# Project Progress Report

**Project Title:** VR Simulation for Disaster Management
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**Reporting Period:** week 7
**Group ID:** 11522-24S1- 42
**Project ID:** 2024-S1-69

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## 1. Executive Summary:

The project is currently underway with significant achievements in initiating coding work using Unity for the development of a Virtual Reality (VR) simulation platform for disaster management. Despite initial challenges in accessing resources and workload distribution among team members, progress has been made with secured lab access and coordination efforts. Major milestones include commencing coding tasks, conducting a preliminary literature review on VR technology in disaster management, and refining project timelines. Moving forward, the team aims to complete coding tasks, finalize the literature review, and prepare for upcoming project deliverables. Overall, the project is progressing steadily towards its objectives, with a focus on effective communication and collaboration to overcome challenges and achieve success.

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## 2. Key Accomplishments:

a. Initiated Coding Work: The team has commenced coding work on the VR simulation platform using Unity. Tasks have been divided among team members, and progress is underway towards meeting the coding deadline set for April 15th.

b. Secured Lab Access: Access to the university lab for coding has been secured, enabling the team to utilize the necessary resources and facilities for development. This has facilitated smoother progress in coding tasks.

c. Conducted Preliminary Research: A comprehensive literature review on the application of VR technology in disaster management has been initiated. This research will provide valuable insights into best practices and inform the development of the VR simulation platform.

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**3. Work Completed:**

- Task 1: Coding Initiation
    - Commenced coding work on the VR simulation platform using Unity.
    - Established the project's codebase and folder structure.
    - Set up initial scenes and environments within Unity to simulate disaster scenarios.

- Task 2: Team Collaboration
    - Conducted regular team meetings to discuss progress, challenges, and task assignments.
    - Coordinated efforts among team members to ensure efficient workflow and task completion.
    - Utilized collaboration tools such as Slack and Trello to facilitate communication and task tracking.

- Task 3: Literature Review
    - Conducted preliminary research and literature review on VR technology in disaster management.
    - Identified relevant academic papers, articles, and resources to gain insights into best practices and emerging trends.
    - Summarized key findings and insights from the literature review to inform the development of the VR simulation platform.

- Task 4: Lab Access
    - Secured access to the university lab for coding purposes.
    - Leveraged lab resources, including computers and software licenses, to support coding and development activities.
    - Ensured compliance with lab protocols and regulations while utilizing lab facilities.

- Task 5: Project Planning
    - Reviewed and refined project timelines and milestones to ensure alignment with project objectives.
    - Identified potential risks and challenges and developed contingency plans to mitigate them.
    - Updated project documentation, including the project plan and requirements analysis, to reflect current progress and milestones.

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**4. Issues and Challenges:**

- Issue/Challenge 1: Limited Access to Resources
    - Impact: Initially, the team faced challenges in accessing necessary resources and facilities for coding, which delayed progress.
    - Steps Taken:

Secured access to the university lab for coding purposes, mitigating resource constraints.
Utilized alternative resources, such as personal computers, to continue coding work remotely during periods of limited lab access.

- Issue/Challenge 2: Balancing Workload Among Team Members
    ● Impact: Ensuring equitable distribution of tasks and workload among team members proved challenging, leading to potential inefficiencies and delays.
    ● Steps Taken:
    Conducted regular team meetings to assess progress and redistribute tasks as needed based on individual strengths and availability.
    Implemented task management tools, such as Trello, to track tasks and monitor progress, facilitating better workload management.

- Issue/Challenge 3: Coordination and Communication
    ● Impact: Maintaining effective coordination and communication among team members, especially in a remote working environment, posed challenges.
    ● Steps Taken:
    Established clear communication channels, such as Slack and email, for regular updates, queries, and discussions.
    Scheduled regular team meetings to discuss progress, address concerns, and ensure alignment on project objectives and tasks.
    Encouraged proactive communication and collaboration among team members to foster a cohesive working environment.


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**5. Next Steps:**

Step 1: Continued Coding Work

● Complete the implementation of core functionalities and features within the VR simulation platform using Unity.
● Refine scene layouts, environmental effects, and user interactions to enhance realism and immersion.
● Conduct regular code reviews and debugging sessions to identify and address any issues or bugs.

Step 2: Literature Review Completion

● Finalize the literature review on VR technology in disaster management, synthesizing key findings and insights from relevant academic papers and resources.
● Summarize the literature review findings in a comprehensive report, highlighting implications for the development of the VR simulation platform.

Step 3: Poster Draft and Final Report Outline

- Begin drafting the poster presentation for the project, outlining key project objectives, methodologies, and preliminary findings.
- Develop an outline for the final project report, identifying sections, subsections, and content requirements for each component.

Step 4: Testing and Evaluation
- Conduct initial testing and evaluation of the VR simulation platform to assess functionality, usability, and performance.
- Gather feedback from project stakeholders, including team members and potential end-users, to identify areas for improvement and refinement.

Step 5: Preparation for Final Presentation and Submission
- Finalize the poster presentation and prepare for the final project presentation, incorporating feedback and revisions as needed.
- Complete the final project report, ensuring thorough documentation of project objectives, methodologies, results, and conclusions.
- Submit the final project deliverables, including the poster presentation, final report, and any additional documentation, by the specified deadlines.

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## 9. Conclusion:

In conclusion, the project has made significant progress towards developing a Virtual Reality (VR) simulation platform for disaster management. Despite facing initial challenges such as limited access to resources and workload distribution among team members, the project has successfully initiated coding work, conducted a preliminary literature review, and secured access to necessary facilities for development.

Moving forward, the team is poised to tackle upcoming tasks and milestones, including the completion of coding work, finalization of the literature review, and preparation for the final presentation and submission. By adhering to the outlined roadmap and leveraging effective communication and collaboration strategies, the project aims to deliver a high-quality VR simulation platform that enhances emergency response and rescue efforts in disaster scenarios.

Key takeaways from the project include the importance of proactive problem-solving, effective team collaboration, and adaptability in overcoming challenges. By addressing issues as they arise and maintaining a focus on project objectives, the team remains confident in achieving project success and delivering tangible outcomes that contribute to the field of disaster management.

Overall, the project is on track to meet its goals and deliverables, and the team looks forward to continued progress and collaboration in the upcoming reporting period.

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# UPDATED PROJECT PROPOSAL

## SYSTEMATIC LITERATURE REVIEW:

Following detailed is the main literature inputs that could be beneficial for us to provide for the simulations:

Explore Social Acceptance of VR Simulation in Disaster Management: Understanding the potential impact of VR technology in search and rescue operations.

Investigating the Efficiency of VR Simulations in Disaster Management: Reviewed work will offer insights on how VR simulations are adopted in disaster management.

Study the Role of Virtual Reality in Simulating Natural Disasters: Increase in research will prepare search and rescue teams to respond to natural disasters.

Developing Virtual Reality Simulation of a Natural Disaster using Microsoft Unity: Understanding how Virtual Reality simulations will improve disaster management plans.

Research Progress of Immersive Systems Development: Reflect how the current literature is addressing the development of an immersive system that will allow the user to experience the disaster.

Dynamic Graphics and Geo-coordinate Data Application In terms of disaster scenes in the VR scenarios, not only dynamic graphics about disaster scenes will be included, but also various kinds of disasters will be presented in the form of dynamic maps of the virtual world. Most importantly, those disaster scenes must be geo-coordinate data. This can surely help occur in various forms. For example, the smoke and fire can occur in a disaster. The visual simulation of happenings can encourage emergency responders and other humans to understand those disaster scenes timely. In addition to smoke and fire, there are various other disaster scenes such as tsunami, radioactive accident, debris flow, flood, earthquake, power outage, etc. 2D modeling for the present study is a key point. What is worth mentioning is that the successful chance of developing the VR for disaster prevention and rescue is not high if the 2D modeling technology is not well. The 2D modeling technology is also supported by the input of the project overview and problem description. It is believed that through the input of this virtual reality field, a virtual reality platform can be built. The virtual reality platform can also be used to support project overview and problem description. By integrating VR simulation, an innovative solution can be developed to overcome the shortcomings of traditional disaster management strategies, and it is proposed to assist emergency management by providing an intelligent, flexible, and coordinate system for decision making and real-time response. The VR simulation described by the project overview is more

needed by the emergency personnel, which can help emergency personnel with different skills and learning experiences. Disaster prevention and rescue can improve its disaster scene processing by using a specific method, and through the phenomenon in the simulation, there are more people who are more likely to combine with the disaster.

## STAKEHOLDER MANAGEMENT:

Identify the Stakeholders:

Primary Stakeholders:

- **Academic Mentor**: As a guide and mediator, the Academic Mentor is crucial for the project's direction and success. They are a primary stakeholder due to their significant influence and high interest.
- **Development Team**: They are primary stakeholders responsible for turning the project vision into a reality, making them essential to the project's success.
- **Sponsors**: Sponsors are primary stakeholders as they provide the necessary resources and have a vested interest in the project's success.

Framework Used:

For stakeholder identification and management, the PMBOK (Project Management Body of Knowledge) framework is helpful. It provides a structured approach to identifying stakeholders, understanding their needs and expectations, and planning how to manage their engagement throughout the project lifecycle.

## QUALITY MANAGEMENT PLAN:

The Critical Success Factors (CSFs) for this VR simulation project aimed at enhancing disaster management capabilities can be outlined as follows:

1. Realistic and Accurate Simulations: The VR simulation must accurately model real-world disaster scenarios, involving geographical and environmental data from the University of Canberra campus area to provide immersive and practical training experiences.

2. High Fidelity of Disaster Dynamics: Incorporate high-quality modelling technology to replicate the dynamic nature of various disasters, ensuring that the VR platform can simulate the unpredictability and complexity of real-life scenarios.

3. Effective Integration of Technologies: Seamlessly integrate Unity, desktop simulators, the Quest platform, and recent GPU technology to create a unified system that delivers smooth performance and realistic graphics.

4. Robust Communication Infrastructure: Develop a reliable communication system that allows the soldier drones within the simulation to transmit data effectively to the mother drone, ensuring real-time information flow and decision-making capabilities.

5. Comprehensive Literature Review Implementation: Utilise the findings from the systematic literature review to incorporate proven VR applications and techniques into the simulation, thereby enhancing the overall effectiveness of the training platform.

6. Intuitive User Interface and Experience: Design a user-friendly interface that enables easy navigation and interaction within the VR simulation, making the platform accessible and usable by emergency responders with varying levels of technical expertise.

7. System Reliability and Performance: Ensure that the VR simulation operates without significant lag or technical glitches, particularly during complex disaster scenario simulations, to maintain user engagement and training effectiveness.

8. Ethical and Safety Standards Compliance: Adhere to ethical standards in the simulation's content and ensure the safety of users by incorporating guidelines and protocols that prevent any form of psychological distress or discomfort.

9. Scalability for Future Expansion: Build the simulation with scalability in mind to accommodate future expansions, such as including more complex scenarios, larger areas, or additional features without the need for extensive reworking.

10. Training Effectiveness Measurement: Implement methods to measure the effectiveness of the simulation in improving the skills and preparedness of emergency responders, using feedback mechanisms and performance metrics to track progress and identify areas for improvement.

These CSFs are designed to align with the project details to ensure that the VR simulation effectively meets the objectives of improving disaster management strategies and enhancing the readiness of emergency responders for real-world crisis situations.

**DELIVERABLE:**

Deploy the Virtual Reality Simulation:

The document outlines the development of a Virtual Reality (VR) simulation using the Microsoft Unity SDE (Software Development Environment) to facilitate search and rescue operations using drones for natural disaster management. The project aims to create a realistic disaster environment within the University of Canberra campus area, where multiple drones, including a central "mother" drone and soldier drones, are deployed to locate survivors and relay information for informed decision-making and coordination of rescue operations.

The project is in the development phase, aiming to create a working model of the VR simulation using Microsoft Unity SDE (Software Development Environment). This suggests that the deployment will be for testing and demonstration purposes to showcase the

functionality and effectiveness of the simulation in aiding natural disaster management and preventive measures.

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