EIE3109 Assignment Report
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Introduction

Based on PartII, I set an Easter egg in the floating picture game of MainActivity. When the floating picture on the page is cleared, it will enter the Easter egg page. Click any point on this page, and a small man named Bob will automatically move to the specified point.

Description

Defined Classes

Based on Part II, there are four new classes, including one inner class.

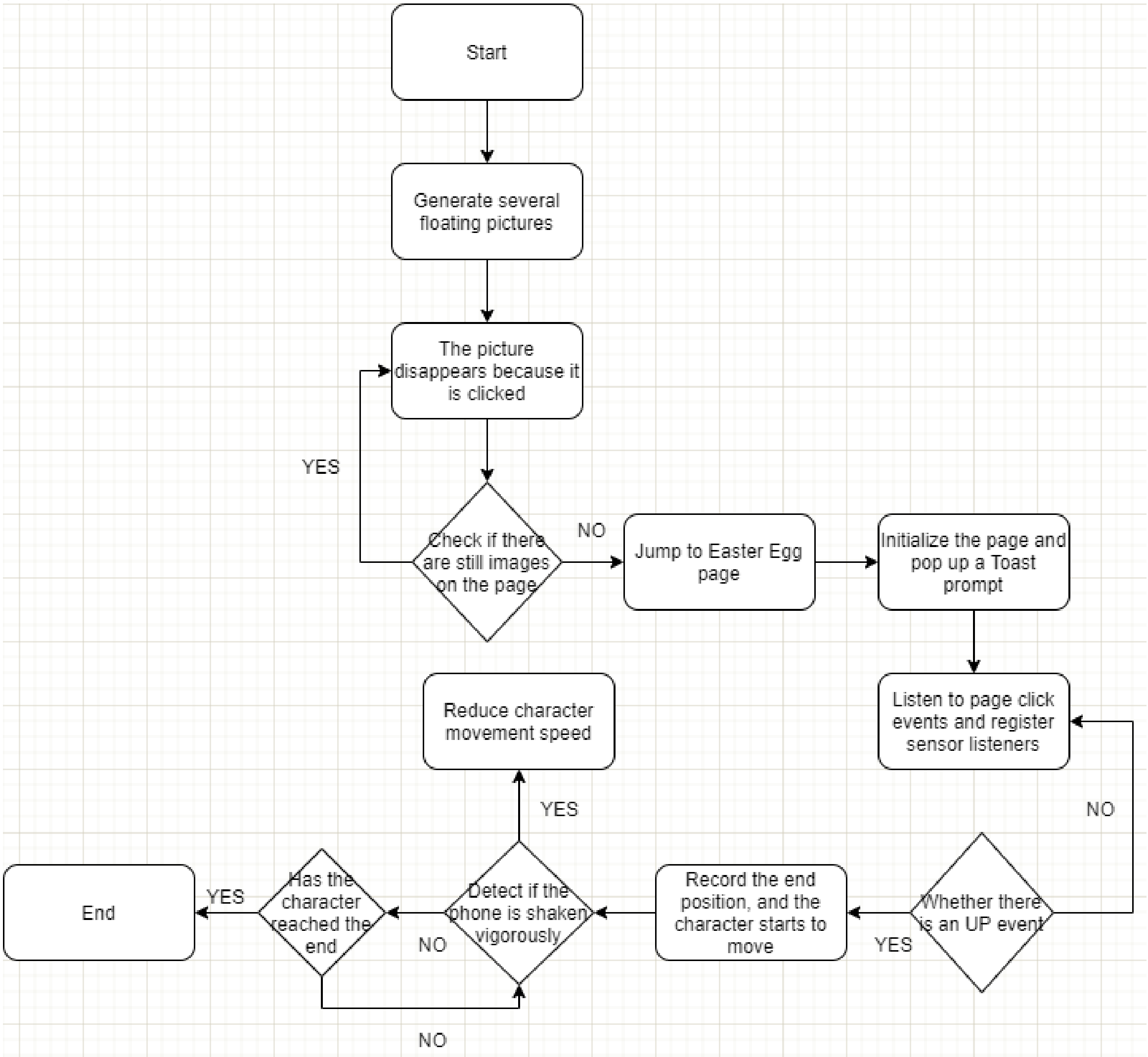
1. **IDrawableClearInterface**: interface class, when the Panel class (homepage game implementation class) will disappear all images click on will be informed by this interface (MainActivity) home page after page jump to eggs
2. **ShakeListener**: Register, listen and unregister our acceleration sensor, and determine if there is a violent shaking of the mobile phone
Page
3. **SpriteSheetAnimationActivity**: eggs, used to carry the eggs of the game can work
4. **GameView**: SpriteSheetAnimationActivity internal class, used to implement the eggs page game function, control of small automatic movement, and mean person move Sprite animation drawing

API

The following part is the API I used.
SensorManager
Sensor
SensorEventListener
SurfaceView
Toast

Methodology

Program flows


Start
Generate several floating pictures
The picture disappears because it is clicked
YES
Check if there are still images on the page
NO
Jump to Easter Egg page
Initialize the page and pop up a Toast prompt
Listen to page click events and register sensor listeners
Reduce character movement speed
YES
NO
End
YES
Has the character reached the end
Detect if the phone is shaken vigorously
NO
Record the end position, and the character starts to move
YES
Whether there is an UP event
NO

New features

1. When all the green squares disappear, a new interface will be entered.
2. You can specify that the villain runs to any point on the page.
3. Shaking the phone while the person is moving will shift the person into a slowing state.

How to play this game

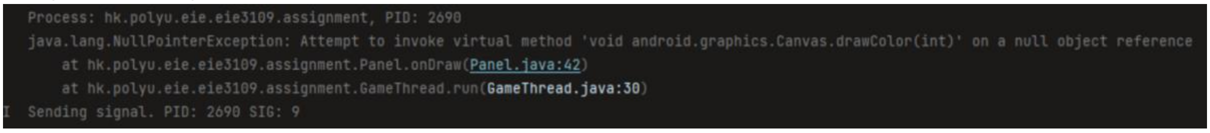
We need to click anywhere on the screen first to create a green square. And then, these green squares are going to move around this area of the screen. We need to eliminate the green block by clicking on it itself. When all the green squares disappear, we will enter a new interface. In this interface we can specify the person to run to any point on the page. At the same time, if we shake the phone while the person is moving, it will put the person into a slowing state.

Conclusion

Problems faced & The corresponding solutions

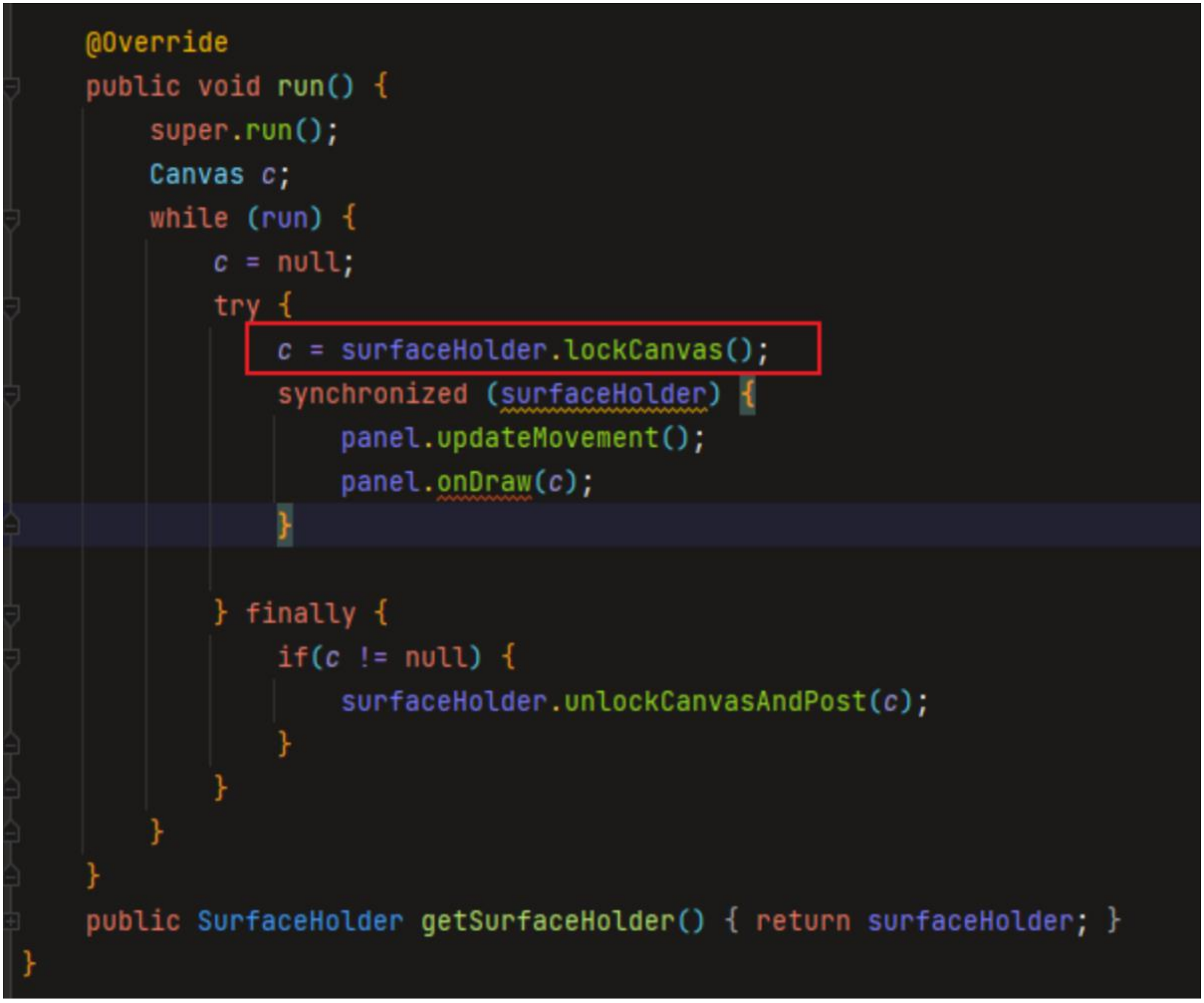
1. **Null pointer exception**

There is a BUG in the provided template project that throws the following null pointer exception when jumping from MainActivity to any Activity



```
 Process: hk.polyu.eie.eie3109.assignment, PID: 2690
 java.lang.NullPointerException: Attempt to invoke virtual method 'void android.graphics.Canvas.drawColor(int)' on a null object reference
     at hk.polyu.eie.eie3109.assignment.Panel.onDraw(Panel.java:42)
     at hk.polyu.eie.eie3109.assignment.GameThread.run(GameThread.java:30)
I  Sending signal. PID: 2690 SIG: 9
```

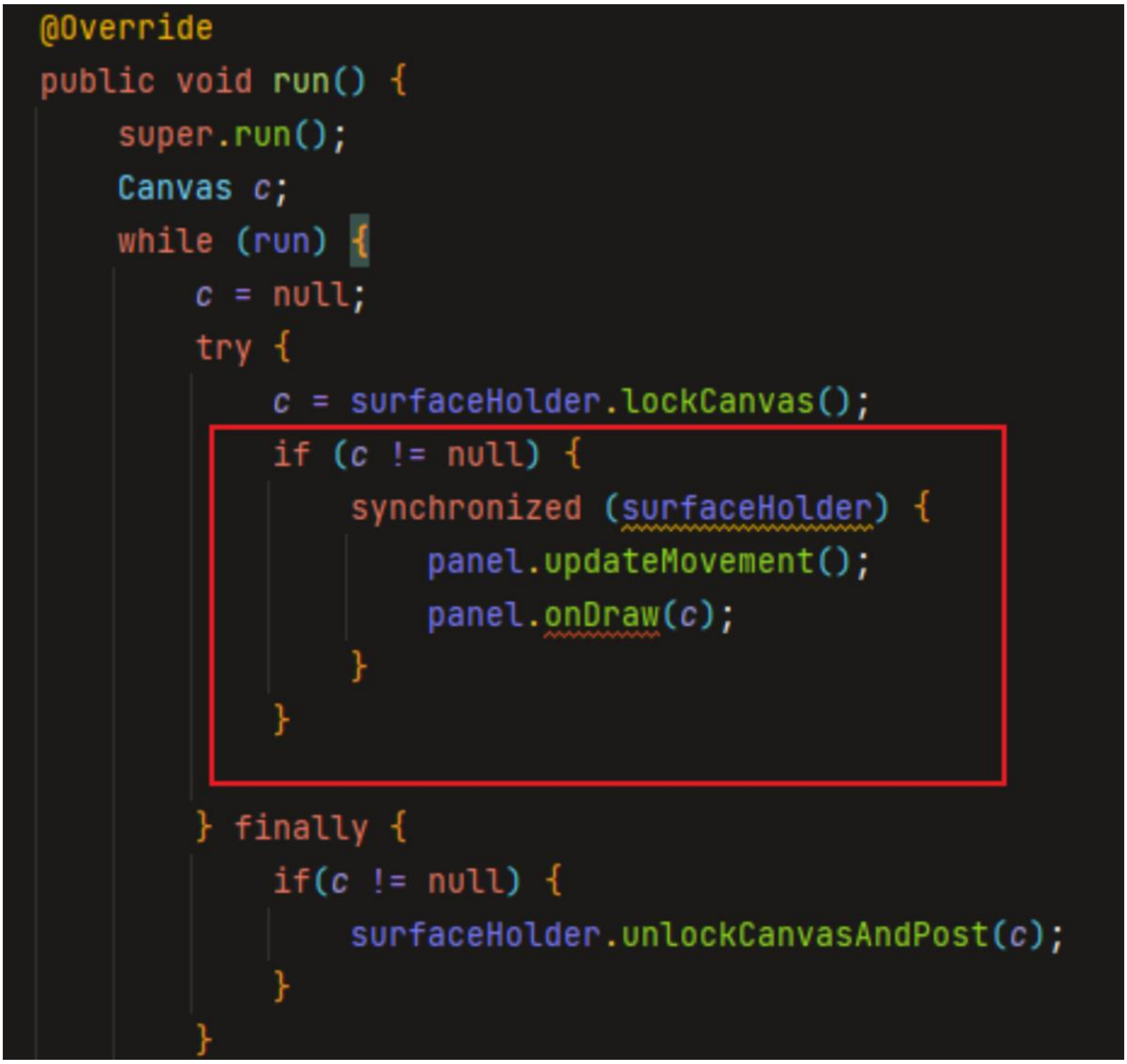
The reason is that the Canvas obtained during page hopping is empty



```java
    @Override
    public void run() {
        super.run();
        Canvas c;
        while (run) {
            c = null;
            try {
                c = surfaceHolder.lockCanvas();
                synchronized (surfaceHolder) {
                    panel.updateMovement();
                    panel.onDraw(c);
                }

            } finally {
                if(c != null) {
                    surfaceHolder.unlockCanvasAndPost(c);
                }
            }
        }
    }
    public SurfaceHolder getSurfaceHolder() { return surfaceHolder; }
}
```

So we make a change to determine whether it is null



```
@Override
public void run() {
    super.run();
    Canvas c;
    while (run) {
        c = null;
        try {
            c = surfaceHolder.lockCanvas();
            if (c != null) {
                synchronized (surfaceHolder) {
                    panel.updateMovement();
                    panel.onDraw(c);
                }
            }

        } finally {
            if(c != null) {
                surfaceHolder.unlockCanvasAndPost(c);
            }
        }
```

2. How to control the villain to move on the X and Y axis

The most difficult part of the menu page is how to control the villain in the X, Y axis unique. I'm going to use

The idea is as follows:

Listen to the OnTouchListener of the page, when the first UP event comes out, recognize that the finger has pressed down, record the current X and Y position coordinates, that is, after the end point, in the SurfaceView drawing thread, gradually increase the position of X axis from the initial position point. The added position of each frame is the set moving speed of the person divided by the FPS on the screen. After the person reaches the end point, it starts to move Y. The logic of moving Y is the same as that of moving X above.

Future developments

I plan to

1. The addition of a three-axis gyroscope sensor allows the person to move as the phone rotates
2. Add a random algorithm, randomly add a 50px*50px end point on the egg page for simple collision and overlap detection. When the little man enters the end range, fireworks will be sprayed on the page

References

Spirte Animation Part

https://examples.javacodegeeks.com/android/games/canvas/sprite-animation-in-android/
https://www.youtube.com/watch?v=WxkuDwJcq6M
https://stackoverflow.com/questions/28201187/w orking-with-sprite-sheet-animations-in-android

Sensor Part

https://developer.android.com/guide/topics/sensors/s ensors_motion?hl=zh-cn
https://stackoverflow.com/questions/7858759/an droid-type-linear-acceleration-sensor-what-does-it-show

Other Reference

https://www.geeksforgeeks.org/how-to-create-int erfaces-in-android-studio/
https://www.youtube.com/watch?v=UYPxgmTNoHs