

Istanbul Kemerburgaz University

Department of Computer Engineering

CE370 SOFTWARE ENGINEERING PROJECT

Space Wars Game

ANALYSIS REPORT

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1. Introduction

a. Purpose

Analysis report gives information about the domain and states the problems with existing system and new features of the new system firstly. Analysis report documents the requirements description. The requirements are the functionalities of the system. In the requirement description, functional and nonfunctional requirements are stated. Also, software system's models are given in the analysis report such as, object and class model as well as the user interface.

b. Background

The domain of this system cannot be limited since it is a game. There is a huge age range for this system of users. However, the main possible users of this system are the children. The game has lots of features of visual effects which attract children mostly and that's why children are willingness to play the game more likely. For the other users of the system, people are bored sometimes after their daily works and want to escape from those duties with playing games. They give their selves some time to have fun. All in all, children are most probably the main domain but that is not for all cases.

c. Motivation

i. Existing game

The existing game mainly destroying the enemies of the player while trying to keep the player's spaceship alive. When the player starts to play game, there are two main objects which are a block of enemy and the player's spaceship. In the game player controls the spaceship and tries to destroy the enemies by ship's laser gun. If player can hit the enemies, the closer one gets eliminated. Also, enemies fire to the player's spaceship and trying to hit the ship. Player begins the game with 3 lives. In the existing system, enemies move together. While moving together they fire together as well. The firing of enemy is very clear and so slow. That causes player to understand easily where can fire come from next, where it can go and where to escape from them. It makes game so easy and boring. Also, existing system has bricks in front of player's ship which cover the spaceship from enemies' fire and it is very hard and causes to take long time to wreck them all and that makes the game much easy again.

Here is the existing game:

http://www.oyunskor.com/oyna600.htm

ii. New Game

In the new game, player is mainly trying to destroy the enemies' spaceships while trying to keep the his/her ship alive. When the player starts to play game, there are two main block of objects which are enemy spaceship block and the player's spaceship. Enemies' ship number depends on the game difficulty level that user chose at the beginning of the game. In the game player controls the spaceship and tries to destroy the enemies separately with using the ship's laser gun. Also, enemies fire to the player's spaceship separately and trying to hit the ship. Player begins the game with 1 life. The new game has lots of improves compared to the existing one. In new game, there are two different difficulty level which are easy mode and hard mode. In easy mode, there are less enemy spaceships and enemies' beams just move vertically, in hard mode there are more enemy spaceships and the beams of enemies follows the position of the player's spaceship. Addition to the existing game, the bricks in front of the player are

removed to make game more attractive. Also, enemies are separated from each other to increase the fire density for player to escape. In the new game player earns coins as well as points by destroying enemies. At the end of each level which successfully passed, player can upgrade the spaceship with the coins earned. Player can upgrade the spaceship's attack damage, speed as well as the firing speed.

2. Functional Requirements

a. System Functionalities

1. Play Game

User begins the game with one life and tries to eliminate the enemy spaceships by shooting upwards. Enemies move horizontally, when they reach one side of the application window, they come one step closer to the user's spaceship. The spaceship of the player can move horizontally at the bottom of the application window. There are no boundaries for the user's spaceship, if the spaceship of user reaches left-most side and user continues to push the left button, the spaceship will appear in the right-most side of the window. User gets coins as well as points for

each destroyed enemy spaceship. Enemies shoot from laser gun to the ground to destroy the user's ship. If one of the beams hits the spaceship of player, game will be over.

i. Easy Mode

In the easy mode, the total number of the enemy spaceships less than the number in hard mode. Also, the direction of the enemies' beams is vertical, they will not change once they released from laser gun.

ii. Hard Mode

In the hard mode, the total number of enemy spaceships are more than the spaceship number in the easy mode. Also, beams released from enemies' laser guns follows the player's spaceship. To do so, while beams moving, the game check two times for the position of player's spaceship and determines beam's new direction if beam is not in the same vertical line with the player's ship.

2. Next Level

If all enemy spaceships are eliminated that means the current level has been successfully passed. Just before the next level, Player have opportunity to upgrade the spaceship. While level going up enemies' ships moving speed increases and it becomes hard to destroy the enemy. Also, the total number of the beams that enemies have will increase which makes game harder to be successful. To success player should upgrade the spaceship in 3 different way which are Attack damage level, beam speed and ship's speed.

3. Pause Game

User have the opportunity to pause the game during playing. Once player pushes the pause button, player either return the main menu without saving instant game or resume the instant game from where he/she paused.

4. End of the game

Once one of the beams released from enemies's hits the player's ship or any of enemies' ship crashes with player's, that cause the game to be over. Player have opportunity to submit his/her score to the High Scores Table if the score is higher than the current high scores with typing username. As default, 'Player' is the username. If player does not do submission for high score game will just display the game is over massage to the screen.

5. High Scores Table

In the high scores table menu, top 10 scores will be shown with their usernames.

6. Help

In the help menu, player can take a look at the controllers of the game and rules as well as the process of the game.

7. Settings

Player can enable or disable the sound from that menu.

8. Credits

User can reach the information of the contributor from that menu.

9. Exit Game

Once exit button pressed from main menu game window will be closed properly. However, if the player press the exit button during playing game, the score will not be stored.

b. System Users

i. Player

In the system, there is only one user which is the player. Player is only user who can changes game settings, views high scores which are recorded before, gets help, shows the game's credits, and mainly plays the game.

c. Specific Requirements

i. Use Case Diagram

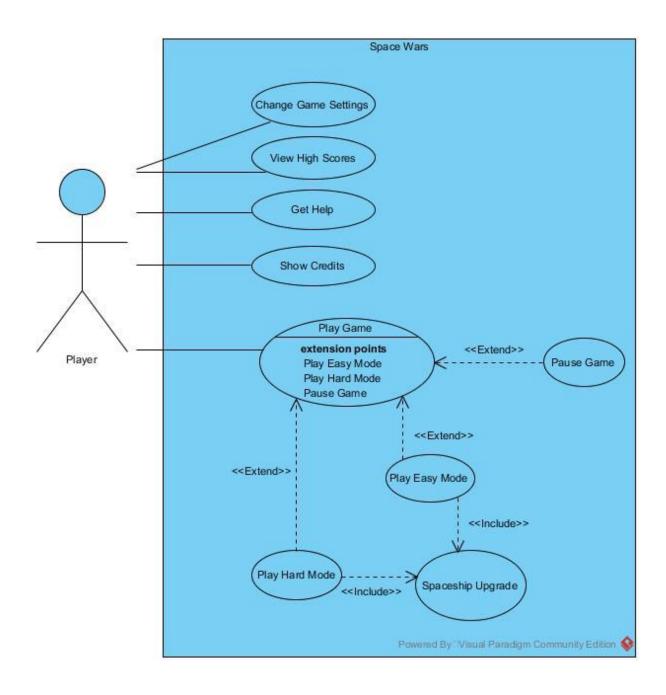


Figure 1 Use Case Diagram

ii. Use Case Priority List

Priority Rank	Description
1	High Priority
2	Medium Priority
3	Low Priority

Use Case ID	Use Case Name	Primary Actor	Priority
1	Get Help	Player	1
2	Play Game	Player	1
3	Play Hard Mode	Player	1
4	Play Easy Mode	Player	1
5	Spaceship Upgrade	Player	2
6	Pause Game	Player	2
7	Change Game Settings	Player	3
8	Show Credits	Player	3
9	View High Scores	Player	3

iii. Use Case Specifications

Requirement ID: 1	Requirement Type: FR	Use Case Name: Get Help	
Description: The player shall get help abou	t game controllers and proce	SS.	
Primary Actors: Player			
Rationale: Player should learn the game controllers, rules, and the process of the game. Otherwise, player will be stuck in game while playing.			
Fit Criteria: In the main menu there should	Fit Criteria: In the main menu there should be a submenu for Help.		
Customer Satisfaction: 5	Customer Dissatisfaction:	: 5	
History: New requirement		VOLERE	

Requirement ID: 2	Requirement Type: FR	Use Case Name: Play Game
Description: The player shall p	oress the play game button to b	e able to play the game.
Primary Actors: Player		
Rationale: To make the main action of this software system which is playing the game, player should reach the play game button.		
Fit Criteria: In the main menu there should be a button to play the game.		
Customer Satisfaction: 5	Customer Dissatisfaction: 5	
History: New requirement		VOLERE

Requirement ID: 3	Requirement Type: FR	Use Case Name: Play Hard Mode
Description: The player should	d be able to choose the game's	difficulty level as hard.
Primary Actors: Player		
Rationale: To play the game in hard mode, player should be reach the hard mode select button after clicking the play game button.		
Fit Criteria: There should be a button to select hard mode after player pushed the play game button.		
Customer Satisfaction: 5	Customer Dissatisfaction: 5	
History: New requirement		VOLERE

Requirement ID: 4	Requirement Type: FR	Use Case Name: Play Easy Mode
Description: The player show	uld be able to choose the game	e's difficulty level as easy.
Primary Actors: Player		
Rationale: To play the game in easy mode, player should be reach the easy mode select button after clicking the play game button.		
Fit Criteria: There should be a button to select easy mode after player pushed the play game button.		
Customer Satisfaction: 5	Customer Dissatisfaction: 5	5
History: New requirement		VOLERE

Requirement ID: 5	Requirement Type: FR	Use Case: Spaceship Upgrade	
Description: The player sh	ould be able to upgrade his/h	er spaceship.	
Rationale: Player's spaces levels.	Rationale: Player's spaceship should be upgradable to succeed against the enemy in next levels.		
Fit Criteria: At the end of the each level, player should be asked for upgrade.			
Customer Satisfaction: 5	Customer Dissatisfaction: 5		
History: New requirement		VOLERE	

Requirement ID: 6	Requirement Type: FR	Use Case: Pause Game
Description: The player shou	ıld be able to pause the gar	ne while playing.
Rationale: Player may want	to have a break during play	ing for some reasons.
Fit Criteria: There should be a pause button in the window or a key from keyboard should be assigned for pausing.		
Customer Satisfaction: 5 Customer Dissatisfaction: 5		n: 5
History: New requirement		VOLERE
		VOLEKE

Requirement ID: 7	Requirement Type: FR	Use Case: Change Game Settings
Description: The player sho	ould be able to change setting	gs of the game as he/she wants.
Rationale: Player may war	nt to disable or enable the sou	and of game.
Fit Criteria: There should be	be a settings submenu in the	main menu which gives the opportunity to
user to enable or disable the sound.		
Customer Satisfaction: 5	ction: 5 Customer Dissatisfaction: 5	
History: New requirement		VOLERE

Requirement ID: 8	Requirement Type: FR	Use Case: Show Credits	
Description: The player sho	ould be able to see the credit	s of the game	
Rationale: Player may war	nt to get information about the	e game's contributor.	
Fit Criteria: There should be about contributor of the gam	Fit Criteria: There should be a credits submenu in the main menu which lets user to get informed		
Customer Satisfaction: 5 Customer Dissatisfaction: 5			
Customer Satisfaction. 5	Customer Dissatisfaction.	J	
History: New requirement		VOLERE	

Requirement ID: 9	Requirement Type: FR	Use Case: View High Scores
Description: The player sh	ould be able to see his/her hi	gh scores.
Rationale: Player may war	nt to see his/her top scores th	at he/she made before.
Fit Criteria: There should be a high scores submenu in the main menu which makes user to view his/her past high scores.		
Customer Satisfaction: 5	5 Customer Dissatisfaction: 5	
History: New requirement		VOLERE

3. Nonfunctional Requirements

Requirement ID: 1	Requirement Type: NFR (Performance)	Performance		
Description: Response time shall be small.				
Rationale: Response time is very critical for gaming to make gaming experience proper.				
Fit Criteria: This requirement can be tested by ensuring that the game respond is enough to make game flowingly to play. Once shoot command given through keyboard, game shall react quick to make shooting as user wants.				
Customer Satisfaction: 5	Customer Dissatisfaction: 5			
History: New requirement		VOLERE		

Requirement ID: 2	Requirement Type: NFR (Usage)	Easy to use		
Description: The game should be easy to control.				
Rationale: Game's control should not be complex. If player can easily play the game, that effects user's willingness to play the game again.				
Fit Criteria: There should not be lots of different keys for controlling the game through keyboard. Also, if user can use the mouse it will be more easy to navigate.				
Customer Satisfaction: 5	Customer Dissatisfaction: 5			
History: New requirement		VOLERE		

Requirement ID: 3	Requirement Type: NFR (Extendibility)	Extendibility		
Description: The game should be easily expanded.				
Rationale: In order to add new features and functionalities to the game in the future if wanted, add-ons shall be easy to adapt to the system.				
Fit Criteria: The structure of the game should have lots of separated modules in order to make game more expandable.				
Customer Satisfaction: 5	Customer Dissatisfaction: 5			
History: New requirement		VOLERE		

4. System Models

a. Object and Class Model

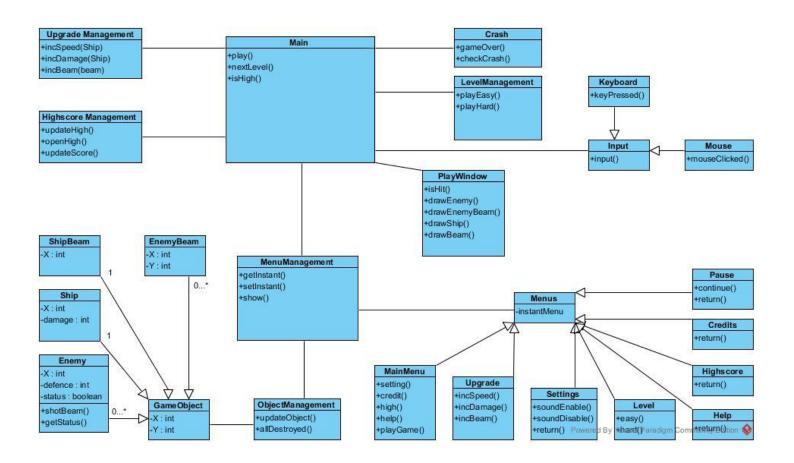


Figure 2 Class Model

5. Dynamic Models

a. State Diagram

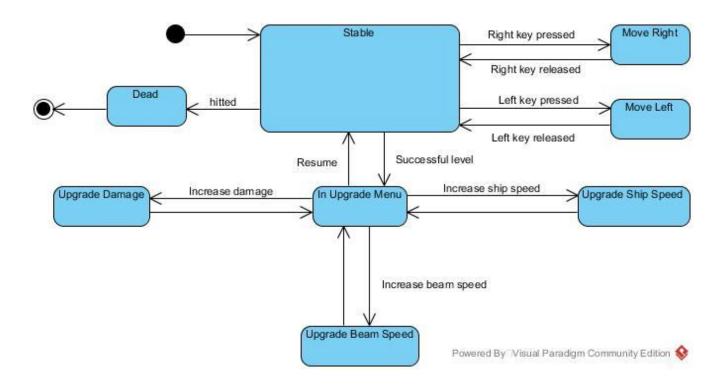


Figure 3 State Diagram

b. Activity Diagram

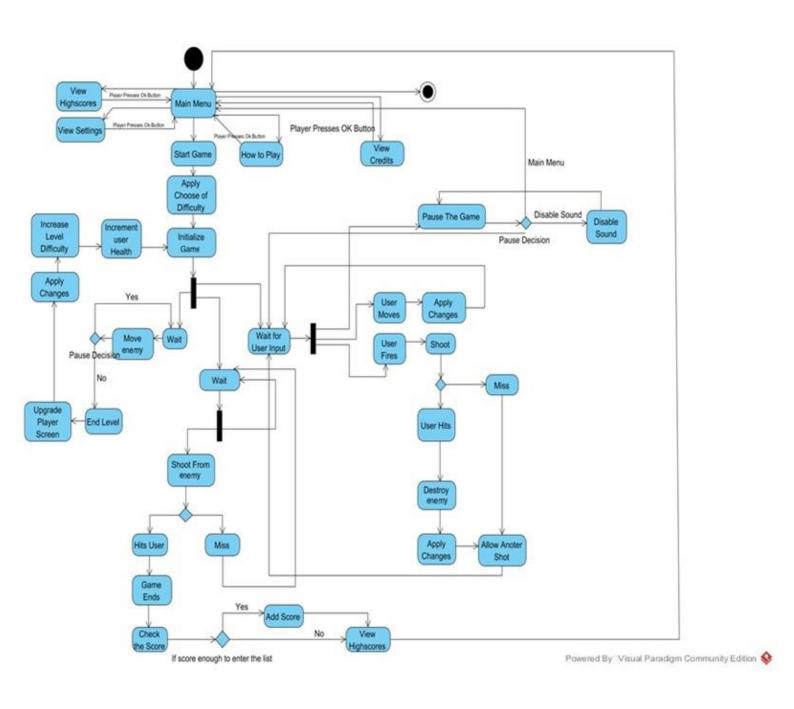


Figure 3 Activity Diagram

c. Sequence Diagram

Scenario 1: Help

- User chooses Help from Main Menu, to get information about game controllers and rules.
- Help is shown on the window
- User wants to return to main menu

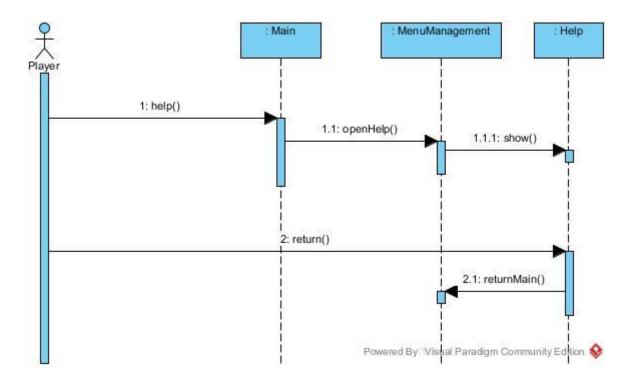


Figure 5 Sequence Diagram for scenario 1

Scenario 2: Change Settings

- Settings can be changed from the main menu or from the pause menu.
- Settings menu lets user to disable/enable the sound.
- Settings are updated as the user changed.
- User wants to return to main menu

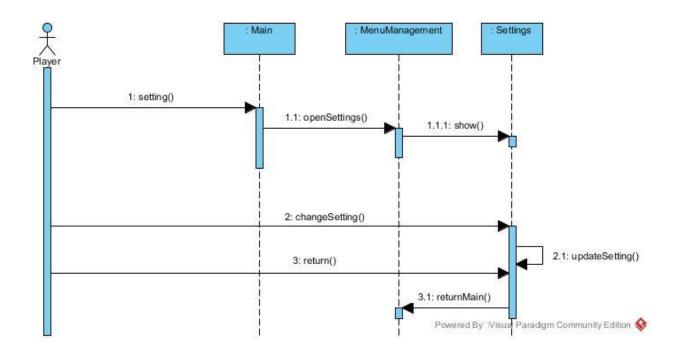


Figure 6 Sequence Diagram for scenario 2

Scenario 3: Upgrade User's Spaceship

-At the end of the successful level, the system gives two options.

Player can continue game without spending any coins or player can

upgrade the spaceship by spending earned coins.

-If coins are spent, system activates the remaining coin amount.

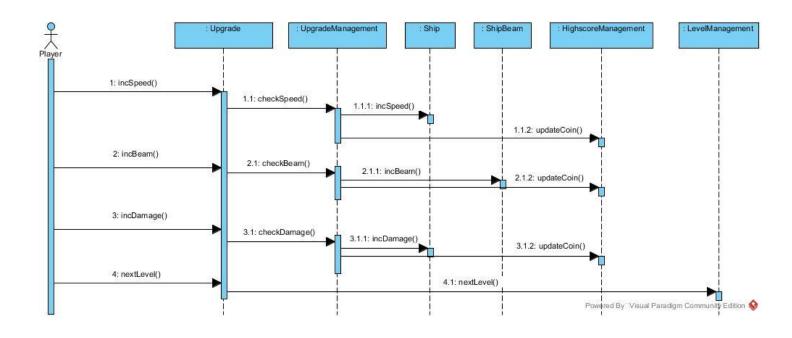


Figure 7 Sequence Diagram for scenario 3

Scenario 4: Choosing Game Difficulty

- The user selects the play game from the main menu.
- -The system asks user the game difficulty level either hard or easy.
- The game is loaded as user wanted difficulty.

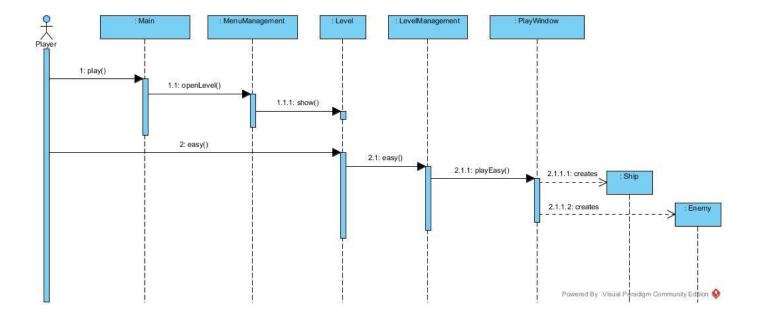


Figure 8 Sequence Diagram for scenario 4

Scenario 5: Shoot to an enemy

- User tries to kill the enemies by shooting.
- When the user succeeds, status of enemy is updated.
- User earns points.
- -When all of the enemies are killed, upgrade menu is displayed.

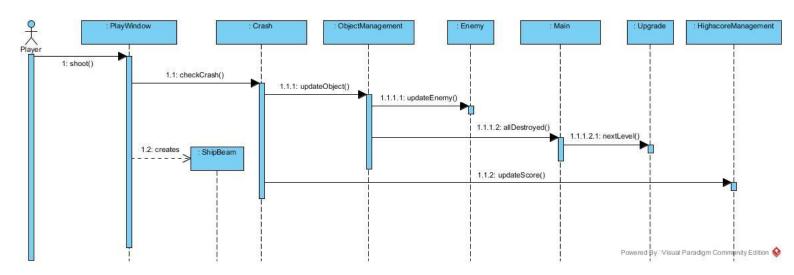


Figure 9 Sequence Diagram for scenario 5

6. User Interface

a. Navigational Path

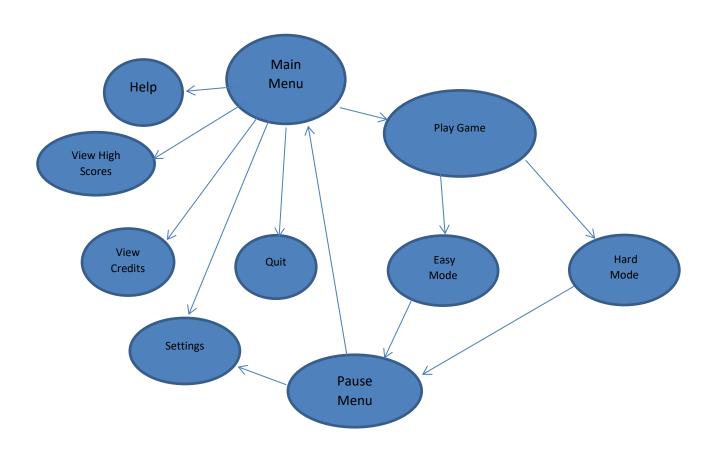


Figure 9 Navigational Path

b. Screen Mock-Ups

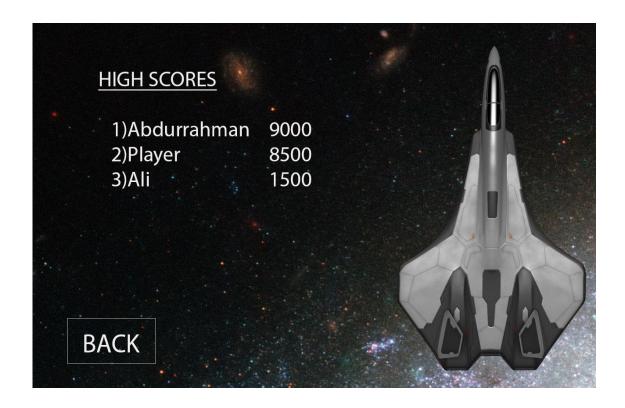
Mock-up Screen for Main Menu



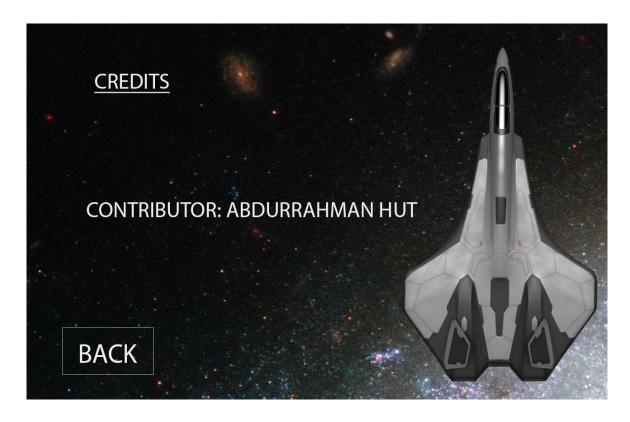
Mock-up Screen for Help Menu



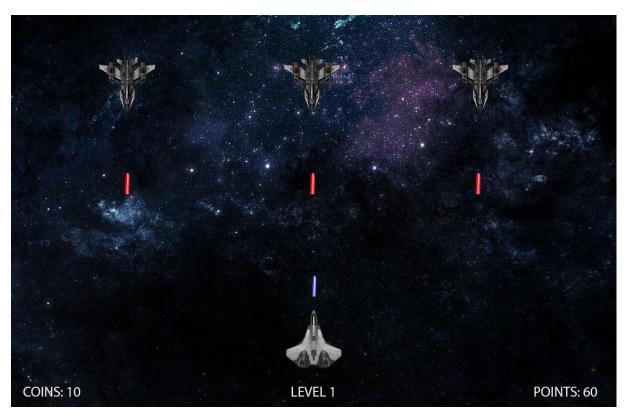
Mock-up Screen for High Scores Menu



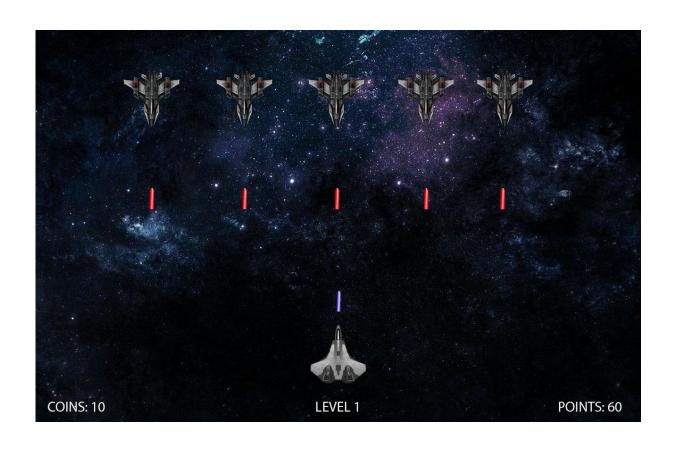
Mock-up Screen for Credits Menu



Mock-up Screen for Easy Mode



Mock-up Screen for Hard Mode



7. References

- http://www.gatherspace.com/static/use case example.html
- http://www.pngmart.com/image/tag/spaceship
- http://millionthvector.blogspot.com.tr/p/free-sprites 12.html