# Singing with an Angry-Birds-like Game

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***Abstract*—This paper presents a game system aimed towards promoting mental health, which implements singing as an input modality to control the bird-shots in an Angry-Birds-like game. Based on existing research, singing can act as a catalyst that medically reduces stress and thus can be used for rehabilitation. Our system works by analyzing singing by the player and adjusting the shooting performance based on the singing score. This paper focuses on how the system is developed and its functions.**

***Index Terms*—Singing game, Pitch detection, Serious games, Mental health**

## I. Introduction

Mental disorders are one of the most common global issues. According to James et al. [1], it is estimated that around 264 million people are currently affected by it. Serious games are nowadays being considered as one of the solutions that impact positively towards reducing stress disorder-related symptoms.

Serious games are defined as games built for a purpose [2]. Science Birds, a clone of Angry Birds, is a game that has been recently used in serious-game research. Previously, Abdullah et al. [3] proposed a serious-game system for Science Birds, where Rube Goldberg Machine (RGM) mechanisms are used to generate a variety of levels with segments set in a way that creates a domino effect when a 'perfect shot' is conducted. A perfect shot is performed in a projectile trajectory that hits a TNT (explosion) whose position is known when its level is generated, resulting in clearing the level. [3]. On the other hand, a karaoke game system called UltraStar Play[1] enables users to sing and receive scores as they sing to the microphone in use.

This paper presents a game system in which a singing score through UltraStar Play is used as a trigger for the system to perform shooting by our proposed shooting mechanism in Science Birds. Here, the quality of a bird-shot is dependent on the player's singing accuracy similar to a karaoke-system. We expect this system to be beneficial for mental-health promotion, which we plan to conduct in the near future.

## II. Existing Work

Singing has been claimed benefiting mental health in a systematic review conducted by Williams et al. [4]. Their study surveyed 13 articles out of 709 that were screened. In the review paper, data from 667 participants were reported where results indicate that group singing increases positive emotions, reduces anxiety, enhances feelings of belonging and self-confidence, and solidifies social bonding.

Our previous survey [5] explored applications and potentials of music therapy games. In that study, a couple of musical games were compared based on their play-styles and related experiments. According to the survey, we observed that most of the games discussed in the literature that use voice input or singing were not experimented for mental health. Therefore, in this paper we introduce a system that uses singing as an interaction tool and can be a platform for our up-coming research on mental health promotion.

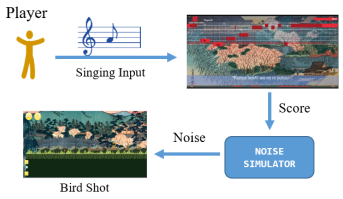


Fig. 1: An overview of the proposed game system

## III. Proposed Game System

The proposed system (see a demo[2]) uses singing as a trigger to shoot birds. We merge two open-source game systems: Science Birds and a karaoke-like music game called UltraStar Play. UltraStar Play lets players sing to the connected microphone of the PC along with music; in our study, we adopt the single player mode of the system. A game flow diagram is shown in Fig. 1.

As the game plays a song, the lyrics and notes are shown on screen to allow the player to follow and sing accordingly. The game matches the notes, or their tempo and pitch, of the player's singing to the original and scores based on the correctness.

Figs. 2 and 3 show a singing scene, obtaining a score, and a domino effect due to RGM mechanisms. Here, as we merge the two systems, a score obtained from singing adds a noise

[1]https://github.com/UltraStar-Deluxe/Play

[2]https://tinyurl.com/ybtsnp57

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