Space Arcade

Android course project

Main idea

- This game is an arcade. You have a spaceship which is going through the space endlessly. Your goal is to hit asteroids with your laser and avoid them.

Key features

- You can play endlessly
- Your score increases with each destroyed asteroid by 50 points and decreases by 1 point if you let asteroid go out of the screen
- You have 3 lives
- You can control your spaceship with virtual joystick or gamepad
- Sound effects and music in background
- We have about 50-60 frames per second in our game

Game parts

- Base structure of the project (Andrey Chernyshov)
- Input controllers (Alexey Katsman)
- Creating and optimizing drawing (Alexey Katsman)
- Collision detection (Alexey Katsman)
- Particle system (Alexey Katsman)
- Sound effects and music (Andrey Chernyshov)
- Styles of the whole game (Andrey Chernyshov)
- Animating dialogs and buttons (Andrey Chernyshov)

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Base structure of the project

What was done:

- Created base activity and fragments as base classes for the game
- Created some kind of game engine to control update and draw threads
- Proper entering the fullscreen mode was implemented
- Handling the back button depending on the current state

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Input controllers

What was done:

- Chosen a set of images for spaceship, bullets and so on
- Created input controllers for virtual joystick and gamepad
- Screen was split vertically for virtual joystick: left part is for movements and right one is for firing
- Implemented logic of player movements and bullet firing
- Implemented arrow buttons controller and virtual joystick and the latter one was chosen
- Perfect time between shots was chosen along with speed of spaceship and fired bullets
- Virtual joystick and gamepad support was put together in composite input controller

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Creating and optimizing drawing

What was done:

- Implemented two game views with and without surface and the first one was chosen as more efficient
- Draw thread was improved by removing timers and adding thread sleeping expecting about 50 fps
- Sprite logic added for all game objects
- FPS counter was added to the left bottom of the screen
- Asteroids were added as new game objects
- Implemented logic for asteroids - random generation of starting x position on top of the screen and angle
- Transformation matrix was used for all translations and rotations
- Parallax background was added
- Layers support was added and used for all game objects including background

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Collision detection

What was done:

- Tried rectangle and circle collision detection approaches, mix of both was chosen as optimal
- Asteroid and spaceship is treated as circle object while bullets are treated as rectangles
- Implemented logic for detecting collisions of any type
- Implemented quad-tree for detecting collisions so we could only do collision checks for objects which are close to each other
- Problem with duplicated collisions was solved inside quad-tree logic

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Particle system

What was done:

- Initializers for particles were implemented which give initial speed, direction and rotation for them
- Modifiers for particles were implemented for smooth fading out
- So called one shot particles (such as explodes) and emitting particles (such as spaceship smoke and asteroid trail) support was implemented

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Sound effects and music

What was done:

- Some basic sound effects were created for asteroid and spaceship explosion and bullet firing
- Created sound manager for working with sounds and music
- Sound effects were properly integrated to sound manager and are used on proper game events
- Music for background was added
- Ability for enabling and disabling sound effects and music using buttons in main menu and pause dialog was implemented

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Styles of the whole game

What was done:

- Custom font in retro style was added and applied throughout the game
- Background for main menu was added
- Buttons with text were replaced with image buttons such as pause, resume, restart, exit, sound on/off, music on/off and implemented beautiful states for them
- Score on the left side and pause button on the right side were separated from the game area
- The score and lives counter were implemented
- Beautiful dialogs were added (pause, game over and exit)

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Animating dialogs and buttons

What was done:

- Spaceship animation using left and right lights was implemented
- Beautiful dialog animation through the top of the screen was added
- Proper buttons handling was implemented in respect that some time is needed for dialog to go away back through the top of the screen
- Added pulsating animation for start button in main menu
- Added animation for game title and subtitle in main menu

Conclusion (some screenshots)

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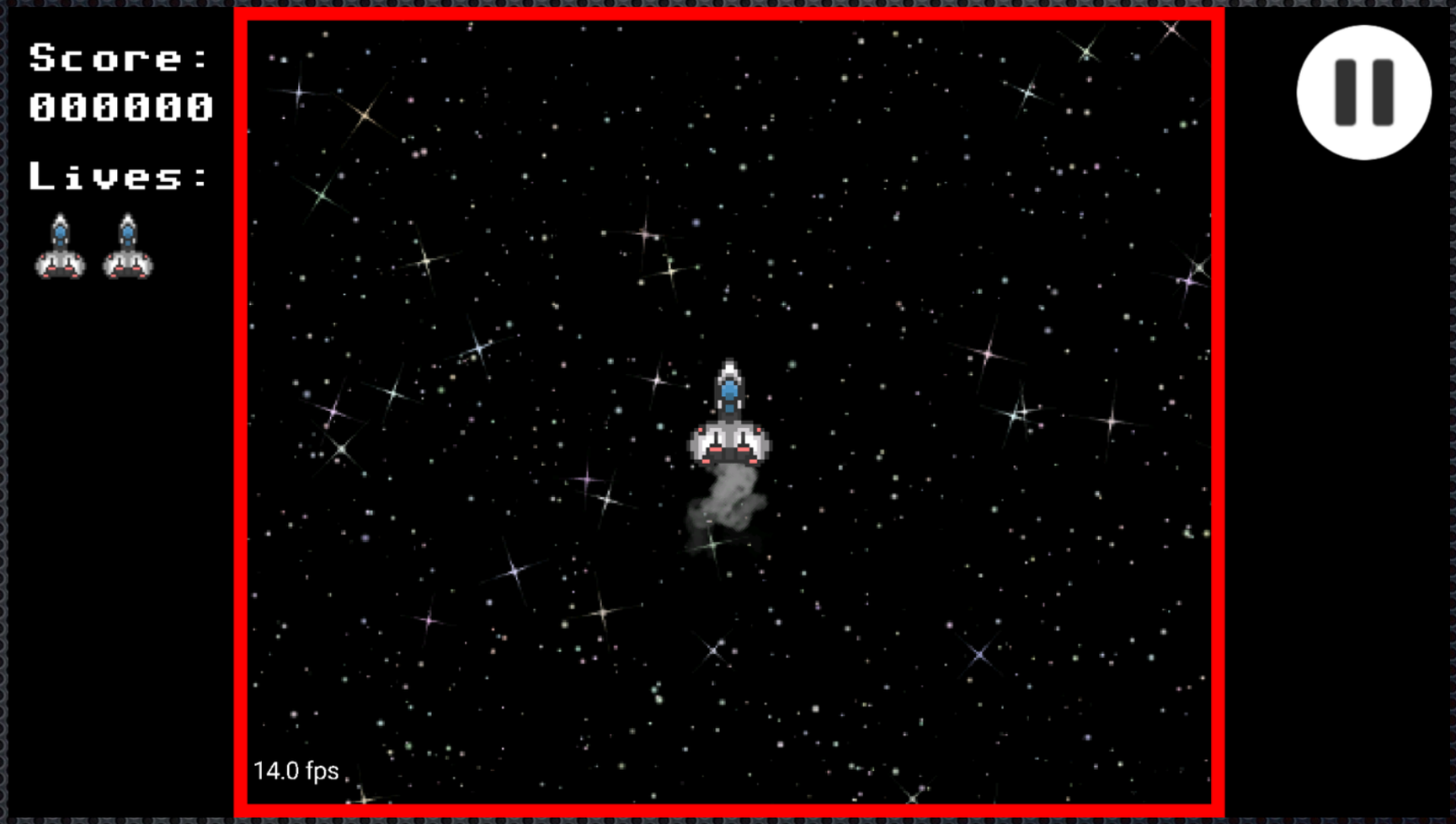

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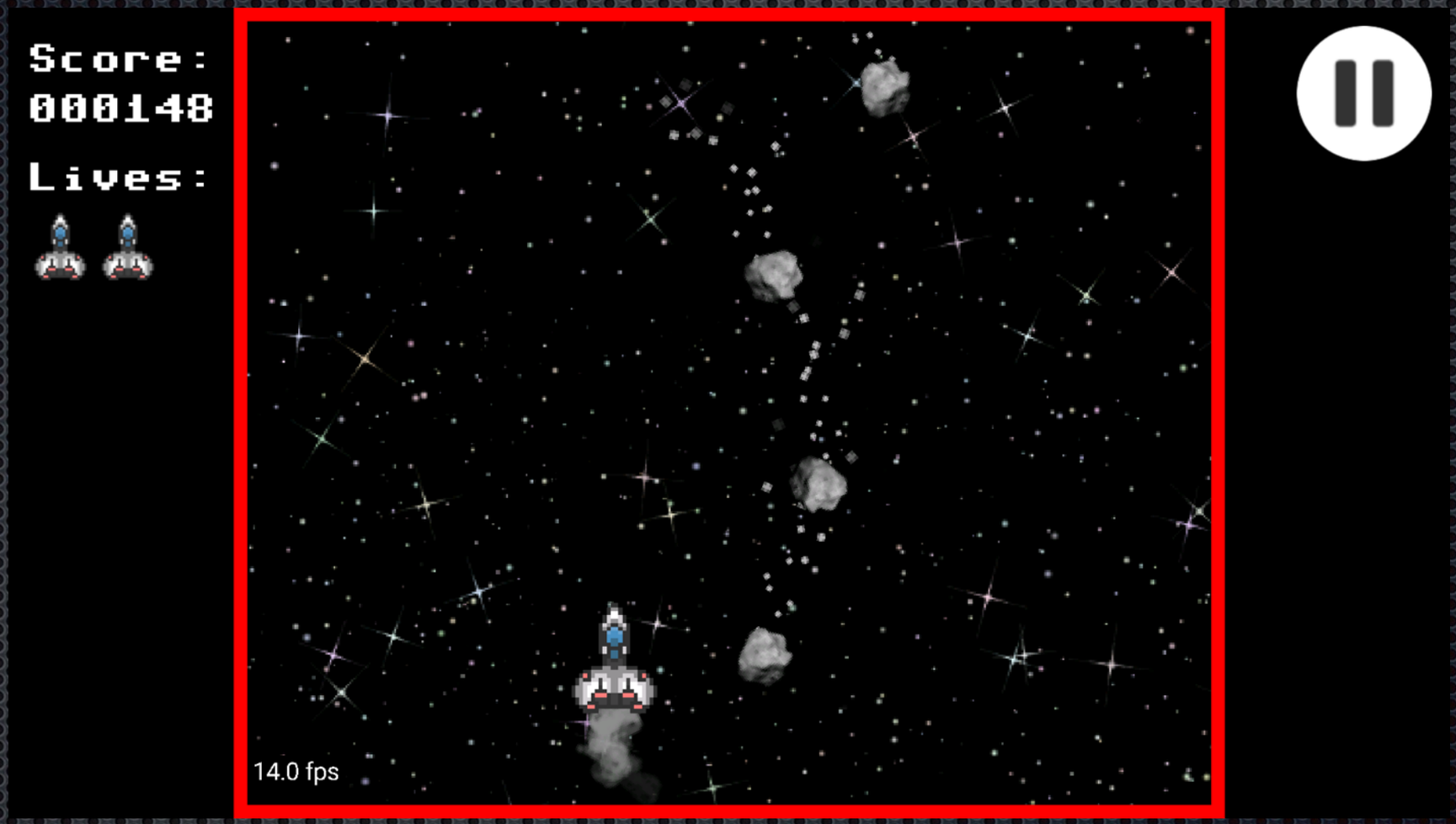

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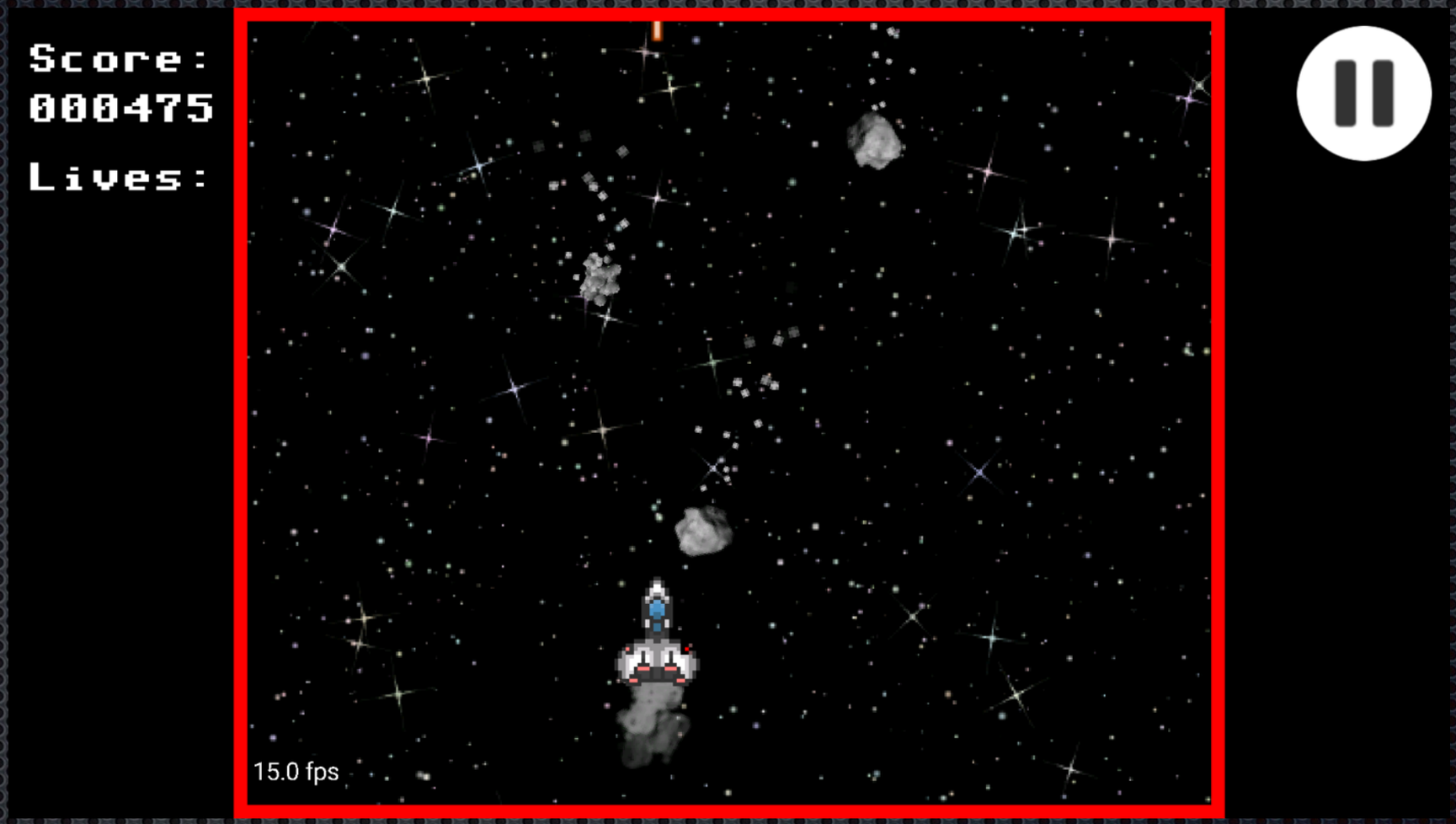

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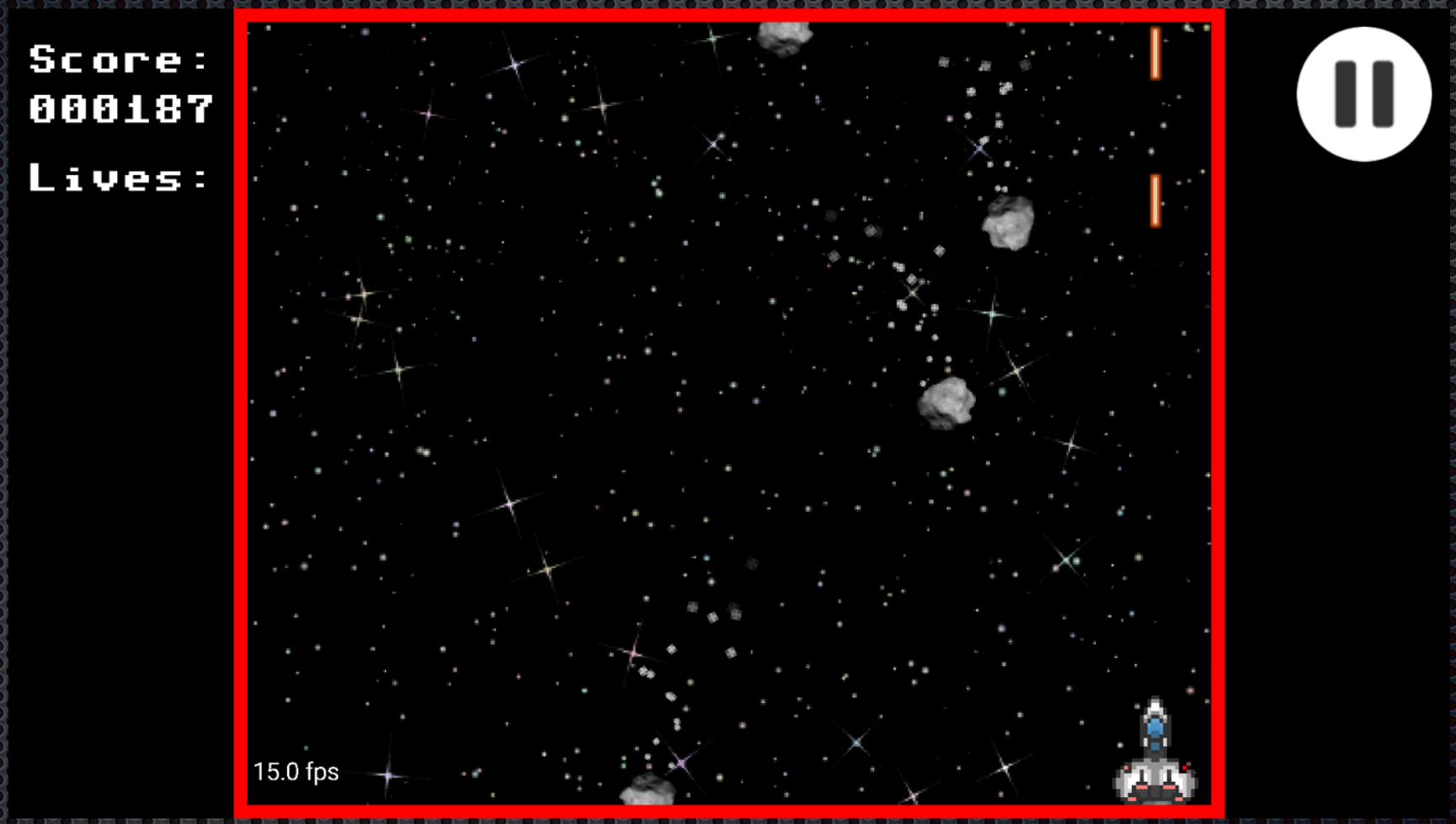

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Thank you for your attention

Source code:

https://github.com/alexkats/AndroidCourseProject

Any questions?

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