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NOVEL APPROACH IN E-LEARNING TO IMBIBE ENVIRONMENTAL AWARENESS

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ABSTRACT

Real world problems are often felt to be somebody else's problems. By transferring the real world problems to the virtual world the player experiences the gravity of the situation first hand, as he/she is forced to solve the problems of environmental degradation faced by his/her virtual town. This game, through the concept of infotainment aspires to help average individuals of all age groups to understand the importance of environment protection and enhancement and learn to lead an eco-friendly life. While the game is simple to play, the learning process is facilitated because all the available solutions to protect the Environment will be researched and implemented in the game. Players and spectators will subconsciously learn various methods to protect the environment.

Keywords: E-Learning, environment, game, AI

I.   INTRODUCTION

Environmental degradation is the plague that is affecting the world today. Eco management and enhancement has never been more critical. Efforts are being made by Governments, Social groups and Environment conscious people to sensitize the average individual about the impending disaster of Environmental degradation.

Real world problems are often felt to be somebody else's problems. By transferring the real world problems to the virtual world the player experiences the gravity of the situation first hand, as he/she is forced to solve the problems of environmental degradation faced by his/her virtual household.

This game, through the concept of infotainment aspires to help average individuals of all age groups to understand the importance of environment protection and enhancement and learn to lead an eco-friendly life. While the game is simple to play, the learning process is facilitated because all the available solutions to protect the Environment will be researched and implemented in the game. Players and spectators will subconsciously learn various methods to protect the environment.

The game starts with the player and the other characters in the house doing mundane tasks. However, the player has been given a limited amount of resources like money, water, electricity, etc for the entire week. The aim is to survive the week with the given resources and at the same time conserve the resources to increase the money. The conservation of the resources will increase the Green-o-meter while wastage of resources will decrease the Green-o-meter. Some mini/bonus levels will be included as a part of the game. It is a multi-level game where the player completes a level successfully when "Green-o-meter" reads full.

II. LITERATURE REVIEW

Artificial Intelligence is an important aspect in game design [7]. Therefore sophistication of AI should be focussed on, rather than Graphic enhancement in game development [6]. Efforts are made to provide Human like characteristics for Non Playable characters in game [1], [2], [3].

An AI must enhance the replayability of a game. Necessary measures must be taken the issue of scripted AI characteristics which makes the game less predictable [4]. An AI game engine can be very useful at times. A well developed AI game engine can provide a common inference machine and general knowledge base and enhance reusability for new games [5].

III. OUR APPROACH

Behaviour Description

Finite State Machine (FSM) approach: The behaviour can be modelled using a Finite State Machine (FSM). It consists of state, percepts and transitions. A state describes the situation of the machine, percepts are the inputs received and transition is change from one state to another based on the percepts. An overview is shown in Fig. 2. States can include behaviour aspects like attack, search, idle, dead etc. Percepts can be Gets_killed, Gets_hurt etc as described in Fig. 1. So if the Agent is in idle state initially, on seeing an enemy (percept) it may attack. Thus there is said to be a transition from idle state to Attack state.
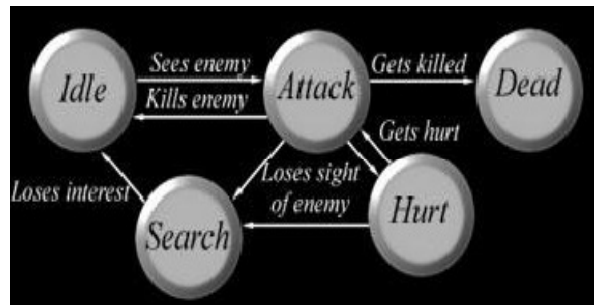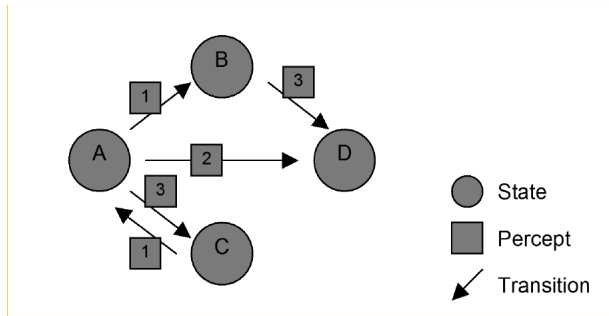

Fig. 1: State Diagram Example

Fig. 2: State Diagram Overview

Path Finding:

Here we are attempting at a more accurate AI space configuration representation using a connected graph of convex polygons and a better approach towards path finding.

Waypoints technique:

An old approach to path finding was the waypoints technique. In this technique, the AI starts from the initial point in its path and moves along a series of connected points along the path to reach its goal (Fig. 3.1).

Navigation Mesh technique: This is a recommended technique as compared to waypoints method. For path finding we avoid representing the world as a series of connected points or waypoints, instead make use of a connected graph of convex polygons (Fig. 3.2). An AI can therefore get from any point in a given node (polygon) to any other point in that node using the convexity. So the overall task of path finding reduces to path finding along connected graph of nodes. Navigation Mesh makes the AI aware of how the walk-able space looks like. Hence, the AI need not hit along each point as in Waypoint Generated Graph. The result of this is a more natural looking movement (Fig. 4). Other advantages of Navigation Mesh are less processing time, easy handling of dynamic environment change. This method can also be used with A* and other search algorithms.
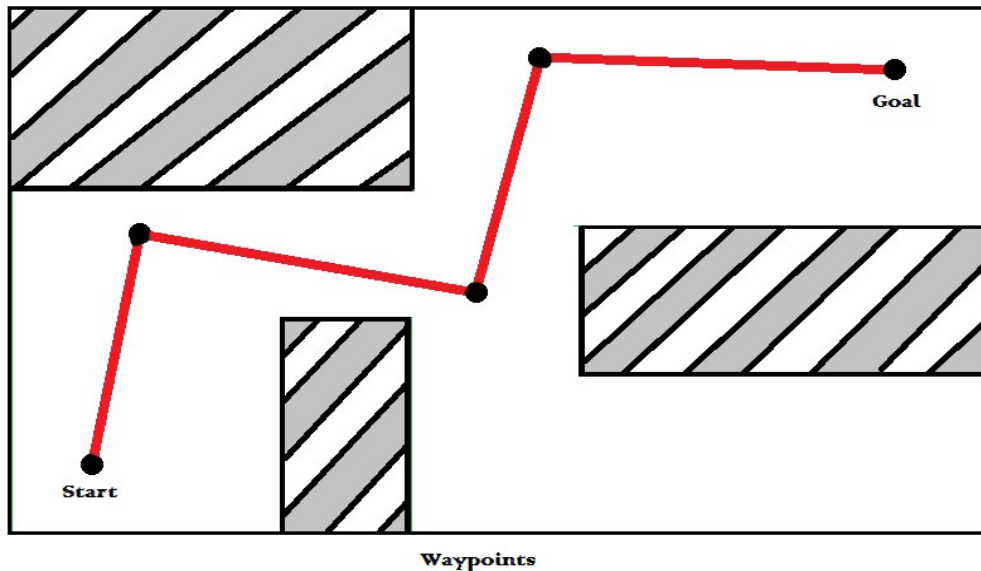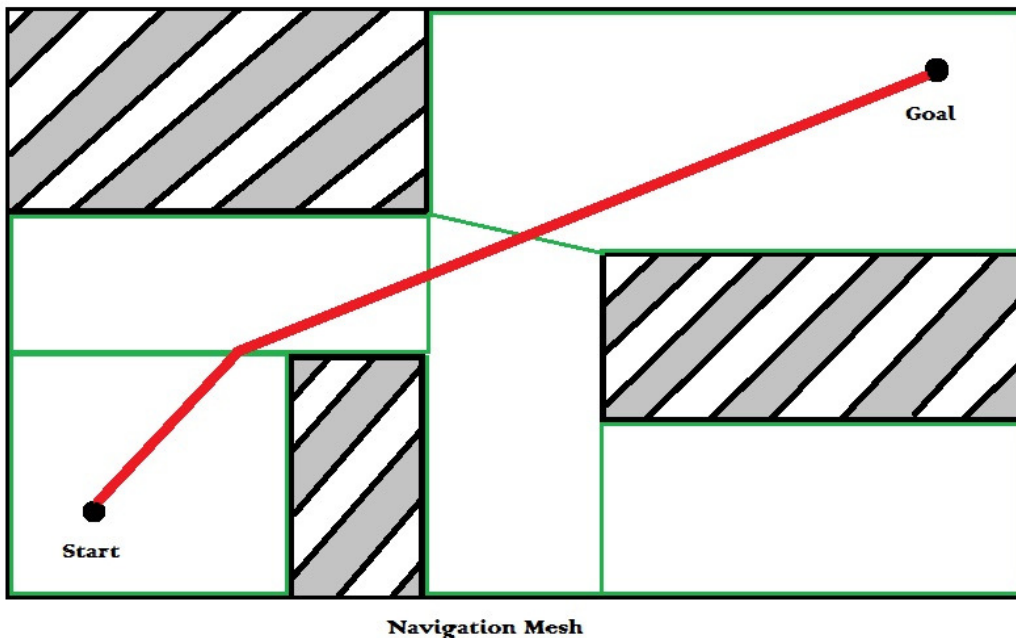

Fig. 3.1: Waypoints
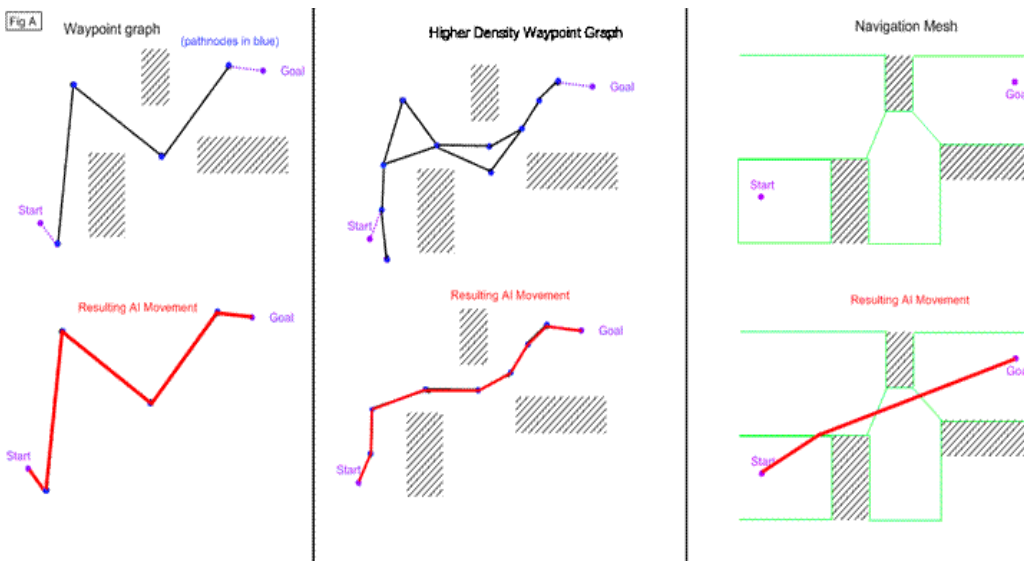
Fig. 3.2: Navigation Mesh Overview

Fig. 4: Comparison of Navigation Mesh and Waypoint graph technique.

IV.   HUMAN LIKE NPC (Non-Playing Characters)

A computer controlled characters are called NPCs. The aim is to create human like NPCs to better emulate the mistakes they make in real life. Since this game is about making the player aware of the problems regarding environmental degradation regarding their own household, The NPCs in this game will exhibit an exaggerated set of qualities that lead to wastage of resources. So we have decided to include the three main characters, who

knowingly or unknowingly cause the wastage of resources in the house. These three characters will exhibit behaviours like forgetfulness, mischief, laziness or just being too busy etc. Research indicates that this kind of behaviour causes 60% of the total wastage of power, water and other resources in a household. So the player has to continuously keep the three members of his household under check and also has to correct their mistakes. Apart from all of this the player also has to innovate in the game to create new ways for saving resources and recycling old products as much as possible. This is what makes the game interesting and challenging at the same time.

V.   PROPOSED GAME

The proposed game will start in a basic household. The player is given a choice of character at the start of the game. The player can choose to be either a male or female character in the game. Besides the player, there will be three other characters in the game that will portray typical behaviours found in a household. These three characters are described in the previous section (Humanlike NPCs). A Green-o-meter will keep track of how green and efficient the player manages the household.

The game will have three levels - first level is a basic household, second level is set in an apartment building and the third level in an office building.
The game starts with the player and the other characters in the house doing mundane tasks. However, the player has been given a limited amount of resources like money, water, electricity, etc for the entire week. The aim is to survive the week with the given resources and at the same time conserve the resources to increase the money. The conservation of the resources will increase the Green-o-meter while wastage of resources will decrease the Green-o-meter.

During the game, there will be certain pop-ups informing the player of various problems in the house due to the other NPCs. The problems caused due to the NPCs cause wastage of the resources. The player has to act upon these problems in a prioritized way so as to conserve the resources. As the game progresses the problems increase forcing the player to handle multiple tasks while trying to keep the resources in check. If the player is successful in managing the resources by the end of the week, then the player is awarded a bonus resource.

In between the game there will be certain bonus levels that will test the player's skill to complete tasks within a given time limit. Each of the bonus level in the game will be based on one of the resources (as explained in the next section - Examples). The bonus level can only be played once. Successful completion of the bonus level will increase the resource on which the bonus level was based on and increase the Green-o-meter by a certain pre-determined amount based on the importance of the resource.

The main aim of the game is to imbibe environmental values in the player so that he or she can apply these same values to everyday life.

VI.   EXAMPLE

Level 1: Player is given $2000, 300 litres of water and 100 hours of electricity for the week. The player is in the house with the other three NPCs. After a certain interval, a pop-up is generated due to one of the NPCs stating that the tap has been left open. The player has to find where the water is left running and turn it off so conserve the water. Another pop-up says that the lights have been left on, and there is a leakage in one of the pipes. The player has to solve the problems by making sure the solution will conserve maximum resources.

At the end of the week if the player can manage the house in the given resources and still has resources remaining, the Green-o-meter is increased and the player is given an additional resource (based on the maximum remaining resource).

Bonus Level: Electricity puzzle

This bonus level will test the player's ability to complete the given task in a limited time.

The player is in a house with some rooms. The player has to exit the house after switching off all the lights in the house. The switches in the room may or may not switch off the light in the same room; switches can be for lights in the other rooms. There will be a flash light and 1 set of batteries hidden in the house, each of which gives an added 5 seconds. The player has to search for these items or complete the task without them.

VII.   CONCLUSION/FUTURE SCOPE

The unique advantage of this approach towards learning and assimilating the critical aspects of environmental preservation an enhancement lies in the fact that the experience will become symbiotic.   While we believe that this "game" can be both addictive and educational, we also are of the firm opinion that this approach will have a subtle yet strong impact in the players' subconscious and a positive change in the behaviour will happen by their game play. This will make the players recognize the indiscriminate wastage of resources and also help them learn new ways of living a clean and green life. The proposed approach can be modified or improved if needed and implemented. If this method is implemented then it can be used as a powerful e-learning tool.

VIII.   REFERENCES

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