CS5041 Interactive Hardware And Software: Practical 1
Micro:Bit And Processing
Game Guide

170004680

University of St. Andrews

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Contents

A   Game Summary

The player(s) are 'Space Junkers' - low-earth orbit garbage collectors whose job is to recover valuable rare-earth resources from orbit. Set in the future, such resources are scarce and must be recovered from the debris of the millions of satellites collecting as cosmic junk around the planet. However, this job is perilous! Due to a series of gravitational events (between the Earth, satellites, and moon), there are now plenty of mini- and macro-sized asteroids collected in orbit around the planet. Space Junkers must, therefore, be skilled pilots capable of dodging the asteroid field to recover the precious resources.

B   Gameplay

B.1   Objectives

1+ player(s) compete to maximise their score by collecting space junk whilst avoiding asteroids that will deplete their health, eventually leading to elimination. This game combines a survival mode mechanic with competitive head-to-head. The player with the highest score wins, which is not necessarily the player that survives the longest.

B.2   Progression

The game progresses over time, with the player(s) surviving as long as possible whilst collecting junk to gain score. The game is over when all players have been eliminated. The difficulty of the game increases as the game progresses; the more score the player(s) gain, the faster spawned asteroids and space junk will become (i.e., asteroids will be harder to dodge and space junk will be more difficult to collect).

B.3   Graphical User Interface

There are three main phases (represented as screens) the player encounters: the title screen, the game screen, and the game over screen (see Figure 1, Figure 2, and Figure 3 respectively).

Initially, the game begins at the title screen. The title screen provides the game name, instructions to add players to the game, a list of currently connected players, and game controls. Next, the player(s) encounters the game screen, where the player interacts with the game to survive an onslaught of asteroids and collect space junk. Once all player(s) have been eliminated, the game over screen is presented. This screen displays the fact that the game is over, the final scores of all the players, the game winner when there is multiple players, and instructions to return to the title screen.
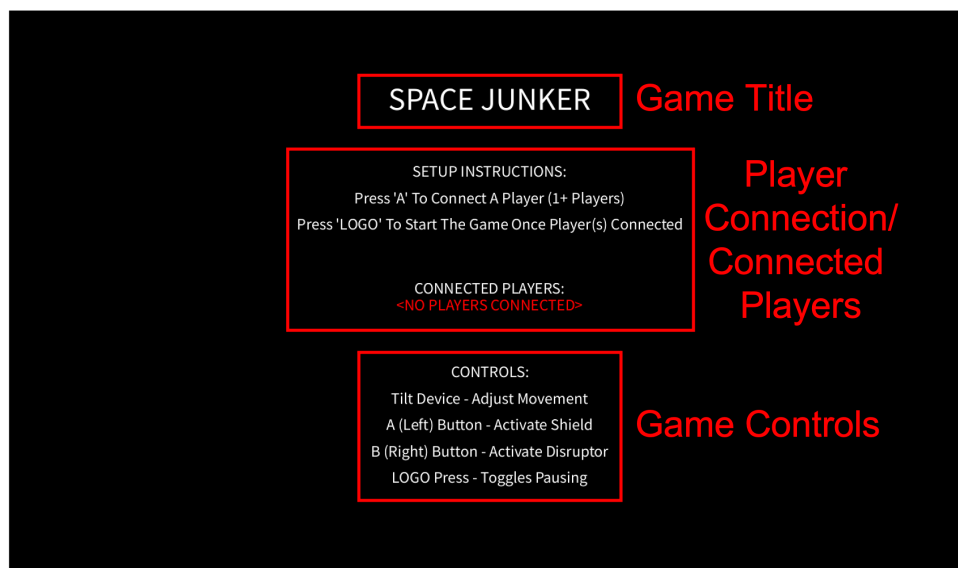
Figure 1: Annotated title screen.
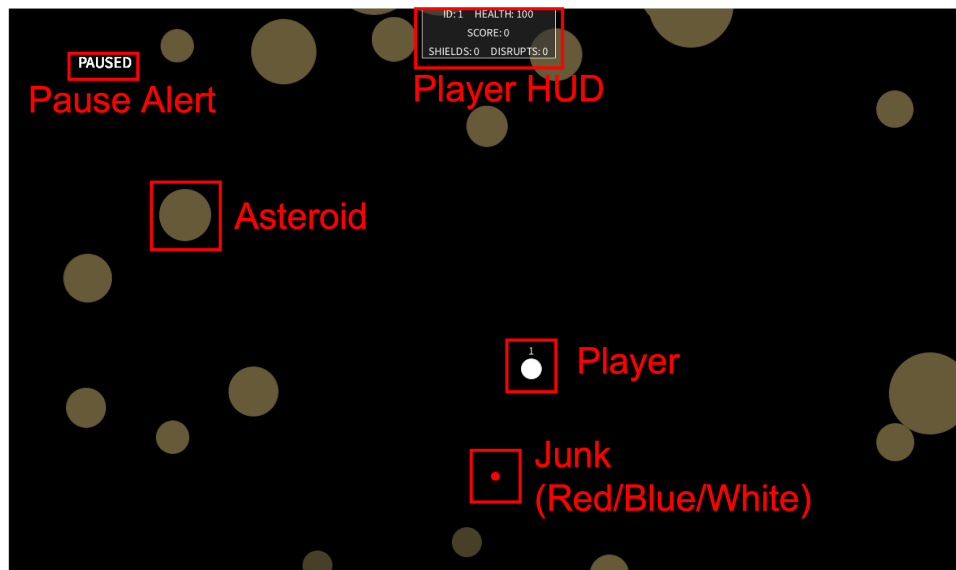
Figure 2: Annotated game screen.

Figure 3: Annotated game over screen.

B.4 Game Objects And Mechanics

The following game objects comprise the game: players, space junk, and asteroids (see Figure 4). Though there are not many game objects, the game has a series of mechanics defining interactions between them, which enriches the gameplay experience.

Figure 4: Figure showing the appearances of the entities comprising the game.
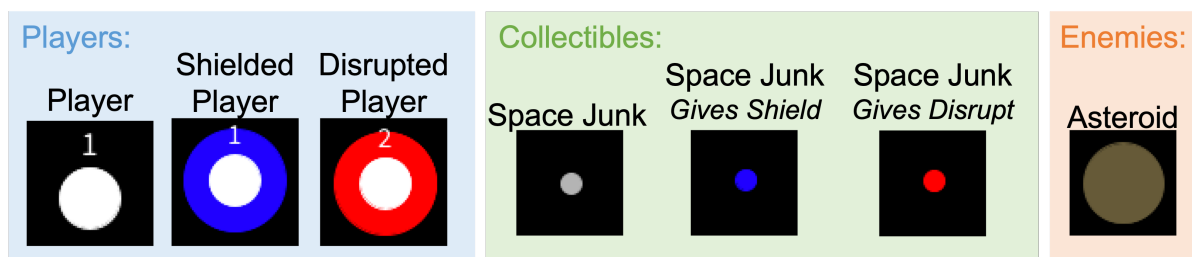
B.4.1 Players

Each player is controlled by a Micro:Bit. There may be 1 or more players in the game. Each player has a maximum health of 100. Health is depleted by hitting asteroids (players can survive roughly 4 seconds of impact) and replenished by collecting space junk (5 health points per junk). Each player also gains score for collecting space junk (1 point per junk collected).

Each player also has access to two abilities: shielding and disrupting. A player can possess at most 3 of each of these abilities at a time. Activating a shield grants the player invulnerability for 3 seconds; they take no damage from meteor impacts and cannot be disrupted by opposition players. Shielded players are represented with a blue outer ring. Activating a disrupt creates an area of effect (visible as expanding red circles). Any asteroids in this area of effect are repelled from the player. Any opposition players in this area of effect become disrupted; they are forced to be stationary for 3 seconds and cannot activate any abilities. Disrupted players are represented with a red outer ring.

B.4.2 Space Junk

Space junk spawns at a random location in the play area (i.e., screen). Spawned junk has a 50% chance of being stationary and is otherwise mobile (with random velocity). There are three versions of space junk: regular (silver appearance), junk that grants a shield (blue appearance), and junk that grants a disrupt (red appearance). The two latter types of space junk grant a single use of the abilities they represent to the player that collects them. The regular space junk has the greatest probability of spawning, and the other two forms have an equal probability of spawning. Note that mobile space junk will move faster the more score the players attain, increasing the difficulty of the game.

B.4.3 Asteroids

The game initially begins with 20 asteroids for the players to dodge. These asteroids have a random size, direction, and speed. As the game progresses and the players attain score, the speed of these asteroids increases to challenge the player(s). Asteroids are despawned after several hits with the screen boundaries and replaced. This makes it difficult for the player to simply track where asteroids will congregate based on their current trajectories. Furthering this, asteroids bounce off each other (and the screen boundaries), increasing the unpredictability of their motion. Also, asteroids have a small chance of splitting into two asteroids of smaller size, increasing the number of asteroids the player(s) must dodge.

B.5 Controls

The following controls allow the player to interact with the game. These controls are also summarised at the title screen.

- *Title Screen:* Pressing the 'A' button on one of the Micro:Bits will add said Micro:Bit as a player (controller) in the game.

- *Title Screen:* When all desired players have joined, pressing the capacitive 'Logo' on any of the connected Micro:Bits will begin the game.

- *Game:* Tilting the Micro:Bit adjusts the position and speed of the player controlled by said Micro:Bit. The greater the degree of tilt, the faster the player moves. For example, tilting the Micro:Bit forward and to the left will move the player up (i.e., forward) and to the left on the screen.

- *Game:* Pressing the 'A' button on the Micro:Bit will activate a shield, if the player has any available.

- *Game:* Pressing the 'B' button on the Micro:Bit will activate a disrupt, if the player has any available.

- *Game:* Pressing the capacitive 'Logo' on any of the connected Micro:Bits toggles pausing of the game.

- *Game Over:* Pressing the capacitive 'Logo' or either of the 'A' and 'B' buttons on any of the connected Micro:Bits will return the game to the title screen and disconnect all players so a new game can be started.