

Response Policy

1. For Immediate Threats

- a. If the fly is within a specific range of a moving object, such as a player or animal, it would trigger its **PANIC** response.
 - i. Within 4-7 blocks of the object, so its response will be quick
- b. If the fly is near water, lava, fire, or some other dangerous zones, it would also trigger its PANIC response, as it is not a solid surface
 - i. Within 2-4 blocks
- c. In this PANIC response, the fly will move erratically and quickly to move away from its apparent threat.
 - i. This would consist of random and unpredictable movement on the fly's side.
 - ii. Speed would be increased a bit to demonstrate the fly PANIC state.
- d. Once the fly is out of its PANIC state, it will transition to an IDLE or SEEK state, resulting in more tranquilized behavior.
 - i. This would mean that the fly does not detect anything within 5 blocks and is in open air. Depending on the transition, it will find a surface that it is attracted to or simply rest.

2. For Obstacles

- a. If the fly approaches an object with an obstacle impeding its immediate path, it will veer off randomly. This would be triggered by one block (depending on Minecraft logic). Logically, the fly will prefer open air to look for larger spaces rather than confined ones.

- i. The fly will veer off in a different direction, perhaps at a 90-degree angle, to search for open space. This would be done, and the fly would continue until there were no obstacles and proceed with the movement.

3. For Any Attractions

- a. If the fly notices some sort of attraction to an object depending on the source, it will transition to a **SEEK** state where it will move towards the source. Its behavior would replicate for other objects, as it will sort of zig-zag to its object.
 - i. It would take about 4-6 blocks for the fly to react or become attracted to the source. It would move at a moderated speed, not too quickly because it is not in a PANIC state.
- b. Once the fly reaches the source or object it will interact with the object and move away after 3-5 seconds.

4. For Idle State/No Attractions

- a. For instances where the fly has no attraction nearby, it will remain stationary in its place for about 10 seconds or so before looking for another object or source of attraction. It would repeat this behavior until the fly finds something. It will also move around and fly to other objects occasionally.
 - i. This would consist of picking a random direction for the fly to move to. It would move in that direction, and repeat the process until it finds something.
- b. If there is a sudden threat, it will find its way out of that situation as quickly as possible.

5. For Interactions with Climate Conditions

- a. The fly will seek shelter in walls or covered areas in case of rain.
 - i. This would consist of the fly looking for solid blocks. If it finds something within 5-7 blocks it will go to that block and
- b. The fly will look for warm spaces rather than cold spaces.
 - i. Examples include lights and torches while avoiding the colder areas.

In case we utilize reinforcement learning, this response policy can be adjusted to implement a policy rewarding the fly for intended behavior and penalizing it for unintended behavior.

Pseudocode for the States:

State: Check Environment

```
If (detect threat within 2-7 blocks)
    setState(PANIC)
Else if (detect attraction within 4-6 blocks)
    setState(SEEK)
Else if (raining and in open air)
    setState(SHELTER)
Else
    setState(IDLE)
```

State: PANIC

```
speedIncrease()
while(threat detected within 4-6 blocks)
```

moveErratically()

speedNormal()

If (detect attraction within 4-6 blocks)

setState(SEEK)

Else

setState(IDLE)

State: SEEK

Target = findAttraction(4-6 block range)

If (target not null)

goToTarget(moderate speed, zig-zag motion)

If (distance \leq 1 block)

Remain in target for ~10 seconds

Else

setState(IDLE)

State: SHELTER

Target = findBlock(5-7 block range)

If (target not null)

goToTarget(quick speed, zig-zag motion)

setState(IDLE)

Else

Move in random direction until something found