माधव प्रौद्योगिकी एवं विज्ञान संस्थान, ग्वालियर (म.प्र.), भारत
MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR (M.P.), INDIA
Deemed University
(Declared under Distinct Category by Ministry of Education, Government of India)
NAAC ACCREDITED WITH A++ GRADE

Project Report
On
DEPARTMENTAL LAB (AR-VR Lab) (2270721)
For
VR Shooting Game & AR Math(3-D Shapes) Visualiser

SUBMITTED BY

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Fourth Year (Seventh Semester)
Artificial Intelligence & Data Science

SUBMITTED TO

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Session: Aug-Dec 2025

CERTIFICATE

This is to certify that the work contained in this project has been carried out by the students mentioned below from the Centre for Artificial Intelligence. This project was done on partial fulfilment of B. Tech. Laboratory **"DEPARTMENTAL LAB (AR-VR Lab) (2270721)".** It has been found to be satisfactory and hereby approved for submission.

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DECLARATION

We hereby declare that the project report for the course **DEPARTMENTAL LAB (AR-VR Lab) (2270721)** is being submitted in partial fulfilment of the requirements for the award of **Bachelor of Technology** in **Artificial Intelligence and Data Science.**

All the information in this document has been obtained and presented in accordance with academic rules and ethical conduct.

Date: November 13, 2025

Place: Gwalior

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A special acknowledgement goes to our colleagues who helped us in completing the file by exchanging interesting ideas to deal with problems and sharing their experience.

We wish to thank the faculty and supporting staff for their undivided support and interest, which inspired us and encouraged us to go our own way, without whom we would be unable to complete our project.

At the end, we want to thank our friends who showed appreciation for our work and motivated us to continue our work.

Diya Badkul
Neeraj Prajapati
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VR SHOOTING GAME

OBJECTIVES:-

The objectives of the virtual reality shooting game are given below:-

1. To design a basic VR shooting prototype that registers shots and awards score points.
2. To enhance the initial prototype into a fully immersive VR shooting environment.
3. To enable realistic weapon aiming, trigger-based shooting, and object/cube destruction.
4. To improve gameplay by adding detailed models, animations, and environment assets.
5. To develop a scoring and feedback system that motivates accuracy and player improvement.
6. To understand VR interaction concepts, including motion tracking, colliders, and physics-based responses.

DESCRIPTION:-

The project began as a simple VR shooting prototype in which the player held a virtual gun using motion controllers and aimed at cubes scattered on a plane. Each time the player pulled the gun trigger and successfully hit a cube, the cube was destroyed and the player earned a score point. This stage of the project demonstrated fundamental VR input handling and basic object interaction.

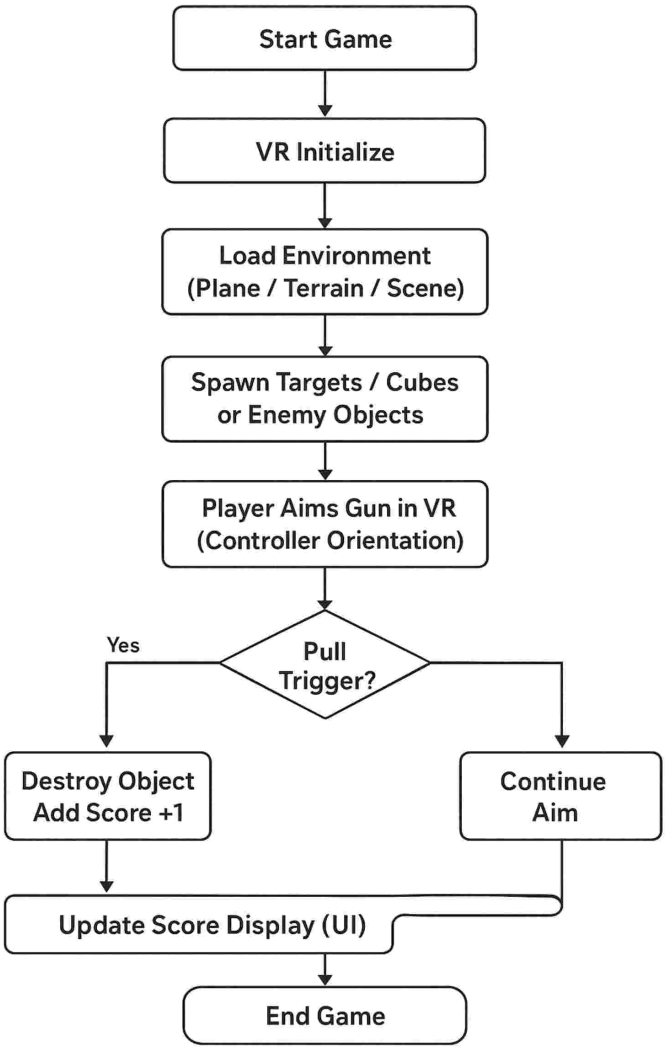
Later, the project was enhanced into a more realistic VR shooting game. The environment was upgraded with improved 3D models, realistic terrain/flooring, lighting, and textures. The weapon models were replaced with realistic guns, and shooting mechanics were refined to feel more natural. Additional visual and audio feedback was introduced, including muzzle flashes, impact effects, and sound effects, creating a more immersive gameplay experience.

This progression reflects the full development cycle:

Prototype → Mechanics Testing → Enhancement → Final VR Gameplay

The final result is a VR shooting game that allows players to physically aim and shoot in a 3D environment, improving hand-eye coordination, spatial awareness, and reaction speed.

WORKFLOW:-



DEVELOPMENT TOOLS USED:-

Tool / Software	Purpose
Unity Game Engine	Scene creation, scripting, and game logic
C# Language	Weapon mechanics, scoring, interaction scripts
XR Interaction Toolkit / VR SDK	VR support
3D Models from Asset Store/Blender	Environment, gun, and props

VISUAL OUTPUTS:-

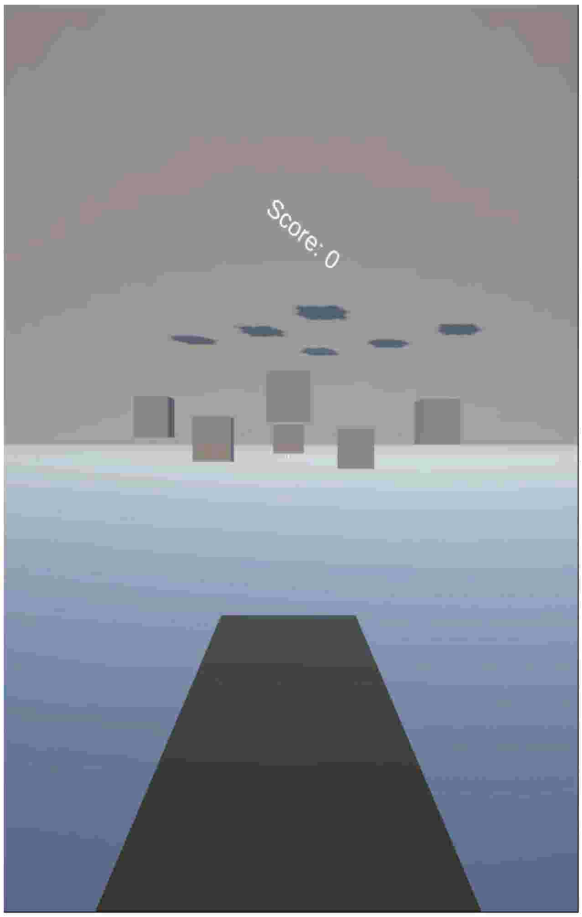


Fig 1: Initial Start of the game

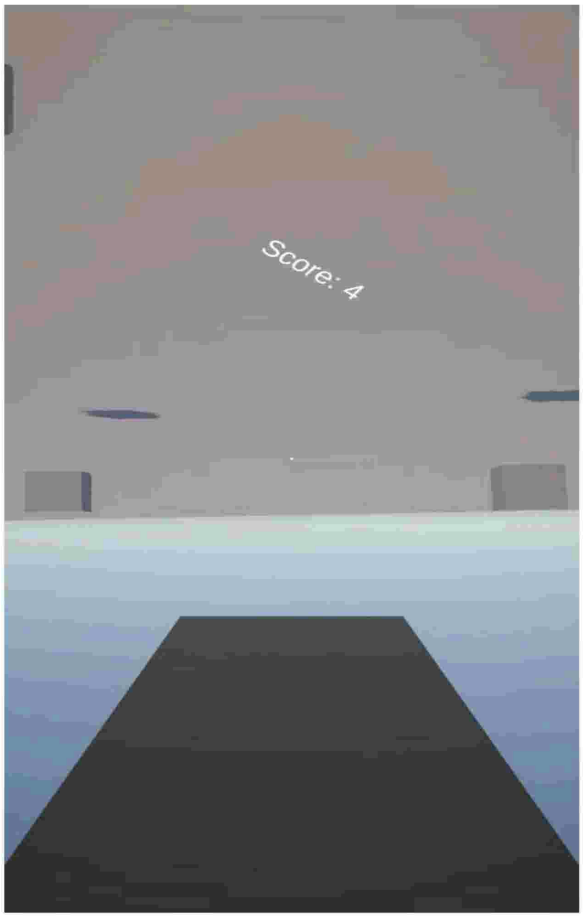


Fig 2: After shooting 4 cubes

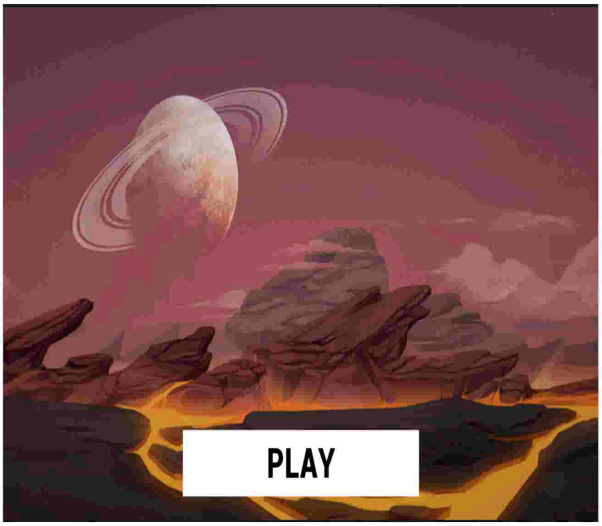


Fig 3: Enhanced Start Scene

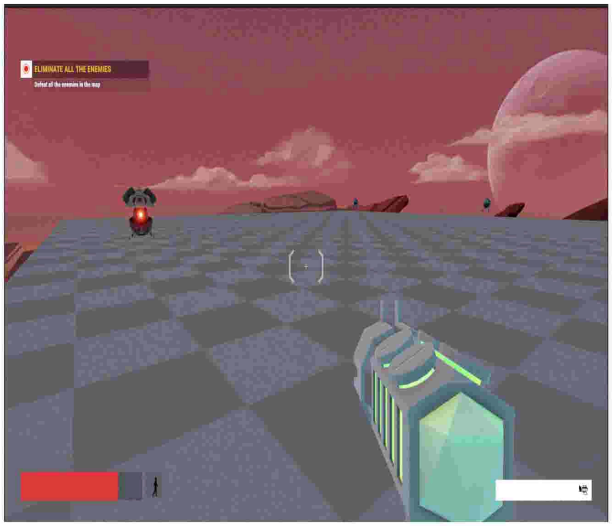


Fig 4: Initial Weapon and target scene

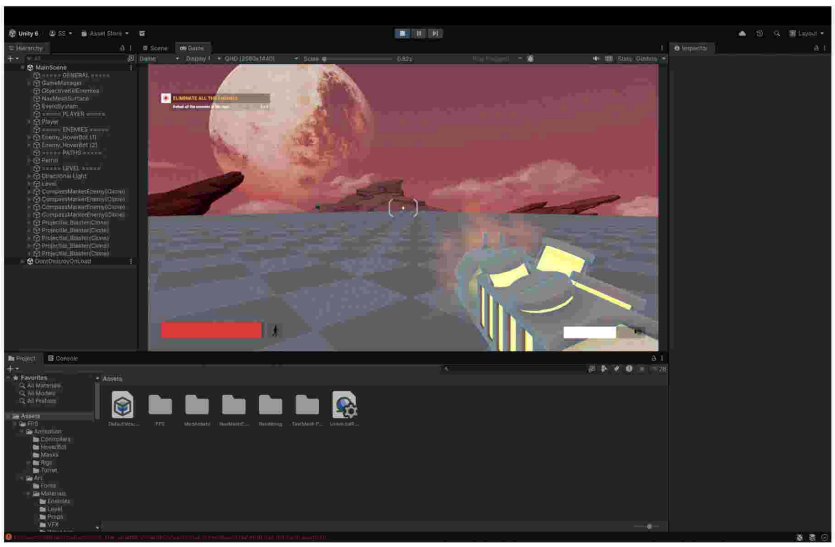


Fig 5: Unity Interface while shooting

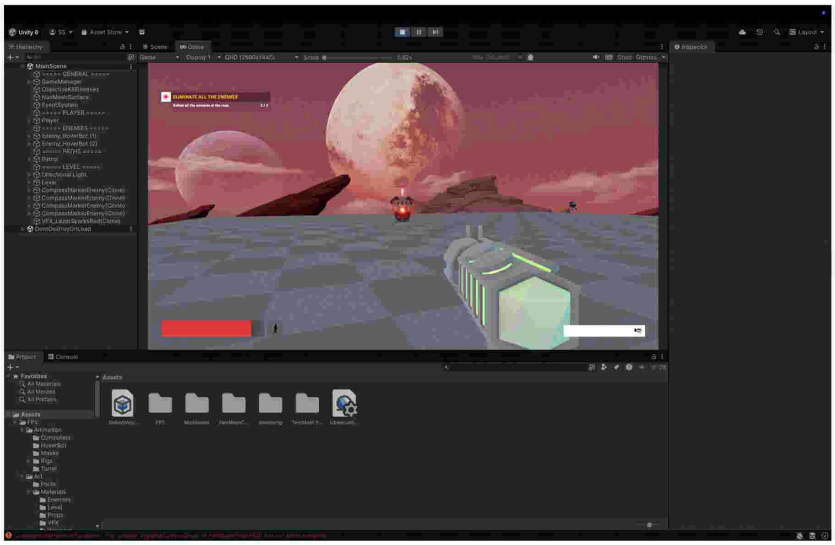


Fig 6: Unity Interface while Aiming for target

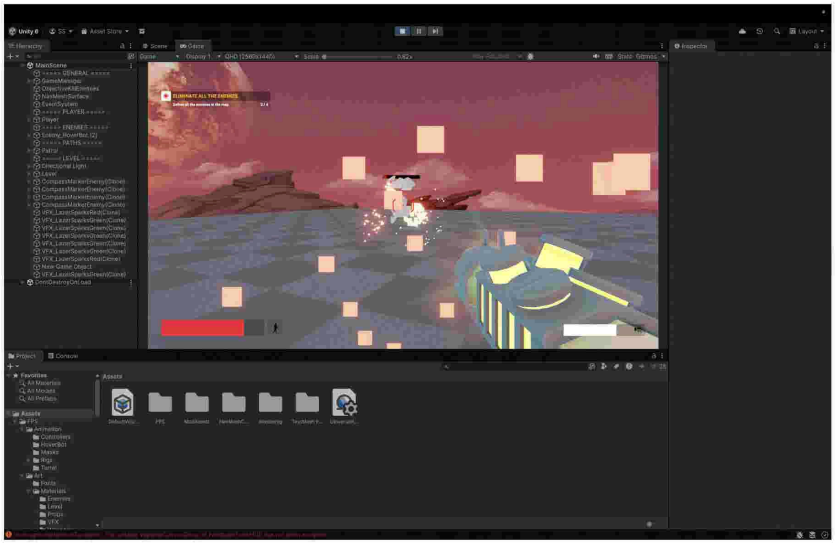


Fig 7: Unity Interface while Destroying the target

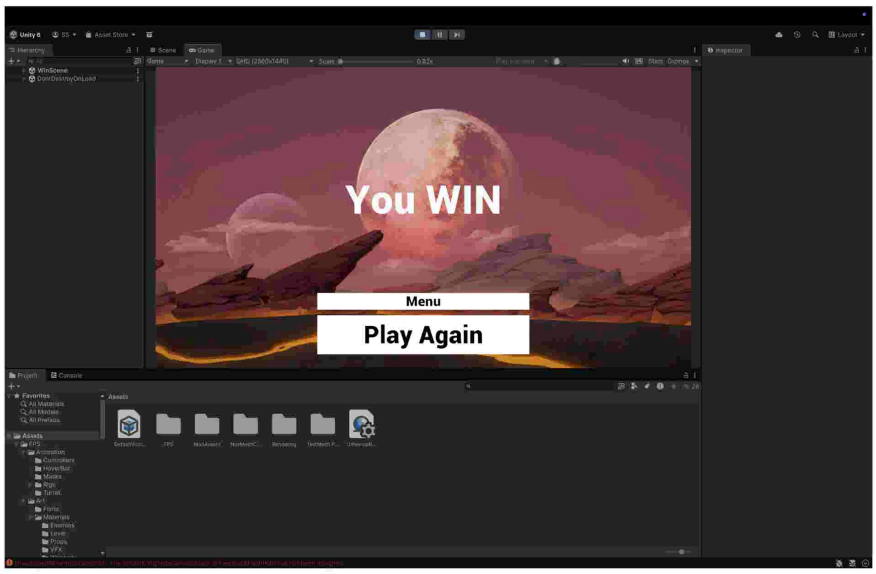


Fig 8: Unity Interface while Game ENDS

CONCLUSION:-

The VR Shooting Game evolved from a simple proof-of-concept prototype into a fully interactive and immersive VR experience. The project helped in understanding real-time VR input systems, 3D environment creation, object interaction using physics and colliders, UI-based scoring systems, and performance optimisation in VR. The final game offers engaging gameplay and showcases the practical applications of VR for training, simulation, and entertainment.

AR MATH(3-D SHAPES) VISUALISER

OBJECTIVES:-

The objectives of AR Shape Visulaiser are given below:-

1. To enable learners to visualise 3D geometric shapes in real-world environments using Augmented Reality.
2. To help users understand volume formulas of basic 3D shapes through interactive visual representation.
3. To allow users to place, move, rotate, and delete 3D objects on detected surfaces for hands-on learning.
4. To provide an engaging learning experience that merges digital interactivity with physical surroundings.
5. To improve concept clarity by making geometry topics more intuitive and experiential.

DESCRIPTION:-

This project is an Augmented Reality (AR) learning application designed to help students understand 3D shapes and their volume calculations in a visual, interactive way. When the application is launched, the camera scans the real-world environment and detects flat surfaces.

Users can:

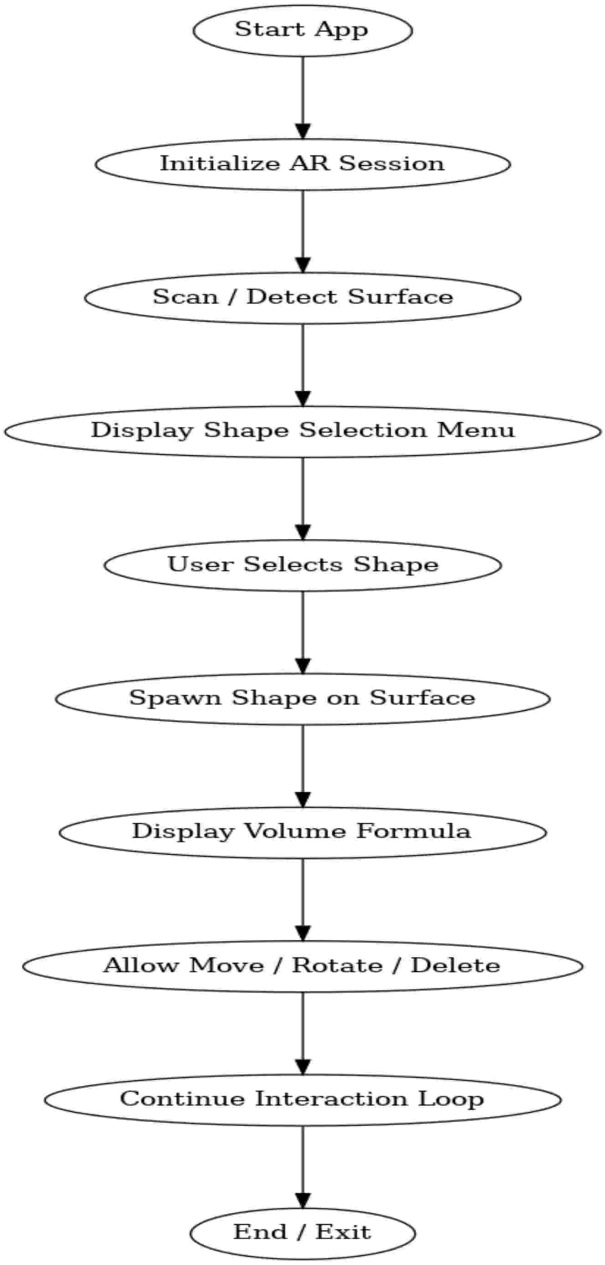
- Select a shape (Cube, Cylinder, or Arch) from the in-app menu.
- Place the selected shape on the detected surface.
- Move the shape by dragging on the screen.
- Rotate the shape for full 3D inspection.
- Delete the shape if no longer needed.

For each shape placed, it also displays the formula for calculating its volume, such as:

- Cube: $V = a^3$
- Cylinder: $V = \pi r^2 h$
- Arch: $\pi r^2 L/2$

This approach supports experiential learning, helping users grasp geometry concepts more effectively than traditional 2D textbook diagrams.

WORKFLOW:-



DEVELOPMENT TOOLS USED:-

Tool / Technology	Purpose
Unity 3D	Game engine and AR scene development
AR Foundation / ARCore	Real-world surface detection and camera tracking
C# Scripts	Shape control, UI logic, interaction controls
Android Build System	Deployment on mobile devices

VISUAL OUTPUTS:-

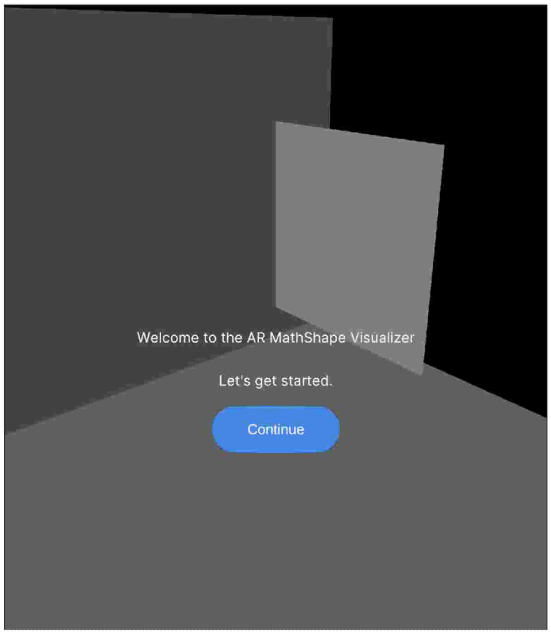


Fig 9: Start of AR Applications

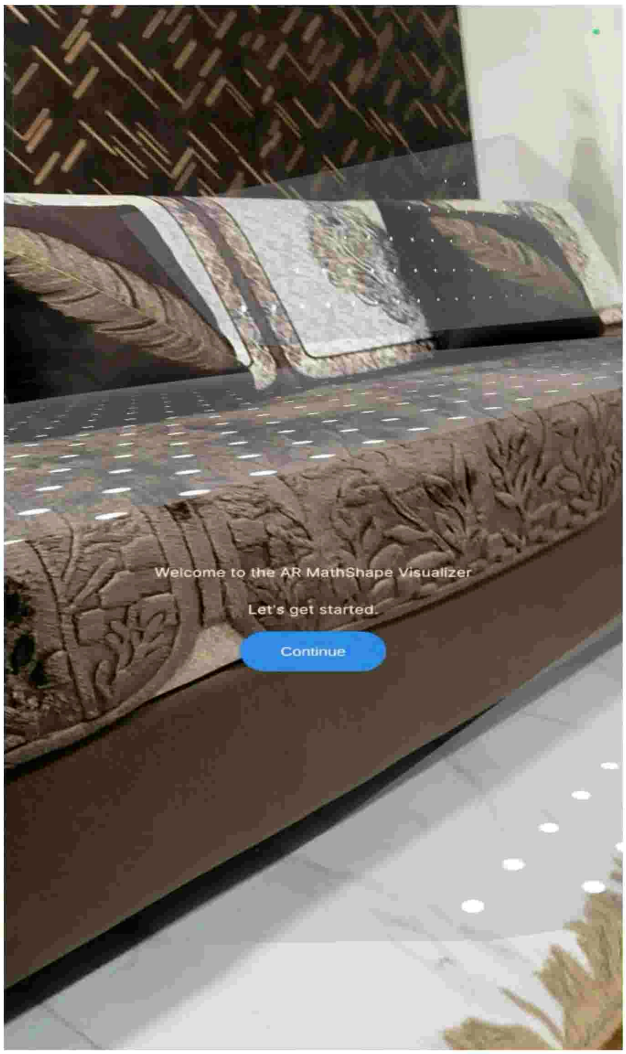


Fig 10: Surface Detection Start

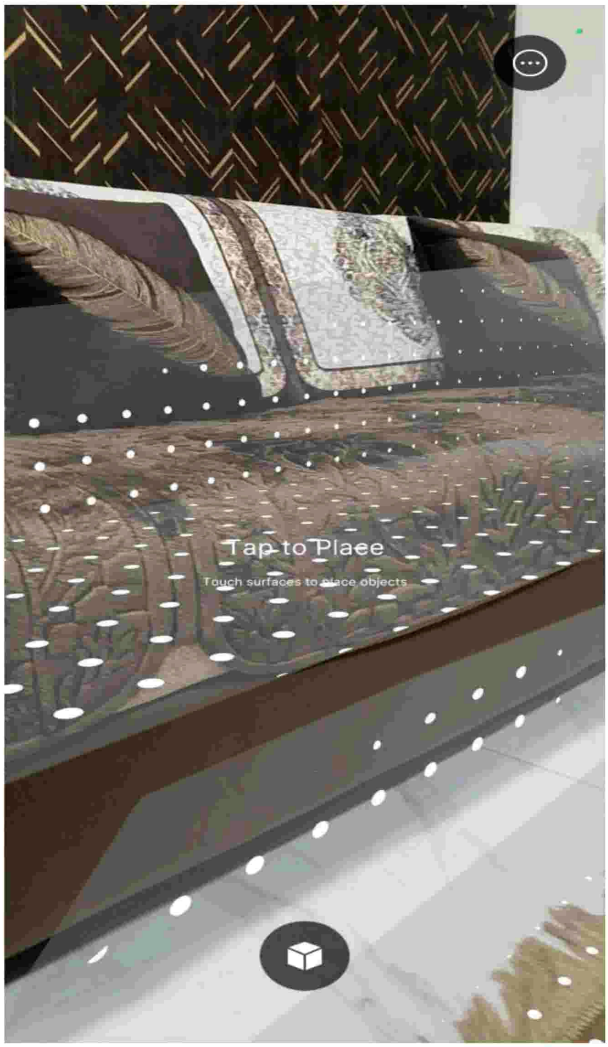


Fig 11: Placing shapes on detected surface

Fig 12: 3-D Shapes Placed & Volume displayed

CONCLUSION:-

The AR-Based 3D Mathematical Shape Visualizer successfully bridges the gap between theoretical geometry and real-world understanding. By allowing learners to interact with 3D shapes using their mobile devices, the application enhances spatial reasoning and improves concept clarity. This project demonstrates the educational potential of Augmented Reality in making learning immersive, interactive, and engaging. It can be expanded further to include more shapes and measurement-based learning exercises.