

Project Information

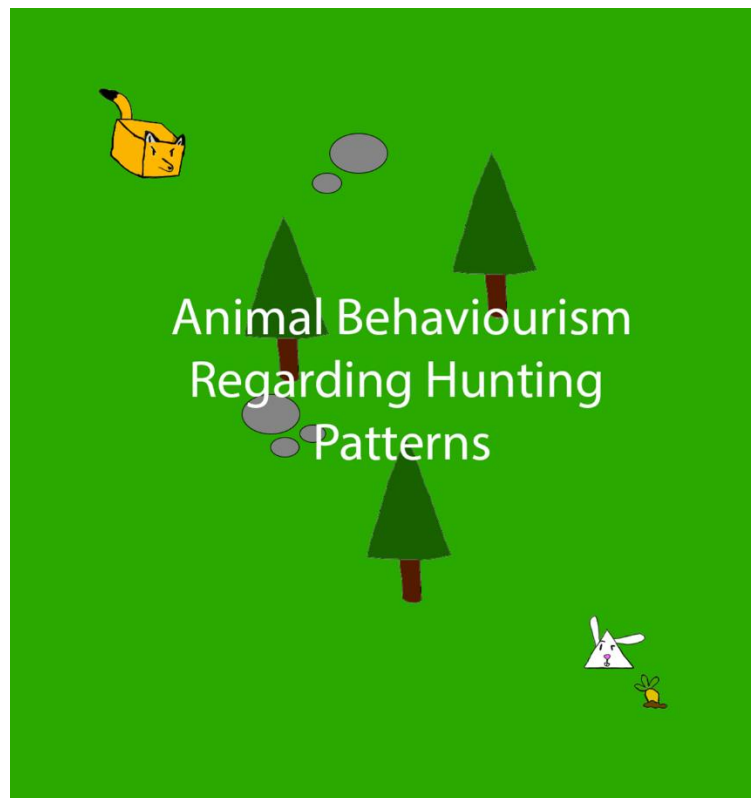


Figure 1: Concept for Animal Behaviourism Regarding Hunting Patterns

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Concept

Animal behaviourism relates to the actions an animal may take interacting with its immediate environment. Autonomous Behaviour is used to simulate the actions an actor takes in a virtual environment to simulate abstract information provided by such entities into a more realistic concept. (Zhao et al. 2021). Zhao implies studying animal behaviour identifies animal anatomy, animal movement, territorial behaviour and animal instinct regarding threats this creates a sense of immersion in relation to gameplay and simulated environments.

The development of autonomous characters according to (Martens et al. 2018) involves finding solutions for design related technical and physiological challenges. These focus on developing game features that are believable and independently functional.

Craig Reynolds from Sony combined "steering behaviours" to achieve examples such as avoiding obstacles, following corridors and joining a group of characters (Reynolds, 1999).

Project Aims

The project is to simulate realistic wildlife mechanics that mimics natural instincts focusing on stalking behaviour and steering. To enhance this further the agents can replicate natural pack behaviour grouping together to coordinate movements demonstrating intelligence. Finally, the environment must be navigated by both prey and predator to allow for obstacle avoidance and adapt to navigate the forest seamlessly whilst seeking out food and water sources. To convincingly simulate animal behaviour predators must track, stalk and chase prey whilst prey must avoid, hide and sense predators for their survival.

The project would consist of a forest level with trees, ponds, carrots, burrows, rocks and various wildlife such as foxes and rabbits. Unreal Engine 5, blueprints and C++ programming was made use of, GitHub would back up the project files and Agile Methodologies such as Scrum were adopted for Project Management.

To effectively demonstrate this simulation: the Player would take control of one of the Prey where a tutorial would take place: they would be instructed to seek food and water. However, they would also be warned of the presence of predators and to gain access to both resources they would take advantage of other burrows, hide in bushes and take advantage of obstacles in the area to slow the predator down. The predator itself would either be hunting on it's own or in a pack and may have to compete with other predators in the area. Similarly, prey would also be seeking out resources in groups or alone, scattering the moment a predator started to chase them – this is something the player can leverage to distract the other agents with. The player achieving both hunger and water bars filled and upon returning to their habitat would end the simulation.

Project Overview



Figure 2: Fox Hunting Behaviour.

Key Challenges:

- Technical and AI Limitations
- Social and Emotional realism
- Design and Practical Challenges
- Ethical and Safety Challenges

Software and programming languages:

- Unreal Engine 5
- Unreal Engine Blueprints
- Blender
- C++ and Python

Method

The research for Animal Behaviourism regarding Hunting Patterns involved use of Qualitative and Quantitative research and adopted Agile Sprint Methodology, Agile Scrum Methodology (Akhtar et al, 2022) (GeeksforGeeks, 2026), Production Cycle and Multiple Production Cycle (Chandler and Chandler, pp.98-99).

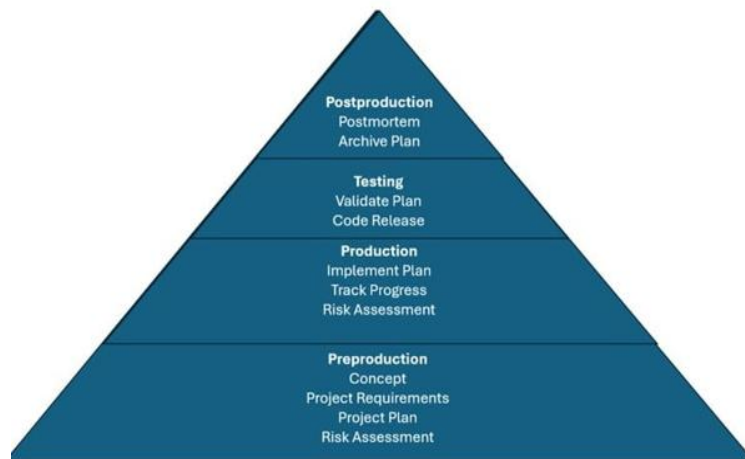


Figure 3: Production Cycle (Chandler and Chandler, p.98).

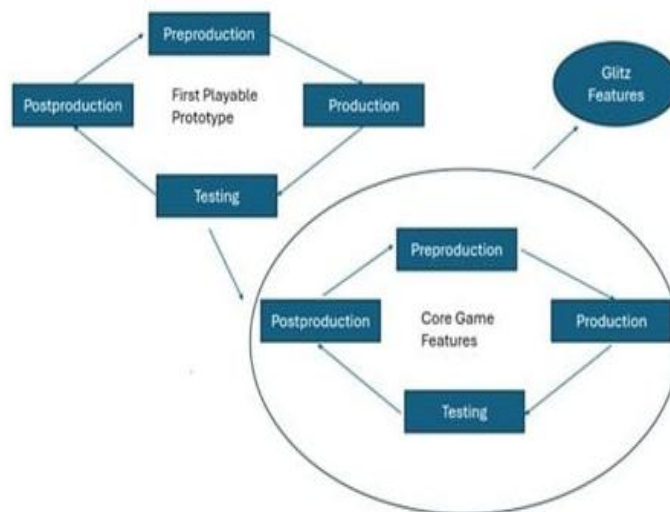


Figure 4: Multiple Production Cycle (Chandler and Chandler, p.99).

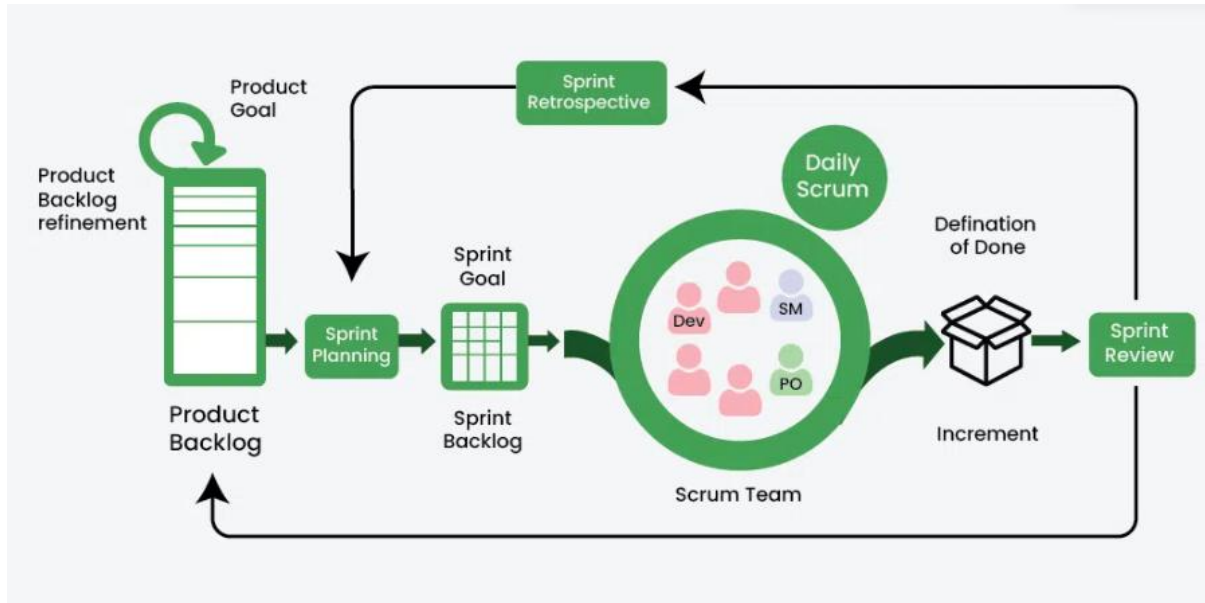


Figure 5: Scrum Workflow Diagram (GeeksforGeeks, 2026).

Scrum Methodology was adapted to along with regular Supervisor meetings that made use of Sprint Planning, Sprint Reviews and Backlog entries. A Gantt Chart was made use of during the project to plan for rough milestones, whilst a Kanban board could help keep tasks organised and ensured progression.

Effectively, the way AI agents would adopt a pathfinding routine to hunt prey. They would first spot either the player or prey, the next sequence is best demonstrated in the Unreal blueprints in Figure 5 (Epic Games, 2022).

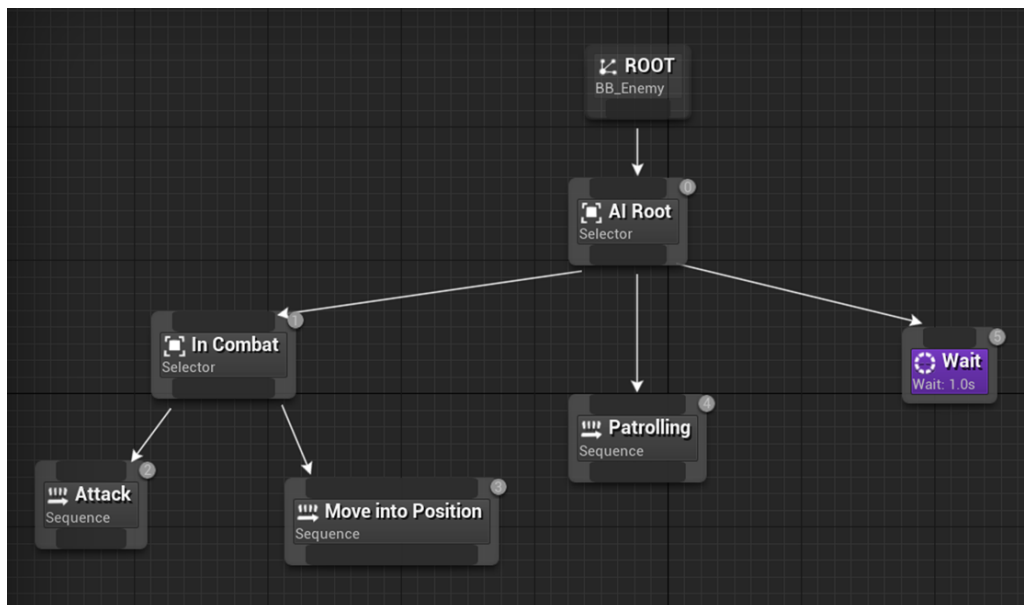
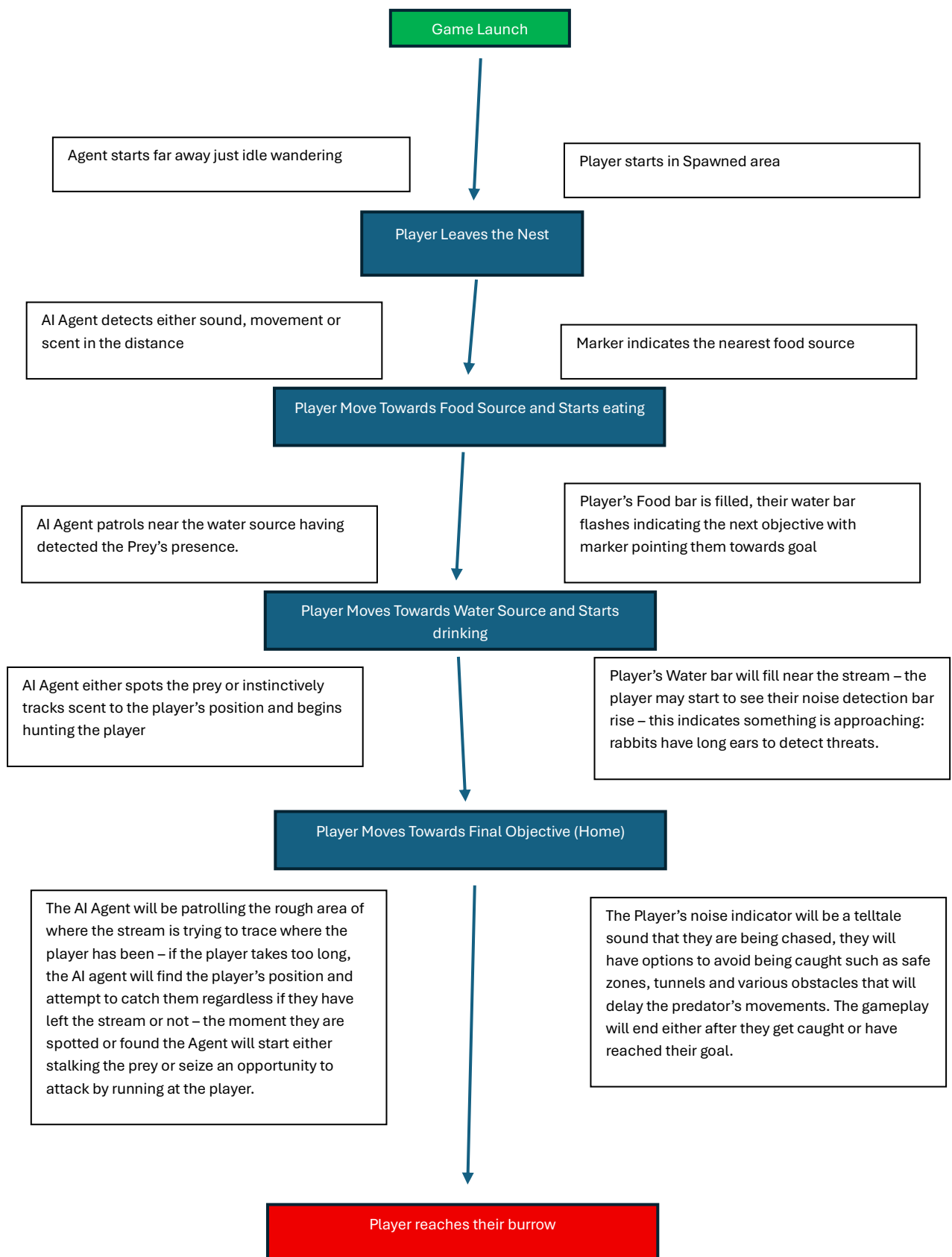


Figure 6: Autonomous Behaviour to Stalk Player Character (Epic Games, 2022).

Gameplay Logic



Game Preview



Figure 7: Pack hunting behaviour.



Figure 8: Rabbit Retreats, Fox Stalks.



Figure 9: Rabbit seeks carrot.

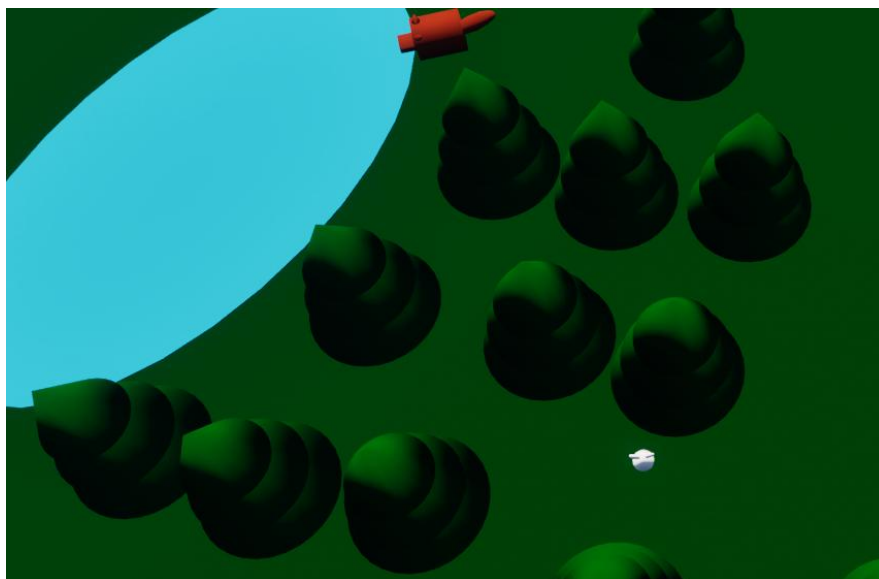


Figure 10: Water needed by both animals.

Findings

The project shows potential in demonstrating AI Agent behaviour that could be perceived as realistic. The project in its current stage of development is still in the process of being fully implemented, more research may be needed at present to determine effective approaches to realistically depict animal movements and behaviours. Further Playtesting would improve the overall look and feel of the simulation upon examination of feedback.

Conclusion

Whilst the project lacks refinement, the overall project will be determined a later stage whether it may be considered a success upon further development. The student recommends that the project will need playtesting and polish to ensure the gameplay feels responsive and immersive towards the player. The graphics could be improved to feature more textures, and the lighting could be better adjusted to depict an afternoon setting, this would involve changing the skybox from Unreal's default setting as well.

The project is yet to be determined a success as several stages of development have yet to be completed. The Gradex event is scheduled to be held 5th June: by then the project should have fully realised potential and improved visuals including a HUD. The project could be potentially turned into a full game with levels and challenges that could involve Story elements, additional prey and predators whilst also including further challenges like time trials and character selection between different species.

Impact

The research simulates a realistic setting of animals in their natural woodland environment this some features include Physics, Animal Steering, Flocking and Object Avoidance. This thus improved the student's understanding of Unreal Engine, Blender Assets, improved project planning and evaluation skills. Given more time the simulation shows promise of being turned into a fully realised and realistic woodland environment with agents that over time could develop more complex hunting strategies. It is hoped that the project will enhance greater understanding of Agent behaviour in games and upon improvement will help the student visualise new potential projects and innovate further upon completion.

References

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