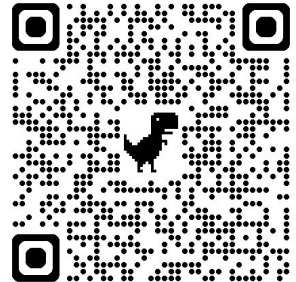


Exploring Alternative AI Creature Techniques for Minecraft by using Rain World as comparison

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AI Creatures in Video Games and Immersion

Video games affect how children learn important social skills.

Many video games use creatures because they increase immersion by serving as opponents, providing resources, or maintaining other symbiotic relationships.

Any software code that mimics living thinking or behavior is considered Artificial Intelligence, regardless of the complexity of implementation.

Why is immersion important?

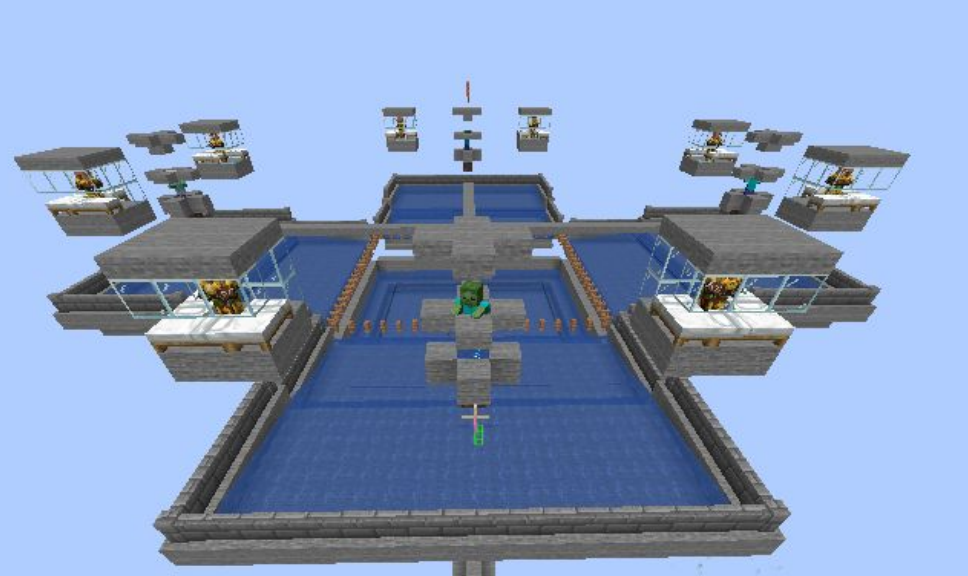
When video game creatures fall short of expectations, it can cause a disconnect that paints them as disposable mechanics.

This disconnect can cause the players to treat the creatures in a way that does not align with their values.

In Minecraft, this can take the form of typical iron farms or typical trading hallways.



Typically, trading halls permanently place villager on shelves for a player's convenience.



Typically, iron farms exploit a mechanic where villagers' fear (pictured: of the zombie within light of sight) summons an iron golem mob as a defensive mechanism.

About Minecraft & Creatures

Minecraft uses hostile monsters for the player to fight, passive livestock that provide materials, and villagers with which the player can trade.

Minecraft is a sandbox. It is meant to operate like an engine or tool.

This doesn't mean the contents should be predictable, instead, it suggests the game should give the players the means to direct and promote experimentation.

About Rain World & Creatures

Rain World is an ecosystem video game where creatures have been developed over six years (2011-2017).

Minecraft should not strive to replicate it, but it should focus on its mission and incorporate beneficial AI techniques in its fitting way.

Creature Display

Minecraft

- PNG images folded like origami to create 3D models
- Animated with relative limb positions over time
- Animations saved for swimming, walking, etc...
- Some creatures (e.g. Fish) use a PNG layer with variable colors.

Stark, Blocky, Duplicated

Rain World

- Divides creatures into body chunks affected by physics
- Draws colors and shapes on-the-go (Procedural Animation)
- Different creatures of the same species vary in color

Dynamic, Smooth, Unique

Creature **Decision**-making

Minecraft

- Hierarchy of goals
- Goals activate based on conditions (nearby blocks, nearby entities, internal state)
- Highest activated goal is picked

Simple, Exploitable

Rain World

- Relationships between types of creatures
- Personality values
- Trackers between encountered creatures (memory)
- Predicts movement when out of sight

Motives, Personality

Creature Pathfinding to **Destinations**

Minecraft

- Tiles have costs (overridden by type of creature)
- Tiles consider all neighbors at once
- Uses A* pathfinding
- Smooths the path (might result in fallacies)

Robotic, Predictable

Rain World

- Tiles have costs depending on creature abilities
- Tiles consider types of connections to each neighbor
- Uses A* pathfinding
- Increases costs for a tile if it failed to pursue it and regenerates path
- Still active when outside the visible screen

Carries intent, shows frustration

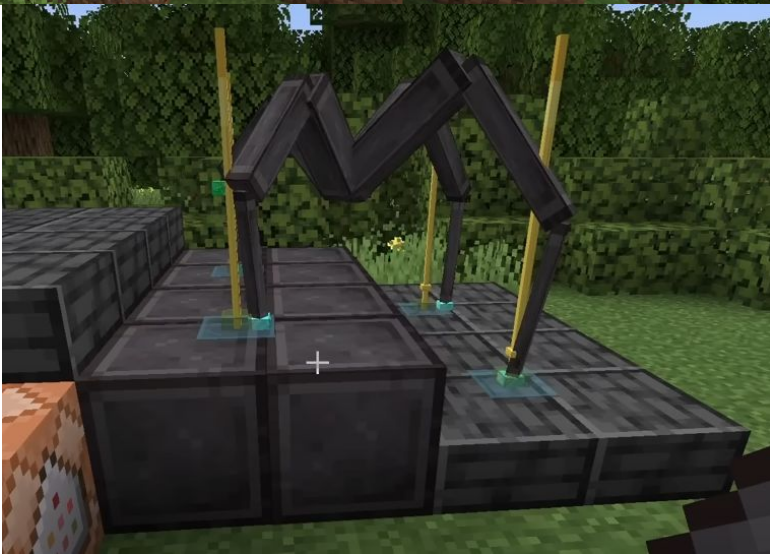
Proposal && Verdict

Detachment from the creatures can cause players to enact exploitative actions that might not align with their morals. Minecraft would benefit from using alternative techniques in handling its creatures' AI, but it should continue to keep its mission of being a responsive sandbox in mind.

- Incorporating a level of procedural animation, especially to segmented creatures where the performance decrease is justifiable, would help better connect the mobs to their physical environment.
- Increasing the intricacies of key mobs' decision-making by adding trackers between creatures, personality values, or emotion values would add a sense of motivation and personality to individual creatures.
- The pathfinding in Minecraft would benefit from dynamically changing the selected path based on specific circumstances, such as a repeated failure in attempts to pursue it.

Counterarguments and limitations

- Multiplayer is supported
 - Sandboxes should be reliable
 - Complicated creatures won't fit in
 - Increased age rating
 - Video games should escape reality
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- Software performance
 - Negative emotional outcomes (Unhealthy attachment or detachment)



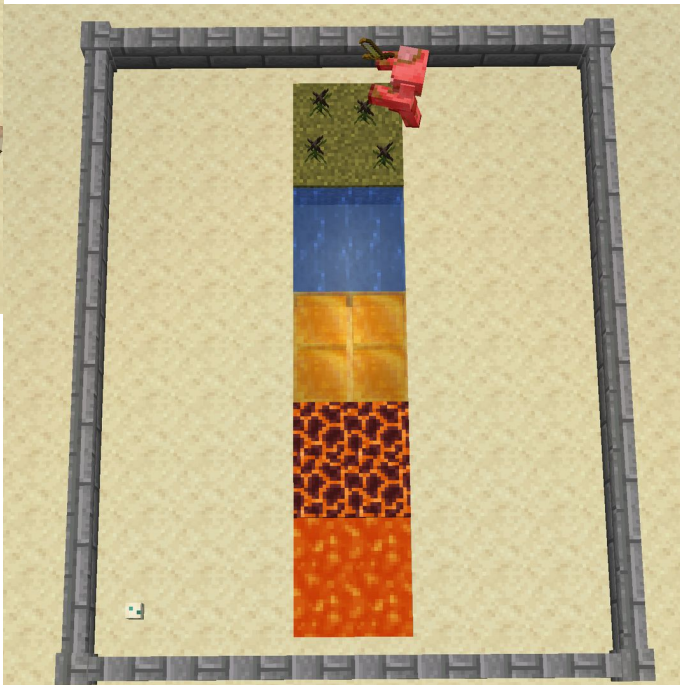


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