Free the Bob - Game Manual

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Contents

I. System Manual

I.1 As-built System Documentation

Notes:

1. This section of the document is intended for personnel looking to maintain the project, or personnel interested in understanding the high-level workings of the project. It aims to inform said personnel on the features of the game, so that the subsequent reading of the technical design document becomes easier.
2. Unless you are a user interested in learning about the high-level details of the implementation of the game, skip this section, and instead refer to *Section II.1 Tutorials* for an walkthrough of the game's features.

I.1.1 Randomly Generated World

The world of *Free the Bob* consists of randomly-generated terrain. Each world is created from a world seed, from which objects are procedurally generated and terrain geometry is randomly created.

To the player’s eyes, the world consists of an infinite set of rows, each populated with a never-ending line. This line is simply a composition of elementary functions. In other words, it is a piece-wise function which extends infinitely. The piece-wise function is procedurally generated as the player moves along the world.

I.1.2 Character Movement

To move around the world, two directional buttons allow the player to move either left or right. The player walks at a constant speed from, no matter the elevation of the terrain. To move from one layer to the next, the user must swipe the screen either up or down, effectively changing the player's level of verticality in the world.

Further, the user can also initiate player movement by pressing on a clickable object such as a tree or a box. When tapped, the player will approach the object until he collides with it.

Upon intersection with said object, the player will interact with it. For instance, if the player touches a tree, and is equipped with a melee weapon, he player will start to chop the tree. If the object he collides with is a box, he will open it. In either case, items will fly out of these objects which the player can collect by clicking on them.

I.1.3 Survival Guide

The player is equipped with the Survival Guide. The guide consists of entries, from which the player learns how to perform survival tasks, such as the creation of firearms. Despite these aids, the player is not informed about every resource in the game. For this reason, the player must put to the test his knowledge of chemistry.

The Survival Guide is accessed from the Backpack menu. It displays a list of entries, each of which have a description to inform the player about myriad survival tips.

In an entry named "How to Escape" of the Survival Guide, the player can learn about item creation, and understand that, in order to escape the forest, Bob must build a teleporter. This device can be crafted using a fixed list of chemicals and resources. With this device, Bob will be reach the end of the game and put an end to the dementia he has been pulled into.

I.1.4 Profiles

The player's save data will be stored in *profiles*. A profile is a Java object which contains all pertinent information about the game's state. On game quit, the profile is parsed into a JSON file and saved on the Android device's hard drive. Furthermore, the player can load his profiles from the world select screen.

I.1.5 Zombies

In the world, the player will find zombies randomly scattered throughout the forest. These zombies are spawned in random locations. Once the player kills a zombie, the same zombie will never be found in the same location again. The zombie has one of two attacks. First, he can charge towards the player. If he gets close enough to the player, he will deal damage to him. After that, the zombie will withdraw back to his original position. Secondly, a zombie can send an earthquake towards the player. The earthquake slowly moves towards the player once it

is created. The player can dodge it by jumping over it. If he gets hit by the earthquake, he loses half his health points. The zombies are not player-controlled, but rather controlled by the use artificial-intelligence.

Zombies have the following stats:

Health: 100 Charge Damage: 50 Earthquake Damage: 25

The earthquake deals less damage than the charge, as the zombie usually has a higher chance of shooting earthquakes. In fact, every time the zombie sends an earthquake, he has a 50% chance of sending one again.

I.1.6 Combat

The zombies introduce a new feature: the combat mechanic. When the player comes into contact with a flesh-eating enemy, the game transitions to combat mode. In this state, the player must fight the zombie in order to defeat him. If the player successfully kills the zombie, he has a 100% chance of being rewarded with iron, and the player's health regenerates completely. If the player dies, he loses all of his unsaved progress. He dies when he is hit twice by a zombie. When dead, a small overlay comes onto the screen which says "Game Over". As this is a simple text overlay, it's visual representation is omitted from this document and the technical design document.

The player starts with *100* health when he fights a zombie. This makes it so that the player is killed when hit twice by a zombie's charge move, or four times by his earthquake attack.

The player is always a fixed distance from the zombie. Only when the zombie approaches to melee the player does the distance between the zombie and the player change.

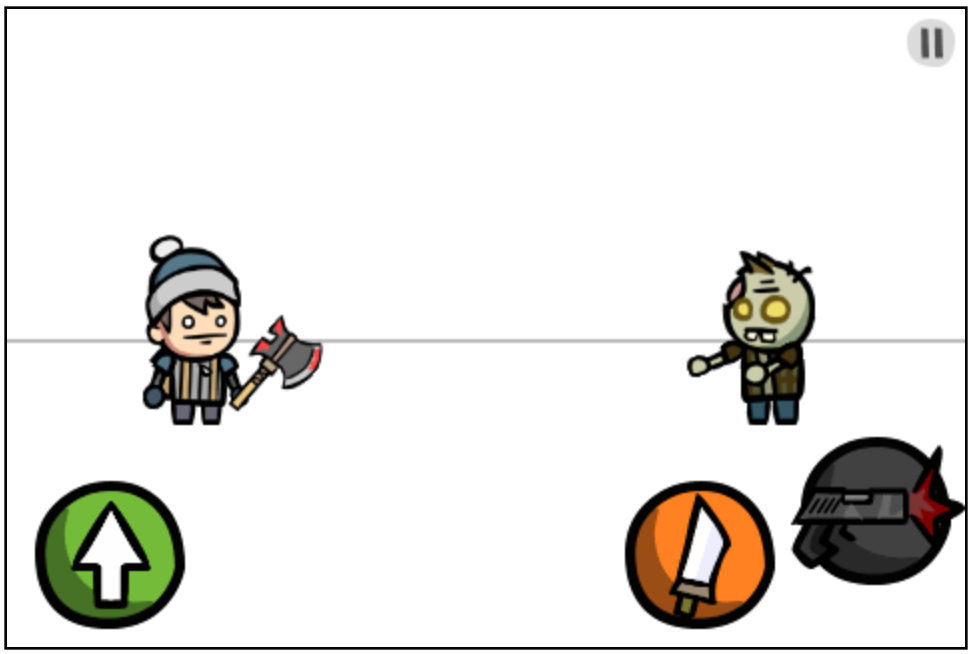

Figure 1 : Player in combat with a zombie

I.1.7 Scavenging

Along his journey, the player will need to scavenge natural resources. Often, these resources take the form of chemical compounds or elements. Resources can be collected from the following objects:

Trees

When armed with an axe, the player can chop down a tree, from which items are dropped. To chop a tree, the player must have a melee weapon equipped. Then, he can press a tree in order to walk towards it and destroy it.

Boxes

The world contains randomly-placed boxes. Right when the player interacts with the box, it is opened, the player receives a random set of items.

The player interacts with these objects by pressing on them. However, they have to be on the same row as the player for the player to be able to interact with said objects.

I.1.8 Items

The resources collected in *Free the Bob* are divided into two types: weapon items and craftable items.

Craftable items can be combined to create different items. Some craftables, such as bullets, cannot be mixed to form different resources. Instead, they are consumed by the player when the player performs the act of firing a gun. Other types of craftable items such as wood are scavenged from the world. They have no worth in and of themselves, but are rather useful in crafting, where they can be used to form other, more important items.

I.1.8.1 Craftable Items

Collected In the World

- Wood: Collected by chopping down a tree (100% chance) or inside a box (40% chance).
- Iron: Dropped by a zombie (100% chance).
- Water: Collected in boxes (60% chance).
- Charcoal: Found in boxes (50% chance).
- Saltpeter (Potassium nitrate [KNO_3]): Found in boxes (20% chance).
- Sulfur (S): Collected in boxes (40% chance).

Crafted Using Other Items

- Gunpowder: Used to create bullets. Created in a batch of 12. (12 saltpeter + 8 charcoal + 6 sulfur + 4 water)
- Bullet: Needed to fire a ranged weapon. The amount of bullets in the inventory is decremented by one every time a shot is fired in the midst of combat. (2 Iron + 4 Gunpowder)
- Teleporter: Teleports Bob out of the game. When crafted, an animation shows Bob entering the teleportation device and winning the game. The user is then brought back to the main menu, where his winning profile remains. If this profile is loaded again, the player will be dropped at the last location he resided before building the teleporter. The player then earns a teleporter item in his inventory. Each of these items represents a token

of victory. (40 Sulfur + 30 Iron + 40 Saltpeter + 50 Wood)

I.1.8.2 Weapon Items

- Rifle: Created using *15 Wood* and *10 Iron*.
- Axe: Crafted using *10 Wood* and *5 Iron.*

I.1.9 Transparently-Tinted GameObjects

GameObjects which are not in the same row as the player are tinted transparent gray. This allows the user to know that the objects in different rows from the player are irrelevant to him. That is, the user may neither press the *GameObjects* nor interact with them.

I.1.10 Weapons

Weapons in Free the Bob are categorized as either melee or ranged weapons. The player can only carry one weapon of each type at a time. A weapon is equipped automatically by the player once he crafts it.

Melee Weapons

Melee weapons allow the user to chop down trees and attack zombies from a close range. They are used when the player taps a tree, or when the melee button is pressed on the bottom-right of the screen whilst in combat mode.

Axe: An axe which is crafted using wood and iron. *Damage: 40*

Ranged weapons can only be used during combat to shoot the zombies from a distance. They operate on bullets, which can be crafted using the iron dropped from killing a zombie. Every time a bullet is fired, the amount of bullets in the player's inventory is decremented by one. A weapon is operated using the red button mapped to the bottom-right of the screen in the midst of a fight. If the player does not have bullets, he cannot fire a ranged weapon.

Rifle: A high-damage iron rifle. *Damage: 70*

I.1.11 Android Compatibility

The game will run on Android devices. All user interfaces and controls will be designed with a touch screen in mind, allowing for a larger potential user base, and a lower barrier of entry for users.

I.1.12 LibGDX Framework

The application is built off of the *LibGDX* framework, which allows the game to utilize the graphical capabilities of the *OpenGL ES* library. The framework also uses scene2d, a 2d scene graph which allows the creation of graphical user interfaces using pre-defined classes inside *LibGDX*. Its functionality closely resembles that of Java's Swing library.

I.1.13 Multiple Screen Size Support

The game will be able to scale to any screen resolution with little-to-no loss in quality. In fact, all graphical assets will appear to scale correctly no matter the Android device it is tested on. The scaling of the game's graphics is done using a technique called *letterboxing*. In fact, the game and its graphics all target a base resolution. In our case, we chose a target resolution of 480x320. This is a common base-line resolution. All cameras in the game are fit to display this resolution. Then, when a device's screen resolution is larger than this base resolution, the smaller dimension is scaled up to fit the target's dimension. Consequently, the larger the aspect ratio of the device, the more of the game's horizontal space is viewable.

I.1.14 Crisp Graphics

The game will contain three different image sizes. In fact, all graphical assets will have scales denoted by the *@1x*, *@2x*, and *@4x* extensions. Depending on the size of the Android device, one of these image sizes will be chosen. For instance, if 960x640 screen size is used, the game will select the *@2x* images as the screen size is twice as big as the base-line resolution of the game. As such, graphics will appear crisp on most Android devices, no matter the screen size.

I.1.15 Polished Animations

The game will feature images drawn with Adobe Flash. Together with the Spine animation engine, all assets in the world will be animated and hand-drawn. The Spine engine uses the concept of skeletons. A skeleton represents an entity and a group of images and animations. The skeleton's data is read from a JSON file, and *LibGDX* uses this information with the *Spine Runtime*. Internally, when an entity like the player is rendered, *LibGDX* extracts the PNGs exported from Flash and animates them around in the world. Further, the player's image is split up into several body parts. Inside the Spine program, the images can be manipulated to create a walking animation. Then, *LibGDX* is able to parse this information and display moving images inside the game. Using this technique, the character and the zombies will animate as they move across the world, allowing for a greater degree of polish.

I.1.16 Tutorial

When the player is greeted into the video game world of *Survivor*, he has the option to access the tutorials placed as entries in the survival guide. They introduce the player to the game's mechanics through a written explanation in the survival guide which describes how to move around the world, jump across layers, and fight zombies.

I.1.17 PC Compatibility

For debugging and presentational purposes, the game will be able to run on a PC. This will allow for easy deploying without having to go through an Android device every time the code is updated.

I.2 System Requirements

Free the Bob is compatible with Android devices running Android version 2.3.4 or higher. It requires a minimum of 10MB to be installed, but 12MB is recommended since the player must save profiles to the device's hard drive. The requirements are summarized below.

Recommended requirements:

- Android version 2.3.4 and above

- Minimum 10MB hard drive space (12MB recommended)

I.3 Installation Instructions

There are two methods which can be used to install the application. First, given the game's APK file, the APK can be transferred to one's Android device and installed there. One of the ways to do this is through the cloud software Dropbox. Conversely, given the Eclipse workspace containing the project's source code, one can build and run the game directly to their Android device.

I.3.1 Installing APK With Dropbox

1. Go to *www.dropbox.com* and create a new account if you do not already have one
2. Insert the given source code CD into your PC
3. Inside the directory for the CD, locate the *survivor-android.apk* file from the APK/ folder.
4. Sign in to your Dropbox account, and upload the *survivor-android.apk* file
5. Install the Dropbox application on your Android phone through the *Google Play Store*
6. Make sure your development options are correctly set so that the phone can install applications that are not from the *Google Play Store*. To do this, go on your phone, navigate to either Settings > Applications OR Settings > Security > Device Administration depending on the version of your phone's operating system, and make sure that the box indicating "Unknown Sources" is checked.
7. Open the Dropbox application on your phone and use your account to login
8. Navigate to the folder where you uploaded the APK in step 4
9. Press on the APK file to download it

10. When a dialog pops up, press "Install"
11. To launch the game, go to the list of applications on your phone, and tap the app named *Free the Bob.*
12. Play the game

I.3.2 Installing through Project Source Code

1. Ensure that you have the JDK installed on your personal computer. If you do not already have it installed, search for "JDK download" on your favourite search engine, or navigate to the following website:
   http://www.oracle.com/technetwork/java/javase/downloads/index.html
2. Install the Android Development Tools (ADT) Bundle by navigating to the website *https://developer.android.com/sdk/index.html#ExistingIDE*. If the link is unavailable, make a Google search for "ADT Bundle", and the site should be the first or second search result.
3. Once the ADT Bundle is downloaded, unzip the *adt-bundle-<os_platform>.zip* file to the location of your choice.
4. Inside that extracted folder, navigate to *adt-bundle-<os_platform>/eclipse*, and run the *Eclipse* executable. (Important note: Make sure to run the program as an administrator by right-clicking the executable and choosing *Run as administrator*)
5. Insert the source code CD into your PC.
6. When prompted to select your workspace, choose *CD/survivor*, where *CD* is the file path for the CD inserted into your PC in the previous step.
7. Inside *Eclipse*, open the Android SDK Manager on the toolbar located on top of the program.

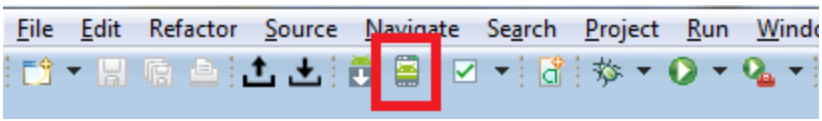

Figure 2: Locating the Android SDK Manager

8. Next, the window below should appear. Inside, select the *Tools* checkbox, along with Android version 4.4.2 or above. Then, press *Install packages...*, and confirm any window which appears.

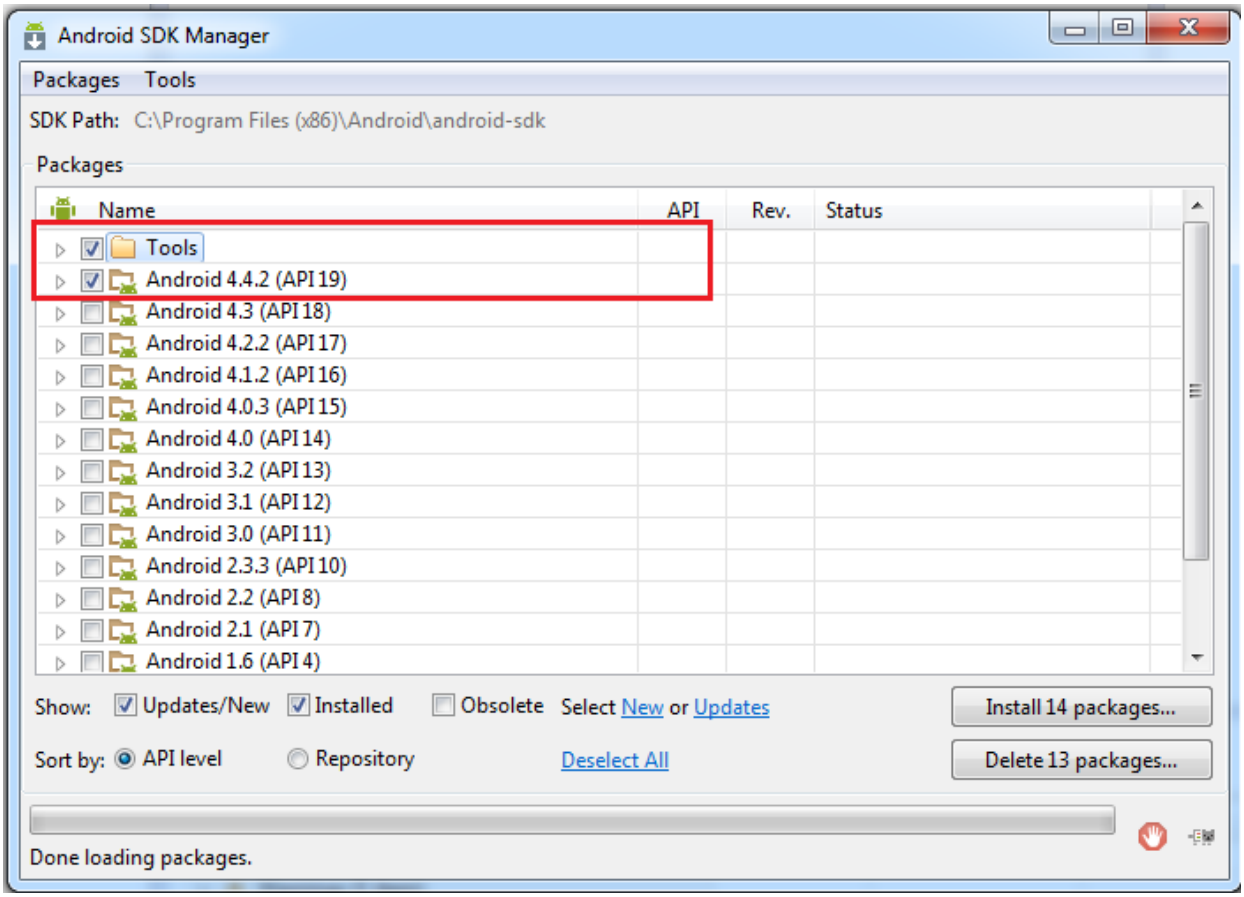

Figure 3: Downloading the necessary packages from the Android SDK Manager

9. Wait for the installation to finish.

10. Next, install the USB drivers for your Android device. Given that USB drivers differ for each device, there exists no unique website which points to a universal USB driver for every phone. Therefore, to find the USB drivers which correspond to your phone, make a Google search for the name of your phone, followed by "USB Drivers".

11. Back inside *Eclipse,* Go to *Windows > Preferences*

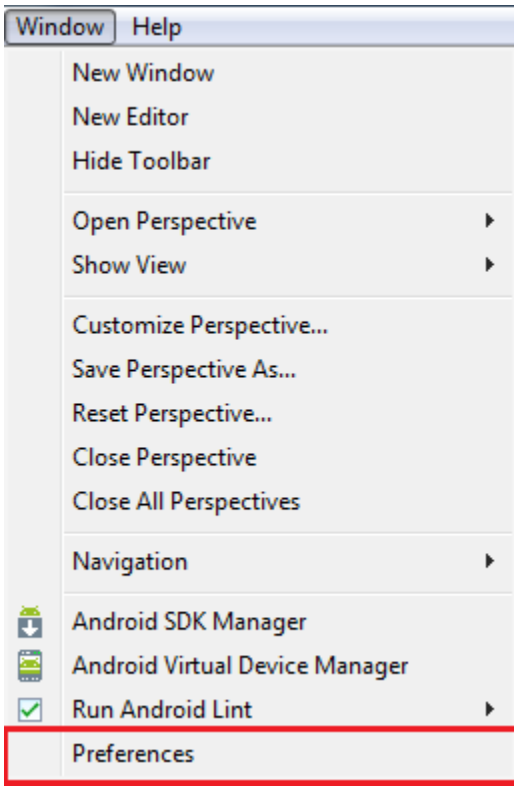

Figure 4: Windows > Preferences inside Eclipse

12. Navigate to the *Android* tab, and press the *Browse* button next to the text field named *SDK Location*

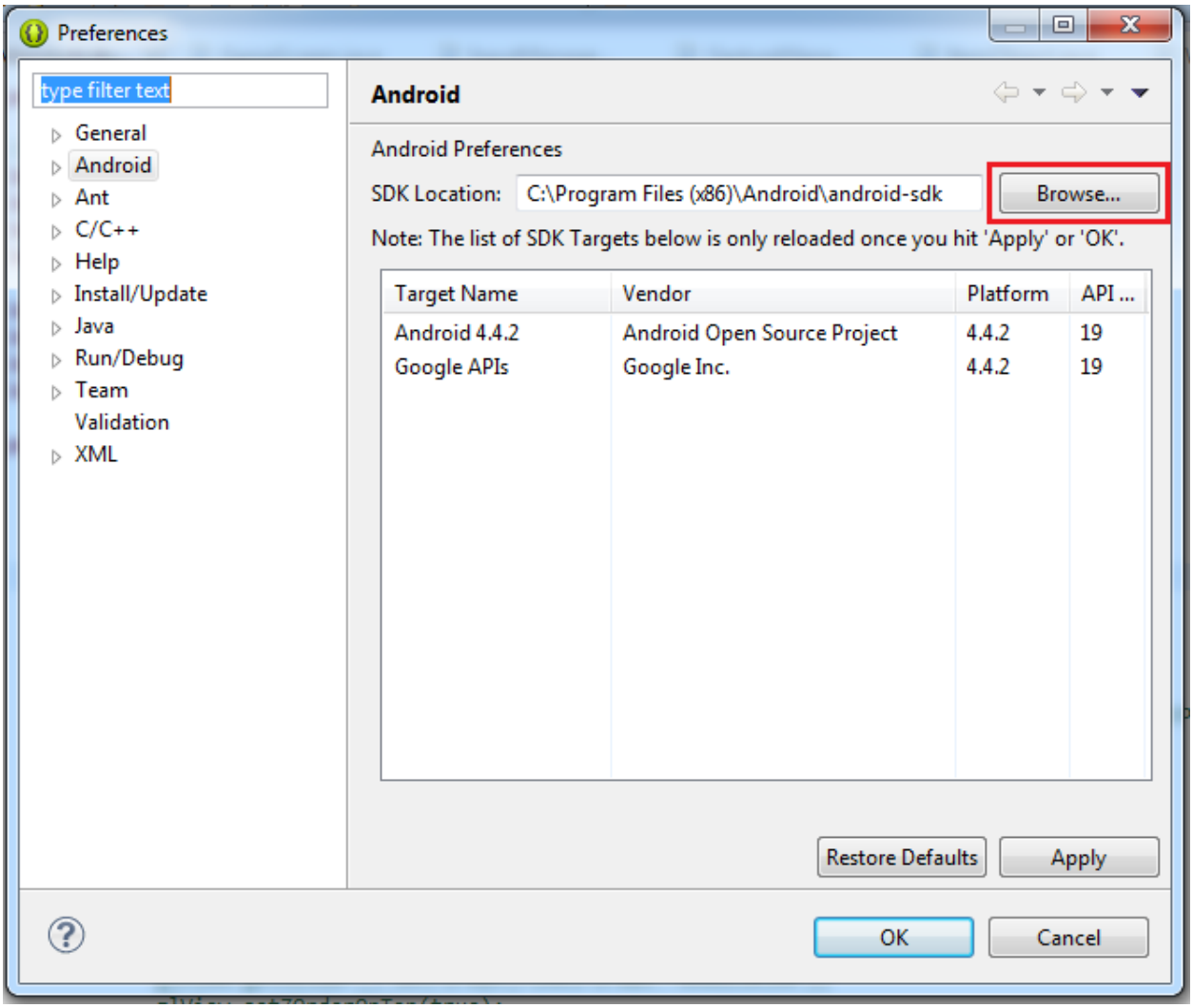

Figure 5: Changing the SDK location in *Eclipse*

13. In the file explorer, choose the sdk/ folder inside the directory where you extracted the ADT Bundle in step 3.

14. Press *Apply*, and press *Ok.*

15. Press on the *survivor-android* folder on the *Package Explorer* to the right of the screen.

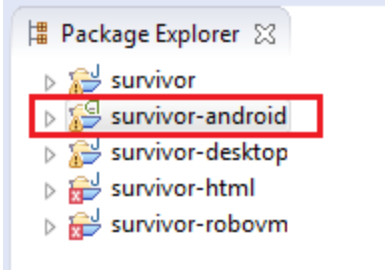

Figure 6: Selecting the correct project to run the game

16. Press the *Run* button on the toolbar on top of *Eclipse*, and your phone should appear in the *Android Device Chooser* list. If not, re-visit step 10 and ensure that the USB Drivers corresponding to your phone are correctly installed.

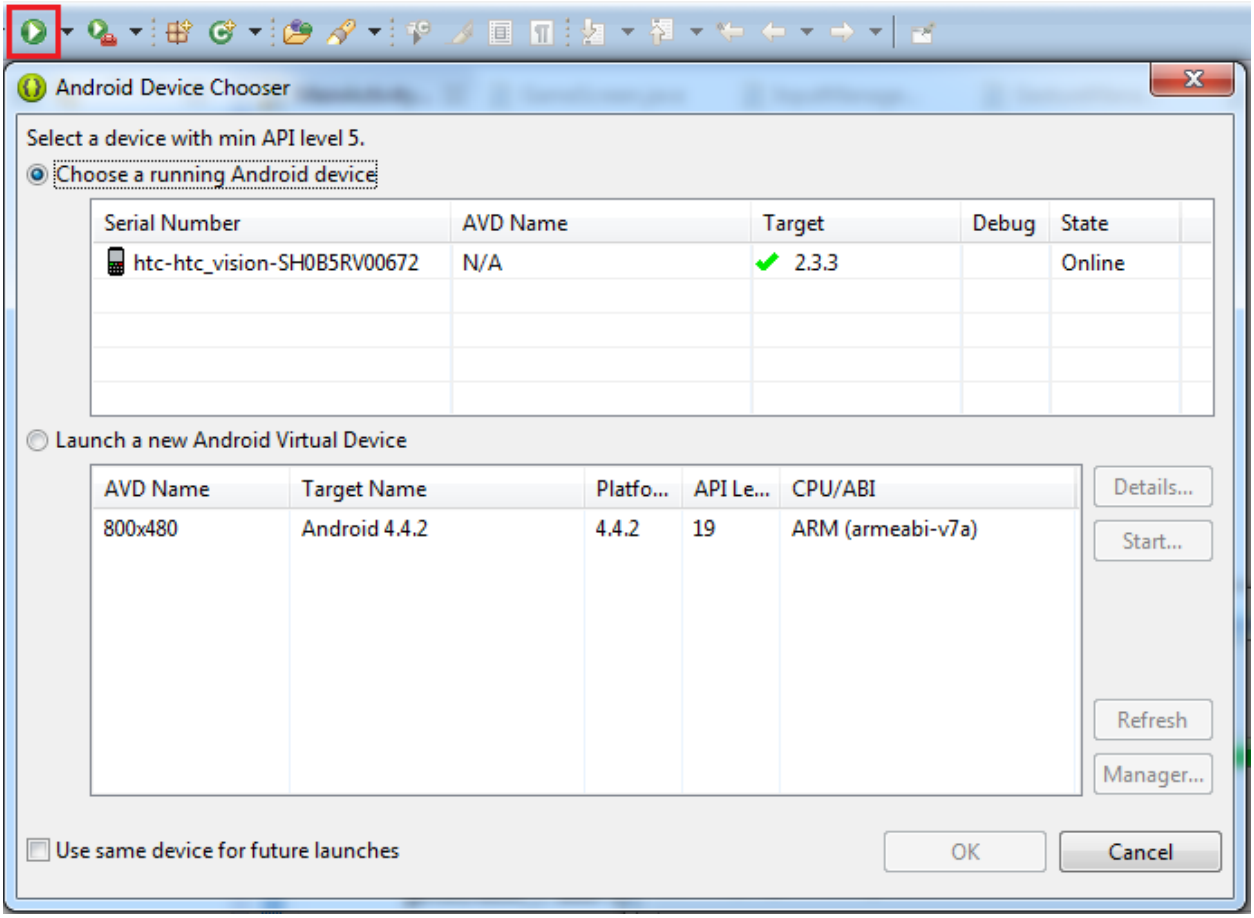

Figure 7: The *Android Device Chooser*

17. Inside the *Android Device Chooser*, select your phone from the list, and press *Ok.*

18. The game will then install on your phone and run automatically

II. User Manual

II.1 Tutorials

II.1.1 Main Menu

Once you launch the game and the game finishes loading, you will be greeted by the main menu. Here, you are faced with a single button: the play button.

Figure 8: The main menu

Once you press the play button, you have three options. You can either create a new profile, load an old profile, or continue from your last-saved profile.

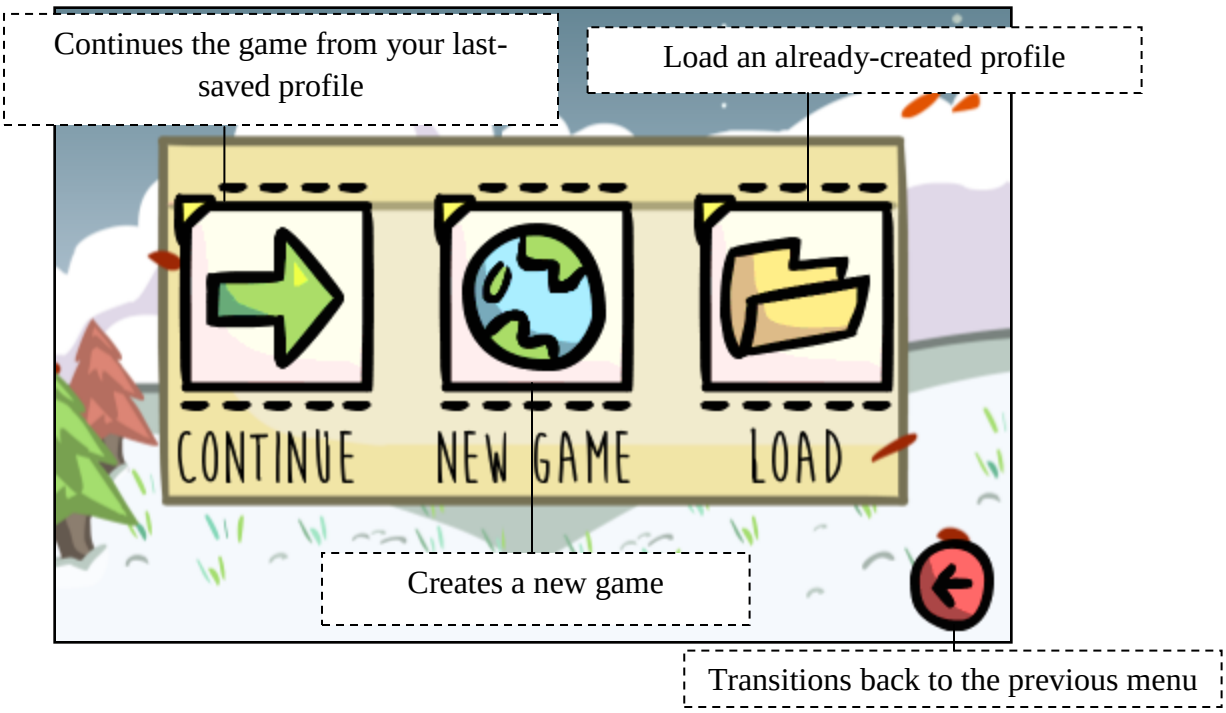

Figure 9: The game selection menu

Upon pressing the load button, you will be transitioned to a list which displays all the profiles which you have previously created. In order to load a profile, select one from the list, and press the load button. You may also choose to delete an old profile by selecting it, and then pressing the delete button.

(See next page for world selection menu figure)

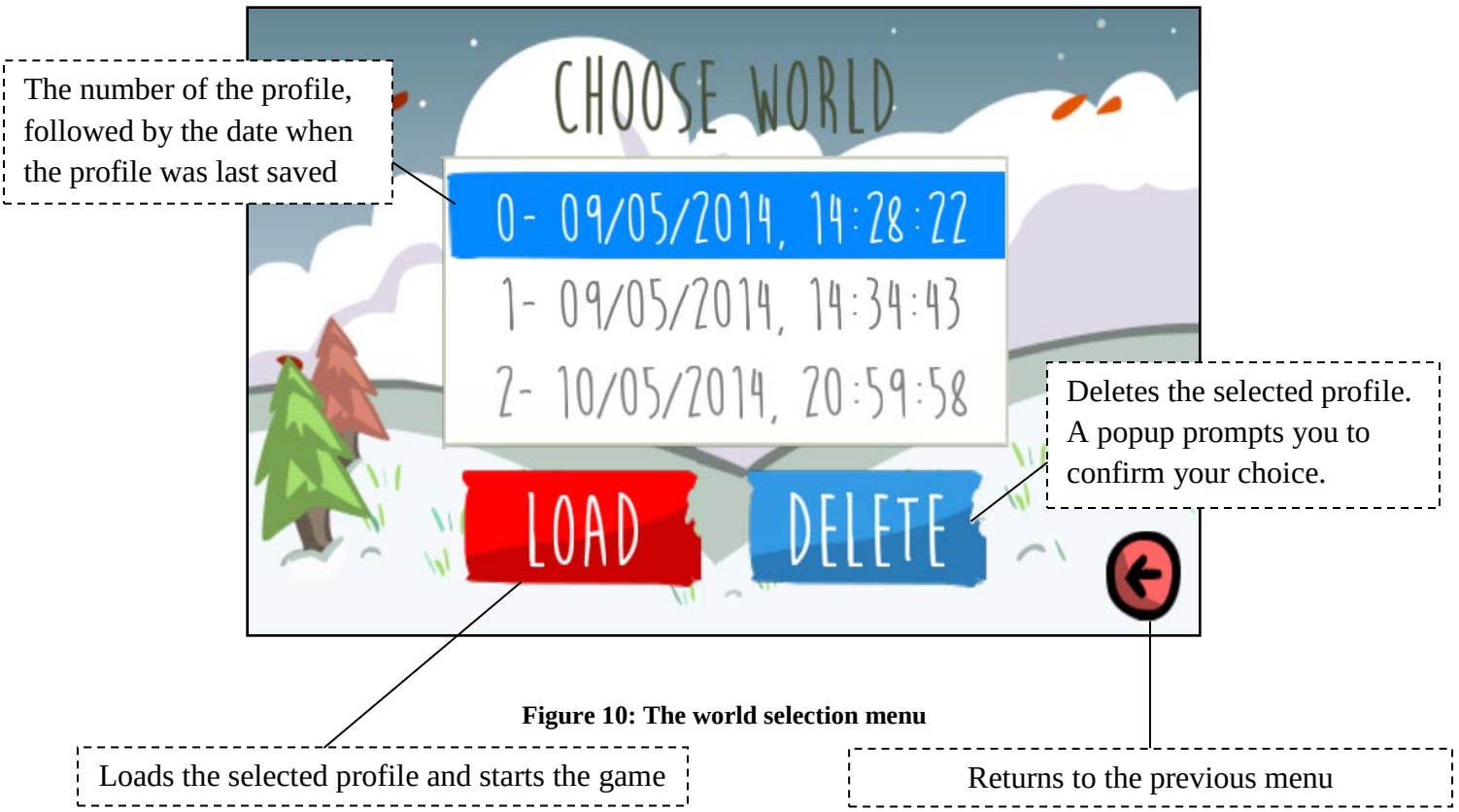

Figure 10: The world selection menu

II.1.2 Walking

Once you load a world or create a new one, you are dropped inside a randomly generated forest.

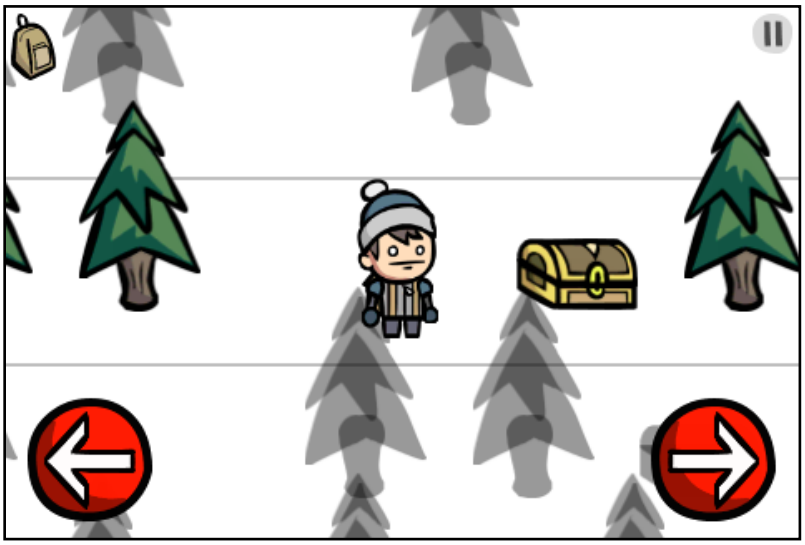

Figure 11: Player inside a randomly generated forest

To walk in either direction, press and hold the left or right arrow buttons on the bottom of the screen.

Figure 12: Walking tutorial

By pressing on either button, you will move at a constant speed in the direction denoted by the arrow you press and hold.

II.1.3 Traversing Layers

In *Free the Bob*, the world is separated by *layers*. You can walk on only one layer at a time. Each of these layers are delimited by a solid gray line, as shown in the figure in the following page.

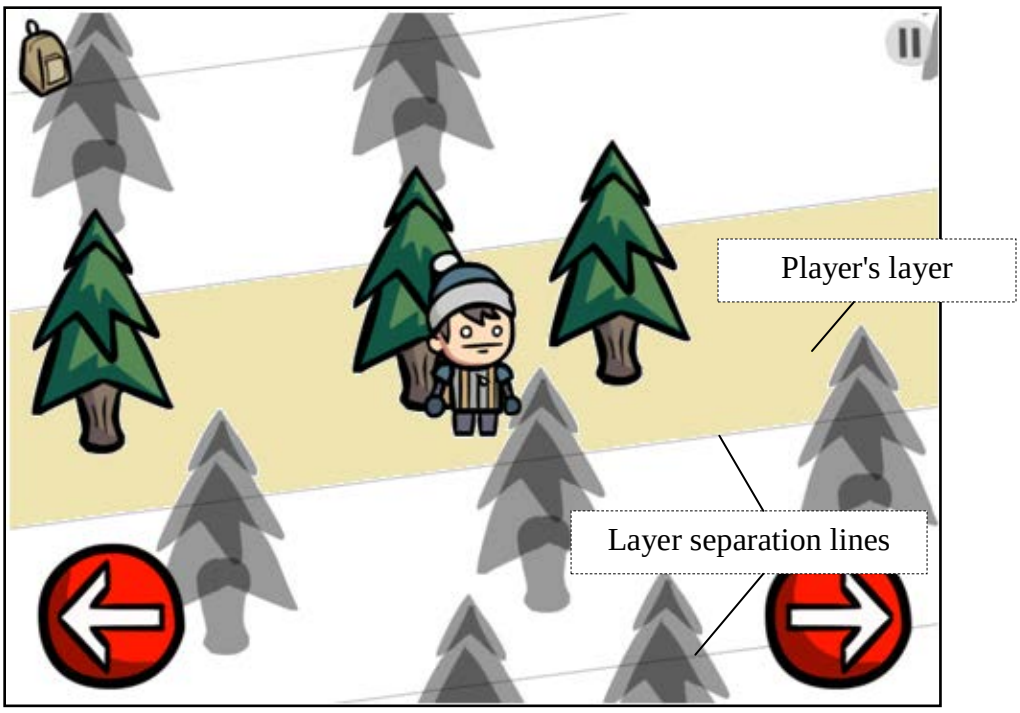

Figure 13: Concept of layers, explained

To move between layers, swipe up or down on the screen. Swiping will change the layer on which the player walks. Swipe up to jump up a layer, and swipe down to fall down a layer.

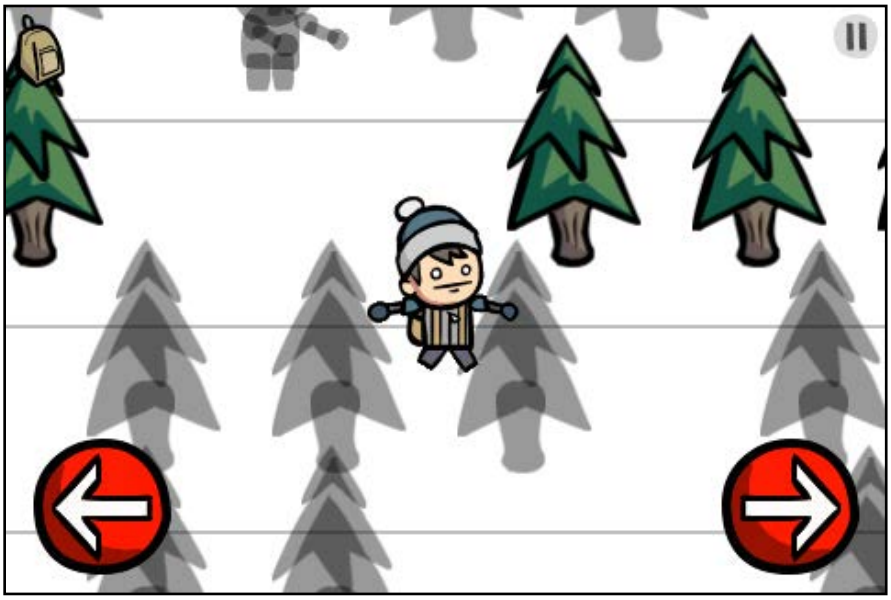

Figure 9: Player jumping to a higher layer

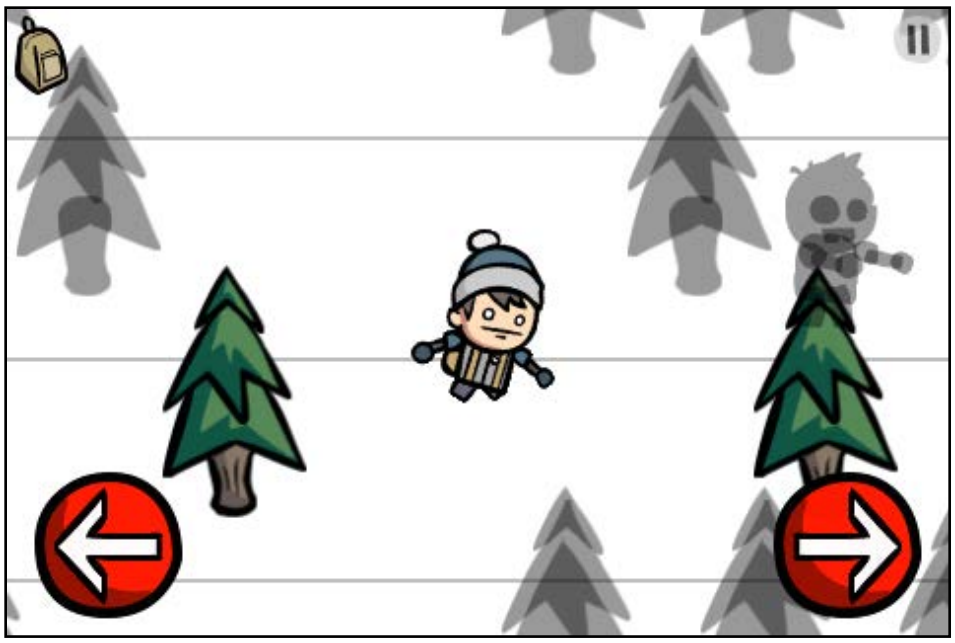

Figure 10: Player falling to a lower layer

II.1.4 Pause Menu

The pause menu can be accessed by pressing the top-right button on the screen.

Figure 11: Accessing the pause menu

The pause menu presents several options. You can either resume the game, save your progress, or quit back to the main menu. If you choose the quit the game, you will lose all of your unsaved progress.

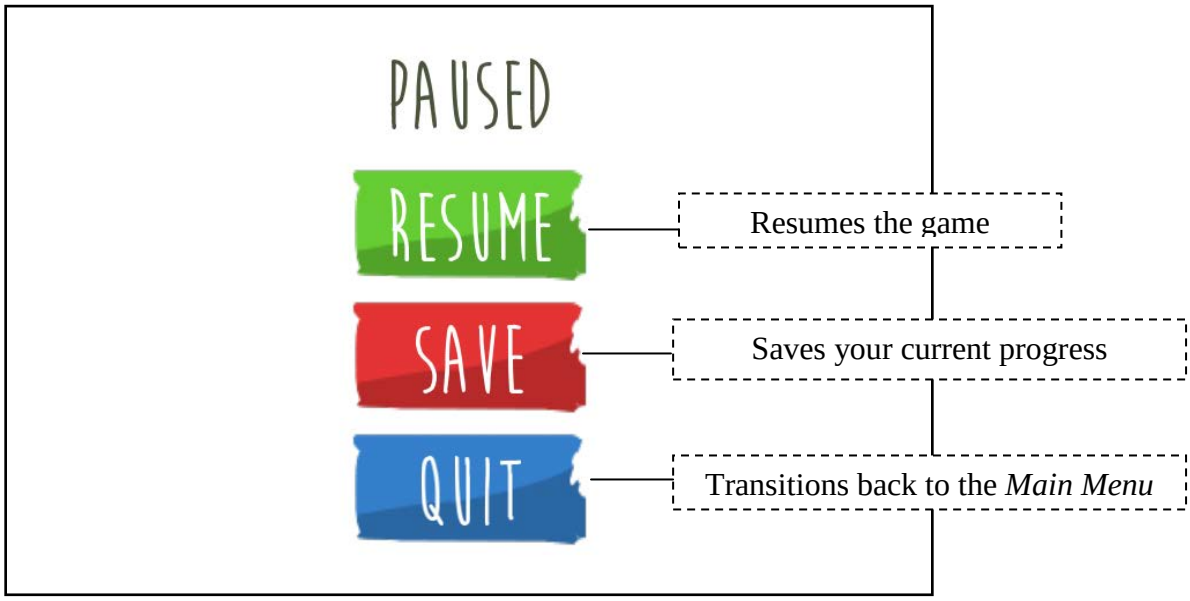

Figure 12: Pause menu tutorial

II.1.5 Collecting Items

Boxes are randomly placed in the world. They contain valuable resources and can be opened as follows. First, tap on the box to walk towards it. You will open the box once you touch it, as shown in the figure on the following page.

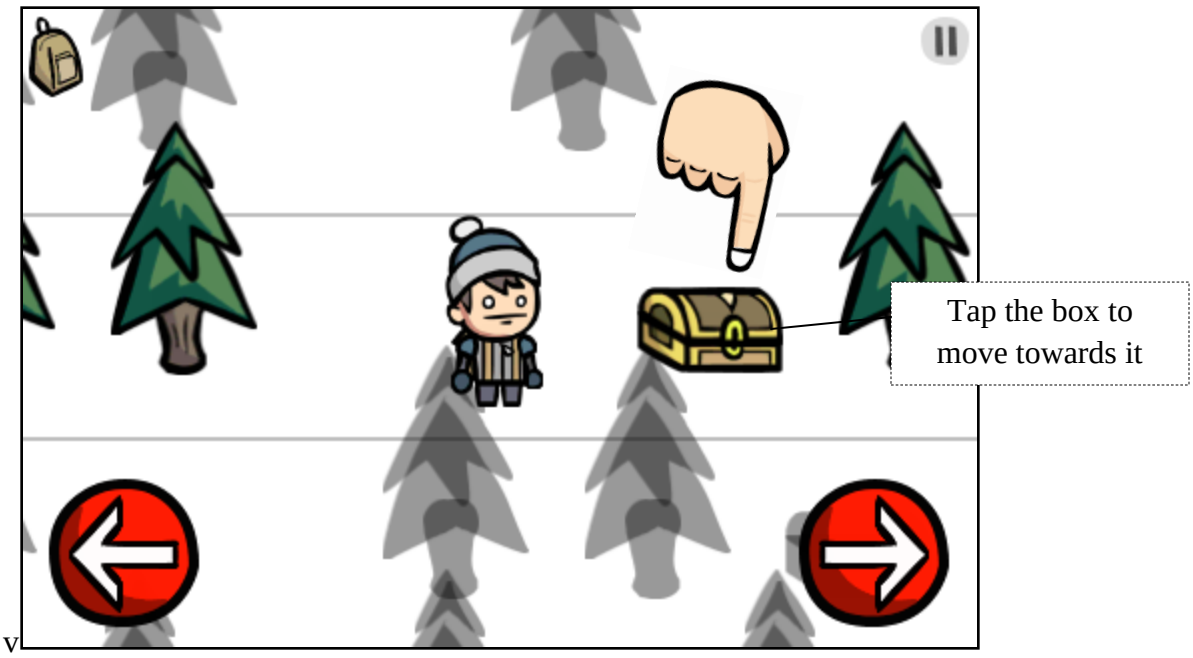

Figure 13: Resource collection explanation

Once the box is opened, items will spawn at the location of the box. To collect those items, simply tap on them, and they will be added to your inventory.

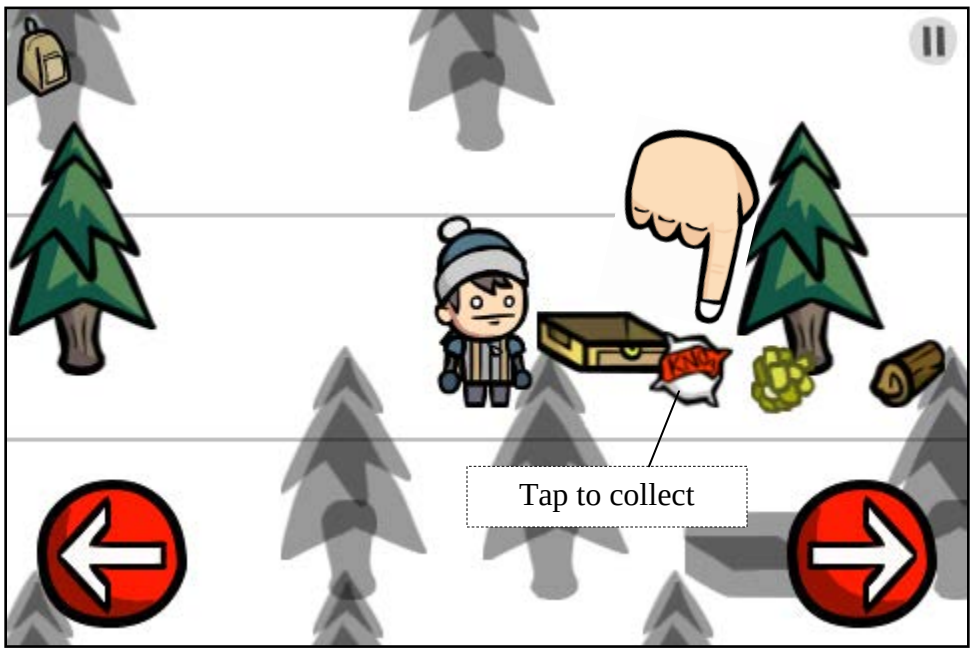

Figure 14: Picking up items

II.1.6 Chopping Trees

As with boxes, trees are randomly placed in the world. With a melee weapon equipped, press on a tree to move towards it. When you come into contact with the tree, you will start chopping it down. In four hits, the tree will be destroyed, and a collectable wood item will be dropped.

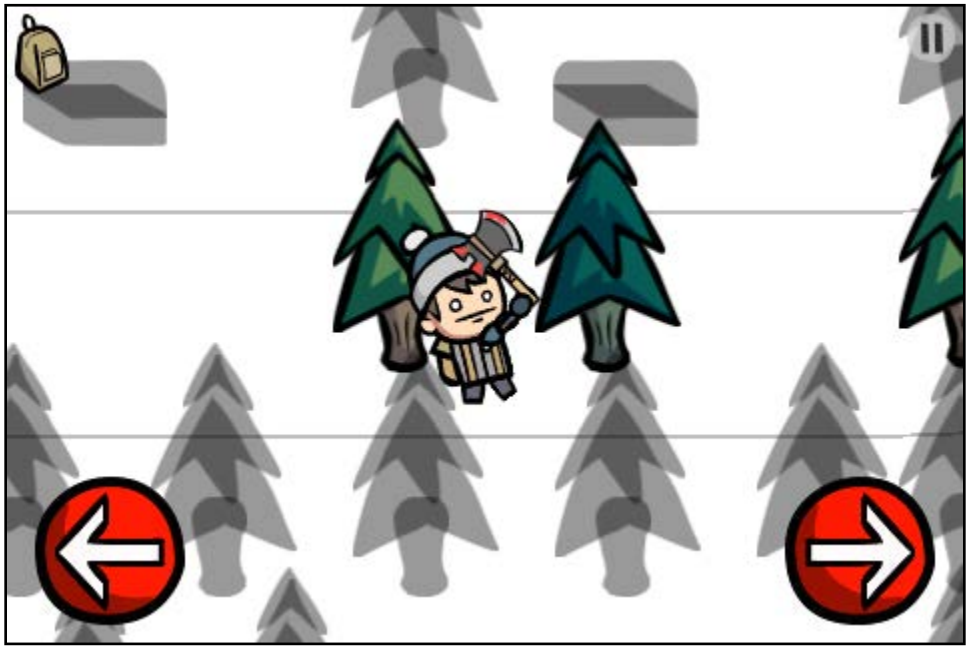

Figure 15: Player chopping down a tree

II.1.7 The Backpack

The backpack allows you to access your survival guide, along with a crafting menu, which allows you to combine your items to craft new resources. To access the backpack, press the button on the top-left of the screen.

(See figure on following page)

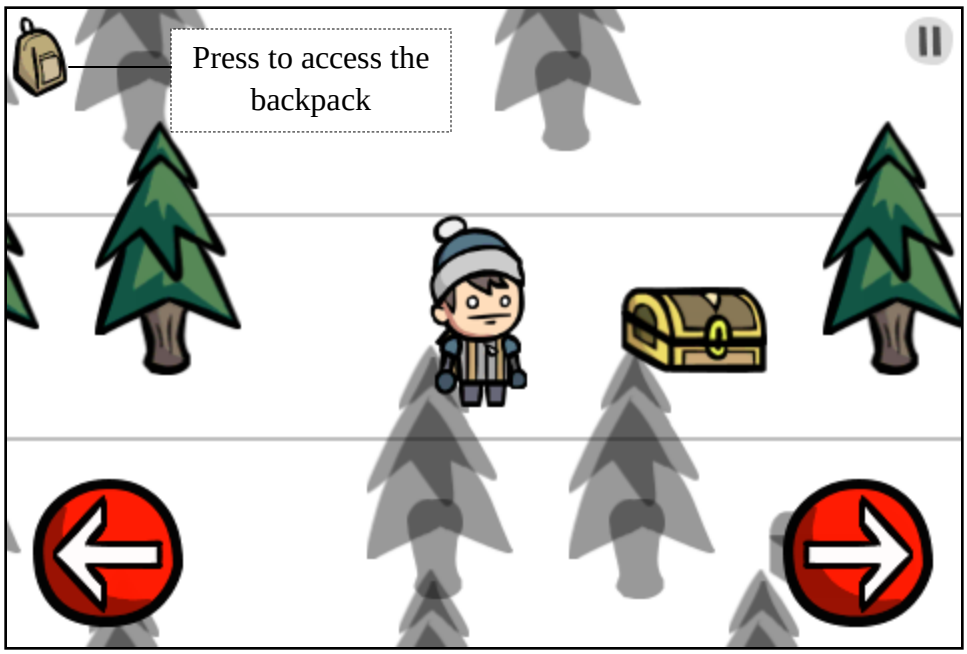

Figure 16: Accessing your backpack

Inside the backpack menu, you can choose to navigate to your survival guide or the crafting menu.

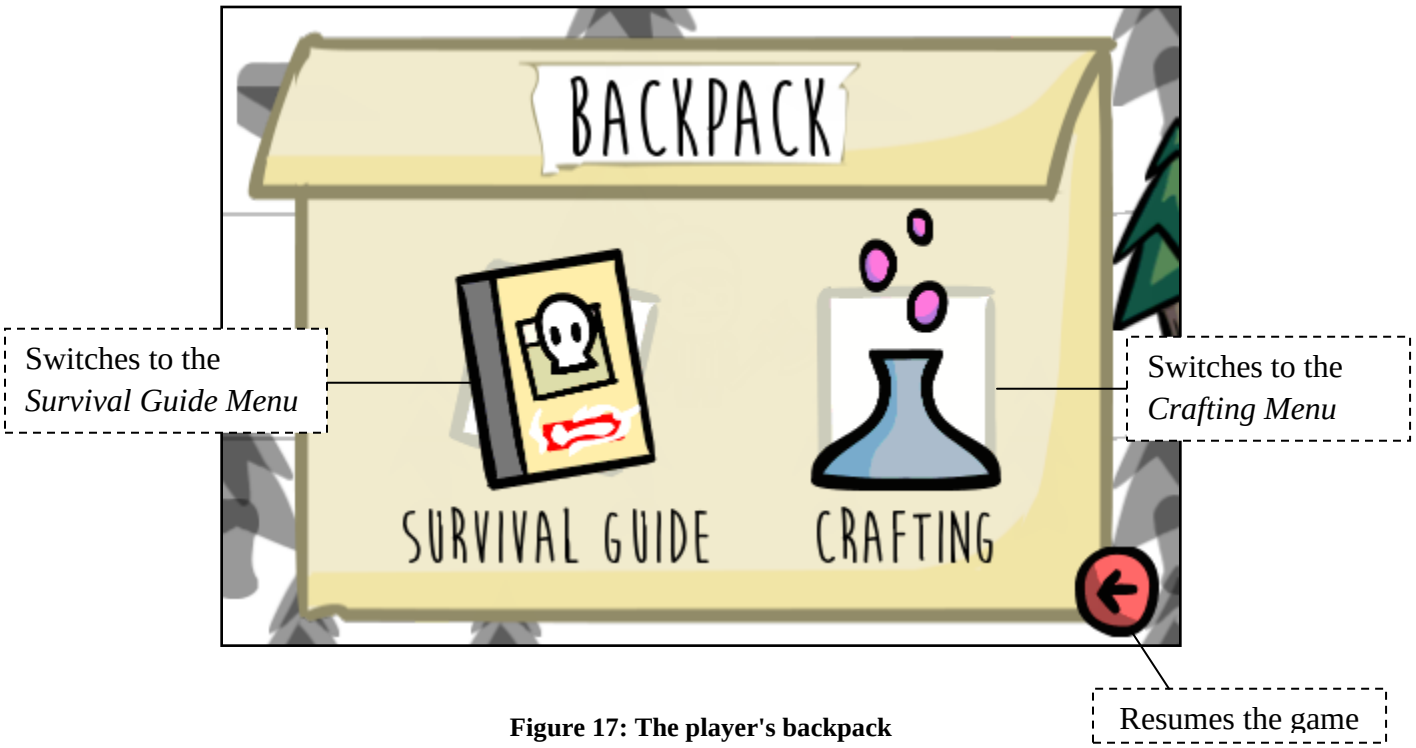

Figure 17: The player's backpack

Inside the survival guide, you are presented with list of entries. By pressing on an entry, a corresponding description will appear. This text informs you on a certain aspect of the game.

Figure 18: The survival guide

The crafting menu allows you to see the items in your inventory in the list on the left of the screen. On the right of the screen is the crafting table, which comprises of a 2x3 grid of boxes. To add an item to the crafting table, simply press on an item in the inventory list. To remove an item, press on that item in the crafting table.

(See figure on following page)

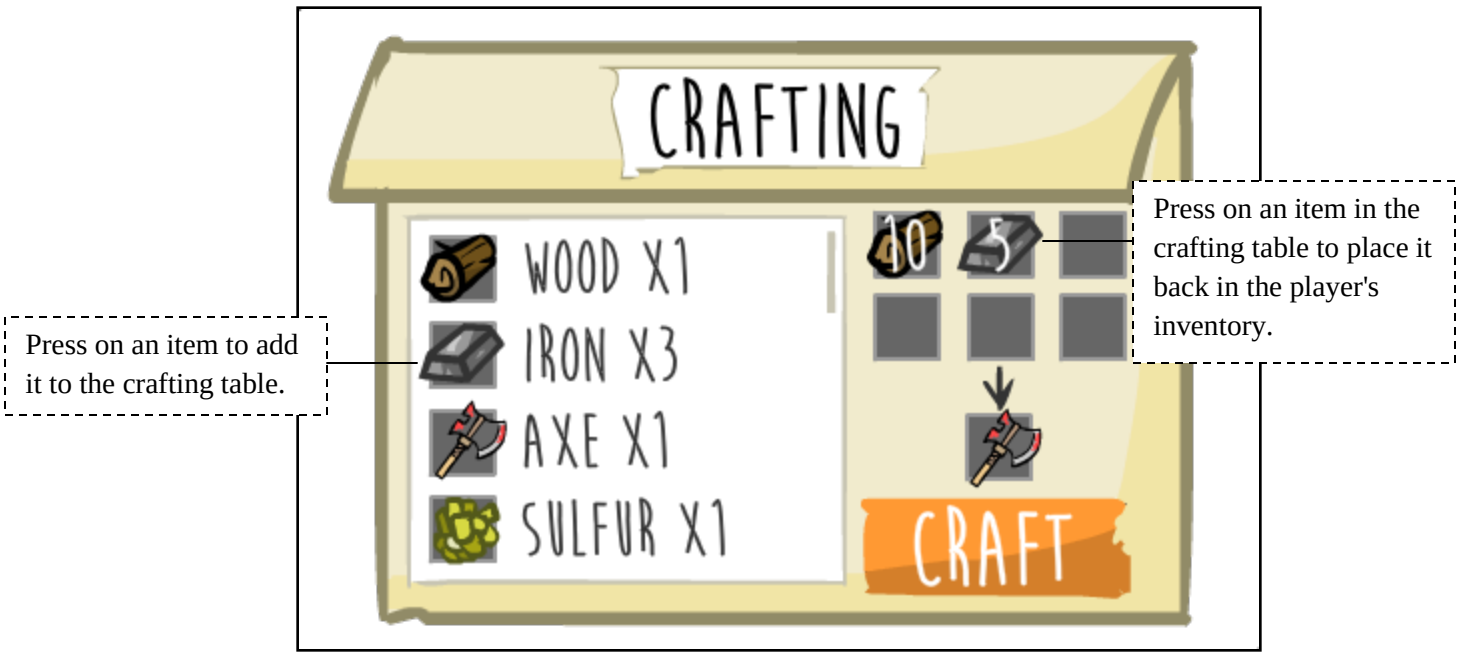

Figure 19: The crafting menu

When you add items to the crafting table, a possible combination forms. If the list of items you add is valid, an item appears in the box below the arrow.

As seen above, with ten wood items and five iron items, you can craft an axe. In order to craft it, press on the "Craft" button, and confirm the dialog which opens.

II.1.8 Zombies

The world is teeming with zombies. Furthermore, the zombies are randomly placed. Unless you feel ready to fight, avoid zombies until you find the necessary resources to kill them.

(See figure on following page)

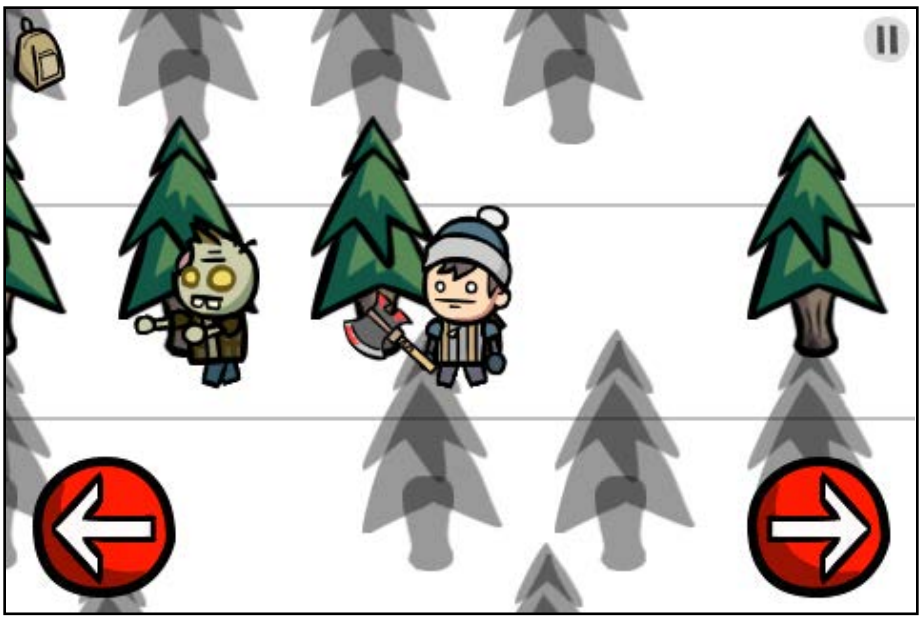

Figure 20: A zombie, unaware of the player's presence

If the player gets too close, the zombie will see the player. As soon as the zombie is alerted of the player's presence, a yellow exclamation point will appear on top of the zombie's head.

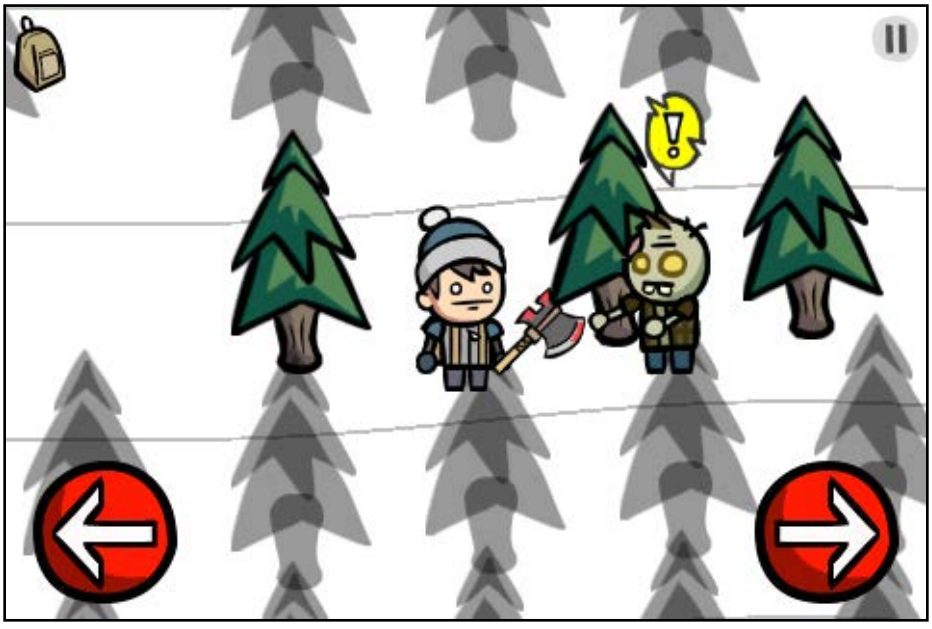

Figure 21: A zombie, alerted of the player's presence

As soon as the zombie knows about the player, he will started walking towards him. As soon as the player collides with the zombie, the two will start fighting, and enter *combat mode*.

II.1.9 Combat Mode

In combat mode, the player and the zombie are dropped into a combat stage. In this stage, the player has three options. He can either jump, melee, or fire his ranged weapon.

The player can jump no matter which weapons are in his inventory. Conversely, in order to perform a melee attack, you must have access to an axe. To craft an axe, refer to the survival guide in the game, or *Section II.2 General References*. Conversely, in order to fire your ranged weapon, you must have crafted a rifle before entering combat. Furthermore, you must also craft bullets before entering the fight. Each ranged weapon shot requires exactly one bullet.

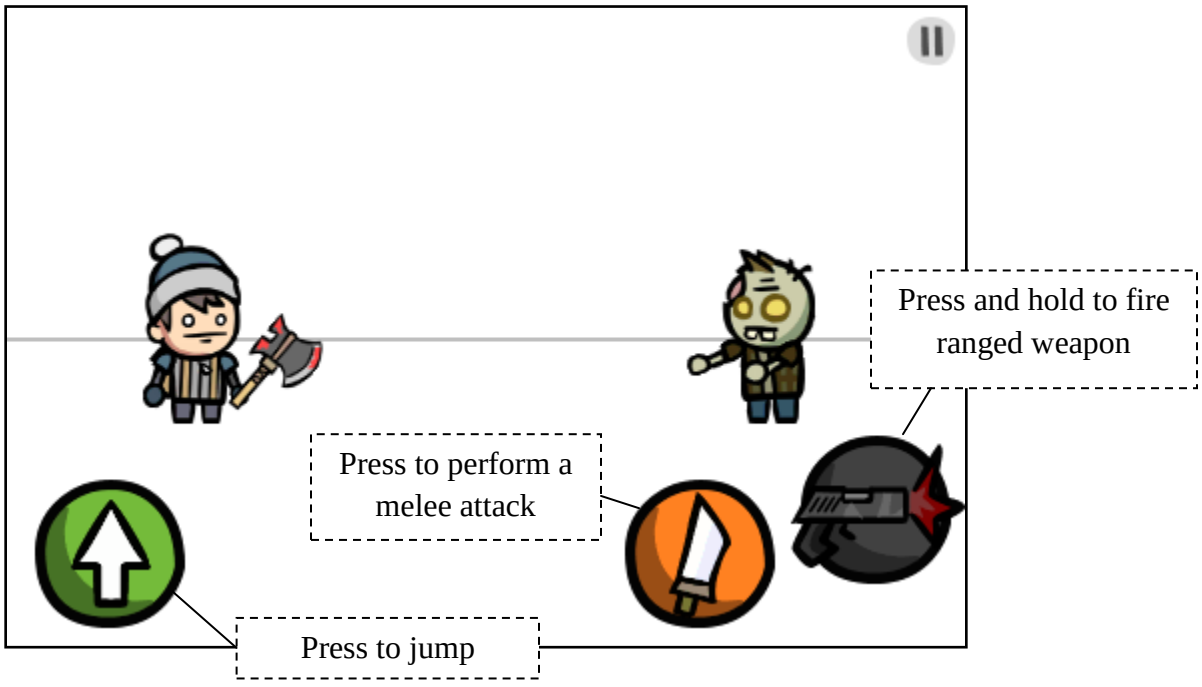

Figure 22: Player in combat with a zombie

Note that, in the figure on the preceding page, the button displaying the gun is greyed out. This happens when you either do not have a rifle in your inventory, or when you do not have any bullets in your inventory. Similarly, if the melee button was greyed out, you would not be able to melee the zombie. This would happen if you did not have an axe in your inventory.

On a separate note, when you have a rifle and bullets in his inventory, press and hold the firing button, and two trajectory lines appear. In order for your rifle to successfully hit the zombie, the two lines have to meet. When you release the firing button, the rifle will inflict damage to the zombie, and the zombie will lose health.

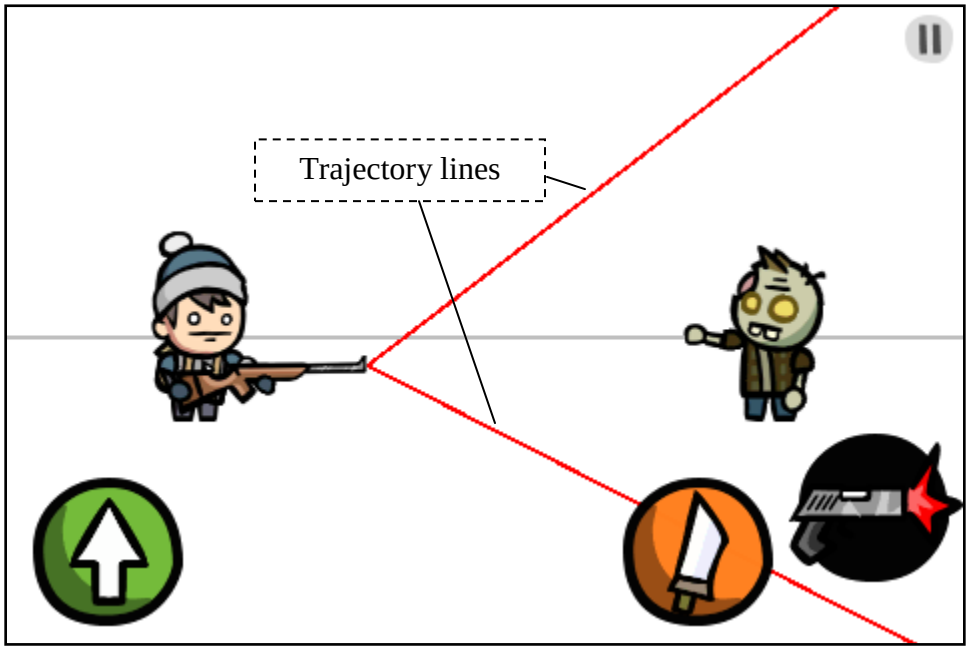

Figure 23: Player charging his ranged weapon

The zombie has two different attacks: he can either charge towards the player, or send an earthquake towards him. To defend against the charge, you can either shoot the zombie before he gets too close, press the melee button at the right time, or jump over the zombie's head. If the

player successfully hits the zombie on the head, damage is inflicted to the zombie, and the aforementioned zombie returns to his starting position.

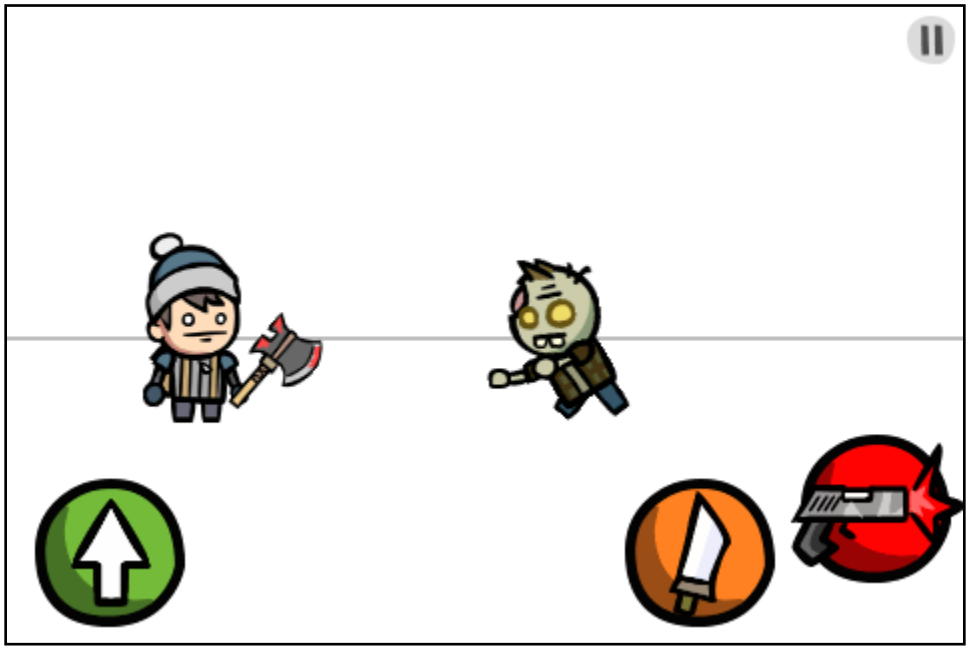

Figure 24: Zombie charging towards the player

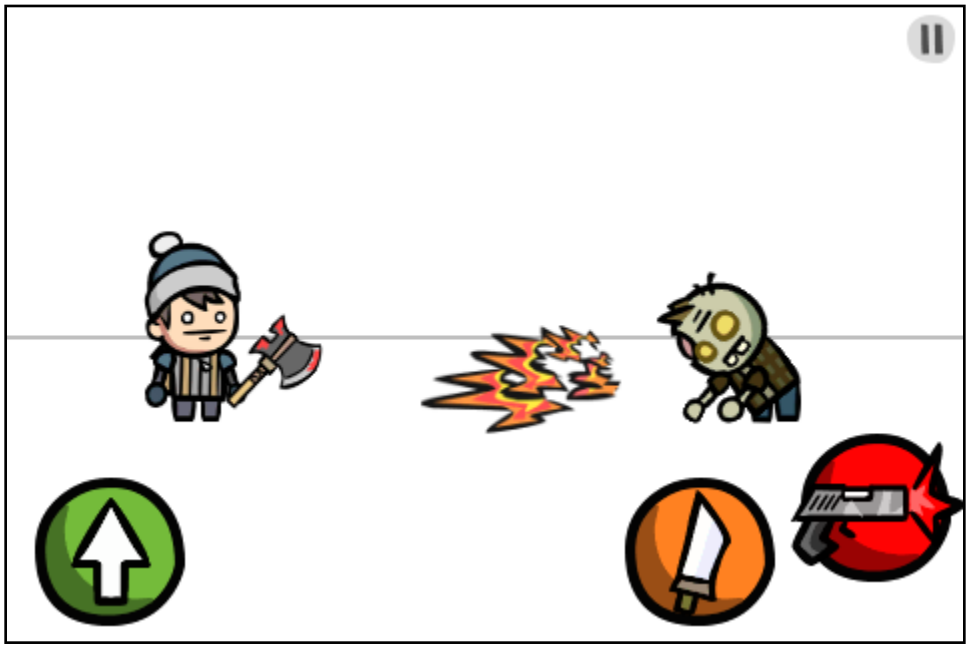

Figure 25: Zombie shooting an earthquake towards the player

Hint: Dodging the zombie's attacks is key to winning a fight.

If the player defeats the zombie, the player returns to the forest, and the zombie drops an iron item which the user can collect.

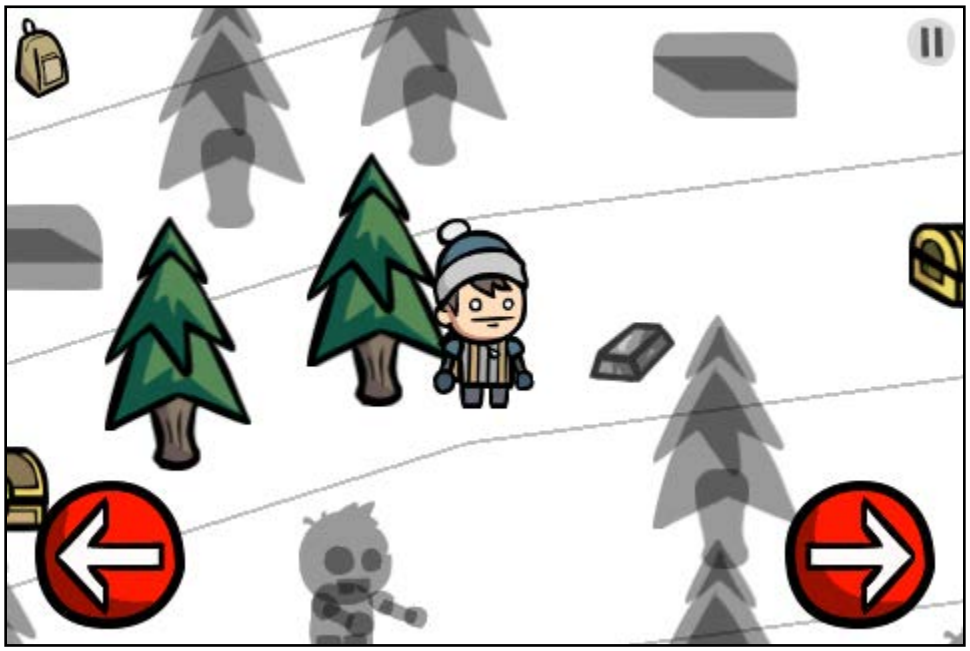

Figure 26: Iron item, dropped by a defeated zombie

Conversely, if the player loses combat, he is prompted by a game over screen, and subsequently returns to the main menu. Upon death, you lose all your unsaved progress.

(See figure on following page)

Figure 27: Game over screen

Hint: Save often to avoid losing progress from unexpected zombie encounters.

II.1.10 Winning the Game

To win the game, craft a teleporter in the crafting menu. For the list of all the items needed to build the teleporter, refer to the survival guide, or *Section II.2 General References*.

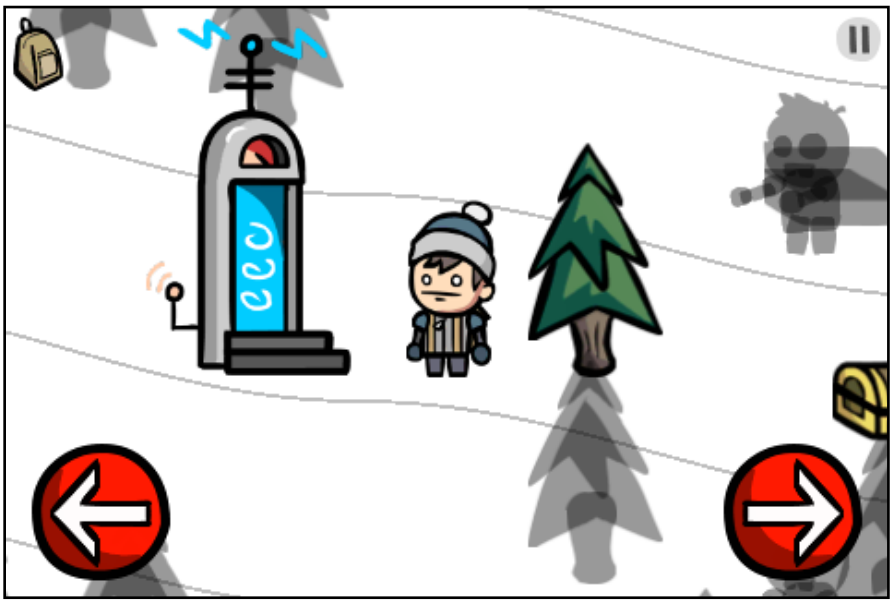

Figure 28: The player, after having built the teleporter

Once the animation of the teleporter finishes playing, you are brought back to the main menu. Then, inside this menu, press *Play*, and then press *Continue* to load the same profile used to build the teleporter. Upon re-entering the game, you will find a teleporter item inside your inventory. Each one of these items represents a token of victory.

II.2 General Reference

II.2.1 Crafting Recipes

All of the possible crafting recipes are listed below for a means of quick reference:

- Axe: 10 Wood + 5 Iron
- Rifle: 15 Wood + 10 Iron
- Gunpowder (x12): 6 Sulfur + 4 Water + 8 Charcoal + 12 Saltpeter
- Bullets (x6): 4 Gunpowder + 2 Iron
- Teleporter: 50 Wood + 30 Iron + 40 Saltpeter + 40 Sulfur

II.2.2 Weapons & Stats

The following table details the amount of health the player and the zombie start with in combat mode.

Human Type	**Starting Health**
Player	100
Zombie	100

Table 1: Damage dealt by player's attacks

The table on the following page displays the amount of damage dealt by the player's attacks.

Attack Type	Damage Dealt
Jumping on zombie's head	25
Axe hit	40
Rifle hit	70

Table 2: Damage dealt by player's attacks

In combat, a zombie can either shoot an *earthquake* or *charge* towards the player. The amount of damage deal by both is detailed in the table below.

Attack Type	Damage Dealt
Smash	25
Charge	50

Table 3: Damage dealt by zombie's attacks

On a separate note, the player and the zombie have different walking speeds. Whereas the player always runs at the same speed, zombies may run at different speeds depending on their state. Below is a table indicating the player and the zombie's speeds, depending on their state.

Human Type	State	Speed (m/s)
Player	Normal	3.0
Zombie	Unaware of player's presence	2.2
	Aware of player's presence	2.7
	Charge (combat mode)	10.0
	Walking back to initial position (combat mode)	10.0

Table 4: Human types and their walking speeds according to state