STATEMENT OF DELIVERY

Room bug detector and killer

Statement of Original Work

I certify that the following used in the creation of this prototype are my own original work:

- Code found in Bug.cs and some code found in Room.cs
- Stage background color and camera settings

References for all external sources can be found on page X of this Document

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DECO2300 Studio 2 - Laura

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The concept

The concept of this project is to detect and alert user when there is a bug inside a room. Flying bugs such as mosquitos or creeping bugs such as spiders can be scary or annoying to the users. It is nearly impossible to live in such environments where there are no bugs. There will be some users, who do not care about living with bugs in their room, but there are large numbers of people who would hate to feel that they are living with a bug in a same room.

A detector will detect the bug with camera and sensor and will alarm the user with either sound or light. Users then will be able to locate the bug and flee from the room with bug until the bug leaves or try to catch/kill it.

The purpose of this testing round

The purpose of this testing round is to prove the hypothesis that has been set and see how users react to certain cases.

The hypothesis set are:

- People fear the bugs and don't want them in the same room
- People would want to know if there is a bug in their room
- People would want to kill the bug
- People would be alerted and look for bugs when alarmed

To find out and prove hypothesis, it was important to set questions that can answer the hypothesis and create prototype that can test all the questions.

As this prototype is for testing purposes, there will not be any gamification or game like interface, such as score. Also, there will not be any unnecessary graphics or sounds that will make the prototype look unrealistic.

The main aim of this prototype testing is to find out if the idea is actually helpful to the users and find any improvements from observation and interviews.

The form of the prototype

The prototype was built on Unity with graphics and C# coding.

First on a plane a rectangular room was built. Instead of placing other items inside the room, the room was left empty, so bugs could be easily spotted and any other furniture or object would not interfere with the user concentrating.

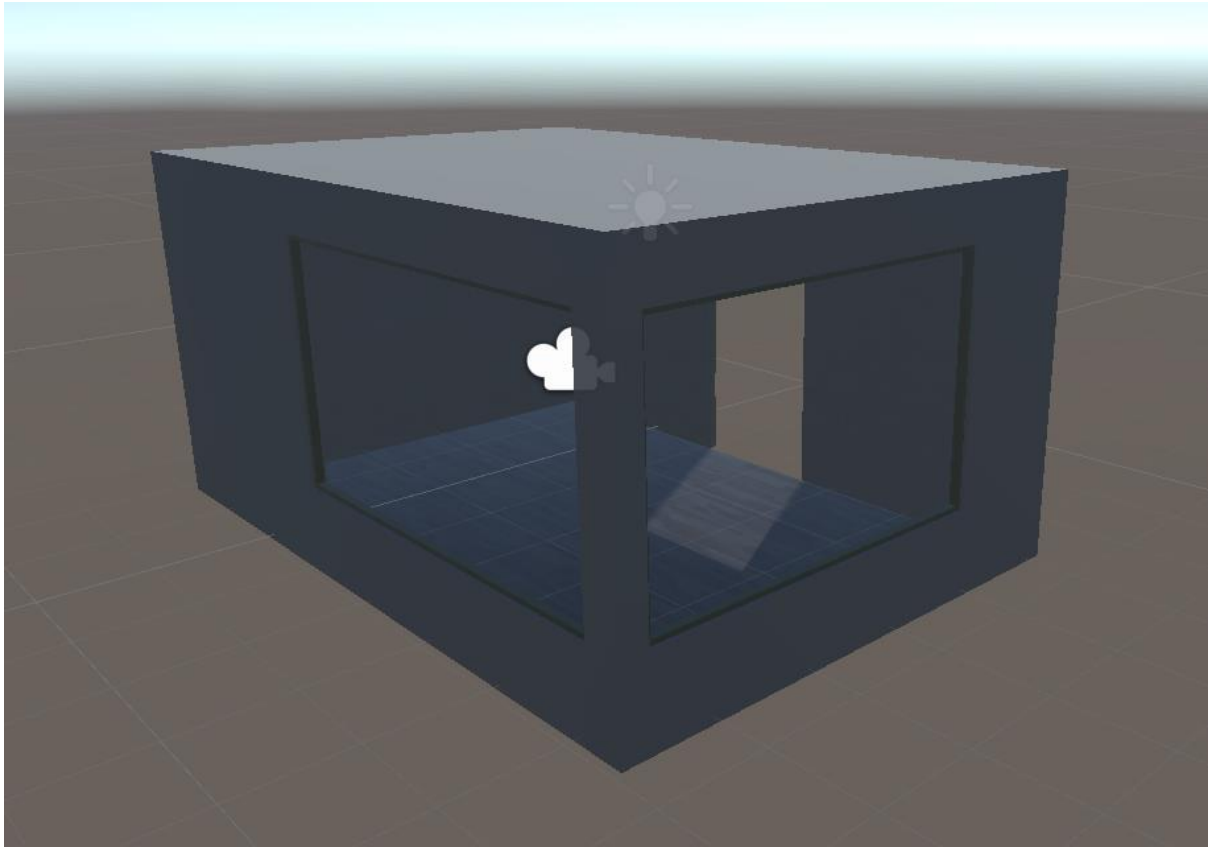

Image 1: Room where the test is held

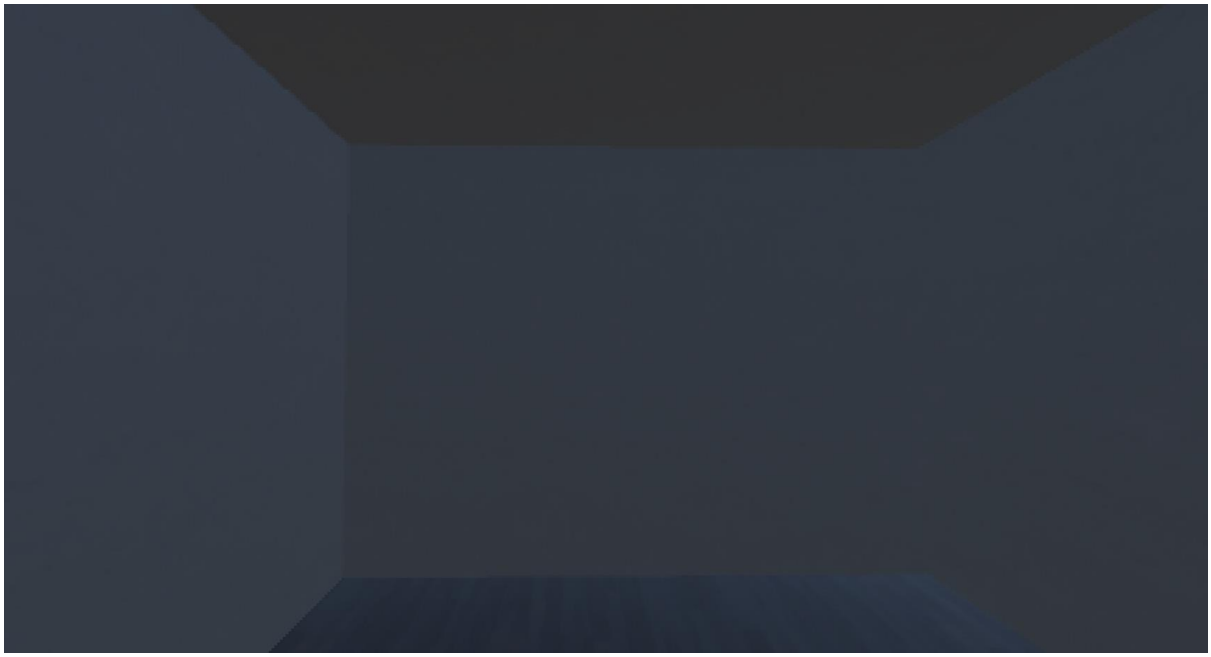

Image 2: How the room looks from inside

Then a spider was created as a bug that will crawl around the room.

Image 3: Spider from Unity Asset Store

The spider that has been created has been set as a prefab that will be randomly generated in random area and move randomly around the plane. This spider will be killed and removed once they have been clicked by mouse.

The camera acts as the user instead of making another object to be a user, as this is not a game and making the view first person will make the testing more realistic. Users can control the camera to go front and backwards and rotate left and right.

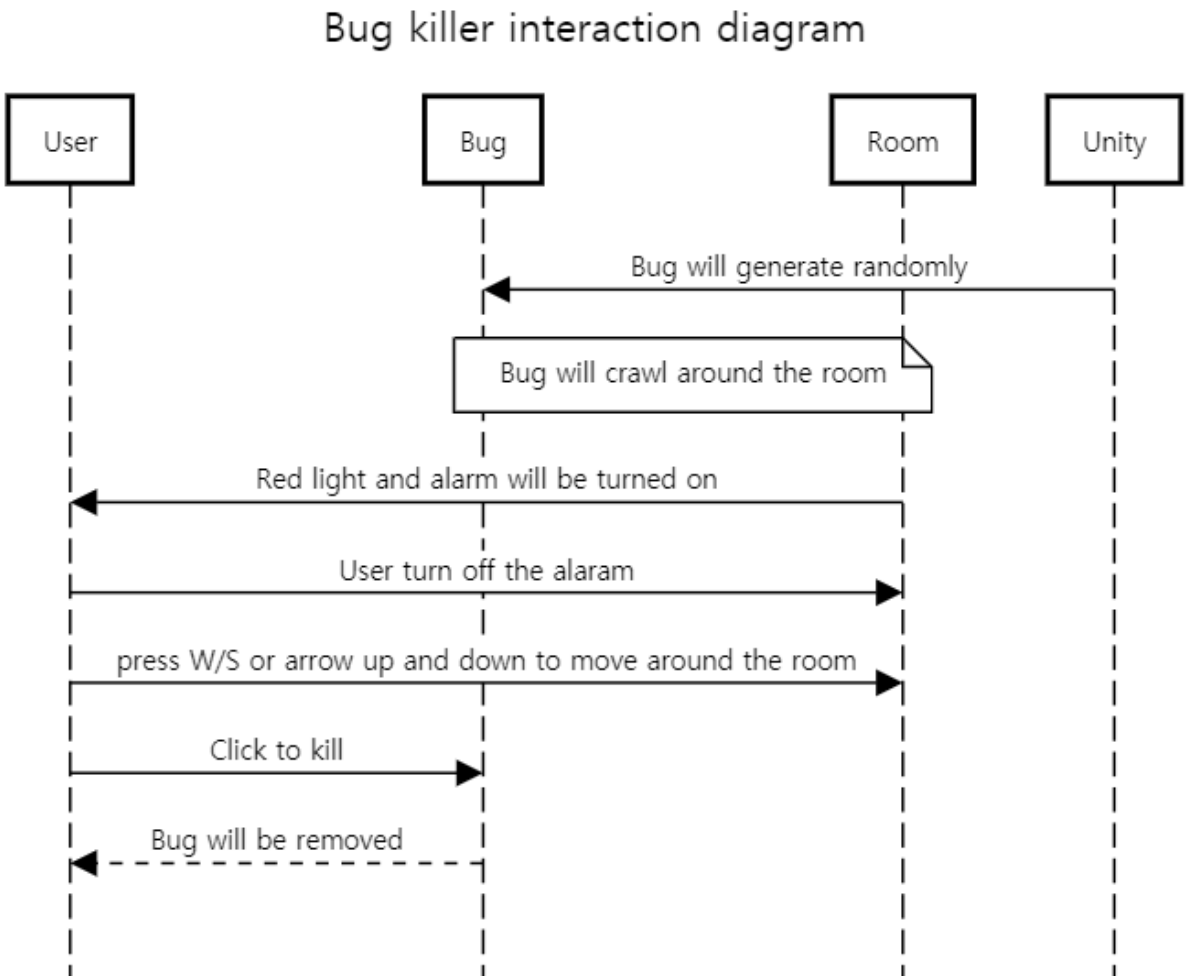

Image 4: Interaction Diagram of the prototype

As the game start unity will generate bugs randomly to the room. Once bugs are generated room will alert the user with red light and alarming noise. User will then turn off the alarm and press WASD or arrow key to move around the room to find the bug.

Once user finds the bug user will click to kill the bug.

The testing approaches

The testing was taken to observe the user's reaction and to receive feedbacks after the testing. Before the testing, users were explained about the purpose and information about the test. The manual to control the camera (user), killing the bug and turning the sound alarm off was given. Due to online conditions, users were tested through 'zoom' screen share with permission of control given to the users.

First for user to feel more realistic and closer to the actual testing, user's imagination was required. As this is simple prototype and does not have any VR/AR features applying user's imagination was the method chosen to make user's feel as if they were in the room. Users were introduced to the room and was told to stay calm and imagine as if they were inside that room. Users were told that they could be doing anything while waiting for the test to begin.

After a minute or two the prototype game was played by generating crawling bugs into the room. As the bugs are generated, the alarm will start to run with red light and alarming sound. Users will be able to act after this. As users were told that the alarm means that there is a bug in the room, users can go looking around the room to find the bug or leave the room. This was to see how users react to the alarm. Also, users could turn off the alarm if they wish to.

To observe properly and to prevent any mistakes, users were let to be in the room with randomly generating bugs for another half to one minute.

The key observations to be made during the test were:

1. How did user react when the alarm first started?
2. Did user approach to the bug or flee?
3. Did user kill the bug multiple times?
4. Did user turn off the alarm?

These observations are critical in the testing as this would show how users will react in such case and find out what users would do in such cases. This will help proving the hypothesis.

After the test completion users were interviewed with several questions.

The questions were:

1. How did you feel about the alarm?
2. How did you feel about the red light and alarming noise (separately)
3. Do you want to know if there is a bug inside your room? And do you want to be alarmed?
4. If yes, from your experience from the testing do you prefer light or noise or both?
5. Did you turn the alarm off? If you did, when did you turn it off?
6. Did you approach the bug and kill it? Or did you leave the room?
7. How do you normally catch the bug?
8. If you were given a tool to catch or kill the bug from a long distance safely, would you choose to use this?
9. The testing was conducted with crawling spider, but how would you feel differently with other types of bugs, such as fly, mosquito and cockroaches?
10. Any other comments to make?

These questions are asked as an interview after the observation, so not all the questions are needed to be asked and they don't have to be in any order.

These interviews will get deeper understanding of the user reactions that were observed and how user's felt.

Evaluation Outcomes & Reflection

From the observation, many participants reacted fast with the alarm and searched or wait for the bug to appear. Once they found the bug, they decided to approach closer to the bug and kill it. Only one test participant decided to flee from the bugs. Many of them did not turn the alarm off, even they were told that they can, and the method was given, none of the participants turned off the alarm as they seemed to wait for the alarm to turn off automatically.

After the observation, interview was held, and interview results gave more clear results. Many users have replied that they could understand what alarm was for and looked for bug right away. However, many of the participants was not fond of the alarm as they felt it was annoying and some even claimed that they had goosebumps. Even they were annoying, most of the participants replied that they would still want alarm or notification when there is a bug in the room. Participants preferred light over sound as they were less irritating. Some participants also suggested, if the sound and light were smoother and automatically turned off after a while, they would feel less stressed. Participants did like how they were being alarmed of the bug and felt they were useful and necessary. This shows that the alarming users is not the problem, but the rate and pitch should be improved.

Participants were also more scared and bothered with creeping bugs likes spider and cockroaches than flying bugs like mosquito. This suggests that there is less needed to focus on small flying bugs, but more focus on large creeping bugs when developing a bug detector.

All the participants agreed that they would use a tool if it provided user to kill/catch the bug from a distance instead of getting closer to the bug. Many participants claimed that they feared the bugs and wanted to keep a safe distance between them. The safe distance between the users would vary and can be tested in next prototype.

Testing Plan

In the next prototype, which is physical interaction prototype using Arduino, users will be tested more deeply on their physical reaction. The prototype in current stage is digital and does not include any physical interactions or activities. Some physical conditions of the user can be only observed and tested when the testing is performed physically.

With the Arduino, some testing that are planned to be taken are heartbeat, temperature sensor that can be attached to users to check how it changes when the alarm is run and when they face the bug. Also, the distance between the bug and user will be measured to find out how much is the safe distance that people feel between them and the bug. Also, user will be given a tool that can catch/kill the bug from a distance and see how user feel different when they have a tool or not. In this prototype, the rate and pitch of alarm can be tested again to find most suitable one.

After the physical prototype, dark horse prototype will be used to test the user. This time there will be some unrealistic ideas will be implemented and tested to see user's reaction. Such ideas controllable laser bug killer, or bug detector which can identify type of the bug will be developed and tested on users to how they react.

Miro Link

https://miro.com/app/board/o9J_l3Z7P24=/

Video Link

https://youtu.be/KGZO5K2mKHk

Appendix

Test Participant 1

Q: Please stay in the room for a minute.

Observations

After the alarm, user knew to find the bug, walked towards the bug and killed the bug in a close-range area.

Turn off the alarm right after finding the bug

Interview

Q: Why did you walk closer to the bug and kill it, instead of a distance away?

A: They feel scary but want to kill it in a closer area because it is more accurate.

Q: How did you feel about the alarm

A: Sound was annoying, makes me anxious, but helps me know to find bug, so ok.

Q: Do you want to be alarmed when there is a bug in the room?
A: Yes, little annoying but it's ok, because finding bug is more important.

Q: Alarm sound vs light or both

Both very annoying

Q: Scary creeping Spider & cockroaches vs harmful flying mosquito & fly

A: Prefer cockroaches. Mosquito/fly doesn't scare.

Q: Would use the item to kill the bug from far away.

A: Yes, would definitely want to use tool to kill without needing to go closer to the bug.

Test Participant 2

Q: Please stay in the room for a minute.

Observations

Left the room right after the bug appeared

Interview

Q: How did you feel about the alarm?

A: Had goosebumps and felt bit scared/nervous

Q: Why did you not kill the bug and left the room?

A: Move away and get someone to help instead killing itself

Q: Do you want to be alarmed when there is a bug in your room?

A: No, don't want to be alarmed until I notice in my eye.

Q: Alarm sound vs light or both

A: Anxious, both annoying and don't want to be alarmed.

Q: Scary creeping Spider & cockroaches vs harmful flying mosquito & fly

A: Small bugs, I will kill myself. Fly with fast speed can't kill.

Q: Would use the item to kill the bug from far away.

A: Would use the tool available to kill the bug from a safe place instead of running away.

Q: How did you feel in overall?

A: Bugs are creepy. Just want to stay away from them

Test Participant 3

Q: Please stay in the room for a minute.

Observations

After alarm user turned back and check the room and behind for bug.

Walked closer to the bug and killed the bug.

After more bug appeared, user moved back and killed from distance

Did not turn the alarm off

Interview

Q: How did you feel about the alarm?

A: Weird, anxious. Worrying. Alarm is useful to tell you that there is a bug.

Q: Sound and light

A: Both little too much and the rate is too fast. If the sound was little calm, it would have been better. (Smoother rate). If the alarm turn off automatically it would be better.

Q: Why did you kill the bug in a closer range first time and moved back and killed in a distance after?

A: Killed the bug in closer range to see the bug. Prefer to kill from the distance. Don't really want to touch the bug.

Q: Do you want to be alarmed

A: Think it's good. If the alarm is not too strong.

Q: Scary creeping Spider & cockroaches vs harmful flying mosquito & fly

A: Would do the same and go kill eat.

Q: Would use the item to kill the bug from far away.

A: Would use it, instead of what I normally use to kill

Q: What do you normally use to kill the bug?

A: Boxes, books, something flat and big normally, but would prefer using the item.

Q: How did you feel in overall?

A: Feel alarm is bit annoying and too much. Other than that it is useful and good

Test Participant 4

Q: Please stay in the room for a minute.

Observations

Walked towards the bug and killed the bug

Turned off the alarm right after killing the bug

Interview

Q: How did you feel about the alarm?

A: Good indicator that something concerning or bad is going to happen, so good and think need it.

Q: Alarm sound vs light or both

A: Would like to small warning instead of big, light was fine. Not too bright. Smooth sounds preferable. Not disturbing during work and sleep.

Q: Scary creeping Spider & cockroaches vs harmful flying mosquito & fly

Friendly bug, catch and leave, cockroach, spider run away.

Q: How do you normally catch the bug?

A: Catch – tissue. Kill – fly swatter. Flat object. Never use spray..

Would you use the item from far away.

Would use it. Boxes, books normally, but would prefer using the item.

Q: How did you feel in overall?

A: Feel alarm is bit annoying

References

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