daily live news broadcasts. Through this system of object placement, we can provide an easier way to use technology as such mentioned above to create attractiveness of news delivery without spending huge budgets, less time and with even less design knowledge.

1.1 Background

A news broadcast in a television means that the audience can both hear and see the news. Having the visual aid to deliver the news gives more opportunities to the broadcasting channels to grasp more viewers and improve their popularity. Having such advantage, the news channel tends to do more new experiments on how to improve their attractiveness more than the other news channels. This creates a competition between news channel to increase their number of viewers.

The quality of a story increases only if the person who grasps it understands the contents of that news well. Nowadays, various television channels try to show some news frames related to the news in their newscasts to make the news feel more attractive to the viewer. By showing these frames using argument reality technology, the news can be better grasped by the viewer. Many channels tend to use advanced technical items such as use of 3D objects, Augmented reality and such in their news programs. But the main problem for them is the lack of budget and knowledge. Some media outlets in the country already use argument reality technology in major news broadcasts, but they do it after months of hard work and pre-set and broadcast live. It's a difficult task. Sometimes these technical works are outsourced to outside graphical companies.

This cost a huge budget and time.

This paper includes a methodical way to make the path of transforming traditional news delivery into more technical and modern way. And, to provide a solution to all news channels to use 3D technology and Augmented reality more easily and budget friendly ways.

Object placement is an approach to make use of 3D objects and 3D graphs in a newsroom to display the news in a viewer friendly manner. The main purpose of this system is adding 3D objects to the live news at its broadcasting level.

1.2 Literature survey

In the literature review mentioned here, I have focused on object placement related research articles and books published in recent years.

By the Jong-Seung Park , Mee Young Sung , Sung-Ryul Noh has also discussed about the Based-on feature tracking, inserting virtual objects into a real video stream and estimating the camera from a collection of single camera video frames [1]. The transformation from 3D objects to object projections needs to be identified in order to insert or alter 3D formats to target video frames. It has been shown that 3D images can be recreated using multiple images from one single camera under defined internal camera parameters without a camera calibration process. The method proposed is based on the simplification of the internal parameter camera model and the use of projection geometry. For enhanced virtual applications, this method is particularly useful for inserting or changing formats into a virtual video stream.

It also mentions the special object detection technology in Open CV to identify the object here.[3] It also describes the special object detection technology in OpenCV to identify the object. Here it uses special algorithms and special libraries in OpenCV. Objects can be identified from image pyramids algorithms , geometric descriptor algorithms

Resource reservation is required in a video-on-demand server to ensure continuous delivery.As a result, each storage device (or striping group viewed as a single logical device) can only accommodate a certain number of client access streams.[4] The number of video files that each storage device can store is also reduced.Multiple storage devices can be used in a video server environment for reasons of availability, gradual development, and heterogeneity.As a result, one or more copies of a video can be stored on various storage devices.There could be a load imbalance among the devices because the access rates to different videos are not standardized.In this paper, we propose a dynamic placement policy (dubbed the Bandwidth to Space Ratio (BSR) Policy) that creates and/or deletes video replicas when mixing hot and cold videos to make the most of a storage device's bandwidth and space. A simulation analysis is used to test the proposed strategy.

The evolution of video-sharing sites has drawn substantial investments in contextual advertising over the last decade.The information provided by users is used by popular contextual advertisement platforms to incorporate 2D visual advertisements into

videos. Current platforms face a number of technological challenges, including ad integration with occluding artifacts and 3D ad positioning.[5]

2 Research Gap

The basic research gap and focus on achieving this research is focused on the presence of 3D objects or graphs in a live news program. Research has shown that existing systems used to integrate 3D objects into the program require more time and more planning. The recent use of such technology can be seen in some local news channels. But it is a separate recording and was added to the live news distribution. Sometimes this graphic work is outsourced to other companies. This can cost a huge budget for the channel. This method can reduce costs, make work more efficient and add attraction to a live news broadcast. There is a system in the world that can do this and there are many problems. For example, it takes a long time to get used to operating that system. And that system is more expensive, but our system is simple, easy to operate, and easy to use for any individual. The table below briefly compares the existing systems with the proposed system.

Table 1 Research gap

Features	ViMix	After Effects	OBS	Vizrt Engine	Our Product
Adding 3d object to video	yes	yes	yes	yes	yes
Adding 3d object to live video stream in realtime	yes	no	no	yes	yes
Prior training on the system is required	yes	yes	yes	yes	no
Spending higher budget	yes	yes	no	yes	no
Lowest latency	no	no	no	yes	yes
Simplify UI	no	no	yes	no	yes

3 Research Problem

With the competition between news channels, they need to attract more viewers to make their channel popular among general public. So, they tend to try more newer ways for delivering news. Not all channel can equally spend money to experiment different technologies and sometimes they might not have proper knowledgeable employees who are qualified or have experience to try different types of technologies. Because of that they try different ways to bring out news in different perspectives. But these ways might not work for all situations.

Nowadays, in daily news broadcasts of the media channels, an image of something related to the news is shown using the screens in their studio or as a background image. Even though this method is practical and might not cost a huge budget, but this is now not a newer way of presenting the news. All most all television channel use this method.

Or sometimes, the object related to the news item is shown live in the channel's studio. They bring out the object to the studio and explain the news. This is to make the news clearer to the viewers. Is this practical in all situations?



Figure 1 : local news channel example

During the news delivery the physical evidence of that news were brought to the studio to compare [i] as shown as in the above example which they have use to illustrates the recent

pricing of a coconut in Sri Lanka. To that news, which is regarding the coconut prices, they were able to bring physical examples to the studio and make each of their prices and shown to the viewers with the explanations done by the presenter. But can they do news delivery regarding Covid 19 patient by bringing them to the studio? So, by bringing physical objects to the studio to explain the news might not be practical in all situations. This is our main research problem which will be solved using object placement system.

Some channel in Sri Lanka, currently trying to add 3D objects in the newsroom and deliver news. But up to date all the news items which contained 3D objects are planned before hand and recorded sparely and then that news clips are added to the live news. What if we can add 3D objects in a live news? Through this system, the 3D objects will be added to the live news clips so that the news creators do not need to plan or spend time and money on creating news separately.

Sometimes the news channels might not have expertise on creating Augmented Reality news items with 3D objects. Because of that they outsource these types of graphical work to outside companies. Outsourcing graphical work can cost much money to the channel. And not all channels have enough budget to do so. This creates another problem and through the objected placement system developed through this research will bring out solutions to that.

4 Objectives

4.1 Main Objective

The main purpose of this research is to show a three-dimensional object or graphical 3D object representing the news item in the newscast while the news item is recorded. With this system 3D objects can be placed in the newsroom much more efficiently. So that the announcer presents the news while showing the 3D object in an Augmented Reality environment in an attractive and understandable manner to the viewer.

4.2 Specific Objectives

- The placement of the 3D object in the live news program. When a news item is recorded through this system, we can add the 3D objects and graphs to the newsroom at the marked points in the studio.
- Making the system more budget friendly and efficient.
- Making the system more time efficient and easy accessibility.

5 Methodology

5.1 Research Area

This research paper is about embedding a 3D object in a live news broadcast at low cost and low human hack. Oral presentation of a news item as well as visual presentation should be very well considered and planned properly. As television is a medium of delivering news in both audio and visual form, attractiveness of both audio and visual forms should be well balanced.

The research area of this component is about adding attractiveness to the visual appearance in a news broadcast by using technology of Augmented Reality and adding 3D elements to the live news delivery. Pre-made 3D objects are chosen according to the type of news which needed to be delivered. Then these 3D elements are added according to the points marked on the studio. This process of adding 3D elements or the process of object placement is done to the live news broadcast.

5.2 Architecture of the Object Placement

Positioning an object is the exact positioning of a three-dimensional or 3.5d object on a live news broadcast to a marked location in its studio. For that we use one simple interface. The key elements and basics of this work are listed below,

- Enabling the to add the 3D object to the live stream video using the given marked point.

5.2.1 System Diagram

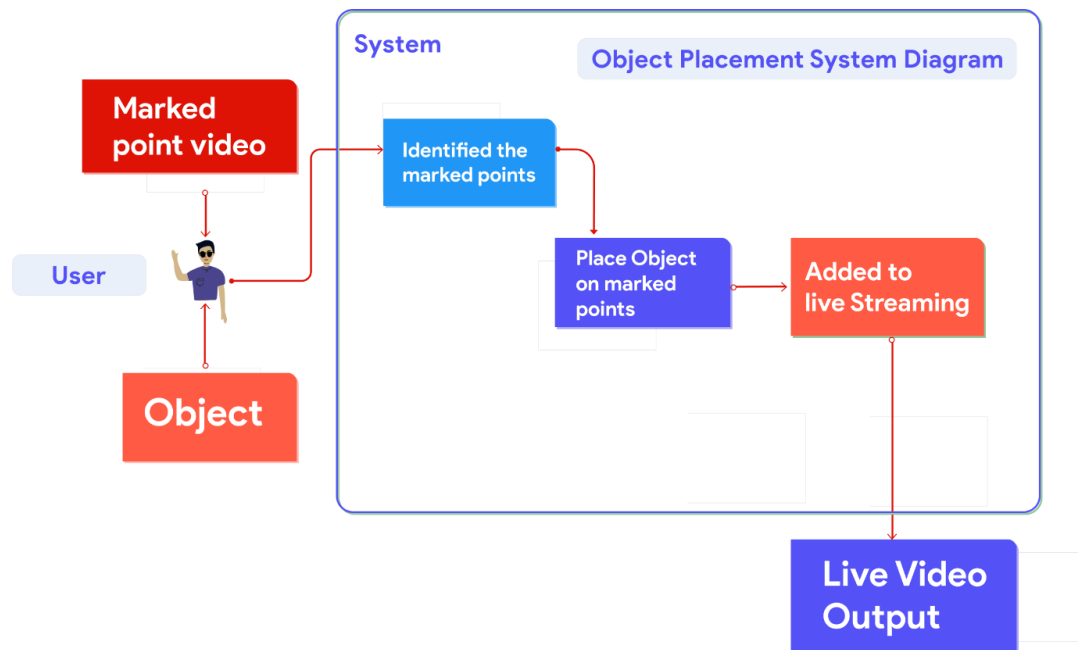


Figure 2 Object placement System diagram

5.3 Hardware Architecture

This system does not have a specific hardware architecture. This is a software tool used to retrieve and process data and information into the system, placing the object live video to given point. Basic hardware components such as computers / laptops will be used. The main feature of such a computer / laptop in use is;

- Should be able to handle high graphic.
- Good processing speed.

5.4 Software Architecture

The waterfall method is one of the best software models for describing our flow.

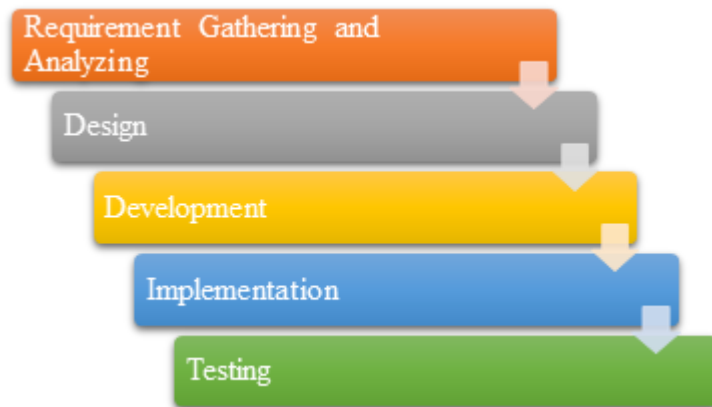


Figure 3 Software Architecture diagram

The waterfall model is the most important model for this study. It demonstrates how the outcomes of one process affect the outcomes of the next [6]. It's the process of moving through phases in a structured way. To progress to the next phase, each phase must be completed carefully. The phases are listed below, along with how they affect the research portion.

5.4.1 Requirement Gathering and Analyzing

Adding requirement to this research was done through an extensive analysis of past research conducted in recent years and identification, analysis of existing systems as well as reading various online resources and We did research in a variety of traditional ways.

1. Day today brainstorming sessions with the team members
2. Examine news items daily
3. Gathering the research papers done regarding the object placement topic

5.4.2 Design

At our stage, the system was designed and plotted on how to divide the system into four main parts that could achieve the desired end goal. The technology and hardware components required to develop this system are discussed at this stage. It is very important to have a proper plan at the planning stage to achieve the goal within the given time frame.

With the guidance of two supervisors, we were able to complete four major sections of the system. At this stage, we organize all our resources, documentation and technical components and design the overall system architecture.

5.4.3 Development and Implementation

In the previous process, all the necessary information and resources were gathered and the plan for this system was designed. Tiny units of the software will be built with the system design and will be implemented at the final stage of the implementation process. All these individual components need to be well matched and should be able to be incorporated without any problems in order to implement the device properly. A good communication between the team members is needed to minimize these difficulties in the integration as well as adequate guidance from the supervisors. It is very important to properly choose technology and instruments. The device is then sent to the test phase after each other's components are completed and assembled into a final product.

The following are some of the techniques and methods we use to developed this system.

Table 2 Technology stack

Part	Technology
Frontend	React Electron
Main Backend	Python (Django)
Identified Points	OpenCV
Server Deployments	Amazon web services

5.4.4 Commercialization

Lumoz can be sold as a full system that can be used to generate virtual reality and 3D effects for interactive media productions on a regular basis.

This system could be marketed to digital media creators like mobile journalists, television productions, live productions, and social media creators like YouTube and Facebook creators.

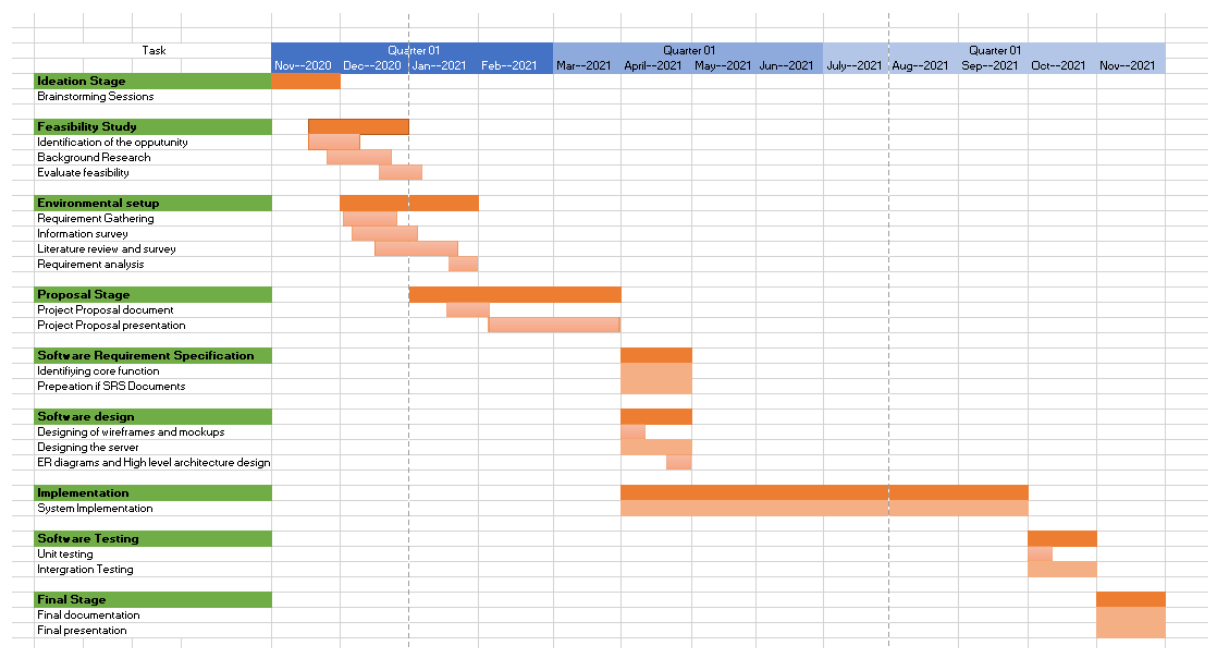
This tool can be launched as a free trial with restricted functions at first, and depending on demand, we can either make it a subscription-based production or transform the free trial into a premium paying method.

In comparison to other media tools, this method would be cost efficient.

Customers should be able to afford the expense because this method can be used in both daily and live productions.

5.5 Gantt Chart

Table 3 gantt chart



6 Project Requirements

A key requirement in this research project is a better understanding of 3D components and AR technology. Proper backup is required to store all required data and documents. The objective of this project is to include a better object placement among the media products and to reduce the time and cost involved.

6.1 Functional Requirements

- Inserting data to the system
- Import the object in to the system
- Recognize the marking
- Place object to the correct marking point

6.2 User Requirements

- Ability to handle the User interface
- Basic knowledge of IT field

6.3 System Requirements

- Good processing speed
- Ability to handle high graphic work
- Enough storage capacity

6.4 Nonfunctional Requirements

- Usability –better and user-friendly interface which provide all functionalities which needs in import and place the object in correct point.
- Performance – the creation of visual elements with less time and easily manageable interface.
- Availability – 24*7 availability. Once the system is installed to the hardware, it will be available in any time.
- Reliability – correct visual elements will be created once the data are inserted to the system.

6.5 Test Cases

Table 4 Test cases

Test Case Id	Test Scenario	Steps	Test Data	Expected Results
Test01	Import the 3D object into the system	Import the 3D(obj) file from the internet.	Sample obj 3D file	Success message of successfully

				import the object.
Test02	Import the 3D graph model into the system.	Import the 3D graph file from the database.	Sample 3D graph file	Success message of successfully import the object.
Test03	Placed the 3d object into the video marked point	Get the marked points output video Placed the 3D object	2D model with correct representation of the visual element.	3D object of the visual element.

6.6 Wireframes

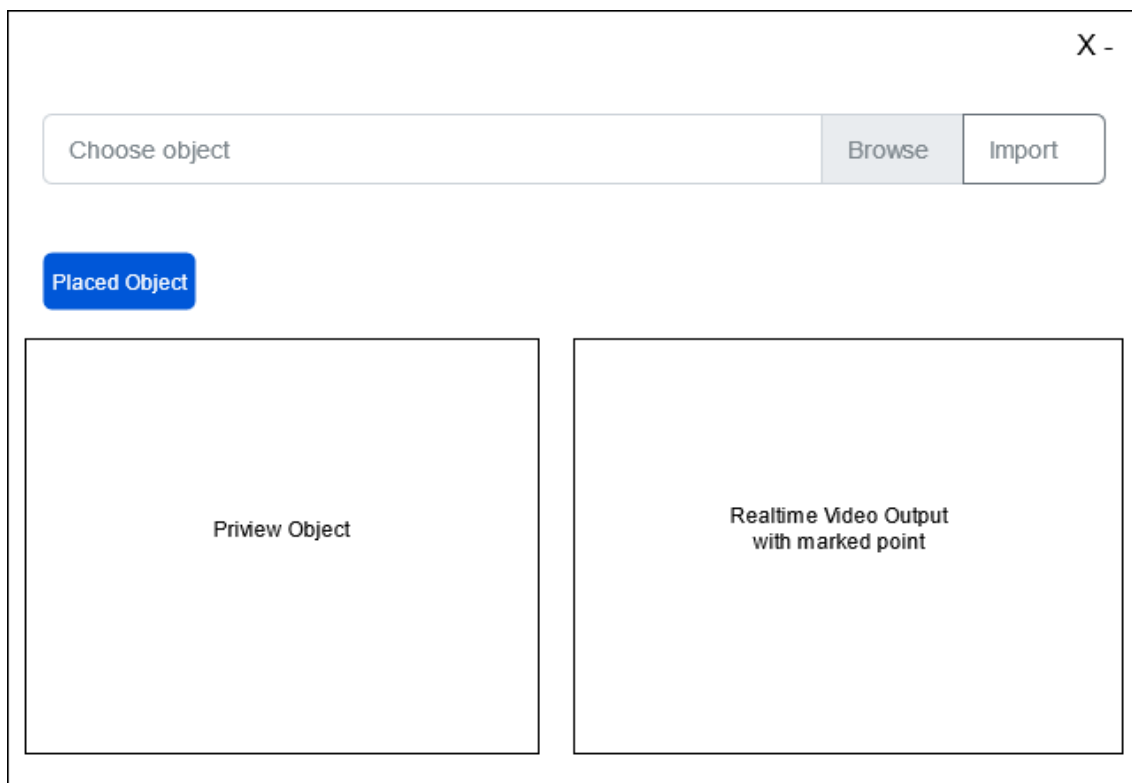


Figure 4 Wireframe

7 Budget

Table 5 Budget

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Resources	Price (LKR)
Electricity	3500
Stationary	3000
Internet	5500
Communication	1000
Paper Publish Cost	4000
Software Purchasing	2000
Total	19,000

8 Reference List

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9. Appendix

Appendix A: Plagiarism Report

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Figure 5 Appendix