Report for ECE36200 Mini-project

Team number: 32

Team member: Teoh Shu Hwai, Huang Po Yu, Wang Chien Hung, Li Chieh En

Team member logins: teoh0, huan1338, wang4161, li3261

Peripherals: GPIO, DAC

Materials: STM32F051R8T6, graphic LCD 128x64 STN LED Backlight (LCD-00710),

amplifier (LM324), 10 µF capacitors, 8 Ω speaker, 10kΩ potentiometers, and

5V-1A power bank.

Project:

1.INTRODUCTION

Basically, our project is mimicking a snake game. the game is displayed by a LCD and four buttons are used to control the direction of the snake. The game start with a snake with length 5, the length of the snake will increase by 3 whenever the snake eat a dot. When the length of the snake grow to 20, you win the game., but don't hit the wall or eat your tail.

2. HARDWARE

We use GPIO of STM32F051R8T6 to drive the LCD-00710 to show the snake game and read in the input of four buttons which are used to control the direction of the snake. When the game is playing, we use DAC of STM32F051R8T6 to drive a 8 Ω speaker to play music and a potentiometer to adjust the volume.

3. AUDIO

We use TIM6 and DMA for the DAC to output the sine signal. Through adjusting the ARR of TIM6, we let STM32F051R8T6 produce two octaves. We use five arrays to store the sine wave and the notes of the music for game starting, game continuing, dots getting, and gameover, respectively. Also, we use TIM3 to invoke the interrupt to read the notes from the arrays and update the ARR of TIM6. The STM32F051R8T6 outputs the music by PA4 and drive the speaker through an amplifier (LM324) and a potentiometer to play the music.

4. DISPLAY

We use PC0~PC7 and PA7~12 to control the input/output for controlling the two chips and data bit transfer. There are two chips to control the whole LCD board and in each LCD, one for the left side of the screen and the other for the right side. Each chip has 8 pages and each page has 64 pixels. Therefore, we write several subroutines to let the dots shows in the correct coordinates in a systematic way and print them onto the screen.

5. Game

The game will begin with a starting page, and then the game starts after 5

seconds. The snake begins with length 5, the length will increase by 1 whenever you eat a dot. When the length of the snake equals to 10, you are win. If the snake hit the wall or its body during the game, then you are game over. After you win or lose, press the reset button on the STM32F051R8T6 to restart the game.

6. Youtube link: https://youtu.be/XYAc7GxQ5R4