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| **Department of Computer and Software Engineering – ITU** |
| **MD442: Mobile Application and Development** |

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| **Course Instructor: Usama Bin Shakeel** | **Dated: 06/05/2025** |
| **Teaching Assistant: Hammad Kamran, Abdul Rehman** | **Semester: Spring 2025** |
| **Lab Engineer: Hateem Hassan** | **Batch: BSCE2021 & BSEE2021** |

# **Lab 13. AI Implementation**

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| **Name** | **Roll number** | **Obtained Marks/35** |
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Signature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Submission:**

• Email instructor and team, if there are any questions. Plagiarism will be dealt with according to the course policy.

Instructor’s email: [ubs@itu.edu.pk](mailto:ubs@itu.edu.pk)

Teaching Assistant’s: [bsce20029@itu.edu.pk](mailto:bsce20029@itu.edu.pk), [bsce20039@itu.edu.pk](mailto:bsce20039@itu.edu.pk), bsee20063@itu.edu.pk

**• Submission after due time will not be accepted.**

# **Car Racing Game**

## **Objective**

## In this lab, you will implement a Racing Game using Realistic Car Controller (RCC) in Unity. You’ll learn to set up the player-controlled car, configure AI opponents, and build the racing game mechanics including lap counting, win conditions, and UI.

## **Tasks Overview:**

**Setup RCC Car with AI Controller**

1. Create or import an AI car model.
2. Add the RCC\_CarControllerV3 script to the car.
3. Add the RCC\_AIWaypointsContainer to the scene and create a path using waypoints.
4. Add the RCC\_CarAI script to the AI vehicle.
5. Assign the waypoints container to the RCC\_CarAI script.
6. Tweak parameters like follow distance, speed, and obstacle avoidance.
7. Implement Navmesh on road.

**Add Brake System in RCC**

1. In the RCC car prefab, locate the RCC\_CarControllerV3 script.
2. Use the following method to apply brakes via code:
3. For AI cars, braking is handled automatically. For player cars, you can map the input to a brake key:

**Additional Tips:**

* You can customize ABS, traction control, and brake bias under the RCC\_CarController settings.
* You can enable/disable auto-braking via the useAutomaticGear and autoReset options in RCC.

**Task 2: How to Make a Racing Game in Unity (Lab/Home task)**

**Car Setup**

* Drag an RCC prefab car into the scene.
* Add cameras (e.g., RCC\_Camera) and assign to the player car.
* Setup input (mobile, keyboard, or controller).

**Create AI Opponents**

* Duplicate player car and assign RCC\_CarAI.
* Set waypoint container and define a racing route.

**Lap Timer & Checkpoints**

* Add invisible checkpoint triggers.
* Create a lap system to count completed laps.

**UI System**

* Add UI for lap count, timer, and position.
* Display win/lose condition.

**Final Touches**

* Add start countdown and finish line.
* Optimize AI logic and performance.

**Assessment Rubric for Lab**

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| **Performance metric** | **CLO** | **Able to complete the task over 80% (4-5)** | **Able to complete the task 50-80% (2-3)** | **Able to complete the task below 50% (0-1)** | **Marks** |
| 1. Realization of experiment | 1 | Executes without errors excellent user prompts, good use of symbols, spacing in output. The testing has been completed. | Executes without errors, user prompts are understandable,minimum use of symbols or spacing in output. Some testing has been completed. | Does not execute due to syntax errors, runtime errors, user prompts are misleading or non- existent. No testing has been completed. |  |
| 2. Conducting experiment | 1 | Able to make changes and answer all questions. | Partially able to make changes and few incorrect answers. | Unable to make changes and answer all questions. |  |
| 3. Computer use | 2 | Document submission timely. | Document submission late. | Document submission not done. |  |
| 4. Teamwork | 3 | Actively engages and cooperates with other group member(s) in an effective manner. | Cooperates with other group member(s) in a reasonable manner but conduct can be improved. | Distracts or discourages other group members from conducting the experiment |  |
| 5. Laboratory safety and disciplinary rules | 3 | Code comments are added and do help the reader to understand the code. | Code comments are added and do not help the reader to understand the code. | Code comments are not added. |  |
| 6. Data collection | 3 | Excellent use of white space, creatively organized work, excellent use of variables and constants, correct identifiers for constants, No line-wrap. | Includes name, and assignment, white space makes the program fairly easy to read. Title, organized work, good use of variables. | Poor use of white space (indentation, blank lines) making code hard to read, disorganized and messy. |  |
| 7. Data analysis | 4 | Solution is efficient, easy to understand, and maintain. | A logical solution that is easy to follow but it is not the most efficient. | A difficult and inefficient solution. |  |
| **Total (out of 35):** | | | | |  |