

Modeling and Simulation of Emergency Evacuation from Industry Buildings under Toxic Cloud Release

*Hocine Benseghir¹, Abdullah Bin Ibrahim¹, Mohd Fadzil Mohd Idris^{*1}, Muhammad Nomani Kabir²*

¹Faculty of Engineering Technology University Malaysia Pahang, Malaysia 26300 Gambang, Kuantan, Malaysia

²Faculty of Computer Systems & Software Engineering University Malaysia Pahang 26300 Gambang, Kuantan, Malaysia

ABSTRACT

Toxic cloud caused by accidents in the industries is extremely dangerous for the occupants. Thus, in case of such accidents, the occupants must be immediately evacuated from industry buildings. In this paper, we explore modeling and simulation of occupant-evacuation during a toxic cloud release. The proposed model evaluates the toxic cloud concentrations in terms of probability values and then the exit route of each occupant is computed such that the toxic effect on the occupants is minimized. We integrated A* search algorithm with the toxic cloud model to find the safest routes for occupants to exit through the doors from the current positions of the occupants. To find the best route, the model considers the distance to egress, the obstacles and the probability of toxic concentration. We presented the simulation results of the model to demonstrate the plausibility of the model. This model can be used by evacuation management to guide the industry occupants to exit the industry building through safest routes during an accident scenario.

KEYWORDS: Toxic cloud release; pedestrian dynamics; evacuation model; simulation models

FUNDING

This research was supported by a project no. RDU1703118 from Universiti Malaysia Pahang