THEME PARK CROWD SIMULATION USING MULTI AGENT SYSTEM

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Declaration

I declare that this is my own research proposal and this proposal does not incorporate without acknowledgement any material previously published submitted for a Degree or Diploma in any other university or institute of higher learning and to the best of my knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text.

Signature: ..... Date:

I have read the proposal and it is in accordance with the approved university proposal outline. I am willing to supervise the research work of the above candidate on the proposed area.

Signature of the supervisor: ..... Date:

Dedication

I am dedicating this thesis to beloved my family and many friends, who have meant and continue to mean so much to me.

A special feeling of gratitude to my loving father, Buddhadasa Matarage. Although he is no longer of this world, his memories continue to regulate my life. And my loving mother Sumana Gunawardena, whose words of encouragement and push for tenacity ring in my ears. My loving wife Deepani, children Yehen and Risandi have never left my side and are very special.

I also dedicate this dissertation to my many Msc friends and office friends, who have supported me throughout the process. I will always appreciate all they have done, especially my reporting manager Mr. Saliya Sajith for releasing me from work to achieve deadlines. And my co-workers sharing my work load to balance research work and office work.

Last but not least I am dedicating this to my late elder brother Samantha Matarage, gone forever away from our loving eyes and who left a void never to be filled in our lives. Though your life was short, I will make sure your memory lives on as long as I shall live.

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Abstract

Computer-based crowd simulation has become a dominant research topic today. Computer-based simulation applications are used in education, entertainment, training, theme park design and building evacuation. Among them, virtual crowd simulation has become a dominant topic in theme park industry. Limited research has been conducted in theme park crowd simulation using multi-agent system. Virtual simulations can be done changing the configurations, to decide the best-suited locations for stalls in the premises. Otherwise, it will cost a lot to change physically located items as experience and feedback.

In this research, Multi-Agent Technology has been used to simulate crowed behavior in Theme Park when an emergency is caused due to fire. NetLogo, a multi-agent simulation software, is used to build the modal. The crowd in the park is identified as agents. Different agents, children, parents, individuals and couples are programmed to behave as for social norms, defined under social science. The basic goal of every living agent, is to stay away from fire and evacuate from the closet exit as quickly as they can. But there are exceptional scenarios, unique to different agents. For instance, parents try to find their children, before existing from environment. We have defined coordinator agents to manage crowded areas and to help parent agents, who get lost while looking for their children. Logics, that governs each type of agent behavior are programmed in NetLogo.

The simulation is tested changing the number of agents and observed increment of evacuation time when the number of agents are increased.

In research simulation, few emergent phenomena were observed. One is, some areas get crowed while agents are evacuating the theme park. Another is, exits which are away from the fire location are getting crowded. And parent agents get lost in theme park while looking for their children.

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Abbreviation

MAS	-	Multi Agent System
FPS	-	Frames Per Seconds
SFM	-	Mathematical Model Social Force Model
OSM	-	Open Street Map
DAI	-	Distributed Artificial Intelligence