

DELHI TECHNOLOGICAL UNIVERSITY



THEORY OF COMPUTATION (MC-304)

Midterm Project Proposal

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Modelling the NPCs in the game “Pac-man” using Deterministic Finite State Machines.

WHAT IS PAC-MAN?

Pac-Man is a classic game that requires the player to navigate through a maze, eating pellets and avoiding the ghosts who chase him through the maze. Occasionally, Pac-Man can turn the tables on his pursuers by eating a power pellet, which temporarily grants him the power to eat the ghosts. When this occurs, the ghosts' behavior changes, and instead of chasing Pac-Man they try to avoid him.

The ghosts in Pac-Man have four behaviors:

- ☐ Randomly wander the maze
 - ☐ Chase Pac-Man, when he is within line of sight
 - ☐ Flee Pac-Man, after Pac-Man has consumed a power pellet
 - ☐ Return to the central base to regenerate.
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INTRODUCTION

Finite state machines (FSMs) are mathematical models that can be implemented in hardware and software that help simulate sequential logic. When designing video games, finite state machines in the form of deterministic and nondeterministic finite automata are particularly useful for designing simplistic artificial intelligence (AI) models or for programming the flow of events in a game.

The ghosts in Pac-Man are called NPCs (Non-Player Characters). Their behavior is state-based. Hence, their AI can be modelled using a Finite State Machine.

THE PROJECT

In the project we shall attempt to design a Deterministic Finite State Machine that specifies the behavior of the NPC Ghosts at every step.