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
Centre for Artificial Intelligence

ANNEXURE-II

Experiment list/ Lab manual

for

Departmental Laboratory Course (DLC) of

B. Tech. VII Semester

[Information Technology (Artificial Intelligence and Robotics)/ Artificial Intelligence (AI) and Data Science/ Artificial Intelligence (AI) and Machine Learning]

(Batch admitted in academic session 2022 – 23)

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DEPARTMENTAL LAB (AR-VR Lab) (2240721/2270721/2280721)

COURSE OBJECTIVES

- Enable students to develop practical skills in creating and manipulating 3D models and animations for use in AR and VR environments.
- Enable students to create intuitive and responsive user interfaces for interacting with virtual objects.
- Support students in developing projects that showcase their ability to innovate and think critically.

List of Experiments

1. Overview and setting up Unity for AR/ VR development
2. Develop a scene in Unity that includes: cube, plane and sphere, apply transformations on the 3 game objects.
3. Develop a scene in Unity that includes a cube, plane and sphere. Create a new material and texture separately for three Game objects. Change the color, material and texture of each Game object separately in the scene.
4. Develop a scene in Unity that includes a sphere and plane. Apply Rigid body component, material and Box collider to the game Objects
5. Study on enhancement and improving markers with Vuforia engine.
6. Implement and visualize scaling and rotation transformations on a 3D object in an AR environment.
7. Implementing Marker-less and Marker-Based AR with Vuforia engine
8. Implementing Animations in AR/VR Using Vuforia
9. Creating 3D objects using Blender.

COURSE OUTCOMES

After completing this, the students will be able to:

CO1. Create new projects and properly configure them for AR/VR application development
CO2. Develop Marker-Based and Markerless AR Applications
CO3. Develop and import 3D models into AR/VR environments
CO4. Integrate VR input and output hardware to enhance the user experience.
CO5. Develop applications that simulate real-world scenarios, such as a virtual gym or training simulations.
CO6. Identify areas for improvement and implement changes to optimize performance and user satisfaction.

CO-PO Mapping Matrix														
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2	3	1	3				2	1	2	2	2	1
CO2	3	2	3	2	3				2	1	2	2	2	1
CO3	3	2	3	1	3				2	1	2	2	2	1
CO4	3	2	3	1	3				2	1	2	2	2	1
CO5	3	3	3	2	3	2	1		2	3	2	3	2	1
CO6	3	3	3	3	3	2	1		2	3	3	3	2	1

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DEPARTMENTAL LAB (AR-VR Lab) (2240721/2270721/2280721)

Skill based Mini Projects

Micro/ Macro Projects : Game Development

(The developed game should be a single player game .Score Card is to be displayed for each game. Apply your creativity for making game interesting)

1. Develop a VR Golf Game. The scene should contain a play area (golf course), which consists of a series of cups/holes each having different scores. Display the score card.
2. Develop a VR game in Unity such that on each gun trigger click, destroy the cubes placed on the plane and gain a score point .
3. Develop a VR Basketball Game.
4. Develop an AR bowling game with one image target .

Mini Projects

1. Develop a VR environment for flying helicopter
2. Develop a VR environment for moving car simulation.
3. Develop a VR environment to visit a zoo
4. Develop a VR environment for virtual Gym
5. Create a multiplayer VR game (battlefield game).

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CREATIVE PROBLEM SOLVING (2240722/2270722/2280722)

COURSE OBJECTIVES

- To solve open-ended, real-world problems using systematic problem-solving methods.
- To apply interdisciplinary approaches to problem-solving.
- To develop team-based solutions through collaborative projects.

List of Experiments

1. Choose a standard algorithm (e.g., Dijkstra, Quicksort) and propose a modification to improve performance in a specific use case.
2. Reimagine a common app (e.g., calendar, to-do list, news reader) using SCAMPER to generate at least 3 innovative features.
3. Identify the root causes behind a known software/system failure (e.g., a crash in Zoom, data breach, etc.) using Fishbone Diagram.
4. Take a vague problem like "Improve online education" and generate 3-5 concrete, solvable, and measurable AI/CS problem statements.
5. Interview 3–5 users of the college ERP system and ideate improvements. Propose a new user interface or feature using design thinking.
6. Create a wireframe/prototype (on paper or Figma) for an app that supports mental wellness in students using AI recommendations.
7. Given sample data (e.g., books, movies, courses), design a simple rule-based or collaborative filtering recommender.
8. Analyze a small dataset (e.g., hiring, lending) and identify potential biases. Suggest methods to reduce bias in training.
9. Analyze an AI failure (e.g., facial recognition bias, chatbot toxicity) and propose a creative solution to prevent such issues.
10. Design a smart system (e.g., smart parking, fire alert, air quality monitoring) using sensor data simulation and basic ML classification.
11. Develop a Python automation script to extract and process data from a website or automate repetitive desktop tasks.

COURSE OUTCOMES

After completing this, the students will be able to:

CO1 Apply creative thinking tools to reimagine and improve existing software applications.

CO2 Analyze the root causes of failures in software systems and datasets using structured problem-solving techniques.

CO3 Design innovative AI-based systems and interfaces that address real user needs, ensuring usability and ethical AI integration.

CO-PO Mapping Matrix														
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	2	2	3	1	2	1			1	2	1	2	1	2
CO2	2	3	2	3	2			1	1	2	2	2	3	3
CO3	2	2	3	2	3	1	1	2	2	2	3	2	3	3

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PROFESSIONAL SKILLS & COMPETENCIES (2240723/ 2270723/ 2280723)

(Activity Based Learning)

COURSE OBJECTIVES

- To equip students with essential professional competencies.
- To develop analytical and technical skills.

Module 1: Communication Skills

Verbal Communication: Public speaking, Group discussions, and Interview handling. Non-verbal Communication: Body language, Gestures, Listening skills. Written Communication: Résumé writing, Email etiquette, Cover letters, Report Writing. Presentation Skills: Visual aids, Audience engagement, Delivery techniques. English (Verbal Ability): Passage/Sentence Rearrangement, Error Detection and Correction, fill in the Blanks, Reading Comprehension Passages, Sentence Completion, Synonyms and Antonyms, Words Completion, Para jumbles etc.

Activities: Mock interviews and GDs, Email & résumé writing workshops, Peer review and instructor feedback.

Module 2: General Aptitude

Quantitative Aptitude: Number systems, Ratios, Percentages, Averages, Time & Work, Probability. Logical Reasoning: Series, Puzzles, Syllogisms, Direction sense, Blood relations. Data Interpretation: Tables, Pie charts, Graphs.

Activities: Weekly quizzes, Group problem-solving sessions, Timed mock aptitude tests.

Module 3: Basic Coding Skills

Basic Programming Concepts, Syntax and semantics, Input/output handling, Variables, data types, Loops. Functions and recursion. Arrays, strings. Sorting and searching, Pointers (C/C++) / References (Java/Python). Exception handling (Java, Python).

Activities: Technical round based Weekly coding exercises, Mini hands-on projects, Error debugging practice, Mock technical tests.

Module 4: Competitive Coding Skills

Introduction to Data Structures: Linked Lists (Singly, Doubly), Problem solving using linked lists. Stacks, Queues, Trees (Binary, BST, basic traversals), Heaps (Min/Max heap concepts), Graphs (Adjacency list/matrix, BFS, DFS), Sets (HashSet, TreeSet). OOPS concepts: Encapsulation, Abstraction, Inheritance and Polymorphism. Introduction to Databases, ER-model, basics of SQL. Version Control: Git, GitHub.

Activities: Weekly coding contests, Problem solving on competitive coding platforms like Leetcode, Codeforces, Hackerrank etc., Peer-to-peer code review, Mock technical interviews.

Module 5: Discipline Specific Tools*

Docker, Postman, MySQL, VS Code, Linux Shell, Jupyter Notebook, Pandas, Scikit-learn, TensorFlow, Tableau, Kaggle.

Activities: Tool-based lab exercises, Branch-specific mini projects, Short presentations on use-cases of tools in industry.

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COURSE OUTCOMES

After completion of the course students will be able to:

CO1 Demonstrate effective communication strategies in professional scenarios including interviews and group discussions.

CO2 Solve real-world quantitative and logical reasoning problems with time-bound accuracy.

CO3 Implement basic algorithms using standard programming languages.

CO4 Design efficient algorithmic solutions to solve coding problems.

CO5 Apply discipline-specific tools to simulate, model, or develop solutions relevant to core engineering problems.

CO-PO Mapping Matrix												
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1								1	3	3		2
CO2	2	3				2		1				2
CO3	3	2			2							2
CO4	3	3	3	2	2							2
CO5	2	2	2	2	3	3	1				1	2