MEMBANGUN PERMODELAN INFORMASI GEDUNG BIM DAN ABM BERDASARKAN SKENARIO PENILAIAN EVAKUASI BENCANA GEMPABUMI DAN KEBAKARAN DI GEDUNG PERPUSTAKAAN UGM

Diajukan oleh:
Rizki Ramdani
18/435105/PMU/09616

ABSTRAK

Penelitian ini secara komprehensif mengeksplorasi evakuasi keselamatan gempabumi dan kebakaran di gedung bertingkat. Analisis evakuasi keselamatan ini dilakukan pada model gedung perpustakaan UGM yang merupakan pusat rujukan informasi ilmiah di yogyakarta.

Model BIM seluruh bangunan dihasilkan dari perangkat lunak *Autodesk Revit*. Perangkat lunak *Pathfinder* digunakan untuk analisis evakuasi dan *PyroSim* digunakan untuk analisis persebaran api dan asap. Model BIM bangunan dioptimalkan sedemikian rupa sehingga dapat langsung diimpor ke dalam perangkat lunak untuk analisis kebakaran dan evakuasi. untuk memodelkan pergerakan agen dalam keadaan darurat memasukkan atribut, karakteristik dan penundaan pergerakan berdasarkan tipe gen dan jenis kelamin. Analisis kebakaran menggunakan metode reaksi asap NZ (New Zealand) sebagai referensi yang tidak menetukan komposisi bahan bakar input.

Memodelkan simulasi pasca gempabumi, digunakan beberapa skenario evakuasi. Skenario situasi normal, antrian dipintu keluar, situasi kegiatan besar, dan kemungkinan terburuk seperti agen sakit/cedera serta agen yang membutuhkan kendaraan kursi roda dan *stretcer* dalam melakukan perpindahan. Sehingga didapatkan kinerja evakuasi berupa total waktu evakuasi, lokasi densitas dan analisa kelayakan gedung sebagai bahan pertimbangan rekomendasi.

Memodelkan sistem kebakaran yang terletak di area api yang diperhitungkan dalam model numerik. Mekanisme sistem ekstraksi asap dan panas dianalisis menggunakan perangkat lunak *PyroSim*. Hasil penyebaran asap di atas lantai diperhitungkan dalam analisis evakuasi di *Pathfinder* yang digunakan untuk menganalisis kecepatan evakuasi dari gedung.

Bagian terakhir dari penelitian ini didedikasikan untuk analisis kecepatan agen terhadap visibilitas tutupan asap berdasarkan faktor persebaran asap di dalam gedung dan tingkat keamanan keselamatan agen. Hasil utama analisis berupa waktu evakuasi ditampilkan dalam bentuk animasi di *Pathfinder* dan *Pyrosim*

Kata kunci: Agent-based modeling (ABM), Building Information Modeling (BIM), evakuasi, pathfinder, perpustakaan, pyrosim

BUILDING MODELING OF BIM AND ABAM BUILDING INFORMATION BASED ON SCENARIO EVALUATION OF EARTHQUAKE AND FIRE DISASTER EVACUATION IN UGM LIBRARY BUILDING

By :
Rizki Ramdani
18/435105/PMU/09616

ABSTRACT

This research comprehensively explores earthquake and fire safety evacuations in high rise buildings. This safety evacuation analysis was carried out on the UGM library building model which is a reference center for scientific information in Yogyakarta.

The whole building BIM model is generated from the Autodesk Revit software. Pathfinder software is used for evacuation analysis and PyroSim is used for analysis of fire and smoke distribution. The building BIM model is optimized so that it can be directly imported into software for fire analysis and evacuation. to model the movement of agents in emergencies to include attributes, characteristics and delay of movement based on gene type and sex. Fire analysis uses the NZ (New Zealand) smoke reaction method as a reference that does not determine the input fuel composition.

Modeling post-earthquake simulations, used several evacuation scenarios. The scenario of a normal situation, the queue at the door out, the situation of major activities and the worst possible such as sick / injured agents and agents who need a wheelchair and stretcer in moving. So that evacuation performance is obtained in the form of total evacuation time, density location and building feasibility analysis as consideration of recommendations.

Model the fire system located in the fire area that is calculated in a numerical model. The mechanism of smoke and heat extraction systems was analyzed using PyroSim software. The results of the spread of smoke on the floor are taken into account in the evacuation analysis in Pathfinder which is used to analyze the evacuation speed of the building.

The last part of this research is dedicated to the analysis of agent velocity on the visibility of smoke cover based on the factor of smoke distribution in the building and the level of safety of the agent. The main results of the analysis in the form of evacuation time are displayed in the form of animation in Pathfinder and Pyrosim

Keywords: Agent-based modeling (ABM), Building Information Modeling (BIM), evacuation, Library, pathfinder, pyrosim