

## Implementation of A\* Algorithm for Real-Time Evacuation During Fire Situation

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### Abstract

Building architectures are growing towards increased complexity, with countless people moving through them. Not all amongst the crowd could possibly be familiar with the building to escape a fire danger zone. Even if the infrastructure complies to safety standards, decision making for fire evacuation, while ensuring safety, is utmost critical. Tailoring to these constraints, it is essential to protect lives by efficient and complete evacuation. For fire emergency, the proposed evacuation routing system is inputted by a group of wireless sensor nodes present across the considered floor plan; a MATLAB based central server to find/calculate better safe evacuation routes for the imperiled people, at a remote location in the building; a Wi-Fi based network that communicates this calculated route from the sensor network to server and server to the occupant, on evacuee's cell phone. The information from the sensors is transmitted by a Wi-Fi network and is aggregated by the Thingspeak server. The real-time evacuation route is calculated by the server, towards the nearest and safest exit door from the occupant's instantaneous location, by deploying A\* algorithm for route optimization, along with data from sensor network that informs about origin and fire spread regarding hazard's location. The server transmits the route information to the occupants through Wi-Fi connectivity. The endangered evacuees are thereby enabled to view and follow this information of dynamic and real time active maps using a Smartphone. The proposed framework is prototyped and analyzed for their future inclusion into existing fire evacuation systems.

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