FLAPPY BIRD: Voice Interactive Visual Programming Game

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1 Abstract

Different types of interaction designs in game development are increasingly explored nowadays. Flappy Bird game is a voice interactive visual programming game, in which the player navigates/controls the bird with their voice pitch to avoid the obstacles/pipes and gain a score for each successful avoidance.

2 Introduction - Problem Statement

Flappy bird - a voice interactive game using visual programming language is an attempt to explore the visual programming features for game development. The user/player controls the bird's movement with their voice/pitch, and the bird starts navigating through obstacles to reach the maximum score possible. We set out to implement the voice interactive flappy bird game in the visual programming tool called Max version 8. Along the development of the project, we also encountered some roadblocks such as scrolling background, collision detection, gravity mechanics, and rotated pipes. We solved the problems of scrolling background by using a '.gif' file. Collision detection by making sure the synchronous detection of collision on either side of the pipes and score counting, and for the gravity mechanics by making the bird fall after the collision with the pipe, and for the rotated pipes we used the rotated pipe image.

3 Background

Research paper by Zargham et al. [2022] depicts an anticipatory error handling using voice-controlled game. Game would perform in a locally optimized action with respect to goal completion and obstacle avoidance, when a command is not recognized. In flappy bird game we calculate the collision few milliseconds before bird actually reaches to the horizontal position as of the pipe's. This also helps in synchronized score counter increment. Voice interaction has depicted certain challenges in achieving the accuracy. Some of the limitations include, the awkwardness that players feel while interacting with the system and inaccurate voice recognition. The paper Allison et al. [2018] has researched on common approaches game makers take to address the voice controlled game design challenges. To justify the high pitch sound, we have implemented a pitch bar visualization to make the voice interaction more transparent to enhance the user's experience. The feature of procedural generated pipes/obstacles ensures the pipe scaling and positioning in such a way, that they are always avoidable to win the game.

4 Design

The main inspiration for the design of voice interactive flappy bird game is the original arcade style of the flappy bird game. We did not want to lose any important aspects of the design and went

with the original arcade style of the game. Research paper Allison et al. [2018] explores the different design patterns of voice interaction. These design patterns are used to change the game control and actions. We use the idea of using voice pitch constantly to keep the bird up in air to avoid obstacles. We implemented our game in a visual programming language called Max version 8 installed on our own personal computers. The players/users will be able to interact with the bird to navigate it through the pipes by using their voice/pitch and gain a score every time they avoid the pipes. The experience for the users/players will be exemplary as there have not been many voice interactive games in the real world. The envisioned components of the system include following:

- Flapping Bird – a bird sprite made to look like the bird flaps its wings.
- Procedural Pipe Sprites – moving and randomly placed pipes so that the bird has some space to move.
- Jump/Gravity Mechanics – bird jumps with the players voice/pitch.
- Background – a background which scrolls along when the bird is moving.
- Score Counter – a score counter to keep track of the score when it succesfully avoids the pipe.
- Audio Pitch Control – an accurate voice control by the players/users voice input to make the bird avoid the pipes to gain a score.

Our design has evolved, as we have added a visually appealing pitch visualizer to let the users/players know how high their pitch tone is crossing the threshold to make the bird avoid the pipes. We tried different approaches for some system components which helped us pave the way for achieving a successful voice interactive game while successfully solving the roadblocks.

5 Evaluation

The evaluation of voice interactive flappy bird game were conducted for the following components:

- Audio Input : To make the smooth navigation of bird for avoiding the obstacle. We used filters and peak amp calculation on the audio input for this purpose. It is able to avoid the background noise till some extent. The implementation can be seen in 1. However, more optimized filter values can be discovered in order to make this smooth navigation more reliable.

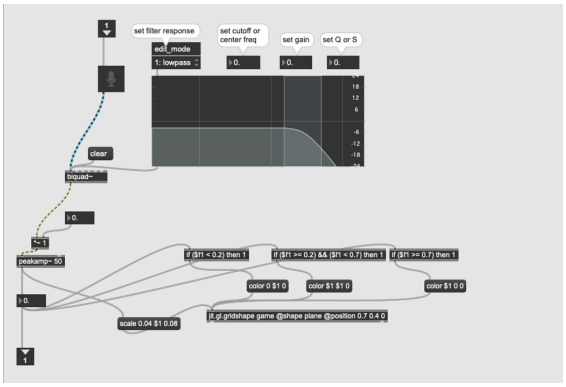

Figure 1: audio input

- Procedural pipe sprites : In the first implementation of obstacles. We used random size/position of the pipes. We found that the random size of pipes made game unplayable sometimes. We kept size of pipes to be random but not in a way that the game becomes unplayable. We decided to use the random size but in some limits of game window size, referred from 2. The idea of procedural generated pipes was implemented successfully.

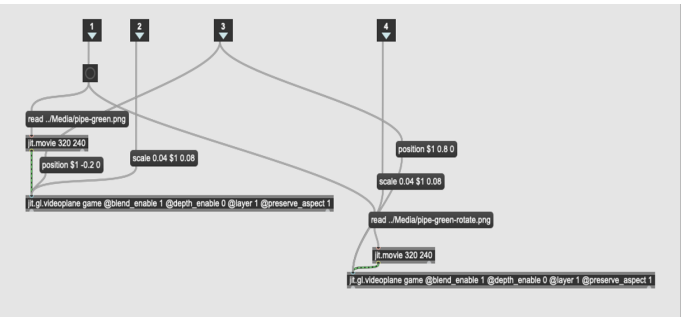

Figure 2: procedural pipes

- Score Counter : We are using score sprites to show the gained score to users. We have implemented only 0-9 scores in the flappy bird game as displayed in 3. We tried to use different ways of implementing the larger counts, which seem to need the more lines of code than expected. Hence, we resisted to implement it in this version of flappy bird. However, the score counter still incomplete and needs to be finished in more better way.

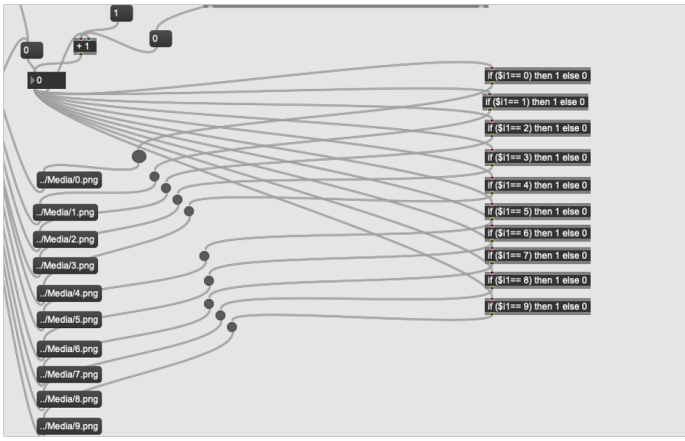

Figure 3: score counter

6 Implications for Design – Discussion

Voice interaction based game design is increasingly explored nowadays. However, Some of the limitations include, the awkwardness that players feel while interacting with the system and inaccurate navigation due to presence of multiple noise in the room. Instead of using physics body and man-

ually created objects, we used the flappy bird sprites. The sprites helped us in implementing the visual close to the real game. Using flappy bird sprites reduced our total implementation time.

7 Conclusion

Flappy bird game was originally developed with gesture interaction to navigate the bird. The voice interaction based flappy bird game provided us insights of using voice pitch in game control. It also helped us in understanding the challenges in using the voice interaction in game. For example, immediate fluctuation in bird position for small changes in pitch and background noise. We also learned, how the feedback of listening audio can help user in getting more confidence of playing the game correctly.

8 Future Work

In future work, we intend to implement the sound effects in the flappy bird game and improve the audio control to avoid background noise accurately.

References

Fraser Allison, Marcus Carter, Martin Gibbs, and Wally Smith. Design patterns for voice interaction in games. In *Proceedings of the 2018 Annual Symposium on Computer-Human Interaction in Play*, pages 5–17, 2018.

Nima Zargham, Johannes Pfau, Tobias Schnackenberg, and Rainer Malaka. "i didn't catch that, but i'll try my best": Anticipatory error handling in a voice controlled game. In *Proceedings of the 2022 CHI Conference on Human Factors in Computing Systems*, pages 1–13, 2022.