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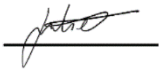
Signed: 

Date: 25/06/2021

Intention

This game was created to explore how physics in Unity could be used to manipulate a character and guide them through a series of levels in a way which is easily accessible to players. This will be done by using a simple clicking mechanic to interact with various environmental elements. The fact that this mechanic is simple will have the secondary effect of making this game accessible to many people. The interaction with the environmental elements will be reinforced with simple and clear communication.

Process

Through the implementation of a single level for playtesting purposes, several changes were made to the original project plan. These changes may be seen in Appendix A. Although it was specified in Task Scheduling in Appendix A that the communication design features were to be done after the level design features, it was realised that this would be challenging for playtesters and would negatively impact their perception of the prototype. In this way, several basic communication design features had to incorporated into a part of the level design iteration. This includes the clickable object highlights and particle effects to indicate when a vent is on. Other communication design features were left until after the level design as planned, such as the breakable wall communication and rat sprite. Furthermore, it was decided that instead of hit boxes which would make the rat change direction when confronted with a wall, the rotating platforms would perform this as a secondary function. Not only could they be rotated to open a passage or prevent the rat from running into water, but they could also make the rat turn around. The reason for this was so that more nuanced puzzles could be created. It was also realized that the fog of war would make the game frustrating. This is because vision is already impaired since the camera is attached to the rat and the rat is moving quickly. If the lighting were to be lowered, and a light source attached to the rat, this would decrease the player's vision so that they would find it difficult to react to the environment in time. Instead of three exits, this first prototype level only had two to see if this feature would be well received before time was spent adding a third. Thus, this first prototype was comprised of several vents both on and off which the player would have to interact with to propel the rat in a certain direction. The hit boxes on these vents were extended past the sprite in order to make them easier to click on. Furthermore, several spikes and traps were added, with traps appearing on the ground versus spikes appearing on walls or the roof of the tunnel. For the purpose of playtesting, the spikes were represented by yellow blocks and the traps were

represented by red blocks. One rotating platform (which was represented by a green block) and one breakable wall (represented by a grey block) were also added to this level. The purpose of this iteration was for the players to give feedback on the responsiveness of the mechanics, the physics as well as the general game concept.

After the first round of playtesting several changes were made to the project plan for the following reasons. In this section, references will be made to playtesting data from Playtesting Build 1 under Appendix B. The original concept was for the level to have a maze-like structure with multiple exits. These multiple exits were seen by several people as a nice feature, but ultimately unnecessary as they "lacked incentive to use them", according to Playtester 2. The idea that multiple exits did not necessarily add anything was mentioned by Playtester 1 and 5, with Playtester 5 saying they would prefer "one well designed puzzle path than multiple boring paths". Due to this feedback from Playtesters 1, 2 and 5, it was decided that it would be preferable to have a more linear level design with well-designed puzzles, rather than overreaching and potentially not having time to perfect each "branch" of the maze. Furthermore, what occurred through the playtesting of this prototype is that many who tested this level would take the easier route due to the difficulty of the path to the right. It was pointed out by several people (mentioned by Playtesters 6 and 7) that this second route was far too hard for the level, which was classified as "not an introductory level" by Playtester 3. For this reason, it was decided that this overly difficult route would be used in the third and final level. Another significant change which was made to the project plan is that traps were removed. Spikes and traps perform the same function, and therefore have the same code. This was recognized by Playtesters 3, 6 and 7, who did not understand why there were red and yellow blocks which performed the same function of destroying the rat. Therefore, the traps were removed and only spikes were used. These changes can be seen written in red in the project plan in Appendix A below.

Several other important changes were made to this prototype itself which were not specified in the project plan. A large problem with the first prototype was the ball speed, which added to the frustration of the game as it was too slow. This was mentioned in the playtesting data by Playtesters 2, 3, 4 and 7. In response to this I increased the maximum speed of the ball. This movement code came into effect when the ball was colliding with the floor, so not all elements of the game would speed up, but the ball itself would traverse platforms faster. In connection with this issue, there was the problem of checkpoints. Four out of seven Playtesters recommended that checkpoints be added due to the frustration of having to restart the level if

their rat died near the exit. Although this would have been somewhat improved by making the level design more linear, a checkpoint was added to the second and third levels. The introduction level was too short to justify a checkpoint.

As there was some confusion about how the level elements were presented, an introduction level was given to the player as level 1. As the ball (which represented the rat) approaches the interactable elements, the speed slows and a message appears telling the player what the level element is and how to interact with it. When the player interacts with the element, the ball speeds up to its regular speed. This was especially necessary as each level contained all types of interactable objects within the game. It was originally intended to introduce each level element introduced separately, with one being presented in each level. However, it is challenging to create complex puzzles using a single element. As a result, these elements were introduced to the player in the first level and are used in increasingly complex ways as the levels continue.

There were several issues present within feedback received regarding the second prototype. In this section, references will be made to playtesting data from Playtesting Build 2 under Appendix B. There was some uncertainty regarding the physics related to the rotating platforms by Playtester 1 and 3. Although I believed how these platforms worked was made fairly clear through level design, the fact that they flipped the direction of the sprite may have been difficult to see in the prototypes, as the rat was represented by a ball. With the addition of a rat sprite, the player would be able to clearly see in which direction the rat is running and this would aid the player in reacting to the game. Furthermore, Playtester 3 and 6 suggested the addition of a checkpoint symbol. Therefore, in order to make the player aware that they have reached a check point, there is a green flag which will disappear when collided with. This has the secondary function of giving a player the satisfaction that they have made progress within the level. In order to complete the communication segment of the project plan, simple art assets were added to this game. As mentioned above, the rat aids the player in understanding precisely which direction it will be running. Furthermore, the cracks of the breakable walls were also added. As the player clicks, more cracks appear which helps the player know if their clicks have registered, and how many times they will still need to click the wall before it breaks. Lastly, the red blocks representing spikes were replaced with white spikes with red blood on the tips. This red was included so that the spikes would stand out as dangerous objects and so that they could be seen quickly.

There were several dreams which were detailed in the project plan that were unable to be realised as a result of the large amount of time which had to be allocated to level design. These include sound design, a soundtrack, animated sprites and detailed artwork. However, in order to make the game as easy to react to as possible, as twitch skills are relied heavily on, the artwork was kept minimalistic.

Reflection

Although the playtesting and feedback process was successful in exposing many issues with this game, there were ways in which this could have been improved. For example, the set of questions presented to the playtesters during the first playtesting session were the same as the questions given during the second playtesting session, with only a question on difficulty being added. As only two playtesters from the second playtesting session had not seen the game before, this made these questions redundant. This can be seen as far less information was received from the second playtesting session. Furthermore, it would have been beneficial to include at least four people who had not played the game before in the second playtesting session. Although it was helpful to see if the issues identified by the first set of playtesters had been rectified, two new playtesters was not enough to gain an understanding of how the game felt to those who had never encountered it before. This would have also been useful in determining whether the introduction level explained the environmental interaction well enough, as those who had played it before already knew how this worked.

In hindsight it may have been problematic to take interactable objects away such as the trap instead of differentiating it and keeping it in the game. For example, it could have been incorporated as a trap which the player had to click to disable in time. This would have made it easier to find new ways of arranging the environmental objects and would have provided new challenges for the player.

Overall, the goals outlined in the intention have been successfully met in several ways. The clicking mechanic has generally been viewed positively by playtesters, and several changes have been made to make clicking on objects easier, such as increasing the size of the hit boxes on the vents. In terms of accessibility, all the playtesters seemed to have been able to engage and complete the levels of the second prototype with a positive outlook on the overall experience. This accessibility has been accentuated by the communication, which has been developed throughout the iteration process to make interacting with the game feel responsive.

Appendix A – Updated Project Plan

Updated Project Plan

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Introduction

Rat Run will be a real-time 2D puzzle platformer where the player manipulates a rat's surroundings in order to guide the rat through a maze of tunnels to an exit. The idea of environmental manipulation was inspired by *Where's My Water?* (2011, Disney Interactive Studios). The player will need to click interactable objects within the environment to ensure the rat stays out of harm's way whilst on its path. As the player is unable to control the rat directly, the rat will continue moving in its designated direction unless its path is obstructed by an environment object. Interactable objects will be shown to the player using clear dynamic feedback as the player mouses over objects. This clicking mechanic is simple so that the player is able to focus on the puzzles of the level rather than how to interact with the level elements. Furthermore, this makes the game accessible to many people as this mechanic is not overly difficult to understand but challenging to execute correctly. As an increasing number of items must be interacted with as the levels increase, an increasing level of challenge is provided. Production will start on the 24th of May and will end on the 25th of June.

Design Methodology

We chose the iterative agile methodology because the ADTC method (analysis, design, code, test) is best suited for our team, as the team aims to:

A - Analyse and collaborate different objectives for each iteration, ensuring that each idea and approach is discussed.

D - Design through iteration, iterating multiple design aspects of the game such as level design and user-interface design to provide the clearest design goals.

C - Coding through iterations to ensure that the most efficient code is utilized within the project, that allows for easy expansions within the code for future iterations.

T - Testing each iteration to ensure that each change is tested thoroughly and problems are identified quickly.

Feature List

Task	Scope (in hours)	Design Element/Iteration
Core mechanics: • Physics and forces applied to the rat, including movement. • Non-interactable threats which kill the rat – water and spikes the rat must avoid. • Interactable objects – breakable walls, climbable walls, air vents (applies directional force to rat) and rotating platforms used to guide rat.	7	Basic Design Features
Overall Level design: • Multiple levels increasing in difficulty. • A tunnel system with single end point.	6	Level Design Features
Level design for objects: • Placement of non-interactable threats. • Placement of interactable objects.	5	Level Design Features
Art assets: • Rat sprites and animations. • Interactable object art assets. • Non-interactable art assets. • Threat art assets. • Environment art assets.	7	Communication Design Features
Interactable objects: • Clickable objects indicated when player's mouse hovers over them. • Increasing number of cracks as the player clicks the breakable walls to better communicate damage done to wall. • Air vent particle effects showing the direction of airflow.	5	Communication Design Features
Polish: • User-interface such as mouse over icon.	3	Communication Design Features
Negative feedback loop: • Levels get progressively more difficult as the player goes on.	2	Feedback Loops

Task Breakdown

Needs

- Impactful non-interactable threats and dynamic interactable objects.
- Physics and forces applied to the rat.
- Rat movement and direction changes when confronted with a rotating platform.
- A single level tunnel system.
- Clickable objects communicated to the player when they are moused over.
- Simple assets communicating different objects.

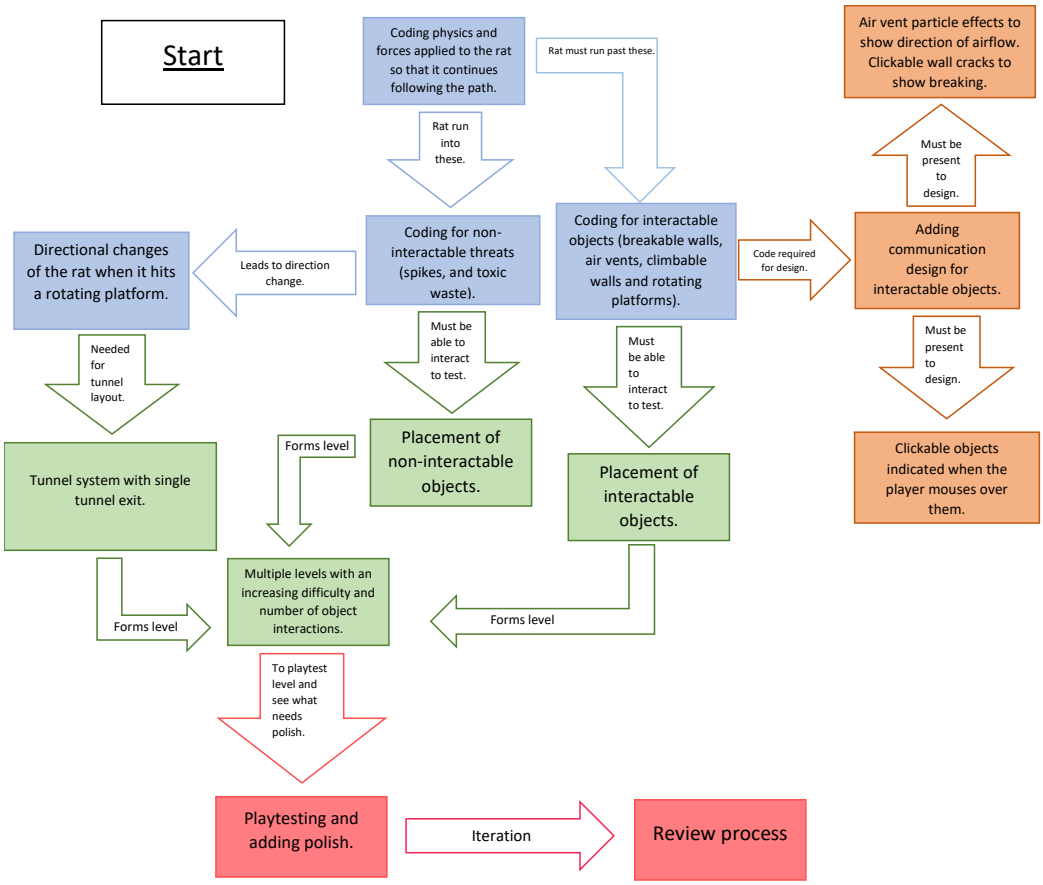
Wants

- Breakable wall cracks when clicked.
- Vent particle effects showing direction of airflow.
- Multiple levels with scaling difficulty.

Dreams

- Sound design.
- Soundtrack.
- Animated sprites.
- Detailed environment artwork.

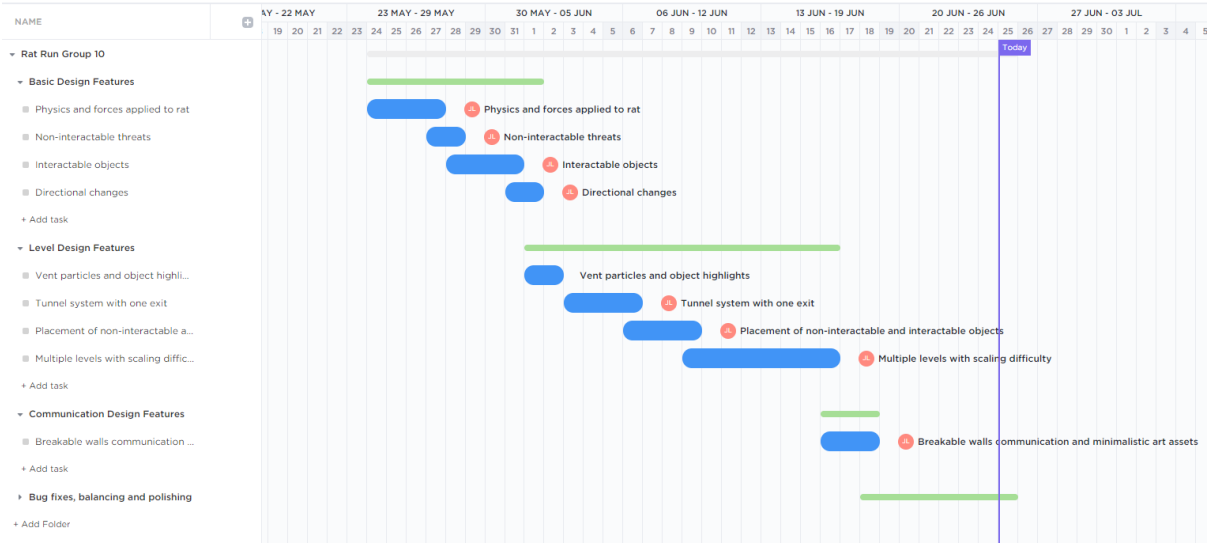
Dependencies



Requirements

- Software:
  - Made using Unity and Microsoft Visual Studio
  - Krita
  - Github
- Technology:
  - Wacom Intuos S drawing tablets
  - Hardware that is compatible with Unity and Microsoft Visual Studio

Task Scheduling



As each member of the group will be completing this project individually, all tasks will be assigned to each person. This can be seen in this linear schedule as a single person will only be able to work on one task at a time. The last week may also act as a buffer to prevent risks such as illness impacting the game.

Risks and Management

Risks	Level of Risk	Management
Technical Difficulties such as corrupted files or stolen property.	Medium	Backing up of files Github.
Loadshedding	High	Plan in advance to our best ability and work when there is no scheduled loadshedding. Acquire funding for backup generator.
WiFi problems	Medium	An extra week provided before submission (Bug fixes, balancing and polishing).
Covid and sickness	Medium	An extra week provided before submission. We will work from home.

Milestones

- Due 1 June – Basic Design Deliverable: Implement basic features of the game regarding rat movement and object manipulation.
- Due 16 June – Level Design Deliverable: The creation of appropriately scaled and replayable levels with careful placement of environment objects to facilitate learning. Basic communication elements will be included.
- Due 18 June – Communication Design Deliverable: Implement simple and effective feedback which clearly communicates how interactable objects function.
- Due 25 June – Final Deliverable: Implementation of final bug fixes, balancing and polishing.

References

Where's My Water? (2011). Android/ Microsoft Windows [Computer game]. Disney Interactive Studios: Burbank, CA.

Wilson, F. (2018). *What Is the Agile Iterative Approach and Where Is It Used?*. Available at: https://www.ntaskmanager.com/blog/what-is-agile-iterative-approach/#:~:text=The%20iterative%20strategy%20is%20the,time%20known%20as%20a%20timebox (Accessed: 23 June 2021).

Appendix B - Playtesting Data

Notable information suggesting changes is highlighted in yellow. This information and the changes made to rectify these issues will be discussed in the above reflective essay. Playtesters are listed by number for ease of reference in the above essay, with the people's numbers in the second playtesting phase corresponding to those in the first.

Playtesting Build 1

1. Rate prototype out of 10.
2. Is it fun?
3. Why is it fun/not fun?
4. How long is the game?
5. Please describe it to someone who hasn't played it before.
6. Additional comments/suggestions.

Playtester 1

1. 9 out of 10 - it clearly communicates all the main mechanics and has some spicy air current particles - I like those.
2. I will admit, at first I was bloody confused, but after a few runs, I got the hang of things so it was fun.
3. There is a nice level of tension because of how narrowly the rat boi dodges the obstacles - which is enhanced by the fact that you cannot control rat boi in terms of his speed, you can only poke around the environment. I will say it was a little frustrating because some of the air currents need to be timed perfectly (so like the last air current before the end), and having to play through the entire level because of that one jump can be a littttttle bit annoying. I was going to suggest perhaps adding some kind of checkpoint, but then the level ended, so there may not be a need for one. Long levels though, may benefit from a checkpoint of sorts.
4. It took me a few minutes to actually succeed in playing it, coz I kept messing up timings - but a successful run was about 1 minute or less.
5. You have a ball that is a rat - and it will keep running in a certain direction. The goal is to guide the rat through the level without getting it killed on obstacles and dangerous water, by interacting with platforms and air currents - environment stuff. If you collide with dangerous things, you die and have to restart. The level ends once you get the rat to the end.
6. For a finished game, I would have appreciated like a how to play or a "click to start". To combat the frustration of dying near the end you could have many shorter levels. One of the directions (with multiple timed jumps) is much more difficult than the other. The fact that there were multiple routes to the exit did not take away or add anything to the game. It seemed to just be 'there'. Your game has a very good build up of tension.

Playtester 2

1. 6.5/10
2. Yes
3. It's got a level of precision platforming to it but the pace of the ball can ruin the fun. Speed the ball up a bit but still let the player be able to change the environment in due time. It's also enjoyable from the tension built in trying to evade the obstacles.
4. About a minute/minute and a half.
5. Maze with attitude. A bit slow but could work.
6. Multiple ends increase replayability but so far, I lack incentive to use them. Hardness currently 7/10.

Playtester 3

1. 6/10, needs more direction and decrease difficulty.
2. to an extent, it got frustrating quite fast.
3. Effects were cool and physics were engaging
4. Very long, took long to win
5. Geometry dash but you control the vents that push the ball around.
6. Create checkpoints. It should be easier, and much faster. 7/10 difficulty. Work on communication design (breakable walls). Liked split directions. Not an introductory level, which was the cause of the frustration. Why were there yellow and red boxes which did the same thing?

Playtester 4

1. As a prototype I would rate it as an 8 out of 10. I found the game fun and I find the game mechanics interesting, but I feel like there could be more done to tell you what you can click on because you cannot control the movement of the ball.
2. Yes it is fun 8 out of 10 again. I enjoy the stakes involved with needing to think quickly.
3. I like the stakes and needing to think quick. Could be a challenge mode where the ball moves faster.
4. The level is quite short but is acceptable as a first or tutorial level.
5. A puzzle game where you are needing to make quick decisions to save the ball from certain death.
6. Hardness out of 10 is a 2 or 1. Forcefield show up for particle effect so that there is not a delay.

Playtester 5

1. 5/10
2. Yeees
3. Because the little rat boi is fun to manipulate.
4. Very very short.
5. You get to choose a path to the ending by manipulating a rat via force field generators.
6. The game was pretty cool, I like it a lot. The only real criticism is that it's very finicky. I also feel like it's very easy in the sense there is no puzzle solving and only 1 mechanic. So it's very boring in that sense but otherwise I really like it. I don't think you should

speed it up because of how blind you are during the run. If you wanted to speed it up I think you should make a stationary zoomed out camera so that your mouse can be stabilised, the controls would be smoother since you wouldn't have to annoyingly adjust your aim all the time to the movement of the camera which is what I meant about finicky. I like the idea that there are multiple paths to the ending. The only gripe I have with that is that there is no unique challenge to each of them. I'd prefer one well designed puzzle path than multiple boring paths.

Playtester 6

1. 7/10
2. Yes
3. Really intriguing concept that definitely surprises the first time.
4. Beating it the first time was relatively easy and satisfying, trying to beat the right path was impossible, I really wanted to be able to try the difficult jumps again much quicker. I gave up because of the time it took to get to that point to try again.
5. You lead a rat you don't control through a series of challenges, clicking on things to change their state.
6. Add a checkpoint pls so I can beat it fully. Difficulty maybe like 6 or 7 out of 10. It's like the left path is the perfect satisfying challenge, while the right is too much for how long it takes to get to. Not actually sure if the ball should be sped up, maybe a bit, but not way too fast. Also what is up with the color being different on different blocks that kill you. Consistency.

Playtester 7

1. The prototype was grand man I'd give it an 8.
2. Yes I'd say the prototype is fun (challenging).
3. The platforming frustrated me, but I was still engaged. I think what frustrated me was the time it took for the player to get to the platforming point again (which is why I said I felt the movement was a bit slow, but that camera movement is tricky, so it's understandable).
4. It took me like 1-2 minutes to reach the exit on the bottom left.
5. The game is a platformer where you guide the to an exit, by controlling the environment.
6. I'm assuming both the red and yellow blocks are traps? (I was a bit confused at a first, I assumed the yellow block wasn't harmful, however, I realise this is a prototype so that will probably change). The air vents and their functionality are expressed pretty well. The platforming section where the player has to switch off the air vents at a specific point facilitates an opportunity for the player to develop a level of twitch skill which is great, however, I would say that the moving camera made it a bit difficult to turn the air vents off. (I would recommend making the vents slightly bigger so they are easier to click or slightly increasing the space between the air vent and the trap to accommodate for the camera movement).

At the moment it is a little unclear what the player should do when they come across the breakable object (I'm pretty sure it's still a prototype and will possibly be clearer when you hand in, I thought I should mention it anyway.)

At the moment it isn't really clear that there are multiple endpoints (Haha I'm assuming there are multiple I wasn't able to get past that platforming part) A visual indicator of the different areas the player can head towards would help (but then again this might not align with your own goals for the game).

The placement of that red trap at the beginning was great! When the player passes it, it is always by a slight margin which creates tension great stuff. I would say the movement of the player is a bit slow right now, but then again that might be aimed at mitigating the camera following the player.

The frustration came in when you had to restart because you died, and then the ball movement speed felt slow

Playtesting Build 2

1. Rate prototype out of 10.
2. Is it fun?
3. Why is it fun/not fun?
4. How long is the game?
5. Please describe it to someone who hasn't played it before.
6. Please rate the difficulty out of 10.
7. Additional comments/suggestions.

Playtester 1

1. 8 out of 10
2. pretty fun
3. Good amount of tension and thank you for the checkpoint! However, I am somewhat confused about the physics surrounding the green rotating block... coz at times the ball will change its course as it is going past that block?
4. About 6 minutes.
5. You are tasked with guiding a ball to the end, by manipulating the environment i.e wind currents, rotating blocks and disappearing blocks. Touching red blocks or water is instant death.
6. Okay I died about 1-2 times in each level, so about a 7 out of 10 difficulty.
7. Also lovely tutorial thank you. Only other suggestion I have is perhaps adding something to the breaking block to communicate that it is breaking.

Playtester 2

1. 7
2. Yes it is fun.

3. The improvements have an added level of tension and the easier learning curve allows me to get into and enjoy the game a lot more while increasing the tension.
4. Around 5-10 minutes.
5. A runner where you affect the environment and not the player.
6. Level 1 is a nice 2. Level 2 is about 5-6. Level 3 is a solid 8.
7. NA

Playtester 3

1. 7
2. Yesss I want more.
3. The different interactable objects that you can control are great!
4. 4 mins?
5. Controlling environmental elements while infinitely running.
6. 1- like a 1/10; 2- 3/10; 3- 6.5/10.
7. There was some confusion with the green block and was slightly off putting. Could highlight the fact that there were checkpoints. Tutorial was cool.

Playtester 4

1. 8/10 still
2. Yes indeed it is fun. I enjoyed the game very much.
3. It is fun because there is a need to think and act fast when you fist load into a level and even if you don't get it on your fist try you have check points that make it not as frustrating.
4. The game is pretty short with only 3 levels. In the release I would expect less 30 levels or so.
5. A puzzle game where you are needing to make quick decisions to save the ball from certain death.
6. Level 1: 0/10 - super easy. Level 2: 2/10 - pretty easy but provided more of a challenge than the first level. Level 3: 5/10 - the steps part of the level I died a couple of times.
7. N/A

Playtester 5

1. 6
2. Yes
3. It is satisfying to control the rat but the controls are still a bit finicky.
4. about 5-6 minutes
5. A game where you control force fields to try and manipulate a panicked rat to safety.
6. I'd say they are all about a 5, the last one is maybe a 6.
7. Oh wow I really like how you changed your game. It's pretty cool. It could use some more puzzle solving, but otherwise it is a massive improvement.

Playtester 6

1. 8
2. Yes, definitely
3. It mixes calm moment of puzzle with some really good intense reflex action, feels quite varied but not disparate.
4. Took me like five to seven minutes.
5. You guide a ball through a platformer level by turning on and off various objects, which let it pass obstacles.
6. 1:4. 2:5 3:7 (bit of a difficulty jump in the last level, but not too bad with the checkpoint).
7. The checkpoint should be visualized with a flag or something, would make it nicer.

Playtester 8

1. 8
2. It is very fun and engaging.
3. It was fun because it was cool to see how the ball reacted to the physics objects around it and I liked how there was a lot of twitch skill involved in making sure the ball gets to the end of the level.
4. It took me 12 mins to complete the levels
5. A kind of physics simulator game where you have to control various physics objects to move a ball along a set path where obstacles stand in the way of you getting to the end that you have to navigate through
6. Level 1: 2/10
   Level 2: 4/10
   Level 3: 8/10
7. I got frustrated when I kept respawning at the one spot in the level as I felt like I didn't have enough time to figure out how to control the vents as the ball kept moving, I think that every time the ball respawns you should reset the vents to off so that the player knows that the vents are off and the should turn them on every time they respawn.

Playtester 9

1. 7
2. Very!
3. Its rather challenging and I think the concept is quite interesting, where it's like a puzzle platformer game but it requires reflexes or good timing.
4. Quite short, maybe a few more levels would benefit the game and would really show off the concept and gameplay mechanics more.
5. You have to help a rolling ball reach the end of the level by manipulating physics on specific objects.
6. The first level was not too hard since it was the tutorial, maybe a 2/10 since I admittedly died once or twice before I had completely figured out the controls; Level 2 was a little bit harder but not too much and I could get by a few sections just by guessing what to do on impulse before getting there - 4 or 5 out of 10; the third level is a lot harder, especially the final section where you have to time turning on the vents perfectly - 7 or 8 out of 10.

7. No issues with the green rotating platform. There was that one section in level 3 where you have to turn the vent on at the right time to shoot the ball right and I wasn't sure if the green platform had to be up or sideways for it work. Tutorial is fine as is.