

**PERBANDINGAN PENGGUNAAN METODE
REINFORCEMENT LEARNING DAN METODE *FINITE-STATE
MACHINE* TERHADAP KEPUASAN PENGGUNA
(STUDI KASUS: PENGEMBANGAN *GAME* MECHA RUNNER)**

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ABSTRAK

Non-Playable Characters (NPC) berperan penting dalam menciptakan tantangan dan realisme permainan yang dapat meningkatkan atau merusak pengalaman bermain. Penelitian ini membandingkan metode *Finite-State Machine* (FSM) sebagai pendekatan konvensional dan *Reinforcement Learning* (RL) sebagai pendekatan baru dalam pengembangan NPC pada permainan “Mecha Runner”. Tujuannya adalah mendeskripsikan proses pengembangan NPC dengan kedua metode dan menganalisis pengaruhnya terhadap kepuasan pengguna. Permainan dikembangkan menggunakan *Game Development Life Cycle* (GDLC), dengan NPC RL dilatih menggunakan algoritma *Multi-Agent Posthumous Credit Assignment* (MA-POCA) melalui Unity ML-Agents. Evaluasi kepuasan dilakukan menggunakan *Game Experience Questionnaire* (GEQ) terhadap 12 responden. Hasil penelitian menunjukkan bahwa NPC RL lebih unggul daripada FSM dalam aspek *flow*, ketegangan, tantangan, serta pengaruh positif dan negatif, sementara FSM sedikit lebih baik dalam aspek kompetensi. Secara keseluruhan, metode RL terbukti lebih efektif dalam menciptakan pengalaman bermain yang lebih memuaskan pada *game* “Mecha Runner”.

Kata Kunci: *Finite-State Machine, Reinforcement Learning, Game Development, Mecha Runner.*

**COMPARISON OF REINFORCEMENT LEARNING AND FINITE-
STATE MACHINE METHODS ON USER SATISFACTION
(CASE STUDY: DEVELOPMENT OF MECHA RUNNER GAME)**

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ABSTRACT

Non-Playable Characters (NPCs) play an essential role in creating challenge and realism in games, which can either enhance or diminish the player's experience. This study compares the Finite-State Machine (FSM) method as a conventional approach and Reinforcement Learning (RL) as a modern approach in developing NPCs for a game titled "Mecha Runner." The objectives are to describe the NPC development process using both methods and to analyze their impact on user satisfaction. The game was developed using the Game Development Life Cycle (GDLC) framework, with RL-based NPCs trained using the Multi-Agent Posthumous Credit Assignment (MA-POCA) algorithm through Unity ML-Agents. User satisfaction was evaluated using the Game Experience Questionnaire (GEQ) with 12 respondents. The results show that RL-based NPCs outperform FSM-based NPCs in terms of flow, tension, challenge, as well as positive and negative affect, while FSM-based NPCs perform slightly better in competence. Overall, the RL method proved to be more effective in creating a more satisfying gameplay experience in "Mecha Runner".

Keywords: *Finite-State Machine, Reinforcement Learning, Game Development, Mecha Runner*