# Bilkent University

# Electrical and Electronics Department

# Term Project:

# “Guitar Hero”

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**Description:**

This project will implement a game using BASYS3 FPGA and several analog components. The inspiration for this game is the popular video game series “Guitar Hero”. The original game was first introduced to the market by Harmonix in 2005 and then several companies made contribution to the development of the game. The goal of the game is to be able to “play” the sliding notes of a song in time by pressing the appropriate buttons to match the ones on the screen. If a player misses a note by simply misclicking another note or not pressing to any note, a buzzer sound is played.

## Proposed Design:

On the VGA screen, the main menu will appear firstly and have a song selection option as well as a difficulty selection option. The higher the difficulty, the faster and with a harder configuration the notes will come. Also, the player will use the buttons on the BASYS3 board to navigate or select an option in the main menu. After the player decides on the song and the difficulty, the main gameplay screen will appear.

On the main gameplay screen, there will be 8 different note scales, which the notes will slide down, and if the player hits the right button at the right time, the score will go higher. Here is an illustration of the main gameplay screen demo with 5 notes **(Figure 1.1)**:

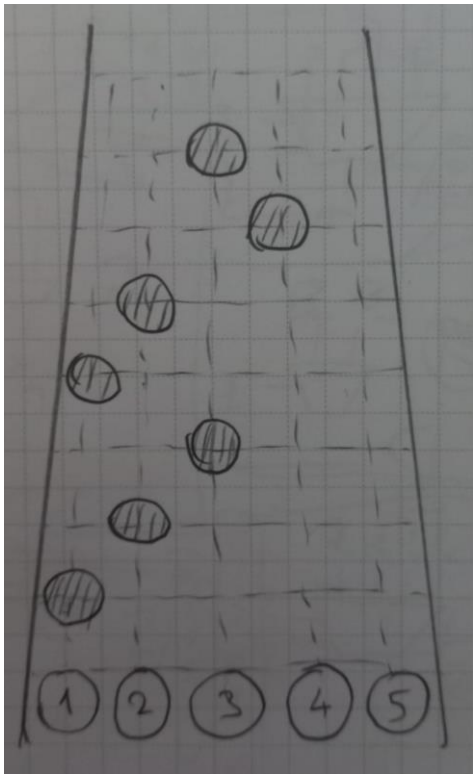


**Figure 1.1: The Gameplay Screen Demo with 5 Notes**

Each of the 8 different note scales will be assigned to different buttons. These buttons will be placed on a piece of hardware that will look exactly like a guitar so that the player can feel like playing a guitar rather than just pressing meaningless flat buttons.

The game will not end until the song is finished; if a player makes a mistake, this will only affect their overall score, which will be on the top corner in the gameplay screen. The more a player makes mistakes, the lower their score be. Also, when a player makes a mistake, an irritating buzzer sound will be played, and therefore the original song will not be heard when the buzzer is on.

When the song ends, a screen will show the player what their final score was and after pressing “OK” in that menu, the main menu will appear on the screen again.

## External Components:

- BASYS3 FPGA
- Buzzer
- Breadboard and Jumper Cables
- A small sized piece of wood or a light metal that looks like a guitar
- Buttons

## Progress Demo Phase:

The algorithm for the main gameplay will be prepared. The buttons and switches will be set to play the game. The hardware that carries the buttons, which represent the notes, will not be ready for the progress demo phase. All the other coding including the VGA algorithms for the main gameplay and the main menu will be ready.

## Final Demo Phase:

The score function will be ready to be used as well as all the hardware required for the project. The project will be set to work completely as proposed.