

Form 2: Literature Documents

1. Team No:22

2. Project Title: Emergency Evacuation simulation using ABMS.

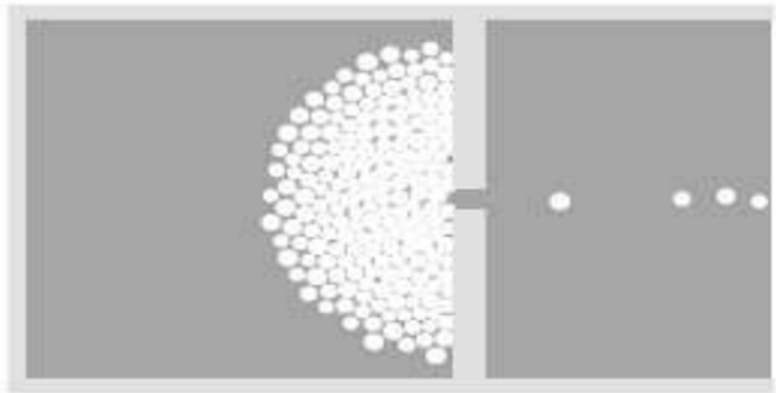
3. Problem Statement

Existing methods for simulating crowd evacuations through fire drills lack the realism needed to effectively prepare individuals for real emergencies, leading to potentially dangerous outcomes during actual evacuations. Multi-agent systems offer a promising approach to address this issue by modeling individual behaviors in emergency scenarios more accurately. By encoding panic levels to simulate irrational and chaotic behaviors observed during stampedes, these systems can provide insights into the factors influencing human stampede effects and offer informed recommendations to enhance survivability in crowd evacuations. This project aims to utilize agent-based modeling to simulate crowd evacuations where the risk of fire and potential stampedes is heightened.

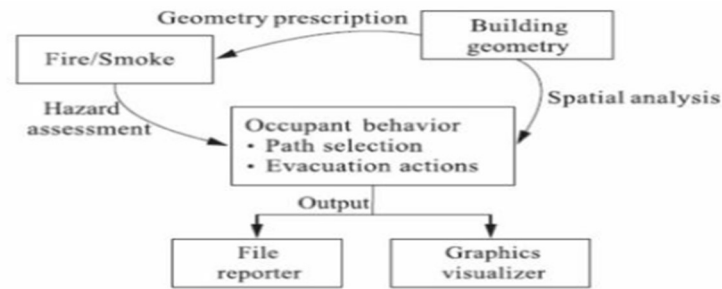
4. Problem Illustration:

Current crowd evacuation practices often fall short in preparing individuals for real emergencies, as routine fire drills lack the genuine sense of danger. The project addresses this gap by employing multi-agent systems to realistically model individual behaviors during emergency evacuations, particularly under panic conditions.

The simulation focuses on evacuating crowds from a venue with an unsafe layout, aiming to understand the significance of factors influencing human stampede effects. The project seeks to provide insights to enhance survivability during evacuations, especially in settings hosting large-scale events.



5 .Concept Tree



6. Comparison of Existing Strategies for Problem solving.

S.NO	STRATEGIES	ADVANTAGES	DISADVANTAGES
1	Traditional drill	Familiarity with emergency procedure	Lack of realism; participants may not take drills seriously
2	Multi-Agent systems	Accurate modeling of individual behaviors	Complexity of implementation; resource-intensive
3	‘Smart’ strategy	Efficient routing to nearest exits	Assume all survivors have knowledge of exit locations; requires accurate information about exit locations and accessibility
4	‘Follow’ strategy	Models herding behavior; simple implementation	Limited vision; inability to adapt to changing conditions
5	Civil defense forces	Professional response to emergencies; can provide aid and support	Response time may be delayed; may not be able to handle large-scale evacuations effectively

7. Comparison of Existing Method from selected Strategies :

S.NO	AUTHORS	STRATEGIES	ADVANTAGES	DISADVANTAGES
1	Reynolds	Distributed boid model	Individual perception and reactions	Limited to predefined behaviors

			Facilitates collision avoidance	Homogeneous behavior within flocks
2	Helbing et al	Physics -based particle system	Describes human crowd behavior Simulates interaction forces	Simplified representation Limited interaction range
3	Musse and Thalmann	Hierarchical crowd control	Simulation of crowd formed by groups Incorporates known goals	Limited interaction ranges Limited sociological aspects
4	Farenc et al.	Environment with behavioral rules	Efficient pathfinding	Complexity in rule implementation

8. References

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Signature Team Members

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- 2.
- 3.

Signature Supervisor

(Name and Designation)