



Unlock the Future: Game and XR Development with Unity





Hello!

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Research Interests – VR, ML, BCI





Topics

- ◇ Introduction to XR
- ◇ Project Demo
- ◇ Development Tools
- ◇ Course Content
- ◇ Queries



A decorative graphic on the left side of the slide. It features a large cyan hexagon with a white number '1' inside. Surrounding this central hexagon are several smaller hexagons in various shades of blue and cyan. Some of these smaller hexagons contain white icons: a lightbulb, a thumbs-up, a smartphone, a magnifying glass, and a gear. There is also a network-like icon with a central node and several smaller nodes connected by lines.

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Introduction

Defining VR, AR, MR



Virtual Reality

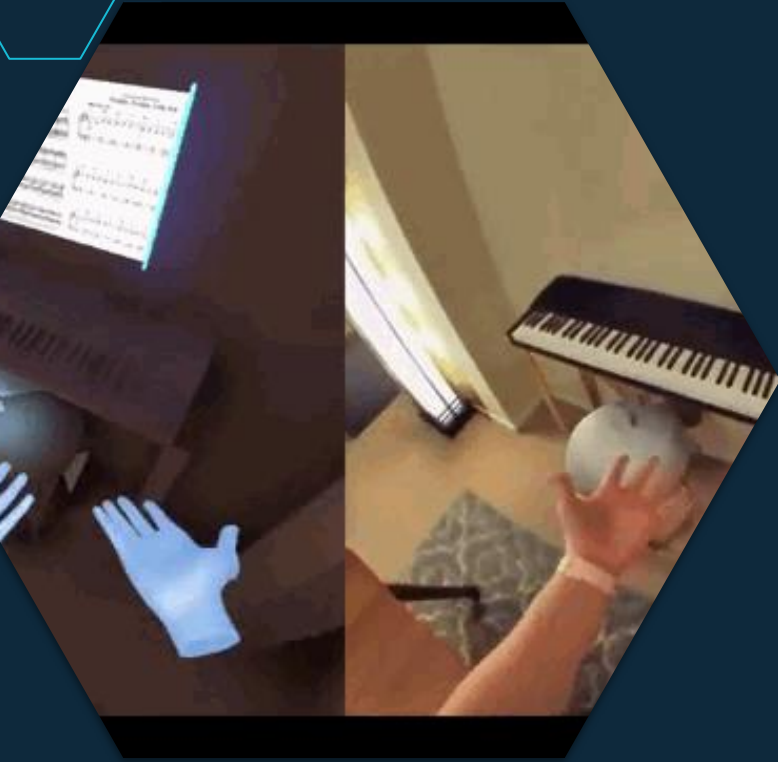
- ◇ a three-dimensional, computer-generated environment
- ◇ can be explored and interacted with by a person
- ◇ ability to manipulate objects or perform a series of actions





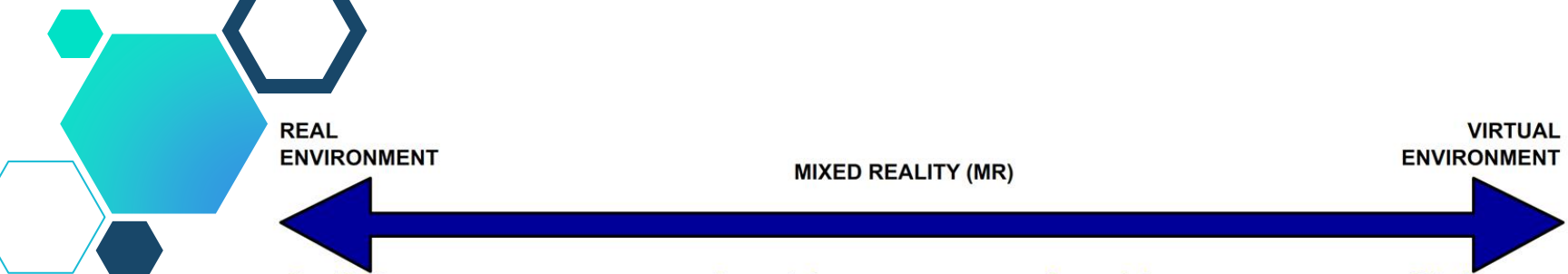
Augmented Reality

- ◇ superimposes a computer-generated image on a user's view of the real world
- ◇ enhances natural environments or situations and offer perceptually enriched experiences



Mixed Reality

- ◇ merging of real and virtual worlds to produce new environments and visualizations
- ◇ physical and digital objects co-exist and interact in real-time



Tangible User Interfaces (TUI)

A TUI uses real physical objects to both represent and interact with computer-generated information (Ishii & Ullmer, 2001).



Using physical objects to create a virtual model (Ichida, Itoh, & Kitamura, 2004). As a user adds a physical 'ActiveCube' to the construction, the equivalent virtual model is automatically updated.

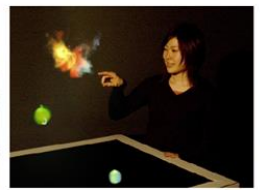
Projection Augmented models (PA model) are a type of Spatial AR display, and are closely related to TUIs

Augmented Reality (AR)

AR 'adds' computer-generated information to the real world (Azuma, et al. 2001).

Spatial AR

Spatial AR displays project computer-generated information directly into a user's environment (Bimber & Raskar, 2005).



The 'Bubble Cosmos' – 'Emerging Technology' at SIGGRAPH'06. The paths of the smoke-filled bubbles are tracked, and an image is projected into them as they rise.

'See-through' AR (either optical or video)

A user wears a head-mounted display, through which they can see the real world with computer-generated information superimposed on top (Cakmakci, Ha & Rolland, 2005; Billinghamurst, Grasset & Looser, 2005).



See-through AR: the butterfly is computer-generated, and everything else is real (Fischer, Bartz & Straßer, 2006; Kölsch, Bane, Höllerer, & Turk, 2006).

Augmented Virtuality (AV)

AV 'adds' real information to a computer-generated environment (Regenbrecht, et al. 2004).

Semi-immersive VR

A semi-immersive VR display fills a limited area of a user's field-of-view.



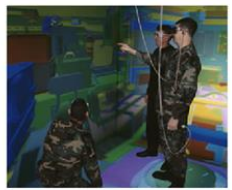
Semi-immersive VR using the Barco Baron workbench (Drettakis, Roussou, Tsingos, Reche & Gallo, 2004).

Virtual Reality (VR)

VR refers to completely computer-generated environments (Ni, Schmidt, Staadt, Livingston, Ball, & May, 2006; Burdea & Coffet 2003)

Immersive VR

Immersive VR, which uses either a head-mounted-display or a projection-based system, completely fills the user's field-of-view.



Projection-based immersive VR. The users are fully immersed in the 'CAVE' (FakeSpace, 2006; Cruz-Neira, Sandin & DeFanti, 1993).





Key Advantages of XR



- Immersive
- Engaging
- Risk Free Experience
- Low Cost
- Enhanced Interactivity
- Entertaining



Opportunities in the Field

Industry

Entertainment

Training

Customer
Support

Manufacturing

Research

Advancing the
field of XR

Psychological
Research

Driving
Artificial
Intelligence



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Project Demonstrations

Implemented as part of research projects at DRDO and IIT Roorkee

VR Cognitive Test Battery



Multi Tasking Drone Simulator



Developed By – Mumbai University Students

Driving Simulator for Workload Estimation





Real Time Cognitive State Monitoring



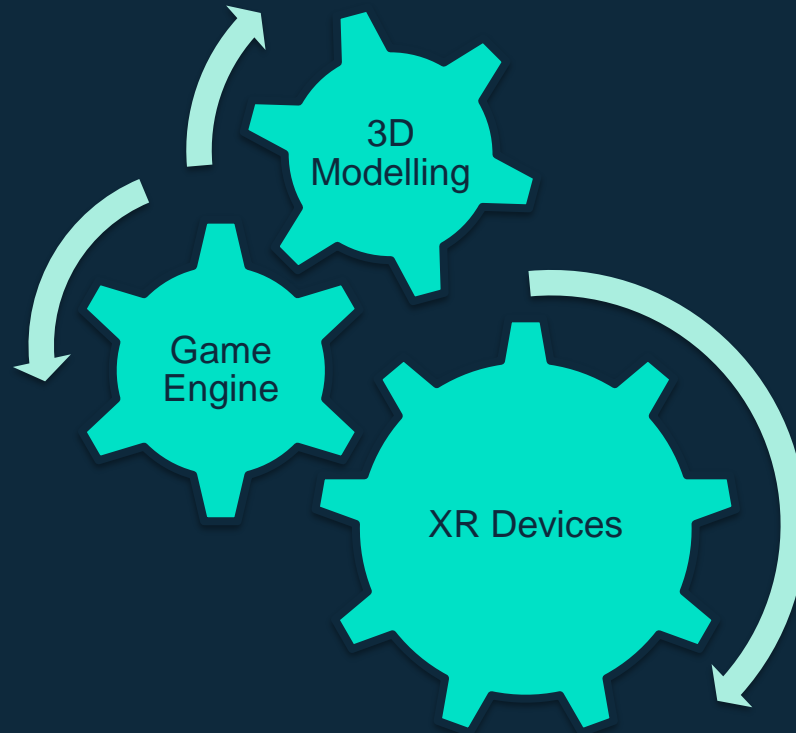
A decorative graphic on the left side of the slide. It features a large central hexagon with a blue-to-teal gradient, containing the white number '3'. Surrounding this central hexagon are several smaller hexagons of varying shades of blue and teal. Some of these smaller hexagons contain white icons: a lightbulb, a thumbs-up, a smartphone, a magnifying glass, and a gear. There is also a network-like icon with a central node and radiating lines, and a speech bubble icon.

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Development Tools and Technology

Base of all XR Development

Key Components





3D Modelling Tools

- ◇ Modelling
- ◇ Texturing
- ◇ Rigging
- ◇ Animation



BLENDER



AUTODESK
3DS MAX



AUTODESK
MAYA®



Game Engines

- ◇ Physics
- ◇ Scripting
- ◇ User Interaction
- ◇ Gameplay



Godot
GAME ENGINE



Devices

Virtual Reality



Augmented Reality



A decorative pattern of hexagons in various shades of blue and cyan. Some hexagons contain icons: a lightbulb, a thumbs up, a smartphone, a magnifying glass, and a gear. A network of dots is also visible.

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About the Course

Introducing VR/AR Development with Unity



Course Content

Introduction to
Unity

1

Effects, Animations,
Gameplay Mechanics

3

AR Development

5


C# Scripting

2

VR Development

4

Bonus

- 
1. AI with Unity – RL & CV
 2. Introduction to Filters with SparkAR

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Build Portfolio

- ◇ 3 Basic Game Apps
- ◇ 1 VR App
- ◇ 1 AR App





Internship Opportunities



IIT Roorkee

CogXR Labs

Referrals at
Reputed
Organisations
and Startups





Thanks!

Any questions?

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