Project Name :- Space Impact

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Introduction :

The problem here is to design a game in which the gamer controls a spaceship. It is attacked by some alien creatures coming towards it. Both can fire missiles on each other. Spaceship, if hit by aliens will get destroyed or lose its health(game over). After reaching a particular score value , the player gets to the next level. The player can also select the level which he/she wants to play, from the start-screen method.

 Level 1:- The aliens go down straight. It's quite easy to destroy them, you can even skip an alien if it's hard to hit it.
 Level 2 :- The aliens are designed to sense you and follow you as you approach or flee from them. You have to hit each of them or die otherwise. You can't skip any alien.
 Level 3:- This time the aliens won't chase you, but beware!!! They will move sinusoidally and thus making it hard to hit them and dodging their bullets at the same time.
Level 4:- Finally the boss appears in this level,the hardest level,he has various deadly weapons to damage the spaceship

Outline of the Code:

We have used "htdp/universe" package for the simulation of the game.A list of lists is taken which consists of positions of our spaceship, it's bullets and aliens and their bullets. These lists are updated on every call of "on-tick",thus moving aliens(and bullets) and creating new aliens after a specific time interval. Using a function 'close-enough' it is decided whether a bullet hits another object(either our spaceship,alien or another bullet). Our bullets can only hit aliens or their bullets and not us. Same goes for alien's bullets. Aliens fire their bullets after a regular interval. Every time an alien is created a new item (alien's position) is added to the list. Similarly, when an alien is hit by a bullet we start a "crash-effect" simulation followed by the deletion of the alien. Again,in a similar fashion,bullets get added to the list (after a time interval for aliens and on left mouse click for the spaceship) and gets deleted when it hits the spaceship . Whenever a spaceship bullet hits an alien a global variable named "score" gets updated.
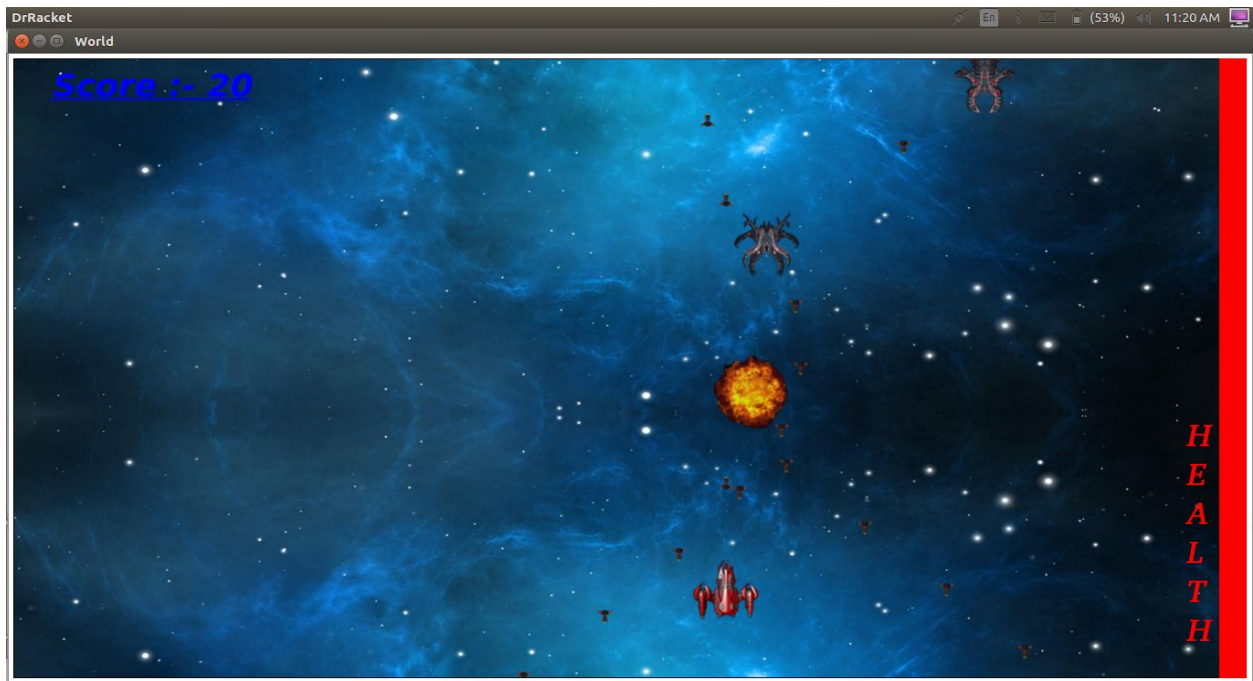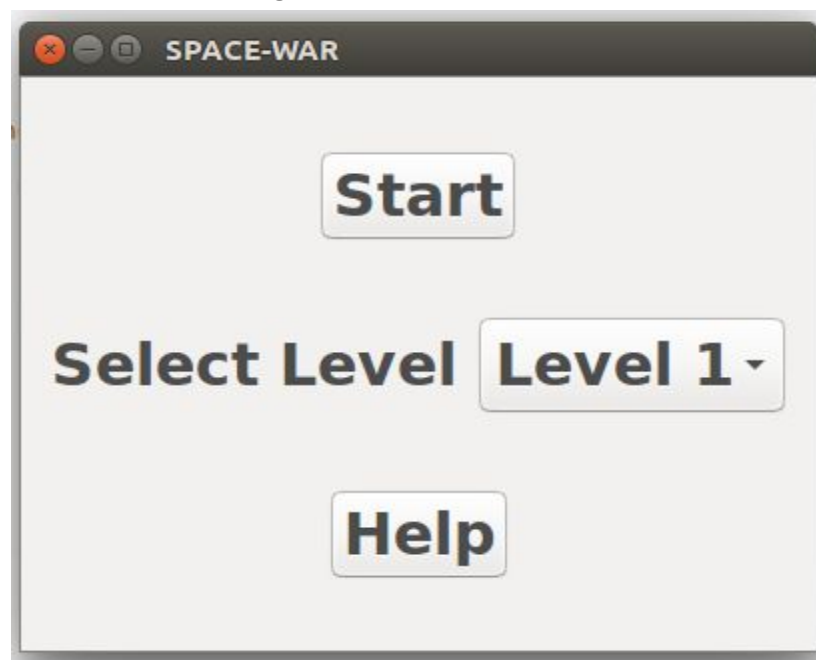
Figure 1: Gameplay

Packages Used : rsound package, "htdp/universe" package

On clicking Help button on Start Screen menu , instructions on how to control the spaceship appear.

Figure 2 : Menu

Inputs and Output:-

When you run the code it gives us a start option and a dropdown list showing various levels. One can start from the beginning or simply select any level he wants to play. After hitting the start button you can play the selected level.

Limitations and Bugs:

1. Controls cannot be reconfigured
2. Movement of aliens ,i.e. opening and closing of their 'mouth', does not stop on pausing the game.
3. If we hold any button other than the arrow keys, then our spaceship cannot fire bullets.
4. Level 1,2,3 are similar and the same functions handle their movements but in level 4, we had to define different functions .

Points of interest:

- Deletion of positions of aliens (enemies) and bullets when they go out frame (from top or bottom) from their corresponding lists
- **Background:** A continuous moving background is made by combining a photo with its vertically flipped counterpart and repeating the process till the game gets over.
- **Aliens:** The aliens are designed to behave a particular way in each level.
- Transition between levels leads to change of state variables, thus affecting the behaviour of aliens.
- We have used a simple list as the world-state which gets updated and creates the images.
- We have also added sound effects when certain event happens (like when a bullet is fired,
  alien crash,etc.)