

# **STARWARS USING AUTOMATA THEORY**

**A PROJECT REPORT**

***Submitted by***

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## **I. ABSTRACT**

Automata theory is useful for both scientific investigation and cross-disciplinary computing. Automata theory is fundamental in the design and development of automated games. Effective communication between game designers and programmers is essential for the development and implementation of designs in high-quality games. The goal of this study is to advance the use of automata tools and computation theory in game design. In this Project we summarize the game Star Wars using Automata theory. NFA is used in various levels of designing the game. The reason we used NFA is that the levels in this game are shown very explicitly.

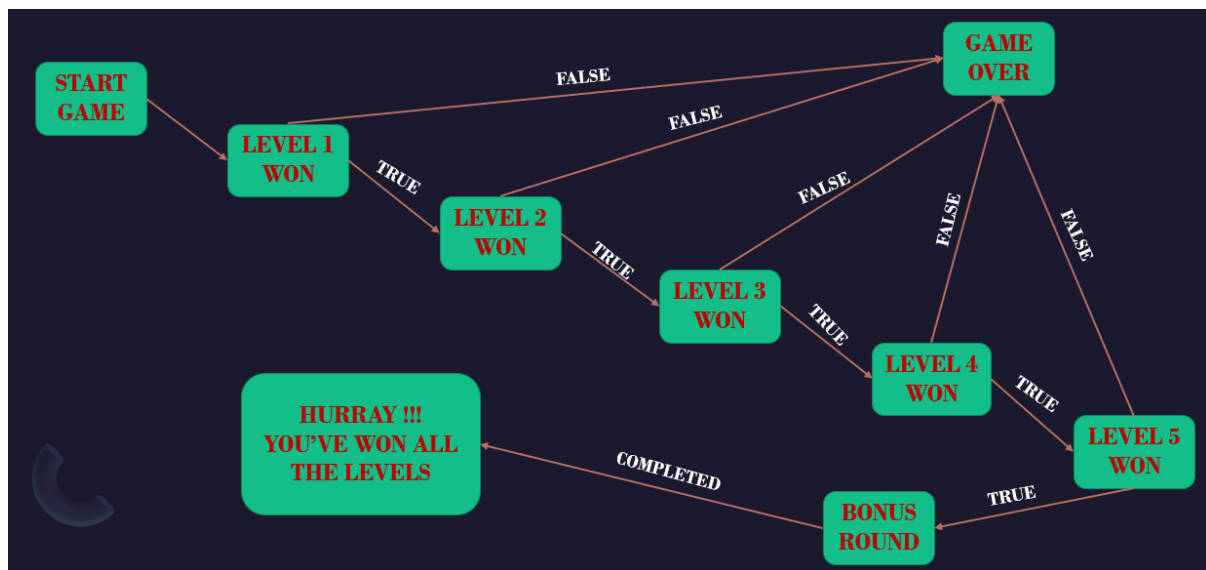
Keywords – Finite Automata, JFLAP

## **II. INTRODUCTION**

Automata are so easy to understand that their integration into game theory would be a huge step forward in the field of computer game development. Games created using automata and computer theory tools are easier to program and create than games created using other tools. All computer software works according to the principle of automata or automation. Computational and automaton tools, which are very useful for solving complex problems easily, are increasingly being used in research in the field of computer applications. The design and subsequent development of game theory can be greatly influenced by the tools of computers and automata.

The Design of this StarWars Game is presented by using Finite Automata. The Reason that we have analysed the game using this is that, Finite Automata is flexible and also as we have taken many levels of the game as using Finite Automata the reachability of a State can be easily determined. Many computer programs are developed according to the principles of automaton theory. Automata theory facilitates solving complex problems in modern research areas. Video games are a highly involved approach for students and players to acquire new concepts, and games can be a significant part of behaviour management.

### III. ARCHITECTURE



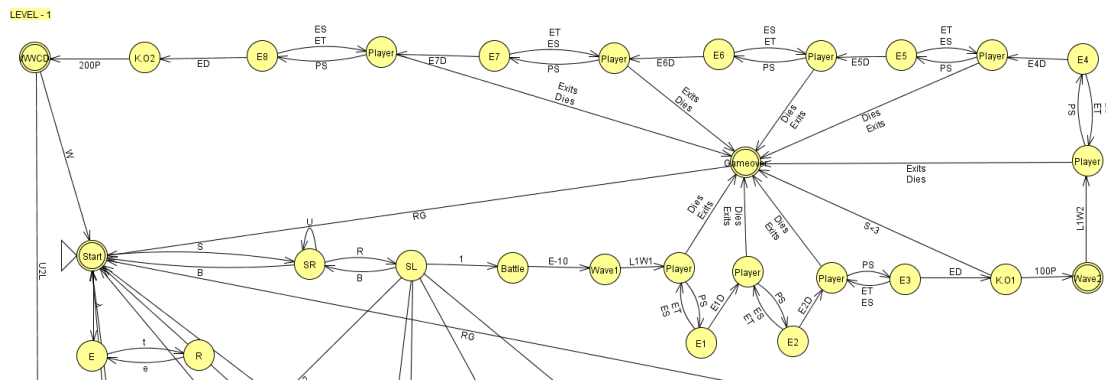
### IV. IMPLEMENTATION

The Game starts in the Start state, moves to the rocket selection state, after that we select the rocket and go to the level selection, energy will be deducted for each level of the game we play. Next, we select level 1 but after we complete all the levels and if we want to play the game again, we can select any level we want. In this we have total of 6 levels in which the last level is bonus level the player can exit or die in any level of the game and if he wants to change the rocket he can change after a level and some of the levels in this game will have waves of enemies/Opponents in which they also will have powers and after each level passing the player will get points.

#### A. Automata Design:

This Star Wars Game is designed using Finite Automata. First, the player starts from Start State and next goes to SR state in which we will select the rocket in this state and after that we will be selecting the level of the game in SL state in which energy will be deducted. The Player goes into battle in level1 in which the energy will be deducted by 10 and the player enters wave 1 of level 1

## LEVEL 1:



### Wave1:

In this wave, Player must face three enemies one by one, he needs to kill 3 enemies and if enemy shoots or touches he will die, and the game is over but if he pass this wave by killing all the 3 enemies he is succeeded in Knock Out, he gets 100Points and he moves to Wave2.

### Wave 1 Test cases:

Table Text Size		
Input		Result
SR1E-10L1W1PSE1DPSE2DPSED100P	Accept	
SR1E-10L1W1PSESDies	Accept	

### Wave 2:

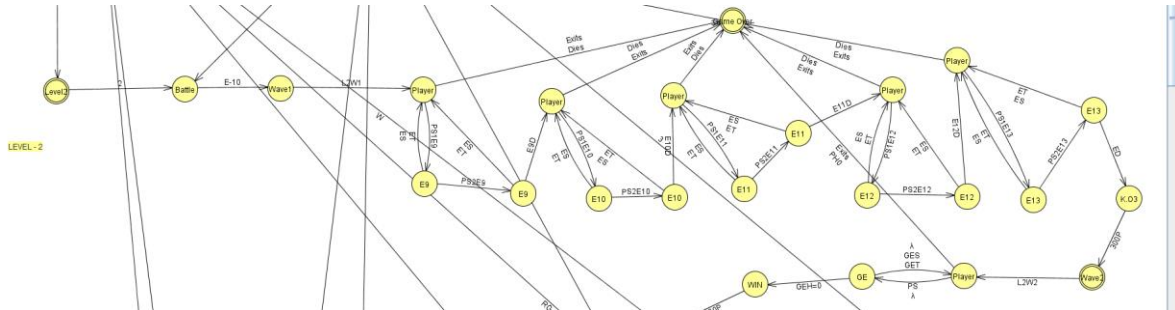
Now in Wave 2 he has to face 5 enemies one by one and if he gets shot or touched by enemy, he dies but if he succeeds to kill all 5 enemies he will pass knock out 2 and he receives 200Points and he wins the wave2, with that he wins the level 1 of the game and the level 2 gets unlocked.

### Wave 2 Test Cases:

Table Text Size		
Input		Result
SUR1E-10L1W1PSE1DPSE2DPSED100PL1W2PSE4DPSE5DPSE6DPSE7DPSED200P	Accept	
SUR1E-10L1W1PSE1DPSE2DPSED100PL1W2PSE4DPSE5DPSESDies	Accept	

## Level 2:

After winning the level 1 of the game, the player moves to level 2 and while entering the wave 1 of level 2 the energy of the player decreases by 10.



## Wave 1:

In this level, he needs to shoot the enemy twice to kill him, he needs to face 5 enemies and if the enemy shoots or touches the player dies and the game is over. If he manages to kill all enemies, player receives 300P and he succeeds to wave2.

## Wave 1 Test Cases :

Table Text Size	
Input	
SUR2E-10L2W1PS1E9PS2E9E9DPS1E10PS2E10E10DPS1E11PS2E11E11DPS1E12PS2E12E12DPS1E13PS2E13ED300P	Accept
SUR2E-10L2W1PS1E9PS2E9E9DPS1E10PS2E10E10DPS1E11ESDies	Accept

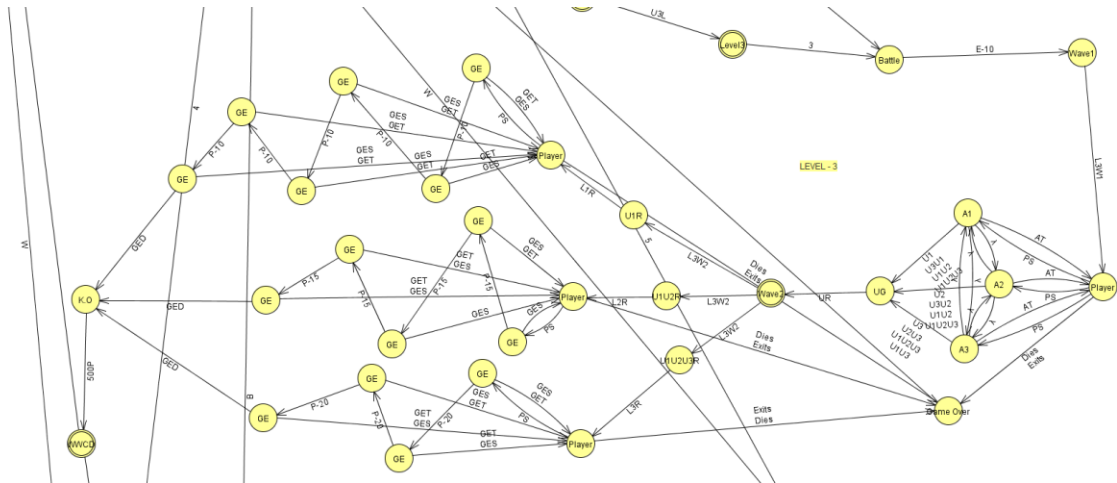
## Wave 2:

Here the player needs to face a giant enemy in which he will win only if the Giant Enemy health becomes zero and if he is shot or touched by giant enemy, his health decreases and if health becomes zero he is dead and the game is over but if he kills giant enemy he receives 400P and he wins the level 2 of the Game, Making the Level 3 unlock.

## Wave 2 Test Cases:

Table Text Size	
Input	Result
SUR2E-10L2W1PS1E9PS2E9E9DPS1E10PS2E10E10DPS1E11PS2E11E11DPS1E12PS2E12E12DPS1E13PS2E13ED300PL2W2PSGEH=0400P	Accept
SUR2E-10L2W1PS1E9PS2E9E9DPS1E10PS2E10E10DPS1E11PS2E11E11DPS1E12PS2E12E12DPS1E13PS2E13ED300PL2W2PSGESPH0	Accept

In this level the player has to face two waves in which he gets some rocket upgrades which are helpful for the player to complete wave 2 of level 3. Energy will be deducted.



Player can get the rocket upgrade by shooting the asteroids, for Suppose he need to shoot 3 Asteroids in order to get 3 upgrades, if he shoots 2 asteroids he get 2 upgrades but he need hit a minimum of 1 rocket and if not asteroid touches or shoots the player then he dies and if he hit the asteroids he will move to the wave 2.

ple Run

Table Text Size	
Input	
SUR3E-10L3W1PSU1U2U3UR	Accept
SUR3E-10L3W1PSU1U2UR	Accept
SUR3E-10L3W1PSU2U3UR	Accept
SUR3E-10L3W1PSU3UR	Accept
SUR3E-10L3W1PSU2UR	Accept
SUR3E-10L3W1PSU1UR	Accept

In this Wave the Player has to face the giant enemy with the upgrade he got in wave 1, if he destroyed 1 asteroid he will get level 1 rocket and same with 2&3 asteroids and each rocket will have different powers and level 1 rocket takes 5 shots to take the giant enemy down and 4 shots for the level 2 rocket and 3 shots for level 3 rocket and if any case the enemy touches or shoots the player, he dies

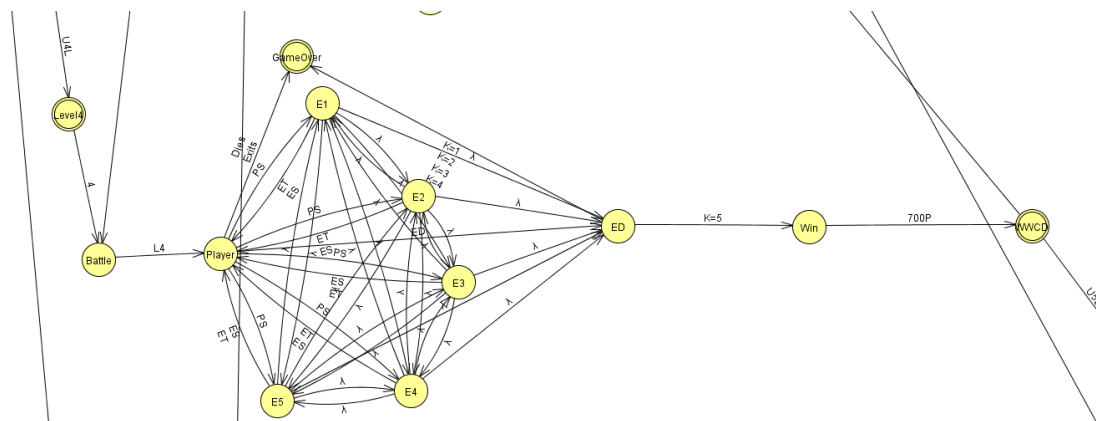
and the game is over. But if he manages to kill the Giant enemy, he wins the level 3 of the game. So that level 4 gets unlocked.

## Wave 2 Test Case:

Table Text Size		
Input		
SUR3E-10L3W1PSU1U2U3URL3W2L3RPSP-20P-20P-20GED500P		Accept
SUR3E-10L3W1PSU1U2U3URL3W2L2RPSP-15P-15P-15GED500P		Accept
SUR3E-10L3W1PSU1U2U3URL3W2L1RPSP-10P-10P-10P-10GED500P		Accept

## Level 4:

In this level the player again must face 5 enemies but in this level all the enemies will be attacking all at a once and he dies if the enemy shoots or touches him and he will be winning this level only if he kills all the 5 enemies, then unlocks level 5



## Test Cases:

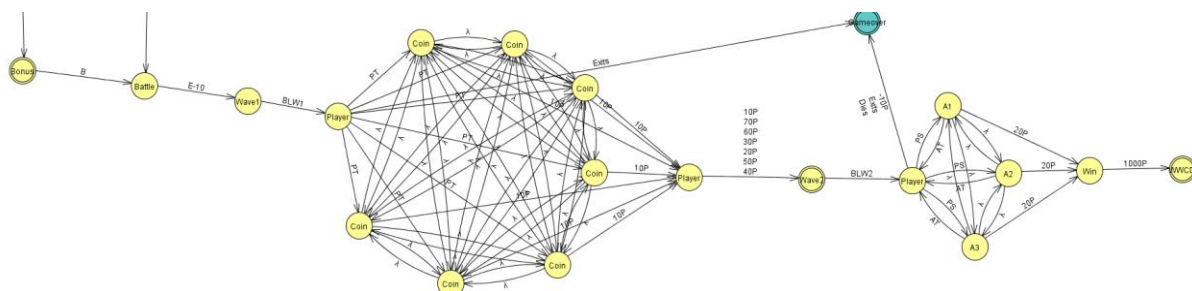
Table Text Size		
Input		
SUR4L4PSK=5700P		Accept
SUR4L4PSETDies		Accept

In this level the player had to face 3 giant enemies at a time in which he can hit the enemy in any order for suppose he can hit the enemy 1 a shot and he can go to 2<sup>nd</sup> enemy and shoot 2 shots and he will be qualified for the bonus level only if he kills all the giant enemies



### Bonus Level :

Player will get to collect coins in this level and for each coin he collects he will get 10P and in next wave he needs to destroy the asteroid and for each asteroid the player destroys he gets 20P and with that he wins 1000P and end of the game.





## Test Cases:

Table Text Size	
Input	
SURBE-10BLW1PT10P70P	Accept
SURBE-10BLW1PT10P70PBLW2PS20P1000P	Accept

After finishing the bonus level player gets a appreciation message that the game is completed successfully.