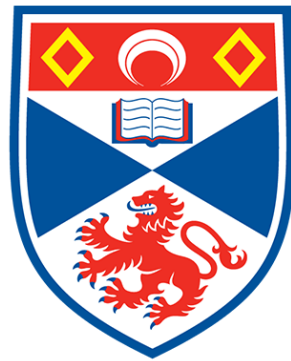# CS4099 - Nintendo Wii Over IP

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18th March 2025

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Abstract

The Nintendo Wii is well-known for its innovative, motion-based controls and engaging, family-friendly games such as Mario Kart Wii. Despite its hardware limitations compared to modern consoles, its local multiplayer experiences have cultivated a devoted following. However, with the rapid shift toward online gaming, recreating the Wii's in-person, split-screen experiences has become increasingly challenging. This project proposes a solution that vitalises the Wii's input and output interfaces, enabling remote players to enjoy an experience that mirrors local multiplayer gaming.

The approach centres on two key components. First, video and audio streaming techniques capture the Wii's outputs and deliver them to remote devices using low-latency protocols. This ensures fluid gameplay and preserves the authenticity of the original experience. Second, a novel controller input relay system transmits Wiimote signals, including motion and button inputs, over a network. This system addresses challenges such as Bluetooth communication, network variability, and precise synchronisation between audiovisual and control data, ensuring real-time responsiveness.

By bridging the gap between traditional local multiplayer and modern online connectivity, this project extends the life of a beloved console while revitalising classic gaming experiences. Furthermore, it establishes a framework for adapting retro systems to contemporary, distributed gaming environments. The work not only preserves the social and communal essence of local play but also offers broader implications for making nostalgic gaming experiences accessible to players across geographically separated locations.

Declaration

I declare that the material submitted for assessment is my own work except where credit is explicitly given to others by citation or acknowledgement. This work was performed during the current academic year except where otherwise stated.

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Acknowledgements

I would like to thank our supervisor Dr Ton Spink for his encouragement, support and counsel throughout my Senior Honours project. We would also like to thank . Finally, I would like to thank the School of Computer Science's Systems Team for their continuous help.

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The system is designed to virtualize the Nintendo Wii's local multiplayer experience, adapting it for remote play while retaining the console's authentic appeal.

Functional Requirements:

- **Video and Audio Capture and Streaming:** The system shall capture the Wii's video and audio outputs and stream them to remote players with minimal latency. This functionality is critical to preserve the fluid, immersive experience typical of classic Wii titles.

- **Controller Input Relay:** The solution must reliably capture and transmit Wii Remote inputs—including motion data and button presses—over a low-latency network connection. This bi-directional communication is essential for maintaining the real-time responsiveness expected in interactive gameplay.

- **Synchronization:** To ensure a seamless gaming experience, audiovisual data and controller inputs must be synchronized. The system should adjust for network variability and maintain precise timing to replicate local multiplayer dynamics.

Non-Functional Requirements:

- **Performance:** The system must operate under strict low-latency conditions to minimize delay and jitter. Efficient processing and optimized data streaming protocols are required.

- **Reliability and Robustness:** The solution should tolerate variations in network quality, ensuring continuous, stable operation even under less-than-ideal conditions.

- **Usability:** An intuitive interface and straightforward setup process should be provided, enabling users to connect and enjoy games with minimal technical intervention.

- **Evaluation:** Comprehensive testing in real-world environments is necessary. Both quantitative performance metrics and qualitative user feedback will be gathered to assess the overall experience.

Implementation

Evaluation

5.1 Challenges and Solutions

5.2 Limitations

5.3 Reflection and Future Work

Conclusion