**1.Brief introduction of this project:**
- I like the **Raiden**(雷电) game very much, I played several series of the game, especially at my childhood period. So I followed with a very small part of Raiden(雷电) game, my plane with bullet fighting with enemies as the basic model. I spent 3 weeks total around 45hrs.
- For this project which majority part is reference from bilibili of below 4 classes.
- And I tried my best to coding it as my own knowledge of MVC structure approach.

<Figure notes: screen shot from bilibili app>
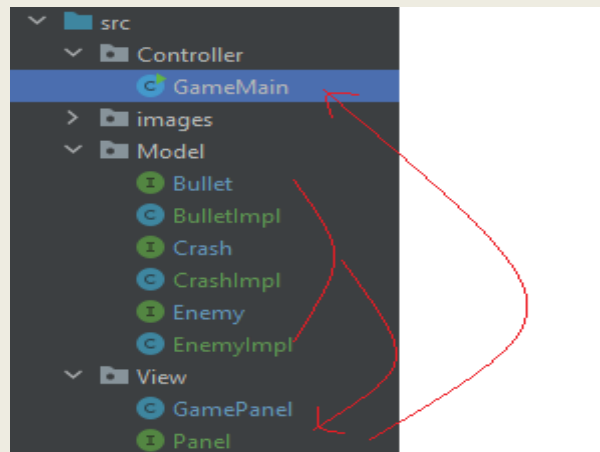
2.Quick demo on my game:
- 4 basics screens of game start, game running, game pause, game over.
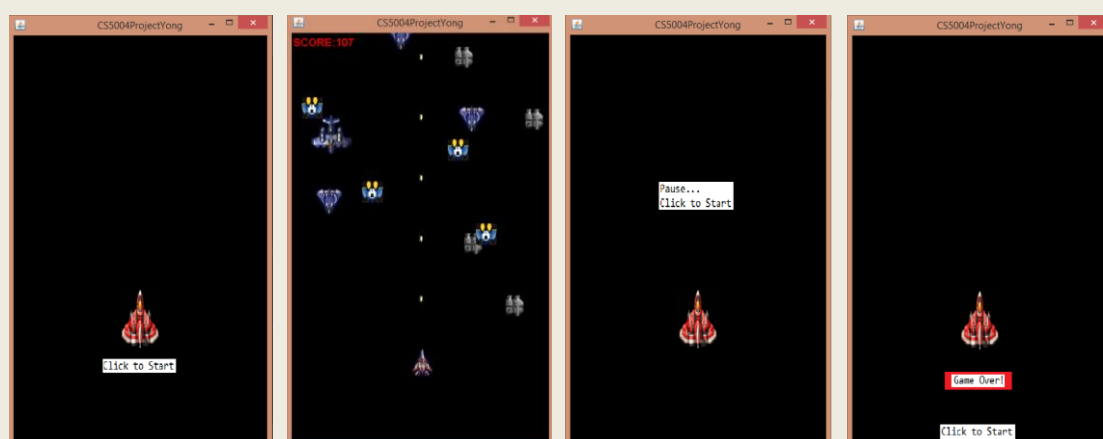
- Bullet and enemy moving, boom out and disappearing.
- My plane crash with correct conditions and visual accept.
- The mouse click and mouse movement design and effects.

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3.Codes quick go through:

● MVC approaching: Model → View → Controller.

● Model basics: Bullet and Enemy, and they disappear when crash.

```
// check bullet and enemy crash
public boolean Boom(Bullet z, Enemy d) {
    int zx, zy, dx, dy;
    boolean crash = false;

    //bullet location
    zx = z.getX();
    zy = z.getY();

    //enemy location
    dx = d.getX();
    dy = d.getY();

    if (zx-dx > 0 && zx-dx < 50 && zy - dy > 50 && zy - dy < 130) {
        //zx-dx>0 and <50, x touch;
        //zy - dy > 50 && zy - dy < 130, y touch.
        //and base on visible also can accept.
        crash = true; //if crash return true
    }
    return crash;
}
```

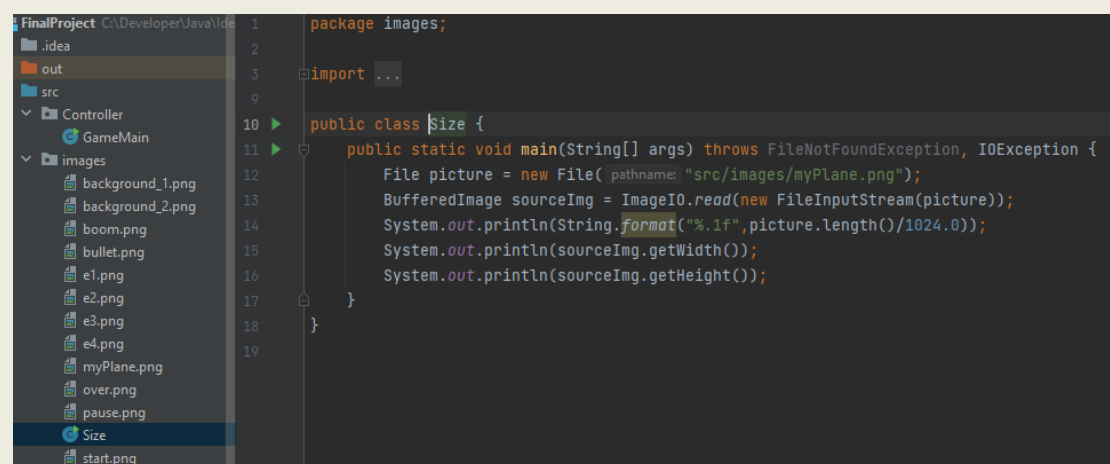● Model game over: my plane crash with enemy.

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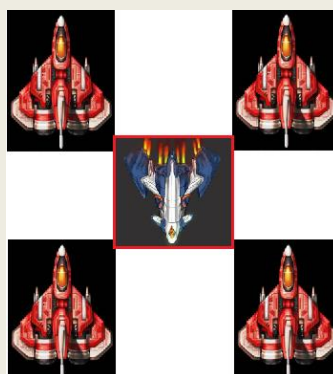
4.Improvement Opportunity:

● Location x, y offset and numbers hard coded. I manually check image size and make adjust.
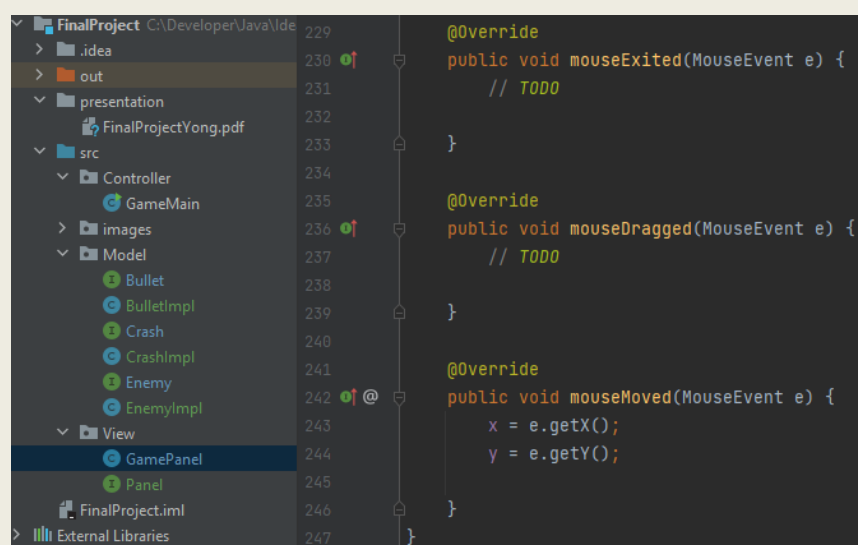
```
//my location with pic size offset to get the visual x,y of my plane
x = x - 25;
y = y - 60;
```

```
int x, y;
int offset1 = 13;
int offset2 = 50;
// use offset to adjust bullet image location to match with my plane center
```

```
Image hero = new ImageIcon(myPlane).getImage();
g.drawImage(hero, x: x - 25, y: y - 60, observer: null);  //draw my plane at upper of mouse location
```

```java
package images;

import ...

public class Size {
    public static void main(String[] args) throws FileNotFoundException, IOException {
        File picture = new File( pathname: "src/images/myPlane.png");
        BufferedImage sourceImg = ImageIO.read(new FileInputStream(picture));
        System.out.println(String.format("%.1f",picture.length()/1024.0));
        System.out.println(sourceImg.getWidth());
        System.out.println(sourceImg.getHeight());
    }
}
```

● GamePanel class got too long code with near 250 lines, which can have more improve.

```java
@Override
public void mouseExited(MouseEvent e) {
    // TODO

}

@Override
public void mouseDragged(MouseEvent e) {
    // TODO

}

@Override
public void mouseMoved(MouseEvent e) {
    x = e.getX();
    y = e.getY();

}
```

● Other features, eg sound, different enemy with different score, enemy bullet, etc.

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