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1 Introduction

Since the last presentation, the work on our project has advanced. We are working a lot faster. Thus, we were able to correct thing that were needed (calculation of angle), rework already existing work (characters and animation) but also progress on our project. Always in a friendly atmosphere, we start working together in order to accelerate the process of creation. Sometimes by easy means (sorting all the files for a better access), sometimes by harder ones (working days together to improve the results). In this report, we will explain you our progress on the project since the last presentation, the complication arising, but also the success. But first, a quick remainder about our game.

1.1 SpaceQbit

SpaceQbit is a game that takes place in... space. One is playing Bob, a mercenary who hunts creature through the universe. One day, during a mission (the tutorial), he finds a piece of an ancient alien technology. Not a big deal considering the fact that in space, everyone is an alien. However, this piece belongs to an old invention : the "SpaceQbit", a self-alimented powerful motor. This discovery is problematic, because this motor can either permits to escape everyone or upsetting the market of spatial ships' motor.

Bob will travel through many planets (approximately three) finding the different pieces in order to fix this technology.

During the adventure, many weapons will be available as well as upgrades for your character, thus allowing to have different play styles. When the game is finished, the player will unlock access to the "endless world", a procedural generated map, offering more and more challenge and rewards. The player can invite a friend whenever he wants. When two players are in the same game, the overall difficulty is raised, which means the enemies are stronger, but then the rewards are better.

2 Progress

2.1 Script behaviours - Erwan Vivien

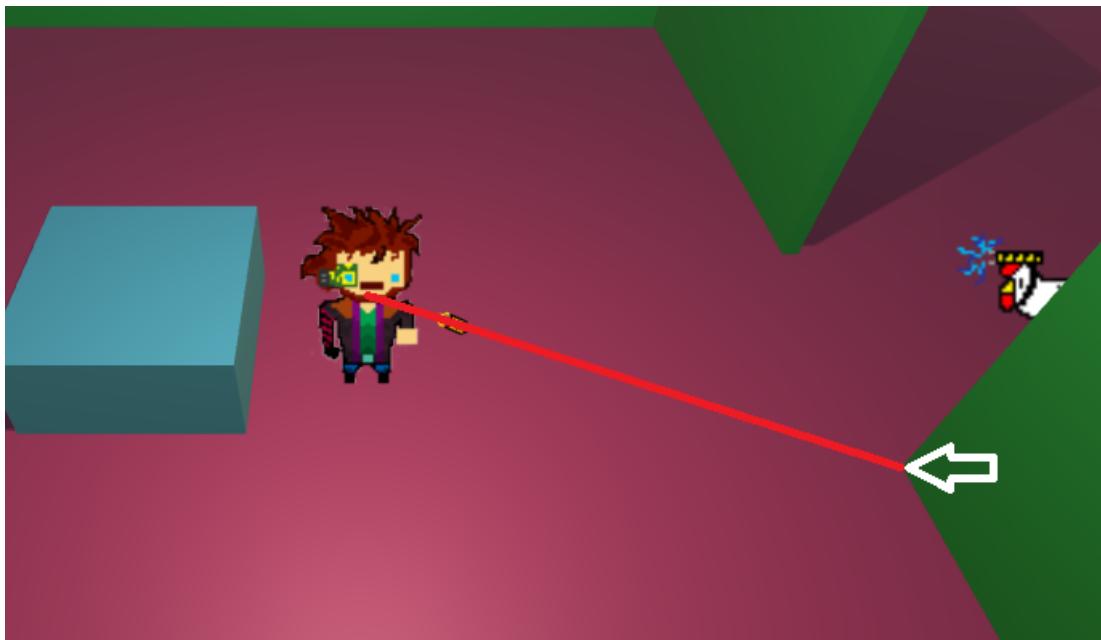
```
1 usage
float GetCooToAngle()
{
    Vector3 pos = Input.mousePosition;
    pos -= new Vector3( x: Screen.width / 2f, y: Screen.height / 2f, z: 0);

    return (float) Math.Atan2(pos.y * 1.42f, pos.x);
}

// Update is called once per frame
// Event function
void Update()
{
    float angle = GetCooToAngle();
    Transform tmp = gameObject.transform;

    tmp.position = (new Vector3( x: (float) Math.Cos(angle), y: 0,
                                z: (float) Math.Sin(angle)))/2f + GetComponentsInParent<Transform>()[1].position;
    tmp.localEulerAngles = (new Vector3( x: 45, y: 0, z: (float) (angle * 180 / Math.PI) - 90));
}
```

(a) Aiming script



(b) Aiming example

On the bottom image, you can see where the mouse was at. We calculate the angle (using mouse position on screen) and we apply some lovely sinuses and cosinuses to determine position and rotation of the drone.

```

RaycastHit hit;

if (Physics.Raycast( origin: transform.position, transform.TransformDirection(Vector3.forward), out hit, maxDistance: Mathf.Infinity))
{
    Material m = previous.GetComponent<Renderer>().material;
    m.color = new Color(m.color.r, m.color.g, m.color.b, a: 0.1f);

    if (hit.collider.CompareTag("Hud"))
    {
        if (previous == null)
            _time = 0;

        previous = hit.collider.gameObject;

        if (_time > timeNeededToTransparent)
        {
            previous.GetComponent<Renderer>().material = m;
        }
    }
    else
    {
        if (previous != null)
        {
            m.color = new Color(m.color.r, m.color.g, m.color.b, a: 1);
            previous.GetComponent<Renderer>().material = m;
            previous = null;
        }
    }
}

_time += Time.deltaTime;

```

(a) Hiding wall, the code



(b) Hiding wall example

We don't want you to get lost while browsing through our vast, pink area.
So we added this feature.

But as you can see on the next page, we have some bugs.



(a) Correction of border



(b) Corner issue

First, the player could go through walls (often the corners). We managed to remove this awesome feature to be competitive in the gaming scene. We have some bug though. When we get too close to corners, the wall (supposed to hide itself) bend underneath the side wall...

```

④ 1 usage  & Erwan Vivien *
public void Damaged(float dmg)
{
    _life -= dmg;
    _life = _life < 0 ? 0 : _life;

    /*
     * Need to add the death when life == 0 (Back to main screen)
     */
}

gameObject.transform.localScale = new Vector3(_life/maxLife * _maxScale.x, _maxScale.y, _maxScale.z);
}

④ Event function  & Erwan Vivien *
private void Start()
{
    _life = maxLife;
    _maxScale = gameObject.transform.localScale;
}

```

(a) Health bar script



(b) Health bar example

When the chickens are too close to you, the damage is done. Before, we had some issues, the graphical life (tool tip) was not updating accordingly to the current life.

```

case "Killable":
    other.gameObject.GetComponent<Killable>().Attack(_damage);

    foreach (var q in GameObject.FindGameObjectsWithTag("Killable"))
    {
        Vector3 transformPosition = q.transform.position;
        Vector3 me = transform.position;

        float distanceSquared = (transformPosition.x - me.x) * (transformPosition.x - me.x) +
                               (transformPosition.z - me.z) * (transformPosition.z - me.z);

        if (distanceSquared <= 10)
        {
            q.GetComponent<Follow_Target>().SetTarget(tmp);
        }
    } // SETS FOR EVERY NEARBY ENEMY THE TARGET

    gameObject.SetActive( value: false);

```

(a) Nearby targetting script



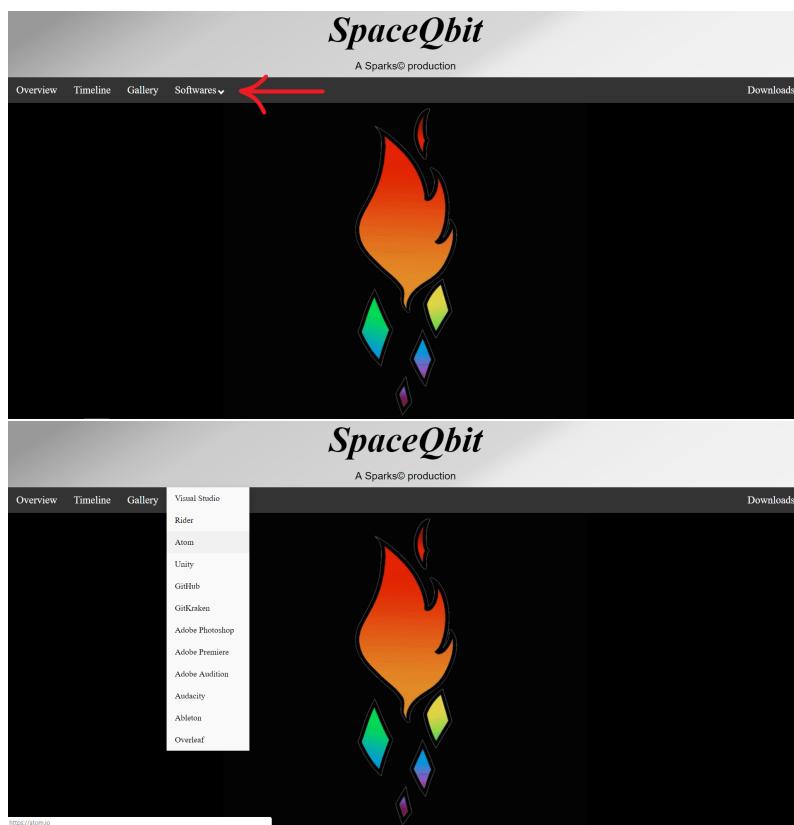
(b) Nearby targetting example

Before, you could shoot those chickens and none of them were acting like it. Now, I dare you to try. The chickens will rebel themselves against you, and you will have a hard time fighting them. All the chickens within a certain range are rallied to his target (it's you, remember).

2.2 Website - Gautier Picard

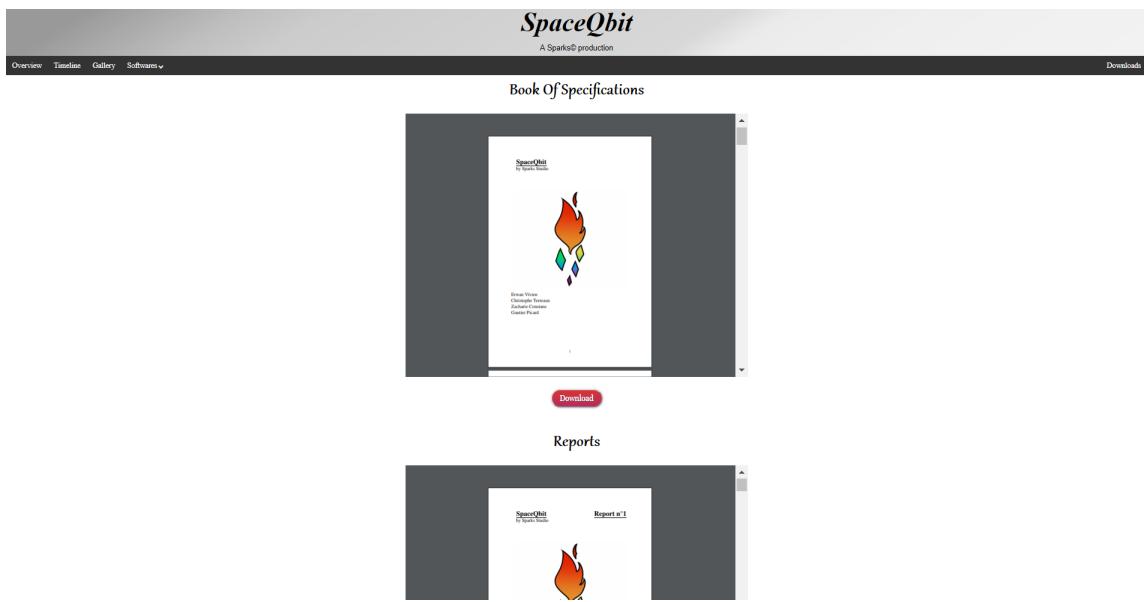
Since the last presentation, the website has undergone a few changes, but more importantly, our goal to make it responsive was reached. Responsive web design is an approach to web design that makes web pages render well on a variety of devices and window or screen sizes. That means that the website have a nice display either on smartphone, tablet and computer. Moreover, one can resize the tab in its computer in which the website is opened without suffering from any unexpected render.

Among the few changes, is the former **Softwares'** tab that took a different path from the original idea. We thought that it was not useful to dedicate a whole tab to those so we first integrated them in the **Overview's** tab. The render was not bad, but it was just some more text to read and didn't bring any interesting features to the website. Consequently, while thinking it through again, we agreed on having something a little bit interactive, slightly different from the rest of the website. We concluded on a simple dropdown menu with the list of every softwares we used, and a link to the site of each one of them.



We also proceeded to the filling of the **Download** tab. It is for now really simply displayed, but time allows us, we might try to find a more aesthetic design. The tab has three subsections: Book Of Specifications, Reports and Game. In the first two, there is an embedded pdf for each document so one can go through without necessarily downloading it, and a download button right below. In the third section, there will be the buttons to download both full and light versions of the game as well as any other content necessary like instructions for download.

Figure 1: Warning: this picture has been zoomed out for a better glimpse



Finally, we also added a **Gallery** tab. It is currently empty, but it will contain different pictures of the game, again to give a glimpse of it to the player.

2.3 Network - Zacharie Constans

The Network is constructed using the Photon Bolt Engine. Thus an important part of our work has been to learn how to use it and how to incorporate our scripts such that they behave the same way in online mode (with Bolt) as in offline mode (for which they were created in first place).

We started by following the official Bolt tutorial, but we encountered a few issues such as unreachable scenes that were not 'seen' by rider despite being built by Unity's compiler, a problem which repeated itself when we started the network implementation in the actual project.

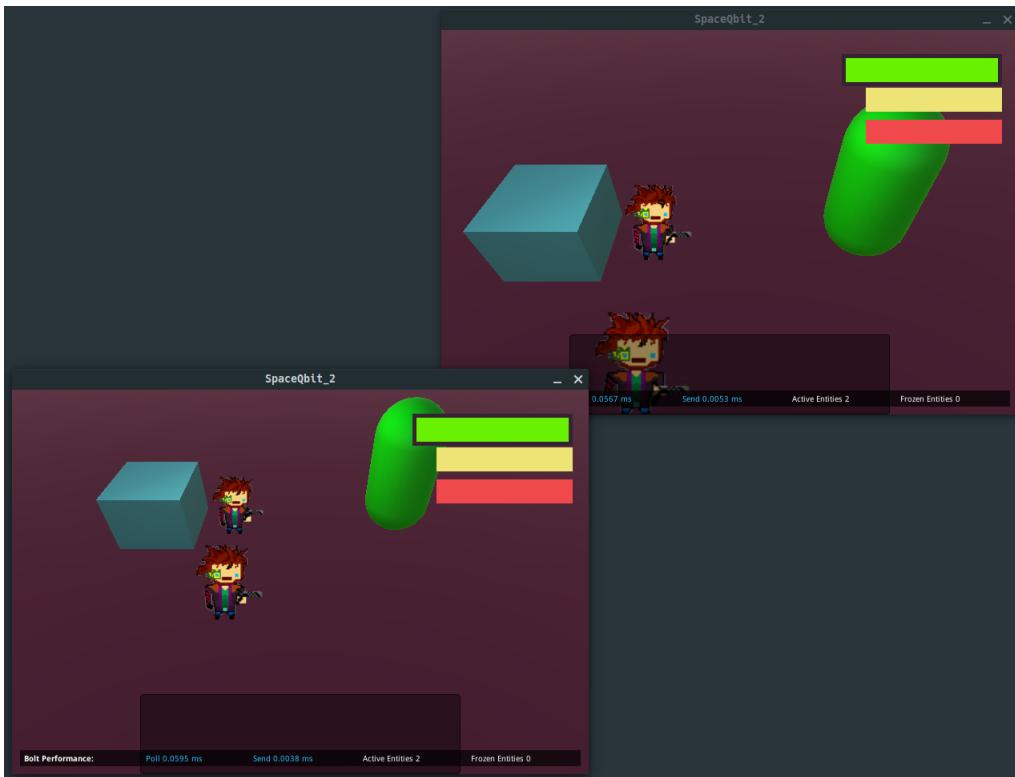


Figure 2: The game running on different instances

The implementation of the network has now a new face, it now is much more like making a new game with the same features as the solo game, because simply adding 'Bolt adapted' functions into the game proved itself ineffective and, on the long run to cause more harm than good asking to modify old functions and to generate too much complexity. Thus the network is implemented using the solo functions and algorithms but within a different architecture and logic.

In Bolt, Callbacks are an important part of the development as they manage the background modifications and calls of the network allowing a wide

range of actions without having to create a new attached script for each one of them.

2.4 Graphics - Christophe Terreaux

Since the last presentation, we reworked most animation of the protagonist but also the protagonist himself. The main change is due to the fact that we decided to change the weapon system. You will see the change of the weapon system further in this section. Concerning "Bob", we simply redesign the arm wielding the weapons. Thus, we had to recreate all the animation in order to match with his new look. The biggest rework concerns his walking animation : now, Bob no more walk but fly.



(a) Iron fly

You can see above that the character fly like "Iron-man".

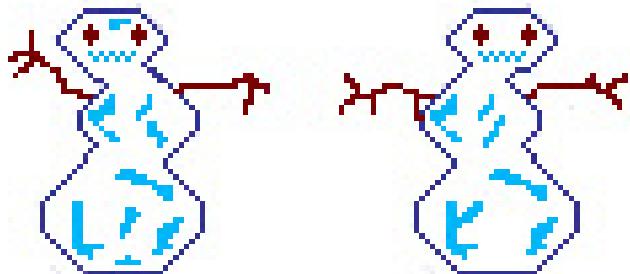
The rework was not very hard because Adobe Photoshop offers the great tools. We just had to copy the arm that was originally made and simply graft it on the other side. However, the flying animation was a lot tougher. Originally composed of one sprite of three frames, it now counts three sprites (taking off, flying, landing) with the flying one having three frames. This implies more coding to trigger the sprites when needed.



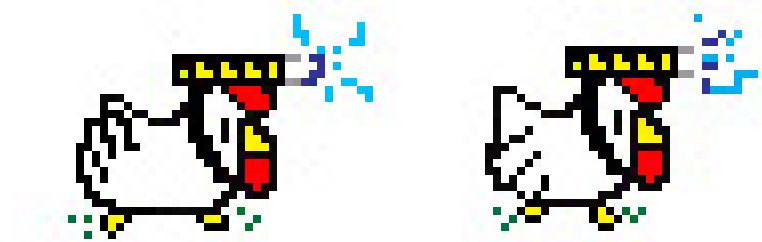
(a) New character

Concerning the weapon system, we decide that they will be present under the form of small drones following you. This system offers easier for the different animations but also for the code. Nonetheless, the weapons does not suffer from this transformation : they still will be different weapons offering different gameplay.

Concerning the bestiary that we talked in the previous presentation, we now have two fully functional enemies. The first one is the "Mister Bise" (a pun between "Mister Freeze" and "Bise" a cold wind from the north) and the second one is the "Poulazer" ("Poule" + "Taser"). The "Mister Bise" is a classic enemy : a normal life point pool, a medium speed. This creature is not a real danger but the discomfort that it issues will destabilise the player. The Poulazer is by far our most deadly monster, and maybe the deadliest that we will create. The Poulazer always stay in group of six or eight. Like velociraptors, they hunt in group and benefit from their speed to prevent any flight. Then, with their taser, they start bullying the player.



(a) Mister Bise



(a) Poulazer

They are still enemies in work in progress. However, creating too many enemies with similar playstyle is not what we aim for our game. We do not want to propose simple reskin of enemies but many different danger.

We also began working on the map. While we were creating the structure of the map (walls, stairs) we looked for map assets in the unity store. We chose a medieval asset type, that is very modular and that we can easily modify if needed. This pack was created by "Cryptogene" and a link will

be display in the index. We all have chosen this particular pack because it matches with our graphic. It cost 10 dollars but it is worth the price.

2.5 Music - Christophe Terreaux

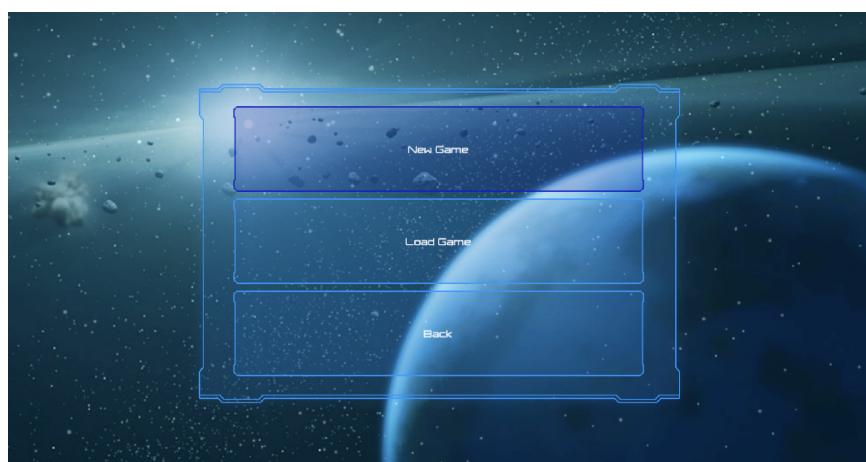
The musics was created with the software Ableton. For our first music, which should be our menu music, we tried to create a rhythmic music with space vibes. We also tried to work on a retro style. The goal here is to have a catchy music that lay back the player.

2.6 User Interface - Gautier Picard Erwan Vivien

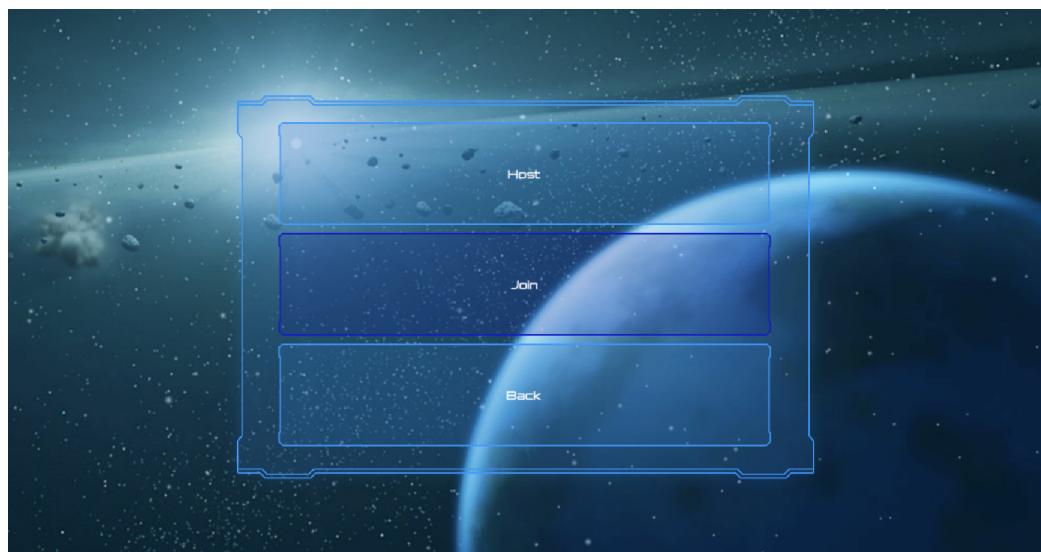
We usually say that first impressions are everything. The main menu will be the player's first interaction with the game. Consequently, it must concord with the main environment of the latter. That is why we decided for the main menu's background to be a space animation, where small particles are crossing through the picture from left to right. Moreover, we wanted the menu to be as simple and intuitive as possible. We downloaded Unity Sample: UI from unity asset store



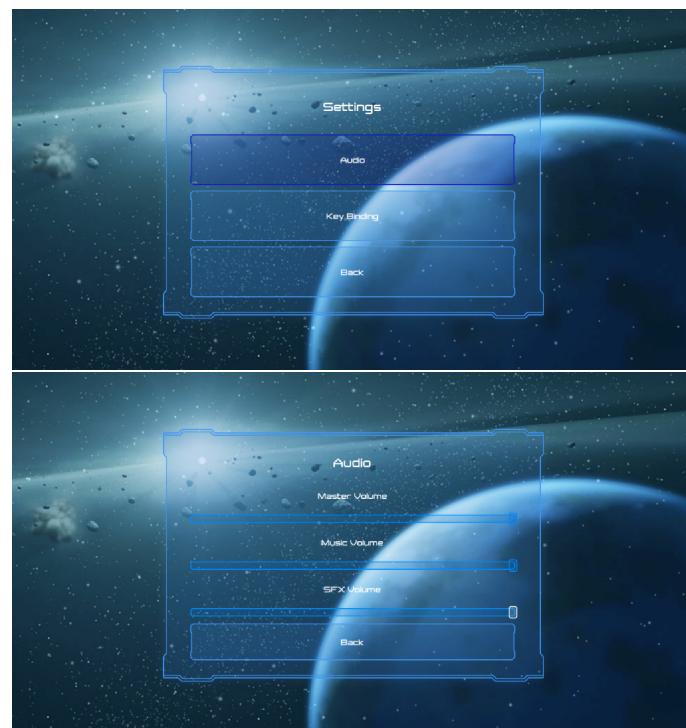
The *Solo Campaign* button redirects the player to the solo menu (cf. below) which simply consists of a *New Game* and a *Load Game* button (as well as a *Back* button as every other sub menus). Currently, only the *New Game* button works, and immediately launches the game when it is triggered.



The **multiplayer menu** offers the player two choices: he can either host the game, which means a second player will join him, or join a game already hosted by another player. However, none of them are currently working.



Finally, the player can adjust the sound or the key bindings from the **settings menu**.



3 Realisation

3.1 Success

For the graphics, the major success is that the time needed to create a sprite is almost divided by two. Thus, it allows us to create more enemies, and more sprites in general.

The main success on the website is the responsive web design. It is not an easy approach to web design but apart from the gif on the home page, it has surprisingly been a lot simpler.

Concerning the user interface, there wasn't any particular success to (nor complications), except that it has been really easy to make and implement.

The network having the ability to instantiate as many character as player and each one having an individual camera and each player having the ability to move individually.

3.2 Complication

We want to implement a shooting system but it is not a first view game and we are using the mouse coordinates to calculate what angles should the bullet take. However, the mouse position is in a different plane as the game plane and it is a struggle to change plane for angles. We still need to find a formula that fits perfectly.

For example:

- When the mouse gets close to the gun, we get some weird angles...
- When it is too far in the plane, the angle delta is at its maximum...

We also had some problems using the Canvas system of unity. It was often disappearing while we were still able to see it in the scene. Many times we had to re-make the whole architecture of the canvas. Also, managing the in-game menu is a real pain. Every canvas must have its own parent linked to it. The escape key, which should be our go back key needs to handle every previous canvas etc... We have not managed to make it work perfectly for now.

The music was a little tough to create but can not be considered as a complication. It is just more work

Concerning the graphics, we are getting better at creating and drawing so there were no complication

The Network had to be restarted, previously the game was supposed to be multiplayer and the solo a multiplayer with only one player. But during the process we encountered complications leading to a new kind of thinking, the game will have a distinguished multiplayer and solo mode. To actually do this we had to restart the implementation of the network from zero.

4 Prevision

4.1 Script behaviours

We plan to correct the angle miscalculation because as said previously it is a bit hazardous. This is the worse part, there is too much mathematics involved and we cannot find a simple algorithm to help us through it.

We also want to add the "real" enemies, since we are only using a capsule at the moment. We already have some enemy model and we are thinking about how he could move itself (Bounce ? Simple lines ?)

We need to implement a functional in-game menu as a main game menu, where the player presses escape and he will have access to all of the settings (key bindings & volume & etc)

We really want to add a procedural generation of a map, maybe for now a really simple one. It would mainly be walls, some obstacles and random enemy placement.

Also our own health points are not decreasing even if our health is changed. We want to fix this as soon as possible to be able to make test for the death and respawn.

4.2 Website

The website being almost done, there are only few previsions left. First we need to finish to fill the **Download** tab, that we will be able to only at the end, and to make put some pictures in the **Gallery** tab

4.3 Network

The network is actually mainly finished we had a setback because of a change of vision concerning the implementation of the network. Thus now the game is divided into two main sections : the solo mode and the multi-player mode.

Regarding future implementations on the network :

A 'quit' button will allow a player to leave an online game.

The 'server' player will be able to name his host so that the 'client' players will be allowed to chose the game they want to join.

4.4 Graphics

For the last presentation, we should have two maps, two or three more enemies and a hub with different non-playable-character

4.5 Musics

We plan to have three more musics for the final presentation, in addition of the sound design of the menu, characters and enemies.

4.6 User Interface

For the solo campaign, only the *New Game* button works so we obviously plan to create a save system that will allow a player quit and come back to where he last left. Moreover, we would like to create a lobby in which the player will be redirected after triggering the *Load Game* button. It will be a place with shops and NPC with whom one can interact. It will allow the player to prepare Bob before going on an adventure.

5 Conclusion

As you have noticed during this project report, our game is improving. We are all very happy to see our game evolved. Progressing become more difficult but we are also a lot more experienced, thus it compensates.

Even if the network were recreated, the strong root that we had before help us help a lot. The website was almost done so we did not much work on it, thus we had more time to work on other fields. This time again, we worked in a good atmosphere, but it was a little bit more stressful. However, we learned from our mistakes and will be ready for the last presentation.

We are in the last rush for the final presentation. This time, they will be no break and we are going to start working again immediately, in order to propose a qualitative project.