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Review Article

A Review on 3D Augmented Reality Design Technique and Inward Leakage Testing on Protective Face Mask

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ABSTRACT

Protective face mask identification is essential today to users as it is a prominent protective wearable to shield from being infected by Covid-19 viruses. Protective face masks consist of layers of fibers that can capture large respiratory droplets and microscopic particles such as viruses or dust. Thus, mask filtration efficiency results depend on the materials used for each layer. Detail about mask description and efficiency are still anonymous to users, which is vital in this COVID-19. Therefore, this paper reviews designing 3D augmented reality for the protective mask with its detail parameter and mask sizing recommendation on android mobile. About 73 articles on the protective face mask, 3D augmented reality modeling, masks inward leakage testing, breathing resistance, and measuring faces have been reviewed. The result examines the existing protective face mask, inward leakage testing parameter, breathing resistance parameters, 3D modeling techniques, mobile applications, and the application used for measuring faces. The identified result shows six recent and familiar masks with 8% of arithmetic mean for inward leakage testing. The best flow efficiency is determined a 0.3 Microns bigger than 95%. The result also shows a detailed parameter for inward leakage testing in terms of inhalation resistance and flow rate. The comparison for 3D AR parameters is identified for application type, evaluated parameter, technical support parameter, AR platform, and software. This research is significant for developing AR

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mobile applications that ease and transparency information to the community for safety and health issues in Malaysia.

Keywords: 3D augmented reality, inward leakage testing, marker detection, mask material, mobile apps, protective face mask

INTRODUCTION

The recent COVID-19 pandemic has made protective masks crucial for all. COVID-19 could infect people through respiratory droplets produced when the infected individual sneezes or coughs loudly causing protective face masks to come in several types, layers, and materials (WHO, 2020). They are all designed to protect against airborne pollutants ranging from pollen to chemical fumes to infections. The capacity of the filter, and the amount of protection against pollutants and viruses, are determined by the materials and the technical design of the protective face mask (Long et al., 2020; Steinle et al., 2018). Figure 1 shows the various size of airborne contamination and pathogens. Therefore, the higher the pore size material design on the protective mask, the lower the filtration efficiency, and these studies show how important it is to design a protective face mask based on the material (Chua et al., 2020).

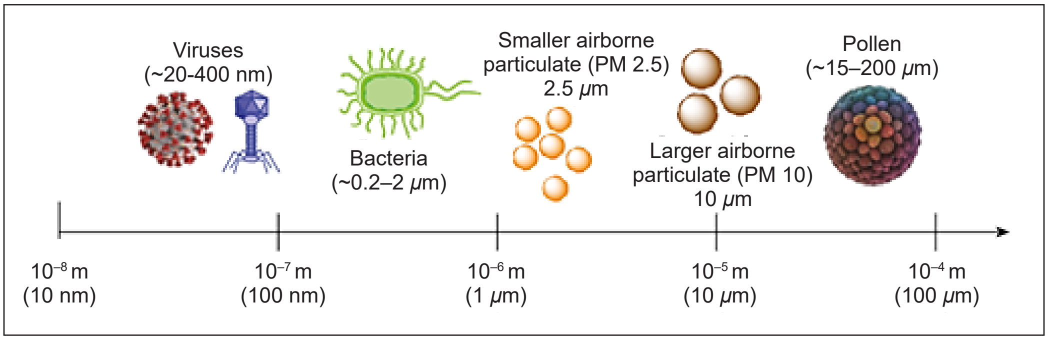

Figure 1. The size chart of common airborne contamination (Chua et al., 2020)

The filtration efficiencies of different materials for the mask are essential to be determined as different materials such as non-woven polypropylene were not threaded like cloth, but by spinning polypropylene to become a thread and to lay them in the form of a web to help provide the breathable condition, filtration, and water-resistant (Balamurali et al., 2021; Hao et al., 2020). Therefore, these criteria for face mask material are crucial to note as they would affect the filtering efficiency, breathable resistance, and the weave pattern of the material to capture the airborne particle. The result shows that the arrangement of the thread producing the front layer of the protective face mask is random. Thus, it has an electrostatic charge that can attract and capture particles of all sizes, showing that almost 95% of medium or small particles can filter. Figure 2 shows the layer of the N95 mask as

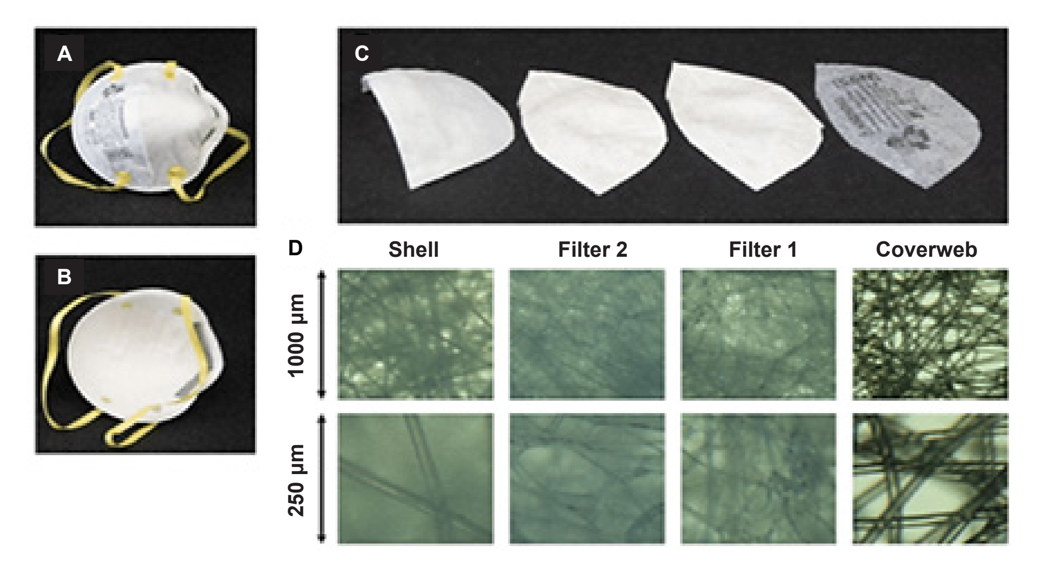

Figure 2. (A) outside layer mask, (B) the inside layer of the mask, (C) the inside layer is called a shell; the center layers are for Filter 1 and Filter 2, while the outside layer is called a cover web, and (D) the microscope images for the four layers showing the thread pattern (Huber et al., 2021).

an example of the space area between the thread, and this study is important in proving which material could give better protection.

Due to high demand during the early stage of covid-19, people buy protective face masks online as they are easier to find and sometimes cheaper-causing some sellers to sell counterfeit protective face masks that are not standard to NIOSH approval. Only by clarifying and understanding the important parameter while choosing a protective face mask will the user be able to understand the essential information shared using 3D augmented reality application. The examination of the inward leakage testing of how the test by doing several exercises would be done on a group of people while wearing different face masks and how the result on breathing resistance, face seal leakage, and filtering percentage will affect.

On the other hand, modeling and clarifying which design technique is used to design a 3D image of the protective face mask is important. Several studies show using a mobile application with AR technology that contains various medical training (Hossain et al., 2021; Leung et al., 2019; Sik-Lanyi, 2017). The app is connected to the database and runs simultaneously on the trainees' and trainers' mobile devices. This setting allows the trainer to watch the trainee's progress and switch the training scenario to judge the trainee's responses during training (Barratt et al., 2020). AR could be a technology that mixes real-world images and videos with computer-generated information and image processing, and students will have a clear view of learning and using the technique even though the virtual (Kassim & Bakar, 2021; Kassim & Zubir, 2019).

Other than that, every human in this world has different size faces causing some protective face masks that may not fit the faces. Based on the Centre for Control Disease (CDC), a suitable protective face mask is to choose a fitted face mask to prevent any airborne particle from passing through the gap. Thus, it is essential to studies on which software to use in measuring faces to recommend the size of protective face mask suitable for users.

This research reviews the AR modeling technique for protective masks and identifies the masks' inward leakage testing parameters to design a mobile AR for fitted faces for masks. This research helps healthcare users and society identify good protective masks for daily use. This research has reviewed 73 papers from index proceedings and journals to place the mask's details information. The 3D AR modeling will focus on the 3D images of the protective face mask and its data structure parameters to develop the mobile application. Comparing each activity done in the inward leakage testing will help users know which protective face mask to wear. In addition, there will be research gaps for the AR protective face mask and mobile applications in AR and VR. This information will help determine if there would be value in engaging augmented reality in sharing the information regarding the protective mask.

Protective Face Mask for Respirator

A respirator is a face mask that will protect the wearer from inhaling harmful air (Johnson, 2016). The United States Occupational Safety and Health Administration (OSHA) states that they should give respirators to any workers anytime they are exposed to danger. Therefore, choosing a suitable and adequate protective mask is essential. Generally, protective masks come in many styles and materials, and not all mask materials filter similarly (Hamid et al., 2016). In addition, each respirator needs to remove impurities like the previously stated particle settling. The existing research has shown diverse data regarding respirators, filtration performance, and test agents (Ghosh et al., 2020).

Nevertheless, different production has different versions. Therefore, collecting the data and inward leakage tests still needed to be researched. The challenges issues are modeling a 3D image of a protective mask and integrating it into a 3D augmented reality mobile application when the user scans the marker. The transition from the database stored to the face tracking system tracks the user's facial shape to determine the fitted protective mask. Total inward leakage is a sum of contaminated air leaking through a respirator from various sources, including the face seal, valves, and gaskets, as well as filtration (Baugh, 2015; Zhu et al., 2020).

For analysis, tests on people selected to represent the target group include gender, general facial traits, and facial measurements. Many people are wearing masks improperly, not fitting to the face or tying them properly, which impacts the seal to the face (Steinle et al., 2018). Surgical and fabric masks showed improper wearing of face masks as the material used to produce shows different filtering percentages (Cherrie et al., 2018). The fit of sealed and loose-fitting surgical masks on human beings of different races and N95 filtering face-piece respirators has been researched (Karuppasamy & Obuchowski, 2021). Filtration efficiency for a protective face mask shows that the mask's design, materials used, and it is fit to the face are vital to point to the designer. Thus, choosing a fit protective mask for various environments is important (Ardon-Dryer et al., 2021; Bazaluk et al., 2021). The user could use this platform to select a suitable and adequate protective mask for different situations and environments. By wearing the proper protective face mask, people can also protect others from getting the infection (Santarsiero et al., 2021). This sense of curiosity will want to know how this protective mask could help us not get infected.

Moreover, extra features such as animation showing the layers of material used to produce the protective mask will allow the user to visualize the airborne contamination and pathogens filter before inhaling (Shelus et al., 2020). As a result, healthcare workers, employees, or even an average person will learn and gain information from these apps. There was also a study in project development on interactive indoor cycling exercises using virtual video games (Kassim & Said, 2018). This project monitors heartbeat rate, cycle speed, finishing line, traveled distance, and stamina levels (Cho et al., 2009; Lee et al., 2008). Even though this project uses virtual reality, the control system was mobile. Therefore, this project motivated the user to exercise to maintain their health and stamina. Thus, this project could be helpful for this research as it could help this study collect data while using the protective face mask, such as inward leakage test and breathing resistance.

Next total resistance caused by the mask during expiration is called exhalation resistance, and the total resistance caused by the mask during inspiration is called inhalation resistance. Breathing resistance is exhalation and inhalation resistance (Ramirez & O'Shaughnessy, 2016). Striving the performance of the respirator in the workplace by evaluating particle penetration and breathing resistance (BR) of N95 filtering face-piece respirators (FFRs) under simulated air environmental conditions was studied (Ramirez, 2015). The results show that the respirators' breathing resistance will increase relative to humidity and low temperature outside the respirators. Yao et. al (2019) found the effect of structural characteristics on breathing resistance qualities in an overall assessment and characterization of face masks' comfort feeling and performance linked to breathing resistance for healthcare in fog and haze weather. Therefore, even if people are outside and using a face mask, there is a need for time to do a deep breathing method. Breathe and inhale-exhale for eight minutes or open the face mask for a moment to breathe fresh air. It could help improve breathing for a moment and help to release stress (Hariharan et al., 2021; Jerath et al., 2006).

Augmented Reality

AR has a solid potential for development in the future. AR has been implemented in many industries, critically impacting people's lives: education, healthcare, and security. Furthermore, the mobile phone is a reliable and helpful device for AR to easily access millions of people. Mobile augmented reality (MAR) gadget that uses sensors to determine the position and details of the environment. These combined features resulted in the merging of reality and the virtual world (Ganapathy, 2013). Figure 3 depicts the MAR system's architecture.

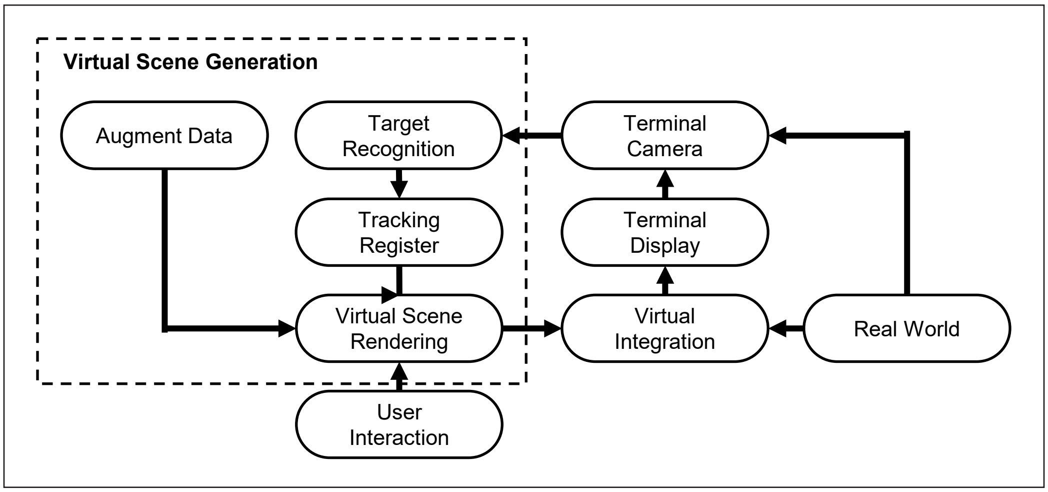

Figure 3. The architecture of the MAR System (Ganapathy, 2013)

A previous study in which the project was to design augmented reality for engineering equipment in education was done by Ghazali et al. (2019). These mobile apps have helped the student and teachers explain the component well when teaching. This interactive learning will attract students to learn and understand better as the image will show 3D information. Therefore, the apps will be able to help our society to know better during this pandemic. Other's research in which the project was to design a rehabilitation hand exercise system using video games to help stroke patients done by Mazlan (2020). As the system is interactive and unique, stroke patients will take this chance to learn and move around using it, motivating them to start moving their hands. Therefore, it shows that augmented reality will help others learn, train, and play video games.

METHODOLOGY

More than 73 papers have been reviewed from journals or previous research proceedings. There are mainly from IEEE Xplore, ResearchGate, and Google Scholar. Figure 4 shows the review scope in which papers were chosen over five years, beginning in 2015 and 2020.

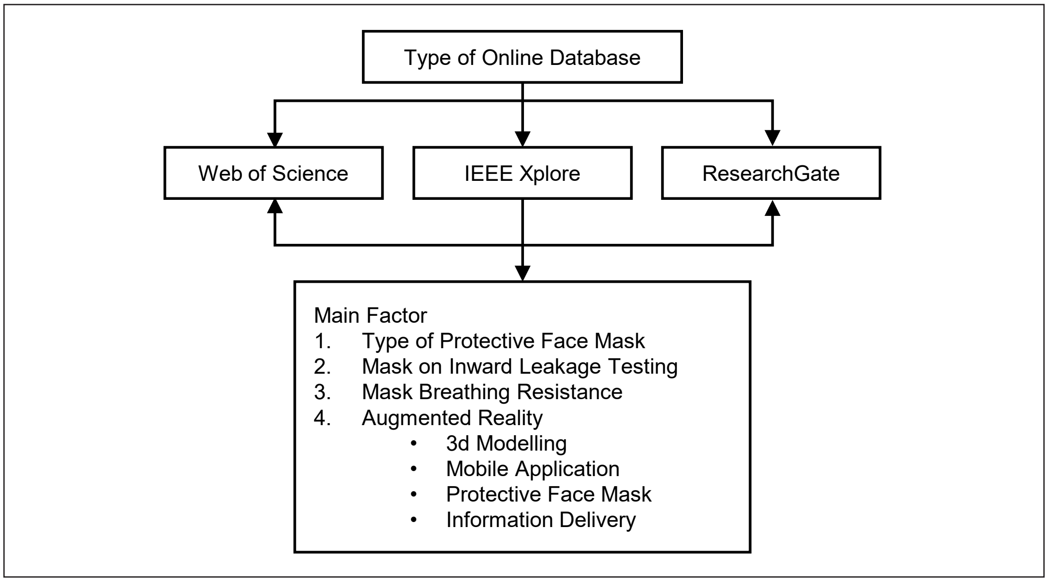

Figure 4. Review structure from publications record

Most of the journals and proceedings are from 2018 to 2021, and only a few journals and proceedings are between 2013 and 2017.

RESULT AND ANALYSIS

This chapter reviews the protective face mask parameter, mask in inward leakage testing parameter, followed by mask breathing resistance parameter, AR's discussion on mobile augmented reality, and 3D Augmented Reality Modelling parameter. Then, the research gap in augmented reality for the protective face mask continued in information delivery and face detection.

Protective Face Mask Parameter

A respirator is a protective device covering the nose and mouth or the entire face or head to guard the wearer against hazardous air environments. Table 1 provides an overview and comparison of several types of protective face masks. Because 0.3 microns is the most demanding particle size, the higher the filter effectiveness, the better the protection against microparticles. As a result of the study review, employing a protective mask primarily on N95 was the best filtering approach.

Mask in Inward Leakage Testing Parameter

Total inward leakage is the combination of contaminated air that leaks through a respirator from various sources, including face seals, valves, and gaskets, and penetration through the

Table 1
Comparison of different protective face masks

Protective Face Mask	Brand	Material Used	Filter Efficiency	Test Agents
 	N95 (US)	3 layers 1: non-woven fabric 2: electrostatic fiber cotton 3: skin-friendly lining fabric	0.3 Microns ≥ 95%	NaCI
 	FFP2 (EUROPE)	4 layers 1: Spunbound-outer layer 2: Meltblown 3: Airlaid in polypropylene 4: Spunbound skin-friendly	0.3 Microns ≥ 94%	NaCI and paraffin oil
	KN95 (CHINA)	5 layers 1: non-woven fabric 2: filter sponge 3: melt-blown cloth 4: melt-blown cloth 5: pro-muscle non-woven fabric	0.3 Microns ≥ 95%	NaCI
	P2 (AUSTRALIA)	3 layers 1: non-woven fabric 2: electrostatic fiber cotton 3: skin-friendly lining fabric	0.3 Microns ≥ 94%	NaCI
	KF94 (KOREA)	4 layers 1: the outer layer 2: the structural layer 3: melt blown filter 4: hypoallergenic material	0.3 Microns ≥ 94%	NaCI and paraffin oil
	DS2 (JAPAN)	3 layers 1: non-woven fabric 2: electrostatic fiber cotton 3: skin-friendly lining fabric	0.3 Microns ≥ 95%	NaCI

Table 1 *(continue)*

Protective Face Mask	Brand	Material Used	Filter Efficiency	Test Agents
	Surgical Mask	3 layers 1: non-woven fabric 2: High-density filter layer 3: skin-friendly composite fiber	3.0 Microns ≥ 95% 0.1 Microns ≥ 30%	NaCI
	Airism (Uniqlo)	3 layers 1: fabric mesh 2: micro filter 3: fabric mesh	3.0 Microns ≥ 60% 0.1 Microns ≥ 20%	NaCI

filter (Baugh, 2015). Analysis of protective face masks will test the different groups, such as sex, general facial characteristics, and facial measurements. Table 2 compares several protective face masks used during inward leakage testing. It demonstrates that, in contrast to loose-fitting surgical masks, sealed N95 can significantly minimize inward aerosol leakage and provide functional respiratory protection (Scheepers et al., 2021). The researcher's methodology included four activities: bending down, talking, moving the head side to side, and moving the head up and down. As a result, the prior research will assist this project plan in determining the technique utilized to match the element in obtaining the information required for the user to comprehend more readily. Therefore, this previous study will help this project plan determine the method used to fit the factor in getting the information needed for users to understand more easily.

Table 2
Comparison of total inward leakage testing results for different protective face mask

Protective Face Mask	Total Inward Leakage Testing
N95	N/A
FFP2	≤ 8% leakage (arithmetic mean)
KN95	≤ 8% leakage (arithmetic mean)
P2	≤ 8% leakage (individual and arithmetic mean)
KF94	≤ 8% leakage (arithmetic mean)
DS2	N/A

Mask Breathing Resistance Parameter

Breathing resistance describes how difficult it is to breathe when wearing a protective face mask (Ramirez & O'Shaughnessy, 2016). The findings indicate that the structural characteristics of a face mask can influence the performance of breathing resistance (Davis & Tsen, 2020). The higher the performance BR, the higher the physical condition of that person to breathe through the protective face mask. People will take this chance not wearing a protective face mask. A review done by a researcher for breathability while wearing a protective face mask shows that it depends on the materials as it will also affect the filtering efficiency (Kwong et al., 2021). Table 3 compares the inhalation resistance and exhalation resistance of several protective face masks.

Table 3
Comparison of protective face mask based on breathing resistance parameter

Protective Face Mask	Inhalation Resistance	Flow Rate	Exhalation Resistance	Flow Rate
N95	≤ 343 Pa	85 L/min	≤245 Pa	85 L/min
FFP2	≤ 70 Pa (at 30 L/min) ≤ 240 Pa (at 95 L/min) ≤ 500 Pa (clogging)	Varied	≤ 300 Pa	160 L/min
KN95	≤ 350 Pa	85 L/min	≤ 250 Pa	85 L/min
P2	≤ 70 Pa (at 30 L/min) ≤ 240 Pa (at 95 L/min)	Varied	≤ 120 Pa	85 L/min
KF94	≤ 70 Pa (at 30 L/min) ≤ 240 Pa (at 95 L/min)	Varied	≤ 300 Pa	160 L/min
DS2	≤ 70 Pa (w/valve) ≤ 50 Pa (no valve)	40 L/min	≤ 70 Pa (w/valve) ≤ 50 Pa (no valve)	40 L/min

The previous study by Amilcar Ramirez strived the performance of the respirator in the workplace by evaluating particle penetration and breathing resistance (BR) of N95 filtering face-piece respirators (FFRs) under simulated air environmental conditions (Ramirez, 2015). The results show that respirators' breathing resistance will increase relative to humidity and low temperature outside the respirators. Next, Yao and Wang proposed research to provide an overall evaluation and characterization of the comfort sensation and performance of face masks related to breathing resistance for healthcare in fog and haze weather and address the influence of structural features on breathing resistance properties (Yao et al., 2019). Twelve face masks in different varieties being an experiment, the results show that the face mask's structural features can affect the performance of breathing resistance (Matuschek et al., 2020). Thus, the researcher hopes to help manufacturers develop and produce high-quality face masks for initial applications.

Mobile Augmented Reality

This review aims to identify the potential use of AR in different fields. Table 4 shows the reviews related to mobile AR applications. Mobile technology has impacted us daily; people use it to work, learn, spend their leisure time, and interact socially. However, the actual implementation of mobile AR is still lacking. Nevertheless, more research needs to happen for future industries in AR and VR.

As shown in summary in Table 4, there are many fields in which AR technology can be adapted for teaching and learning. More research on integrating AR in teaching and learning in terms of protective face masks should be conducted. For example, a mobile

Table 4
Reviews on different types of AR application

Field	AR Features Used	Purpose	Author
Construction Safety Education	Interactive 3D image and guided animation	To provide training in wearing PPE and to have Hazard Inspection Process	(Le et al., 2015)
Medical	Interactive 3D anatomy pictures and feedback	To teach anatomy of the brain and guide in the dissemination of mental health information and self-evaluation	(Bakar et al., 2021; Hossain et al., 2021; Moro et al., 2021)
Art Creation	AR technology in exhibiting the object to image	To provide different multi-finger forms in various manipulation operations and could do the rotate, swipe, pinching, and spreading 3D object	(Bhargava et al., 2017; Kanivets et al., 2019)
Tourism	Interactive 3D AR images and interactive features	To provide information about the country and guide tourists to find the place and food	(Rashid et al., 2017; Acaya et al., 2018; Dangkham, 2018; Demir & Karaarslan, 2018; Safitri et al., 2017)
Vibro Motor Wearable	Head-mounted display and personal interaction panel	To demonstrate how to use the app through tactile human-machine interactions and feeling the tactile feedback impact	(Rumiński & Klinker, 2018)
Animation games	Mobile AR games	To show a 3D augmented image of a virtual pet that lives in the Augmented Reality world	(Costa et al., 2019)
Education	AR technology educational	To teach preschool learning platform and having an interactive layout to make fun with the learning	(Hou et al., 2017; Koca et al., 2019)
	AR learning environment	To overlay the objects and produces the sound of the item name. Helping the daze individuals recognize an object	(Mambu et al., 2019)
	Augmented video, animation, and sound	To provide related phrases and sounds to assist in teaching eating skills to blind people	(Bouaziz et al., 2020)

app uses AR technology-enhanced compared to books for users to visualize the image and find the information about protective face masks.

Augmented Reality Modelling Parameter

Augmented reality is relatively a mixture of both reality and virtual that allows real-world objects to be augmented. Thus, adding a 3D image inside the apps would make it more exciting and visualize better. Researchers anticipated that augmented reality has a very high potential and benefits in teaching and learning, based on augmented reality technology's rapid growth and improvement (Kesim & Ozarslan, 2012). Several researchers have used 3D augmented reality to model from image to object (Cheberyachko et al., 2020; Mahrous et al., 2021; Reipschläger & Dachselt, 2019; Teng & Peng, 2017). Using 3D augmented reality technology will result in an appealing application for the user. For example, a previous study has used augmented reality to create a 3D picture of the gut for anatomical purposes (Andayani et al., 2019). This result could help the doctors or students explain to the patient if needed for more closure. Therefore, for this project, there will be an interface where the user can play around with the protective face mask and know the layer-by-layer structure of the protective face mask.

Other than that, the design technique for designing the AR marker-based would be based on the parameter. For example, the camera on the smartphone may be used as a scanner to detect the augmented reality marker-based that employs the Vuforia as an image tracker. As the matching marker-based found, the 3D model of the marker-based will overlay on the image. An excellent marker-based is quickly and consistently visible under all conditions. Therefore, specific parameters for choosing a suitable marker-based are needed to pay attention. Table 5 shows the marker-based detection parameter (Vuforia, 2020).

Table 5
Marker detection parameter

Parameter	Explanation
Marker-based Image	• 4 to 5 Star Rating Upload on Vuforia to have the app detect. The more structures the marker-based, the faster camera is detected.
Distance	• Between 30 cm to 2 meter • 12 × 10 cm images From the marker-based and it should be parallel for the image to overlay on the screen.
Color Image	• RGB and Contrast color between the background and the marker-based. • 12 × 10 cm images The camera needs to focus on the marker-based rather than other marker-based.
High Resolution	• 8-bit and 24-bit image pixel Clearer image for the user to visualize

Augmented Reality for Information Delivery

AR has significantly assisted in giving visualization and information to users by using identifiers such as picture markers to offer the correct information (Roy & Kanjilal, 2021; Shirazi & Behzadan, 2014). Through AR manipulation, people may quickly obtain information ranging from microscopic things to vast terrains. AR will substantially assist in delivering

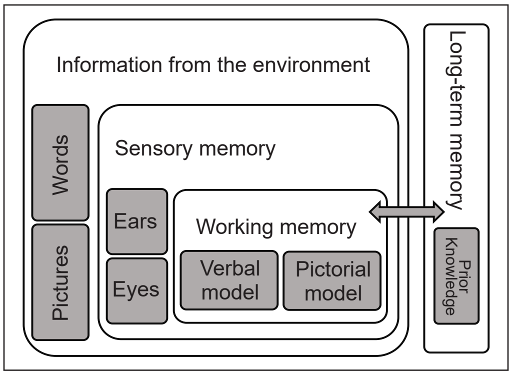

Figure 5. The role of AR in information delivery (Shirazi & Behzadan, 2014)

visualization and information by using identifiers such as picture markers to offer the correct information to the user. Figure 5 depicts the function of augmented reality in information transmission.

Face Detection for Face Mask Sizing

Face masks and respirators come in a variety of shapes and sizes. They are used in the military (e.g., for pilots' oxygen masks), public safety agencies (e.g., firefighters' respirators), medical (e.g., aerosol face masks), and automotive purposes (e.g., paint respirators). Depending on the type of face mask, it intends to provide oxygen or filter air. Most types of face masks must be able to accommodate a wide range of facial shapes. Leakage might result in pollution and inhalation of toxic gases and particles for respirators, which could cause lung illnesses or other health concerns.

Furthermore, ill-fitting oxygen masks that leak into the eyes are irritating, especially to users wearing spectacles. Thus, a tight fit with no leakage is thus essential for constructing an efficient face mask. As a result, automatic face detection systems play a critical role in face identification, facial expression recognition, head-pose estimation, human-computer interaction, and other applications. Face detection is a computer system that locates and sizes a human face in a digital image. Face detection has emerged as a significant issue in the computer vision literature (Kumar et al., 2019). The previous study shows research on designing protective face masks suitable for users to talk or make any motion (Bolkart et al., 2014). Figure 6 shows the landmark point on the face done to measure the size of the protective face mask.

Besides that, a researcher built a semi-automated technique for sizing nasal Positive Airway Pressure (PAP) masks (Johnston et al., 2017). The result shows a 72% accuracy in appropriately sizing a mask and a 96% in sizing within one mask size group. Face detection to measure human faces will help the user buy a suitable and adequate protective face mask. Furthermore, the correct sizing will improve the face seal leakage and filtering percentage when a person inhales. Therefore, it is essential to know the software that will help point the landmark and measure accurate size while integrating it into AR technology.

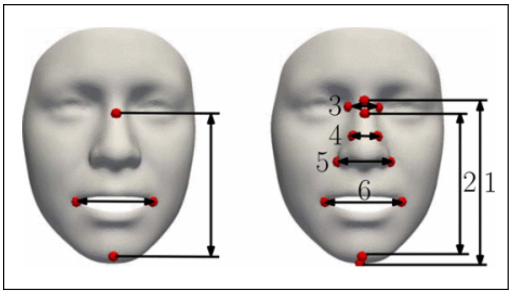

Figure 6. The landmark point (Bolkart et al., 2014)

Analysis of Review Gap in Augmented Reality

Table 6 compares several prior efforts relating to augmented reality use in the mask. The variables being compared include the technology support, parameters, platform, and software used. These parameters were identified, and new parameters for new developments in this research are included in Table 6.

Table 6
Research gap on augmented reality for a protective mask

Tech Support	Parameter	Platform	Software Used	Author
VR and AR (3D)	Supporting safety training to identify the hazards and training in protecting themselves while working in construction buildings	Mobile	Build AR PRO-2, Revit Architecture 2013, and Blender 2.68	(Le et al., 2015)
VR and AR (3D)	Error-avoidant training approach Automated assessments	Head-mounted display	Unity 5 and custom software integrated with Nintendo Switch	(Eubanks et al., 2016)
AR (3D)	Support practical training in safe donning and doffing Assessment of this training	Mobile	-	(Cahill, 2020)
AR (3D)	Information on fibers of an N95 mask	Website	Spark AR	(Bartzokas et al., 2020)
AR (3D)	Information on a protective face mask and face tracking	Mobile	3D Unity, Vuforia	Current development

CONCLUSION

Augmented reality is essential for future technology in our country as a new medium for creating interactive learning during this pandemic. 3D augmented reality will satisfy the end-user in terms of better visual understanding. At the same time, it reduces the time for the user to find or search information for on various types of protective masks. 3D augmented reality represents a leading technology in our ordinary lives that needs to improve to aid people nowadays in teaching or sharing the information to visualize better. As a result, 0.3 microns is the most challenging particle dust to capture. Thus, having a 95% and above filtered percentage shows that the material used for the protective face masks can protect the wearer from inhaling air pollution. The results also show the comparison on inward leakage testing in which six protective face masks give 8% arithmetic means while at the same time identifying the breathing resistance with the flow rate. Moreover, the result for 3D AR for 3D modeling, mobile application, information delivery, and protective face mask can be analyzed and identified. This comparison of data for different protective face masks helps the research provide better information to the user. The various parameter result will help give the user a better understanding and more knowledge in choosing a suitable and adequate protective mask. This application system will help the country, industries, and employees who require a protective mask's information.

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