Centipede Game on DE1-SOC Board

CSEE E4840 – Embedded System – Spring 2019

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1.Introduction:

Centipede - with its colorful mushroom patch, tenacious centipedes, bouncing spiders, fleas and scorpions - was one of the earliest and most popular video arcade games. It was brought to life by Atari in 1981 and has remained relatively popular over the years. We want to reimplementation this game in more advance way and play the game on the DE1-SOC board. In this project, we manage to fulfill it on the DE1-SoC board by using both hardware and software.
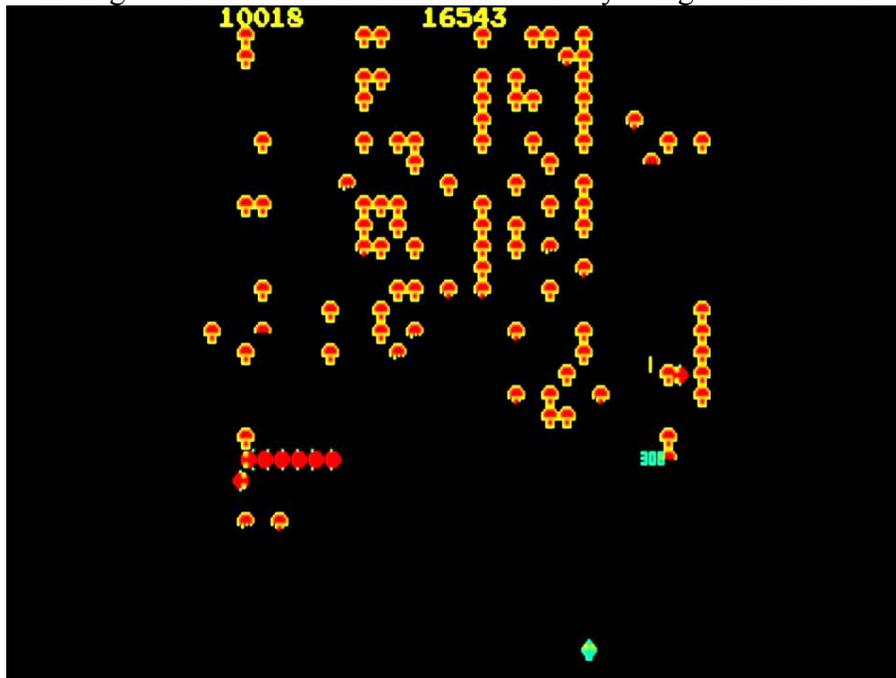

Figure1 – Original centipede game

2.Specification:

We will implement all the elements of centipede game as it showed in 1981. The key elements are:

1.Player: Game player that could move both horizontally and vertically.

2.Mushroom: eliminate it will increase game points. Mushrooms will also block character moves.

3.Scorpion: Enemy that move horizontally and turn the mushroom into poisoned mushroom.

4.Flea: Enemy that will drop Mushrooms as it moves from top to bottom.

5.Spider: move within a rectangular box with bouncing pattern.

6.Centipede: Enemy that moves from top to bottom with a long body. Mushrooms acts like roadblocks for Centipedes.

7.Weapons: Player could equip with different kinds of weapons which is dropped randomly to the playground.

4.Hardware:
- **Display game video through VGA on monitor**
- **Using keyboard driver or game console driver to play the game**
- **Using SRAM to do the load/store game**
- **Using sound driver and speakers as sound device**

5.Software:
- **Game logic implementation**
- **Game control implementation**
- **Sound effects**
- **Different game level implementation**
- **Game difficulty algorithm implementation**
- **Enemy AI implementation**

3. Milestones

Milestones1:
- Basic game logic design and software implementation

Milestones2:
- VGA display and FPGA interface for the game
- Different game frame refresh rate on VGA display
- Sound effect using sound driver

Milestones3:
- Keyboard and game console implementation for control on the FPGA and extra game features.