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जिल्हा नियोजन समिती, कोल्हापूर

शिवाजी विद्यापीठ, कोल्हापूर,

USER MANUAL

DEVELOPMENT AND APPLICATION OF **AR/VR TECHNOLOGY** FOR SCHOOL EDUCATION









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शुभसंदेश

शिवाजी विद्यापीठाच्या यशवंतराव चव्हाण स्कूल ऑफ रूरल डेव्हलपमेंटच्या वतीने ''शालेय शिक्षणात आभासी वास्तविकता तंत्रज्ञानाचा वापर'' या प्रकल्पांतर्गत निर्माण केलेल्या ॲंड्रॉईड ॲप्लिकेशनच्या वापरासंदर्भात माहिती पुस्तिका तयार केली आहे. ही प्रणाली, तिचे निर्माते आणि वापरकर्ते यांना सर्वप्रथम मी मनःपूर्वक शुमेच्छा देतो.

कोल्हापूर जिल्हाधिकारी कार्यालयाच्या जिल्हा नियोजन विभागाने शिवाजी विद्यापीठास शालेय शिक्षणात आभासी वास्तविकता 'तंत्रज्ञानाचा वापर' हा प्रकल्प मंजूर केला. या प्रकल्पांतर्गत विद्यापीठाच्या यशवंतराव चव्हाण स्कूल ऑफ रूरल डेव्हलपमेंटच्या संशोधक व शिक्षकांनी एक अत्यंत अभिनव अशी प्रणाली निर्माण केली आहे. महाराष्ट्र राज्य अभ्यास मंडळाच्या आठवी ते दहावीच्या विज्ञान व तंत्रज्ञान विषयाचा अभ्यास करणा–या विद्यार्थ्यांसाठी ही प्रणाली अत्यंत उपयुक्त आहे. पुस्तकातील विज्ञानाची आकृती अथवा चित्र प्रणालीद्वारे पाहिल्यास त्याचे त्रिमितीय स्पष्टकृती आभासी स्वरूपात समोर येते आणि संबंधित सर्व माहिती विद्यार्थ्यांना मिळते. विज्ञानातील विलष्ट व किचकट संकल्पना त्यामुळे सोप्या पध्दतीने समजावन घेता येणे शक्य होते.

या प्रणालीचा शालेय अध्ययन अध्यापन पध्दतीमध्ये निश्चितपणे उत्कृष्ट उपयोग होईल, याची खात्री वाटते. या प्रकल्पामध्ये सहभागी असणा–या सर्वच घटकांचे मी मनःपूर्वक अभिनंदन करतो. हा प्रकल्प शिवाजी विद्यापीठास दिल्याबद्दल कोल्हापुर जिल्हा नियोजन समितीसही धन्यवाद देतो.

सदर अद्यावत प्रणााली आणि त्याची माहिती पुस्तिका आपणास सादर करीत असताना शिवाजी विद्यापीठास आनंद होत आहे. त्याच्या यशस्वितेसाठी माझ्या हार्दिक शुभेच्छा!

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कलगरू







आमदार सतेज उर्फ बंटी डी. पाटील माजी गृह राज्यमंत्री, महाराष्ट्र राज्य

शुभसंदेश

शिवाजी विद्यापीठाने **शालेय शिक्षणात आभासी वास्तविकता तंत्रज्ञानाचा वापर** हा प्रकल्प यशस्वीरित्या पूर्ण केला याबद्दल मी प्रथम प्रा. सुधीर भरत देसाई व डॉ. वैशाली प्रशांत भोसले यांचे अभिनंदन करतो. ग्रामीण भागातील शिक्षणाचा दर्जा उंचावण्यासाठी _नाविण्यपूर्ण प्रकल्पांना शासनाने नेहमीच प्रोत्साहन दिले आहे.

सतत बदलणाऱ्या जगात सुसंगत राहण्यासाठी शिक्षण प्रणालीला नवीन तंत्रज्ञानाची आवश्यकता आहे. शाळा आणि महाविद्यालये त्यांच्या पारंपरिक शिकवण्याच्या पद्धती बदलत आहेत. कोविड नंतर ऑनलाईन पद्धतीने शिक्षण सुरू झाले. या सर्व पद्धती विद्यार्थ्याला शिकण्यासाठी मदत अथवा प्रवृत्त करत असतात, पण सर्वच विद्यार्थ्यांना या पद्धतीचे शिक्षण मनोरंजक, चित्तवेधक वाटेलच असे नाही. "**संवर्धित वास्तविकता**" ज्याला आपण AR (Augmented Reality) म्हणतो, हे तंत्रज्ञान वापरून केलेले शैक्षणिक कंटेंट विद्यार्थ्यांला शिकण्यासाठी आणि त्या संदर्भातील वेगळ्या शक्यतांबद्दल विचार आणि प्रयोग करण्यासाठी प्रवृत्त आणि मदत करते. तसेच शिकणे अधिक आकर्षक आणि मनोरंजक बनवते. व्हर्च्युअल आणि ऑगमेंटेड रिॲलिटी ही शिक्षण प्रणालीच्या उत्क्रांतीची पुढची पायरी आहे. आभासी आणि संवर्धित वास्तव शिक्षकांच्या शिकवण्याच्या आणि विद्यार्थ्यांच्या शिकण्याच्या पद्धतीत पूर्णपणे क्रांती घडवून आणेल. सरकारी शाळेतील विद्यार्थ्यांना शिक्षणासाठी आधुनिक तंत्रज्ञान उपलब्ध करून देणे हा या प्रकल्पामागचा प्रमुख उद्देश आहे.

कोल्हापूर जिल्ह्यातील लाखो विद्यार्थ्यांना तसेच शिक्षकांना या प्रकल्पाचा नक्कीच फायदा होईल. अशी मी अपेक्षा करतो.

आपला,

(आमदार सतेज उर्फ बंटी डी. पाटील)

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a. Introduction to AR/VR/3D:

What is AR, VR and 3D?

Augmented reality (AR) integrates virtual objects into the user's environment in real time.



Virtual reality (VR) is simulated three-dimensional environment, presented to a person through head-mounted display (HMD) to interact with virtual surrounding.



Three Dimensional (3D) models for real world objects, with added animation and interaction helps in effective teaching-learning process.





b. Application Overview:

SUK-AR is an application for 8th, 9th and 10th standard students. This application is to help students to understand the abstract concepts by performing experiments in an innovative way.

Here are some DO's and Don'ts to use the application.

DO's

- Read and strictly follow instructions given in User Manual.
- For better understanding first read the experiment from the book and then Perform the experiment using the application.
- Use the application under the guidance of teachers.
- Maintain the application volume till it is audible, do not hear in loud volume.
- If you do not understand any part/experiment/function, ask help from teachers.

Don'ts

- Do not perform more than 2 experiments in a day.
- Do not hold the device in hand for long time while performing experiment (maximum 5 to 8 minutes).
- Do not hold device too close to the face.

Disclaimer

The application SUK-AR is a copyright of Principal Investigator and Co-Investigator from Shivaji University, Kolhapur. The application is developed for the content from Maharashtra State Board syllabus for 8th, 9th and 10th Standards. This application is not any kind of replacement or substitution to school teachers. The color, size and material of the assets used in the application are intentionally modified for the better visualization effect. The application works on mobile phones which might be addictive for students, the teachers and parents needs to monitor student.



c. System Requirements

Hardware and software requirements -

• Google Play Service for AR Supported device

- Android device with Minimum 4GB RAM
- Enough space required to download the application (App Size 2 GB)

d. UI buttons and their functions

Application User interface



Main menu



Close

User interface to perform Experiment



Back/Previous step

8

Buttons menu



Reset/Restart



Working information



Disassemble object



Working



Pin object



Unpin object



Speed Fast



View tags/names



Hide tags/names



Rotate object



ON









Assemble Object

Speed Slow

OFF

e. Steps to install SUK-AR application

- 01: Open google play store in your android device.
- 02: Search for SUK-AR
- 03: Select the application and click on Install.



04: After couple of minutes the app will be downloaded and installed in the device.





Tap on the application to open. First the splash screen will appear.



Click on START button.





a. Class/Standard selection:

The class selection screen will appear.

Top right button is main menu selection

On pressing the button there are four options:

Menu	
Guidelines	
Audio	h
Exit	- 2
About	

Guidelines	General guidelines about how to use application	
Audio	Application volume and language	
Exit	Quit application	
About Us	Application development team	

Top left button is to navigate back

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b. Chapters/topics selections:

Select standard (8th / 9th /10th Part-1/10th part-2)

Select Chapter (vertically scrollable)

Select Topic (vertically scrollable)





After topic selection Select the mode AR or 3D.



AR has 2 Modes - Marker based and Marker less.





c. Mode selection AR:

MARKERLESS MODE SELECTION

On selecting Marker Less, the application will ask for Camera Permission. Select option "WHILE USING THE APP".



Read carefully User Guide and to move further Press Close Button.





d. Performing Experiments

After reading the User guide, the camera starts scanning the surface. The surface should be flat, non-reflective, with enough light. The surface should not have objects on the floor.



Move camera slowly to get scanning signal. While scanning surface, the application displays the message (Too far/Good).



Once the message "Good" appears, tap on the screen to augment the experiment on the surface.



When you tap on the screen, respective virtual 3D model will pop up. When all parts are clearly visible then Pin the object, by tapping on the pin button.



In case if you want to set the object again, tap on the Pin button to Unpin the object.





You can rotate/resize object by using fingers. Use Two fingers for zoom in and zoom out. Use Single finger to rotate.

Now you can start exploring the experiment On the right bottom menu button will appear. On tapping Menu Button two more buttons will appear.



1. View tags/ Names- Tap to see Labels/ Naming





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Tap on the tags/Labels to get a detail description of the Part.



Press Back button to continue the experiment.

2. **Working Button:** Tap to enter in the working mode to perform the experiment.



To perform the experiment, tap on the information button to read the details.





After reading the working information you can begin with experiment. At the bottom center screen, you can see the instructions to perform the experiment.



After reading the instructions, tap on the highlighted asset to perform the particular activity.



Follow the instructions to continue with the experiment and observe the reaction in instruction panel.





"Awesome" message will appear which indicates the experiment is finished.



After "Awesome" message restart the experiment by tapping on reset/Restart button or Tap on the Main menu button to proceed for the next experiment.

MARKERBASED MODE SELECTION

For marker-based demo, let's select standard 10th part-1, then select chapter "Refraction of light" and select topic "Effect of atmospheric refraction".



Note: - Before performing marker-based experiment accommodate yourself with the particular standards book to begin.



Here after selecting the Marker based mode User guide will appear. Read carefully User Guide and to move further Press Close Button.

	USER GUIDE	and the
118/01	To placed an object :	
	-Scan the target image	
	-Make sure light is not too bright or too dim	
	-Interact with the Object, After the image has been tracked	- A
	To Rotate a Object :	Carl I
	-Rotate the object with one finger	
	To Scale Object :	
	-Pinch to scale the object	
	To Move Object :	
	-Before setting object, move the object with two fingers	
	Pin Object :	
	-After pinning object you can start the actual experience	
	Unpin Object :	
	-To start experience again unpin the object and follow above procedure	

Open your book and place it on the table, move your mobile/tab on the particular experiment in the book (Page number is given on the Index page)

Face your device Camera in such a way that particular experiment is visible in the book.



Move your device camera (up/down, right/ left) until the experiment will augment on mobile device.





Here also you need to pin the augmented experiment and view it from any angle you want. Rest of the Instructions will remain same as given in marker less application.

3D MODE SELECTION

Read User Guide and continue. Functionality of UI buttons will remain same.

For example, select standard 9th, select chapter "Introduction to Biotechnology" and select topic "Lifecycle of the silk moth".





3. About Us

Sudhir Desai, Vaishali Bhosale-	Team Leader
• Avinash Utturkar -	Lead Artist
• Hetvi Shah -	Sr. Unity Developer
• Sachin Mandavakar -	lighting Artist
• Abhishek Moghe -	Unity Developer
• Snehal Sawant -	VFX Artist
• Pankaj Kamble -	UI design and UX
• Ameya Pawar -	Jr. Unity Developer
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